PRECISION TIME SERIES PHOTOMETRY AND ITS APPLICATION IN SUPERNOVA COSMOLOGY

A Dissertation

by

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Submitted to the Graduate and Professional School of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

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May 2023

Major Subject: Astronomy

ABSTRACT

Type Ia Supernovae (SNe Ia) have played an important role in modern cosmology as distance indicators and have led to the discovery of the accelerated expansion of the universe. Such usage of SNe Ia hinges upon the precision photometry of SNe Ia and that their peak luminosities can be corrected onto a standard magnitude using empirical relationships like luminosity-decline relation. However, intrinsic scatter exists beyond errors and uncertainties introduced by photometry reductions and empirical corrections. The full details of the underlying explosion mechanism also remain unclear despite the commonly agreed thermonuclear explosion picture.

To better understand the systematics in using SNe Ia in cosmology, we developed our own photometry reduction pipeline that uses a novel image subtraction software (`SFFT`) developed by our collaborator for a cleaner subtraction of the underlying galaxy, and does point-spread-function (PSF) photometry simultaneously on multiple images while maintaining a common coordinates for field stars to improve the photometric precision.

Our photometry pipeline is applied to 16 luminous 91T/99aa-like SNe Ia observed by Las Cumbres Observatory. Additionally, we gathered 21 91T/99aa-like well observed SNe Ia from the literature to study the standardizability of 91T/99aa-like objects. We found that 91T/99aa-like SNe Ia are excellent distance indicators but have a brighter Hubble residual than normal SNe Ia after fully corrected. Moreover, we found that the pseudo-equivalent width (pEW) of Si II $\lambda\lambda$ 6355 near maximum light is correlated with Hubble residuals when pEW(Si II $\lambda\lambda$ 6355) is less than 55.6 Å. This new systematic needs to be taken care of to safely use SNe Ia in cosmology especially in the upcoming era of LSST, as luminous 91T/99aa-like SNe will be inevitably biased in flux-limited surveys and 91T/99aa-like SNe are hard to distinguish from normal SNe Ia without spectroscopic observations before maximum.

We also applied our photometry pipeline to the data taken by our DECam survey of Intermediate Redshift Transients (DESIRT). We found 923 transient candidates with 235 being off-nuclear ones. We discovered many SNe Ia at very early phase with decent light curves reduced. Besides normal SNe Ia, we also discovered some 91T/99aa-like SNe Ia, and even one extremely rare 00cx-like SN Ia. With this dataset, we will be able to study SNe Ia at infant phase, recalculate the rate of 91T/99aa-like SNe, and improve cosmology with SNe Ia as standard candles.

ACKNOWLEDGMENTS

First and foremost, I would like to express my greatest gratitude to my advisor Lifan Wang. Thank you for taking me as your student when I was overwhelmed by graduate school and did not know what to do. Thank you for your patience in guiding me through the transition from a student to a scientist. Thank you for your trust and support when I thought I would never see the light from the end of the tunnel. Thank you Nicholas Suntzeff, for your guidance, your kindness, and for sharing with me your own experiences when you were a graduate student, which really helped me a lot in gaining back my confidence and kept me moving forward. Thank you Peter Brown, for answering all my questions that I was too afraid to ask Lifan.

I also want to thank all my peer friends, without whom I cannot accomplish what I have accomplished. Thank you all graduate students in the Department of Astronomy for the efforts to create such an supportive and inclusive environment. I am so lucky and grateful to be part of this big family. Y'all made me realize that I am not in this alone, it is okay to struggle and ask for help, and we always have each other's back. Thank you Sijie Chen and Lei Hu, for helping me with all the technical issues I encountered. Both you are like my academic big brothers. I literally cannot imagine how I could solve those issues without you. Thank you Lauren Aldoroty, for being a wonderful friend. It was not easy living in a foreign country that speaks another language, let alone being in a graduate school. You made it less scary and I am starting to feel attached to this place.

Thank you Kun Hu, for your companion for the past eight years. You are always there for all my little accomplishments, my every struggles, my joy and tears. You give me the courage to make the decisions that I have to make and firmly support me no matter what. You are everything that I could ever ask for and I cannot wait to start the next chapter of

life together with you.

I would also like to thank my family. It's my family's unconditional love, support, and trust that carried me through all the hard times and made me who I am. You all are not only my parents, my siblings, but also my best friends. You all made it possible for me to pursue my dreams freely. I am so lucky and grateful to be born in such a family and I cannot love you all more.

Last I want to thank my cats Myrtle and Lucky, my dog Piper for bringing so much joy and love into my life.

CONTRIBUTORS AND FUNDING SOURCES

Contributors

This work was supported by a dissertation committee consisting of Professor Lifan Wang (chair), Professor Nicholas Suntzeff, Professor Ping Yang of the George P. and Cynthia Woods Mitchell Institute for Fundamental Physics & Astronomy, Texas A&M University, Department of Physics and Astronomy, and Professor Ulisses Braga Neto of the Department of Electrical & Computer Engineering.

The data analyzed in Section 4 were taken and provided by the Las Cumbres Observatory as part of the Supernova Key Project and Global Supernova Project. A combination of Section 2, 3, and 4 was published in 2022 in the Astrophysical Journal.

The data shown in Section 5 were taken using the DECam (Dark Energy Camera) as part of the DECam Survey of Intermediate Redshift Transients (DESIRT) program. The analysis pipeline for DESIRT image subtraction and source detection is developed by Xingzhuo Chen and Lei Hu.

All other work conducted for the thesis (or) dissertation was completed by the student independently.

Funding Sources

The supernova research by Jiawen Yang is supported by NSF grant AST-1613455 and the Mitchell Institute for Fundamental Physics and Astronomy. The Las Cumbres Observatory team is supported by NSF grants AST-1911225 and AST-1911151.

NOMENCLATURE

DECals	Dark Energy Camera Legacy Survey
DECam	Dark Energy Camera
DESI	Dark Energy Spectroscopic Instrument
DESIRT	DECam Survey of Intermediate Redshift Transients
EW	Equivalent Width
FWHM	Full Width at half Maximum
mag	Magnitude
NIR	Near-Infrared
pEW	pseudo-Equivalent Width
PSF	Point Spread Function
SED	Spectral Energy Distribution
SN	Supernova
SNe	Supernovae (plural)
S/N	Signal to Noise Ratio
TNS	Transient Name Server
WCS	World Coordinate System
z	Redshift
ZTF	Zwicky Transient Facility

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1. INTRODUCTION

Supernovae (SNe) are powerful and luminous explosions (releasing energy of $\sim 10^{51}$ ergs) of stars that have reached the end of their lives. The peak brightness of a supernova can be comparable to that of an entire galaxy. The study of supernovae provides us with information of stellar evolution and equips us with tools to examine the innards of stars. Moreover, supernovae eject matter that is enriched with elements, driving the nuclear evolution of the universe. A class of supernovae that are caused by thermonuclear explosions, is called Type Ia Supernovae (SNe Ia). The homogeneous nature of SNe Ia has made them excellent distance indicators and they can be used to probe the accelerating expansion of the universe mainly based on their optical photometry observations. This dissertation focuses on the precision photometry reduction of SNe Ia and the application of the pipeline to both small-field telescopes and wide-field survey. This work also presents a new systematic we found that will affect the use of SNe Ia in cosmology if not properly addressed.

1.1 A Brief History of Supernova

In spite of their immense luminosity, SNe are hard to observe due to their transient nature. Observations of supernovae by ancient astronomers go back to 185 AD, yet it was not until 1931 that the word supernova was adopted by Walter Baade and Fritz Zwicky in lectures at Caltech.

Rudolph Minkowski was the first one to classify supernovae based on spectra in 1941 [7]. He classified SNe into two groups based on the presence of hydrogen lines in the spectra: SNe I without H lines, and SNe II showing obvious H lines. Zwicky later in 1965 proposed new types III, IV, and V [8], although they are no longer used and those new types III, IV, and V have generally been included in SNe II. In the mid-1980s, with accumulating evidence, two distinct spectroscopic types of SNe I have been established: namely, the type Ia SNe with Si II $\lambda6355$ Å near maximum light, and the type Ib SNe without Si II $\lambda6355$ Å [9]. More classes were introduced based on spectral lines and morphology. Current classification scheme can be found in Figure 1.1. And the spectra of the main SN types can be found in Figure 1.3.

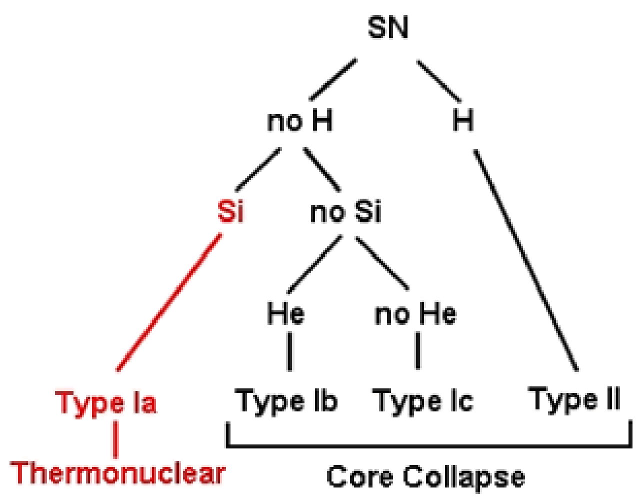


Figure 1.1 The current supernova classification scheme. Image is taken from `https://astronomy.swin.edu.au/cosmos/S/supernova+classification`

It was not known whether different spectral types of SNe were from different explosion mechanisms. For many years, the only explanation was the core-collapse scenario suggested by Zwicky [10], where star's nuclear fusion becomes unable to sustain the core against its own gravity, and releases its energy from the gravitational binding of the newly born compact object, which could either be a neutron star or a black hole, depending on the mass of the progenitor star. In 1960, Hoyle and Fowler [11] found that the ignition of a degenerate stellar core might trigger an explosion and disrupts the star. Later in 1973 Whelan and Iben [12] suggested Type I SN may rise from thermonuclear burning of a carbon-oxygen (CO) white dwarf accreting hydrogen-rich material from a companion star in a binary system. It is now generally accept that SNe Ia are produced by thermonuclear runaway ignited on degenerate white dwarf progenitors leaving no stellar remnants, while all other types of SNe are produced from massive stripped progenitor stars through core-collapse leaving a compact stellar remnant.

1.2 Type Ia Supernova

1.2.1 Overview

SNe Ia are a homogeneous class of SNe. They are used as standardizable candles due to their homogeneity. SNe Ia directly led to the discovery of the accelerating expansion of the universe (e.g. [13, 14]). The light curve and spectra evolution of SNe Ia are remarkably homogeneous with only subtle differences. The light curve rises to maximum light in about three weeks with a maximum absolute magnitude of $M_B \approx -19.3$ mag. It then rapidly declines by about three magnitudes in the first month after maximum, and dims by one magnitude each month later (see left panel in Figure 1.2). Spectroscopically, SNe Ia are characterized by the absence of hydrogen lines, and the presence of strong silicon lines in the early and maximum spectra.The spectra of normal SNe Ia contain intermediate mass elements (IME) such as Si, S, Mg, Ca and O during peak phase, and are dominated by Fe II lines around two weeks after maximum. By the time of the nebular phase, [Fe II], [Fe III], and [Co III] lines become dominant with traces of Ca II lines (see Figure 1.3).

Inhomogeneities among SNe Ia observables were noticed [15, 16] but were soon found strongly intercorrelated. The most prominent and tight correlation is the luminosity-decline relationship [17]. SNe Ia with broader light curve widths (hence slower decline rate) have higher peak luminosities (see Figure 1.2). Efforts have been made to quantize this correlation by introducing a single parameter that captures the width of the light curve, for example, Δm_{15} [17, 18] which is the change in magnitude between maximum brightness and 15 days after maximum; the stretch parameter s which serves as a

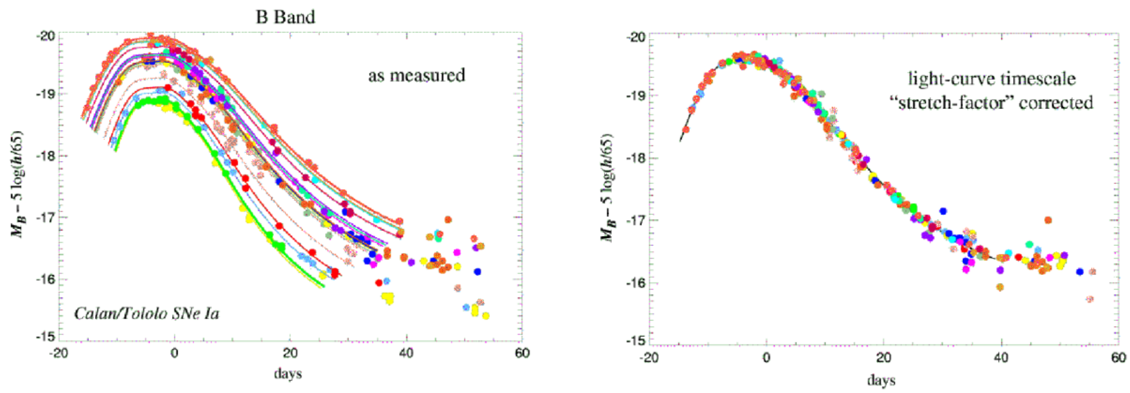


Figure 1.2 Uncorrected (left) and corrected (right) light curves of SNe Ia. Image adapted from [1].

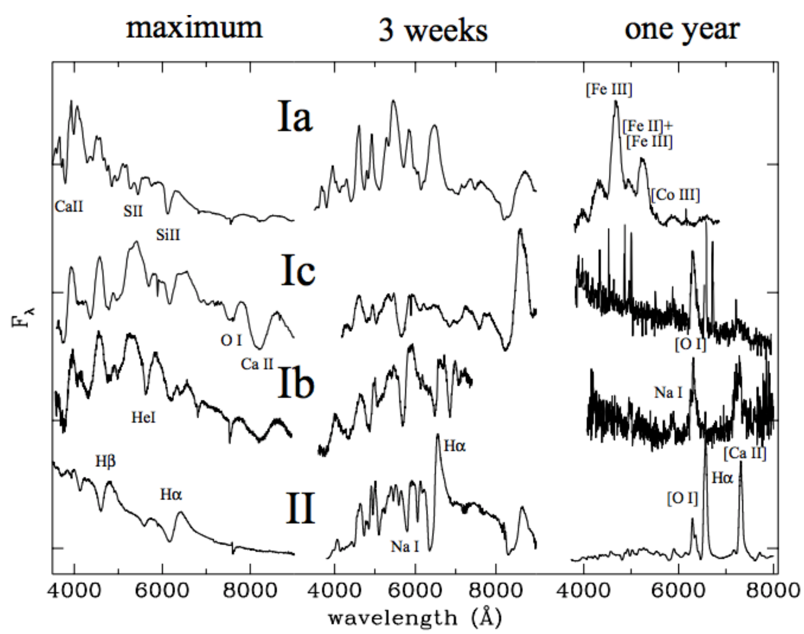


Figure 1.3 The spectra of the main SN types at maximum, three weeks, and one year after maximum [2].

multiplier to the timescale of an average template light curve; and the recently proposed color-stretch parameter s_{BV} which is the time of the maximum $B - V$ color after peak brightness divided by 30 days [19]. This tight correlation is used as a procedure to correct SNe Ia peak luminosities onto a standard value and is the key ingredient of SNe Ia as distance indicators in modern cosmology.

1.2.2 Use in Cosmology

Modern cosmology assumes the universe to be homogeneity and isotropy, which is valid on large scales. These two assumptions lead to the Friedmann-Robertson-Walker (FRW) metric:

$$ds^2 \;=\; cdt^2 - a(t)^2 \left(\frac{dr^2}{1 - kr^2} + r^2 d\theta^2 + r^2 \sin^2\theta \, d\phi^2 \right) \tag{1.1}$$

where ds is the spacetime interval, r, θ, ϕ are the comoving coordinates , k represents the curvature of the spatial section of the metric , and $a(t)$ is the scale factor as a function of the cosmic time t (a only depends on the cosmic time due to the assumption of homogeneity and isotropy).

Einstein's field equation of general relativity can be analytically solved in the FRW background displayed in Equation 1.1, which leads to

$$H^2 \;\equiv\; \left(\frac{\dot{a}}{a}\right)^2 = \frac{8\pi G}{3}\rho - \frac{k}{a^2}, \quad \text{and} \quad \frac{\ddot{a}}{a} \;=\; -\frac{4\pi G}{3}(\rho + 3p), \tag{1.2}$$

where p and ρ are the pressure and energy density of different types of cosmic material that can be assumed as fluid. p and ρ can be connected via the equation of state, i.e., $p = \omega\rho$. The factor H is the Hubble parameter which gives the relative expansion (or contraction) rate of the universe. The current value of the Hubble parameter $H_0 \approx 72$ km s^{-1}/Mpc is also known as the Hubble constant. The expansion history $H(t)$ is determined by the pressure and density of the cosmic fluid through Equation 1.2. In particular, the universe undergoes accelerating expansion when $\rho + 3p = \rho(1 + 3\omega) < 0$.

Equation 1.2 can also be used to derive the continuity equation

$$\dot{\rho} + 3H(\rho + p) = 0. \tag{1.3}$$

This leads to

$$\rho \propto a^{-3(1+\omega)} \tag{1.4}$$

for fluid with constant equation of state ω. For non-relativistic matter, such as ordinary matter and the postulated cold dark matter, $\omega = 0$, therefore $\rho_m \propto a^{-3}$. For radiation, $\omega = 1/3$ hence $\rho_r \propto a^{-4}$. The observation of the accelerating expansion of the universe suggests the existence of dark energy, a hypothetical form of energy with a negative equation of state $\omega < -1/3$. It is accepted that dark energy currently dominates the energy density of the universe (around 70%) and sustains the accelerated cosmic expansion. In the current standard cosmology model, dark energy is associated with the cosmological constant Λ in Einstein's field equation, e.g, $G_{\mu\nu} + \Lambda g_{\mu\nu} = \kappa T_{\mu\nu}$. Assuming the energy-momentum tensor of dark energy is contributed by Λ, the energy density of dark energy $\rho_\Lambda = \Lambda c^2/(8\pi G)$ is a constant during the evolution of the universe.

Taking all the ingredients into Equation 1.2, the expansion history of the universe can be explicitly expressed as

$$H(z) = H_0\sqrt{\Omega_r(1+z)^4 + \Omega_m(1+z)^3 + \Omega_k(1+z)^2 + \Omega_\Lambda} \tag{1.5}$$

where $z = a_0/a - 1$ is the cosmological redshift, $\Omega_{i\ (i=r,m,\Lambda)}$ is the current energy densities of different materials rescaled by a critical energy density $\rho_c = 3H_0/(8\pi G)$, and $\Omega_k = -k/(a_0^2 H_0^2)$. Cosmological observations suggest $\Omega_m \approx 0.3$, $\Omega_\Lambda \approx 0.7$, and $\Omega_r = \rho_{\text{CMB}}/\rho_c \sim 10^{-4}$ [20]. The radiation term can be neglected for small z, which is suitable throughout this thesis. Additionally, It is common to assume the universe is flat in the spatial section, therefore $\Omega_k \to 0$ and Equation 1.5 reduces to

$$H(z) = H_0\sqrt{\Omega_m(1+z)^3 + \Omega_\Lambda}. \tag{1.6}$$

The cosmic expansion history and the composition of the universe can be constrained by the distance measurement of bright objects like SNe Ia through the use of Hubble diagram. SNe Ia Hubble diagram is usually plotted as distance modulus (μ) versus cosmological redshift (z). Distance modulus μ is the difference in the apparent magnitude and the absolute magnitude of an astronomical object (see subsection 1.3.3). Luminosity distance d_L is defined such that

$$\mu \equiv m - M = 5\log_{10}\left(\frac{d_L}{\text{Mpc}}\right) + 25. \tag{1.7}$$

In a flat universe ($\Omega_k = 0$), the luminosity distance d_L at a redshift of z can be expressed as

$$d_L(z) = (1+z)\int_0^z \frac{dz'}{H(z')} = (1+z)\int_0^z \frac{dz'}{H_0\sqrt{\Omega_m(1+z')^3 + \Omega_\Lambda}}. \tag{1.8}$$

Thus if we have measurements of luminosity distances d_L at redshift z, we can derive, or at least constrain, the cosmological parameters Ω_m and Ω_Λ. The very luminous, standardizable features of SNe Ia make them suitable for making such Hubble diagram. A Hubble diagram made with SNe Ia is shown in Figure 1.4 with different lines denoting different cosmological models. As can be seen on Figure 1.4, measurements of SNe Ia up to $z \sim 1$ strongly suggest our universe is currently in an accelerating expansion stage dominated by dark energy.

1.2.3 Subtypes

Despite the homogeneity assumed for corrected peak luminosities in these supernovae, there remains a persistent intrinsic scatter amongst SNe Ia beyond just photometric error and the uncertainties in the reddening law, both photometrically and spectroscopically. Mounting evidences are revealed by the spectral diversity among SNe Ia. It is

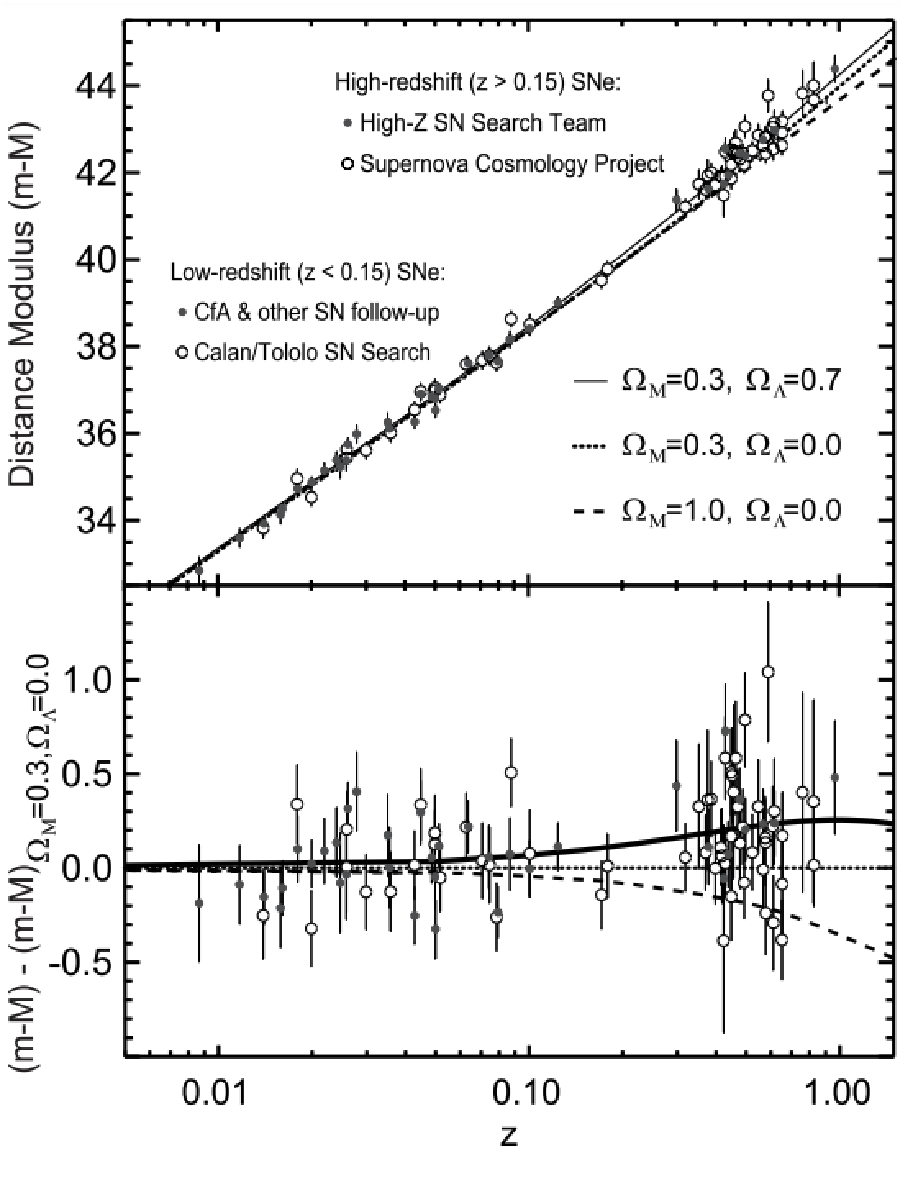


Figure 1.4 The Hubble diagram for high redshift SN Ia (upper), and the distance residual relative to a $\Omega_M = 0.3$, $\Omega_\Lambda = 0.7$ universe. Image taken from [3].

clear that they are not identical standardizable candles but are most likely to originate from more than one explosion mechanism as studied in the literature. Overall, SNe Ia have been classified into four major sub-groups based on their maximum light spectra: core-normal, shallow-silicon, cool, and broad line [21, 22]. They are also grouped into different categories based on the evolution of the Si II$\lambda 6355$ velocities [23, 24]. There are other frequently used sub-types based on the observed spectral features. The representative examples include: 1) the luminous 91T-like SNe, which show weak features of intermediate-mass elements (IMEs) and prominent Fe II/Fe III lines [25, 26]; 2) the sub-luminous 91bg-like [27, 28] characterized by strong features of IMEs and prominent Ti II lines; 3) the 02cx-like [29] showing weak Si II lines before maximum light similar to that of 91T-like but with 91bg-like luminosity and significantly lower ejecta velocities than 91T-like SNe; 4) the over-luminous 03fg-like [30, 31] with strong absorption lines due to unburned carbon in their spectra which could be identified with explosions of super-Chandrasekhar mass WDs; and 5) the so-called SNe Ia-CSM 02ic-like [32] which show strong, broad emission lines of hydrogen presumably caused by strong interaction with circumstellar matter.

1.2.4 Explosion Models

The spectral and photometric characteristics, as well as the homogeneity of SNe Ia yet with intrinsic variability put tight constraints on the progenitor systems and explosion mechanisms. We now generally agree that SNe Ia result from the thermonuclear explosions of CO white dwarfs (WD) with mass approaching or exceeding Chandrasekhar limit M_{Ch} in binary systems. The CO WD accretes mass from the companion star while the nature of the companion star remains unclear. Potential progenitor systems can be broadly categorized into two groups: single degenerate (SD) where the companion star is a main-sequence, subgiant, red giant, or helium star with mass transfer proceeds through Roche-lobe overflow or a strong wind from the companion, and double degenerate (DD) where the companion star is another WD, with the more massive WD tidally disrupt and accretes the lower mass WD. Within this scheme, three major triggering mechanisms have been proposed. The explosion can be triggered by compressional heating near the WD center as a deflagration front as the WD accretes matter from a degenerate or nondegenerate companion to a mass close to the Chandrasekhar limit, e.g. [12]. The explosion can also be triggered by the heat of the dynamical merging process of two CO WDs in a binary system with angular momentum loss via gravitational radiation, e.g. [33, 34]. Another triggering mechanism is through the detonation of a layer of helium on the surface of the WD, which causes a detonation front propagating inwards the WD, e.g. [35, 36].

1.3 Time-Series Photometry

1.3.1 Overview

Photometry is a technique used to measure the intensity or brightness of an astronomical object in an image by adding up its total output of light. Photometry has long been one of the main tools to study astronomy. It can tell us huge amounts of information of the observed objects, such as temperature, distance, etc. The very first known photometric catalogue of the stars based on their observed apparent brightness were made by the Greek astronomer Hipparchus ($\sim$130BC). Later in the second century CE, the Alexandrian astronomer Ptolemy classified stars based on the apparent brightness. The stars were divided into six classes in the unit of magnitude, with the first magnitude being the brightest, and the sixth magnitude being the faintest. With the invention of telescope in the 17th century, people were able to see fainter stars than the originally proposed sixth magnitude class, yet this magnitude "classification" scheme based on stars' brightness remains. It was found with early modern photometric measurements that, Ptolemy's first magnitude is about 100 times brighter than the sixth magnitude. Nowadays, the modern magnitude system we use was proposed by Norman Pogson in 1856 such that each five magnitude steps correspond exactly to a factor of 100 in brightness, with small number being brighter. That is, for two sources with fluxes F_1 and F_2, the magnitude difference between them is

$$m_1 - m_2 = -2.5 \log_{10}(F_1/F_2). \tag{1.9}$$

Uncalibrated magnitude $-2.5 \log_{10}(F)$ is also called instrumental magnitude.

Multiple photometric measurements on the same object over a period of time, or time-series photometry, of SNe Ia, is particularly valuable in probing their fundamental physics. For example, time-series photometry can be used to constrain fundamental physical quantities such as the total ejecta mass, the kinetic energy of the ejecta, and the mass of synthesized, unstable ^{56}Ni. Moreover, the most precise local measurements of H_0 to date rely on SNe Ia distances based on their optical photometry [37]. Time-series photometry also yields huge amount of information in other astrophysics fields, such as aiding us in discovering exoplanets by finding a periodic drop in a star's light curve as the planet transits in front of the star and blocks our view of the star.

1.3.2 Photometric Detectors

Though the invention of telescope can be traced back to the 17th century, for many years, people can only attempt to quantify stars' brightness based on visual estimates with little efforts to improve the precision. It was not until the photographic plates were sensitive enough to record starlight in the late 19th century that the first non-subjective way of measuring stars' brightness was made possible. Photographic photometry was widely used in astronomy up to the end of the 20th century. Many early astronomical surveys were taken using photographic plates including Palomar Observatory Sky Survey (POSS I) of the 1950s, POSS II of 1990s, ESO and AAO Schmidt surveys. Photographic photometry measurements of more than 1 billion objects' were published in the USNO-B catalog [38].

Photographic plates were slowly replaced by photoelectric detectors for higher precision and sensitivity starting in the 20th century thanks to the development of semiconductor technologies. Photoelectric detectors can convert incident photons into charges (photoelectric effect) that can be measured and recorded. Two main types of photoelectric detectors used in astronomical telescopes are Photomultiplier tube (PMT) and charged-couple device (CCD). PMTs amplify the electric signal produced by incident photons, thus are extremely useful in detecting faint light sources. A CCD is an integrated circuit containing an array of pixels that convert photon incidents into electric signals, where the number of electrons in each pixel is proportional to the number of incident photons in the the pixel. PMTs have been supplanted by CCDs because of CCD's high sensitivity, linear and broad spectral response, as well as stability compared to photographic plates and photomultiplier tubes. Nowadays, almost all telescopes in optical astronomy are equipped with CCD cameras.

1.3.3 Photometric Systems and Zero Points

While spectroscopy records the flux of the source at every wavelength and provides abundant information of the source such as chemical structure, kinematics, etc, spectra can be difficult to obtain especially for faint sources due to lack of photons to be split into different wavelengths. A more economic choice would be photometry. Astronomers measure light through different bandpass filters that cut the source's spectral energy distribution (SED) into different chunks, which is essentially measuring a spectrum with very low resolution. Such a set of well-defined filters with known sensitivity to different wavelengths of light is a so-called photometric system (for example see Figure 1.5).

One needs to decide the number and widths of the filters in a photometric system. If the width is too broad and number too small, then we gather too little SED information from observing with such photometric system. If the width is too narrow and number too large, then we would encounter the same problem as spectroscopy for not receiving enough photons in each narrow filter. While there are many photometric systems used by astronomers, the most adopted optical photometric system is the Johnson-Cousins

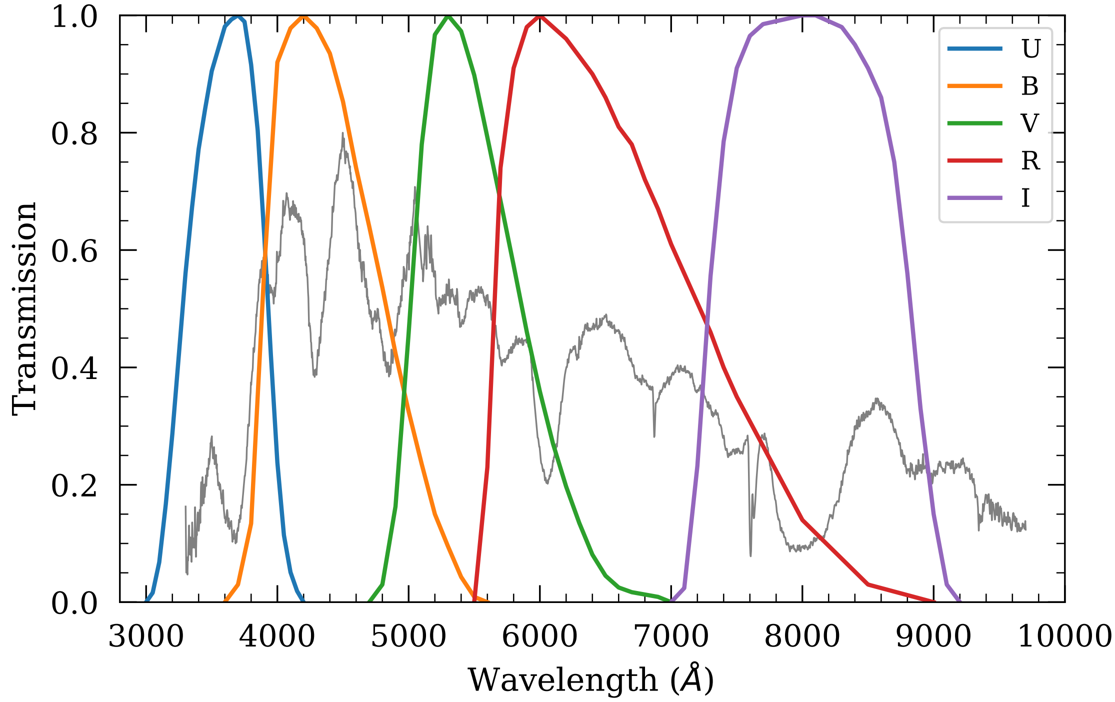


Figure 1.5 Transmission curve of Johnson-Cousins UBVRI photometric system. Spectrum of typical SN Ia SN2011fe at MJD=55799 days is plotted in grey line for comparison.

UBVRI photometric system set up by several astronomers [39]. The Johnson-Morgan UBV wide-band system was introduced by [40] in 1950s and was extended to longer wavelength R and I bands later [41, 42]. Figure 1.5 shows the transmission curves of Johnson-Cousins UBVRI photometric system on top of the spectrum of a typical SN Ia.

Equation 1.10 only gives the magnitude difference between two sources. A zero point needs to be defined to describe stars' magnitudes individually rather than relatively. The individual magnitude of a star with flux F can then be written as

$$m = -2.5 \log_{10}(F) + C \tag{1.10}$$

where C is the zero point. The most used zero point is calibrated by the type A0 V star Alpha Lyrae (Vega), so that the V magnitude of Vega is V=0.03 and all colors (the difference between magnitudes in two filters of the same object) equal to zero. The choice of Vega as the primary standard star is arbitrary and is mainly because Vega is bright and visible in the north sky for over half time of the year and it has a relatively smooth SED. In practice, the zero points of a photometric system are defined by a list of secondary standard stars that are well distributed around the sky. The secondary standard stars are observed extensively and well calibrated with respect to the chosen primary standards such as Vega. Landolt standards [43, 44, 45] which are tied to Vega zero point, are probably the most useful standards and are the foundation of Johnson-Cousins photometric system. The measured magnitude of an astronomical object observed from earth is called apparent magnitude. And an object's absolute magnitude is defined as the apparent magnitude the object would have if it were viewed at a distance of exactly 10 parsecs.

1.3.4 Photometric Calibration

Generally, the process of converting instrumental magnitudes to standard magnitudes in a standard photometric system with well defined zero points is called photometric calibration. The resulting calibrated standard magnitude should then be the magnitude that would be observed above the terrestrial atmosphere and with the detector that matches the perfect photometric system (i.e. has the same transmission curves in all filters). It immediately implies that we need to correct for terrestrial atmosphere extinction and the difference between the instrumental system and target standard system.

Atmospheric extinction correction:

Atmospheric conditions change every night and can cause variations in atmospheric extinction and hence the observed flux. This can be mitigated by observing the standard stars during the observation nights so that the standard stars are observed under the same sky condition as the science objects. But even so, the amount of atmospheric extinction is usually different for science objects and standard stars because of the difference between the path length the light travels through the atmosphere. A star close to the horizon will be dimmed more by the atmospheric extinction than a star closer to the zenith as the star close to the horizon will travel longer through the atmosphere before it reaches the detector.

The length of the path the light travels through the atmosphere is quantified using airmass. Airmass reflects the amount of air along the line-of-sight that attenuates the light. The mathematical form of the absolute airmass' definition is

$$\sigma_{absolute} = \int \rho \, ds$$

where ρ is volumetric density of air, and s is the distance along the line-of-sight. A more commonly used value is the relative airmass (X), which is defined by the ratio of the absolute airmass (σ) along the line-of-sight, and the absolute airmass at zenith (σ_{zenith})

$$X = \frac{\sigma}{\sigma_{zenith}}.$$

The magnitude change caused by atmospheric extinction can then be quantified by

$$m = m_0 + kX$$

where m is the observed magnitude on the ground, m_0 is the magnitude that would be observed above the atmosphere, k is the extinction coefficient, and X is the relative airmass. Many efforts have been made to derive a relationship between the relative airmass X and the zenith angle z. Some representative works are [46] and [47]. Note that the above equation is filter dependent, that is, different filter would have different extinction coefficients k, which are solved as the best fitting numbers by plugging in the magnitudes of standard stars into above equation.

Besides using standard star catalogs for photometric calibration, astronomers now gradually shift to utilize catalogs from wide sky surveys (such as SDSS, PS1, SkyMapper, and APASS etc) which contain extensive stellar magnitudes that are well calibrated. By matching field stars (stars on the same image with science object) with such well calibrated catalogs, and use resulting matching stars to calibrate the science object, the need of atmospheric extinction correction is eliminated as field stars have almost the same zenith angles with the science target and hence suffer the same amount of atmospheric extinction.

Color correction:

Two photometric systems never exactly match. Even with the same nominal filter, two detectors may be measuring slightly different part of the same object's SED. Such discrepancies will introduce systematic errors if not corrected for when calibrating photometry based on standard stars' magnitudes in the targeting standard photometric system. Fortunately, the differences correlate strongly with object's color and can be empirically corrected through the use of color terms [48]. Such correction using color terms is called color correction. Color corrections are usually small, but is necessary in the era of millimagnitude precision photometry.

The color correction can be expressed as

$$m_A = m_{Ainstru} + C(m_A - m_B) + Z$$

where m_A is the standard magnitude in filter A, $m_{Ainstru}$ is the instrumental magnitude in filter A, C is the color coefficient (or color term), $m_A - m_B$ is the color between filter A and filter B, and Z is the zero point difference between the target standard photometric system and instrumental system. The color terms are usually solved by least square fittings of above equations in multiple filters simultaneously based on observations of standard stars.

The color terms are determined based on stars, which have a significantly different SED from that of SNe Ia. Thus the color terms are in fact not suitable to transform SN magnitudes onto a standard system though many works have done so in the past. To avoid this issue, In more recent works, astronomers have been converting standard stars' magnitudes onto the natural system using color terms, to calibrate SN magnitudes in the natural system (e.g. [49]). Once we have photometry in the natural system, the photometry can be brought onto the target standard system using S-correction (see subsection 4.2.2).

2. PIPELINE FOR PRECISION PHOTOMETRY*

2.1 Introduction

We developed a pipeline to measure the time-series photometry of astronomical objects like SNe Ia on images which are pre-processed through a series of steps. After taken by CCD detectors, the images need to be corrected by bad pixel masking, bias and overscan subtraction, dark subtraction, and flat-field correction before fed into our pipeline. Our pipeline first aligns the science images and corresponding template images, then runs image subtraction to remove underlying light pollution of host galaxies (optional). A small stamp centered at the transient is cut out from the difference image and pasted back to the original science image. The pipeline will then run point-spread-function (PSF) photometry on the images with pasted stamps and calibrate the magnitudes against published catalogs.

2.2 Image Alignment and Stacking

Image alignment, or image registration, is the process of transforming images using different coordinate systems onto the same coordinate system, so that they look like as if taken from the same point of view. Image alignment has applications in many fields, such as medical imaging, remote sensing, and panoramic image creation. In astronomy, image alignment is the very first important step in coadding images to increase the SNR, and difference image analysis (see below).

Astronomical images are usually stored in FITS format. And the astrometric information of the images is typically stored in the FITS header as keywords using "World Coordinate System" (WCS) standard [50]. Our pipeline requires WCS keywords to be present in the FITS header. The pipeline will resample the images using `SWarp` [51] by matching the

*Part of this section is reprinted from Using 1991T/1999aa-like Type Ia Supernovae as Standardizable Candles by Yang, et al. 2022. The Astrophysical Journal, 938, 83, under a CC By license.

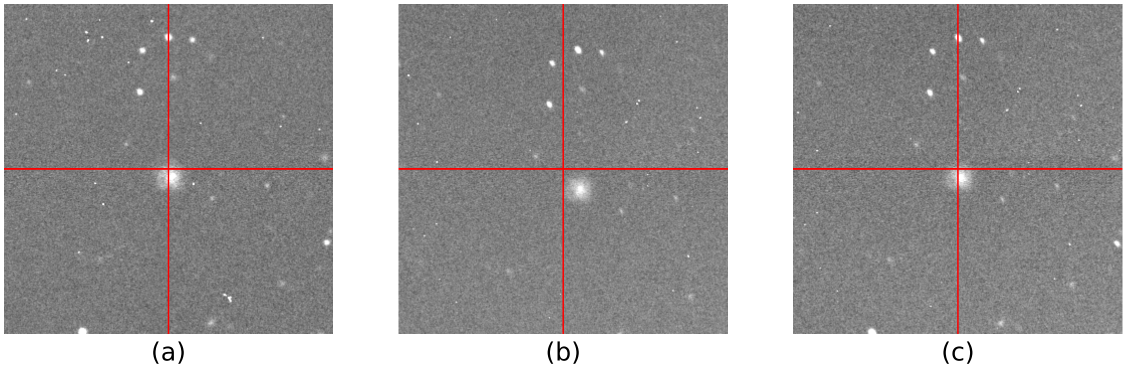
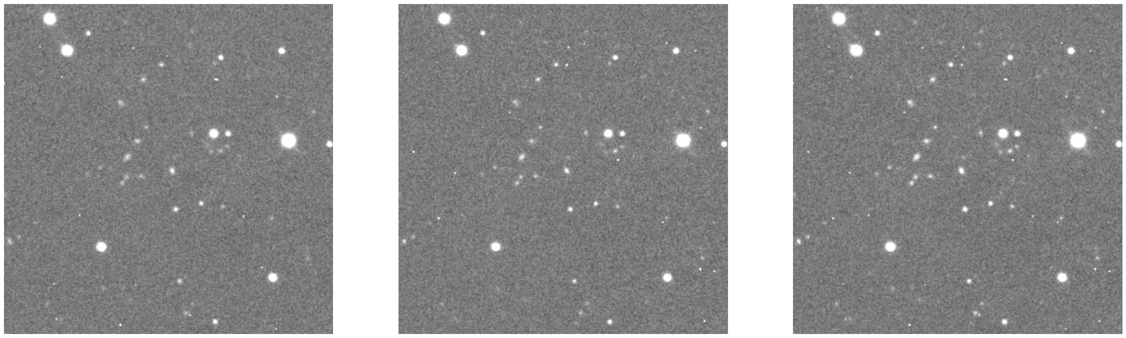


Figure 2.1 Example of image alignment. (b) is the image that needs to be aligned onto image (a), and (c) is image (b) after resampling onto image (a). Horizontal and vertical red lines intersecting at the center of each image are plotted to aid the eye.

images to given target frame on a pixel by pixel level. See Figure 2.1 for example of image alignment (images were taken by Las Cumbres Observatory).

Image stacking can be used to produce coadded images with deeper detection limits and higher signal-to-noise ratio (S/N). When difference imaging is needed but the single template exposure is shallower than the science image, multiple exposures of template images can be coadded to create a deeper image to serve as the template image in order to avoid loss in accuracy due to shallower template images in image subtraction. Figure 2.2 shows an example of image stacking. The right panel is the coadded result of the left two panels (images were taken by Las Cumbres Observatory). The cutouts are centered at SN2019dks (RA=11:44:05.60 -04:40:25.2) with a size of 800 pix $\times$ 800 pix, where 1 pixel corresponds to 0.389". It can be readily seen that, even only with the stacking of two exposures, some stars that are too faint to be detected in one single exposure can be easily distinguished in the coadded image. Our pipeline also uses `SWarp` to coadd images after alignment is done to create deeper template images if needed.



(a) (b) (c)

Figure 2.2 Example of image stacking. Images are centered at SN2019dks (RA = 11:44:05.60, DEC = -04:40:25.2). (a) and (b) are two exposures taken on the same night (MJD=58844 days). (c) is the coadded image of (a) and (b).

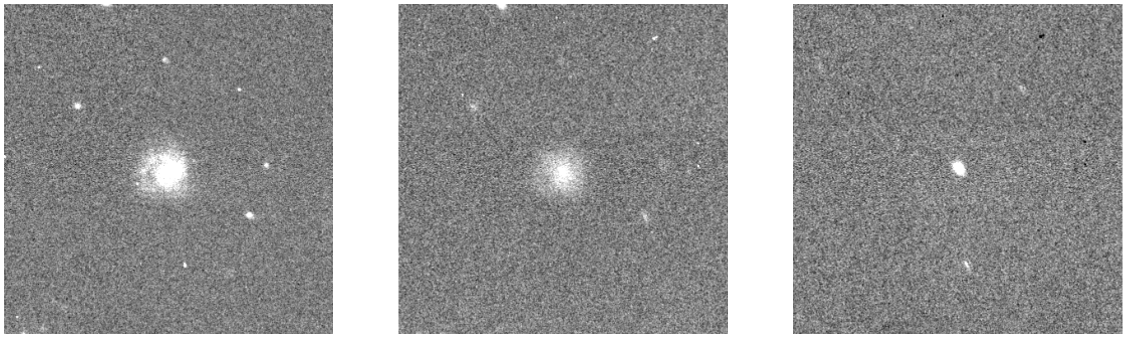
2.3 Image Subtraction

Image subtraction, or difference imaging, is a method broadly used in astronomy to detect transients, monitor crowded stellar fields varialibity, and remove background contaminating light for higher precision photometry. In the field of transient astsronomy, especially SNe astronomy, image subtraction is crucial for any quantitative analysis. Although SNe luminosities are comparable to the host galaxies, and can be spotted by unaided eye on astronomical images, the light from the underlying host galaxies can significantly degrade the precision of photometry if image subtraction is not properly taken care of.

To do image subtraction, first a reference image, or template image, without the transient of interest is needed. In the field of SNe Ia astronomy, such references images are the images taken before the SN Ia's explosion, or after the SN Ia have sufficiently faded away, typically more than one year after explosion. Such reference images can also be stacked together as introduced in section 2.2 when the seeing is not good for a single exposure.

The main difficulty in doing image subtraction is to find the convolution kernel to accurately match images taken under different conditions. The first thought of solving such a convolution kernel would be to find the discrepancies of PSFs on the images based on bright stars with sufficient S/N. The first attempt at image subtraction by [52] followed such thoughts and calculated the convolution kernel by taking the ratio of an isolated bright star or pre-determined PSFs of the two images in Fourier space. However, this method only utilizes a small portion of pixels with high S/N on the images, wasting much information. It is also prone to numerical instability and sensitive to noise. Moreover, such method is difficult to be adapted to crowded fields, and does not accommodate the spatial variation of the PSF across a single image. Many methods of image subtraction were proposed since then to improve the numerical stability, to use information of more pixels, to find the matching kernel without knowledge of PSF, and to improve the computational performance. For more history on astronomical image subtraction methods, see [53]. In our pipeline, we use the Saccadic Fast Fourier Transform (`SFFT`) method introduced in [53]. Instead of finding a common convolution kernel across the whole image, `SFFT` finds pixelized convolution kernels that are decomposed into pre-defined basis functions. The image subtraction is then solved as a least-squares problem in the Fourier space by `SFFT`. `SFFT` allows for spatial variations across the field of view including PSF, photometric scaling, and the sky background. It also remarkably improves the computational performance compared to other published image subtraction software, and can be easily parallelized, making it extremely useful in future time-domain surveys that require timely follow-up observations. Figure 2.3 shows an example of image subtraction using `SFFT` for observations of SN2017hng at MJD=58053 days. Right panel is the difference image of the left panel (science image) and the middle panel (reference image). The SN Ia SN2017hng shows up clearly in the difference image when it is hard to distinguish in the science image from the host galaxy. The field stars are also subtracted cleanly.

Arithmetically, change in the subtraction direction of two numbers would only introduce a negative sign. However, that is not the case in image subtraction. The change in image subtraction direction (hence the convolution direction) often results in inconsistent differ-



Science image Reference image Difference image

Figure 2.3 Example of image subtraction.

ence images. When an image B is subtracted from another image A with a better seeing (smaller full width at half maximum, or FWHM), deconvolution of image B takes place in order to match image B's PSF onto that of image A. This will increase the noise and noise correlation in the resulting difference image. To avoid deconvolution, our pipeline gives a rough estimation on images' FWHM to find the image with better seeing, and use the image with better seeing as the template image in the image subtraction process.

From here, we will refer the minuend image as image A, and the subtrahend image as image B. During image subtraction, the PSF shape as well as intensity and sky background of image B will be matched onto image A. Thus the resulting difference image would have no sky background and a same zero-point with image A.

After image subtraction, our pipeline cuts out a small region (stamp) centered at the transient's location from the difference image, and pastes it back to the minuend image (image A) with a constant sky background added. This way, we have a pasted image with field stars unchanged but with host galaxy of transient of interest removed (see Figure 2.4 for an example). The constant sky background is estimated by the median pixel value from the minuend image (image A). Subsequent photometry can then be measured on such pasted images.

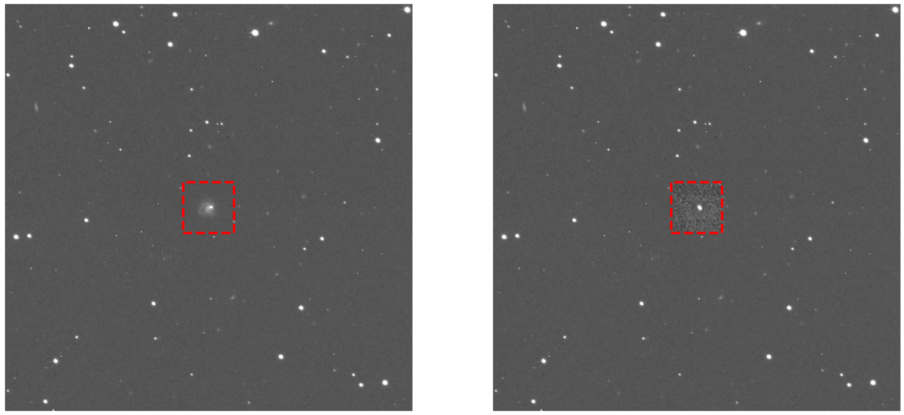


Figure 2.4 Example of pasted image. Left: original science image centered at SN 2017hng taken by Las Cumbres Observatory on MJD=58053 days; Right: science image with the small cutout region centered at SN2017hng replaced with that of difference image. Red dashed lines mark the edge of the replaced cutout region.

2.4 Aperture Photometry

Going back to the definition of photometry, it is a technique used to measure the brightness of an astronomical object, which is essentially counting photons/flux emitted from the object. Such definition of photometry perfectly describes the principle behind aperture photometry.

Aperture photometry measures the flux of an object by suming up the observed flux within a given radius from the center of the object, and correcting the sky background contribution within the same region with the sky background estimated from an annular region.

Aperture size needs to be carefully chosen. Stellar profiles are approximately Gaussian. Naturally one wants to use a larger aperture size to encompass more flux from the object. But the noise (such as Poisson shot noise, flat field errors) also grows linearly with aperture size. [54] found that the precision of aperture photometry reaches maximum at an intermediate aperture size. For sources whose PSF can be well approximated as Gaussian, the optimum radius is 0.6731FWHM, where FWHM characterizes the Gaussian profile's

https://wise2.ipac.caltech.edu/staff/fmasci/GaussApRadius.pdf width.

Aperture photometry is straightforward and fast to apply. But it works best when the field is sparse. When the field is crowded, profiles of stars are blended together. The light of one star will contaminate the light of another. In this case, other ways of photometry need to be resorted.

2.5 PSF Photometry

Star light falls off in the wings of the profile while the noise is approximately uniformly distributed, which means pixels further away from the center have lower S/N. Thus when summing up the fluxes, one may give more weight to pixels near center which are expected to have higher S/N rather than the pixels with lower S/N for a lesser impact from the noise.

PSF photometry first estimates a PSF profile based on field stars, then fits the intensity and position of the source either simultaneously or separately. By doing so, PSF photometry gives lower weight to pixels with lower expected S/N. For bright, isolated source where flux is dominated by the source, PSF photometry does no much better than aperture photometry. But for faint sources, PSF photometry performs better than aperture photometry by doing a Gaussian weighting. PSF photometry also performs better than aperture photometry in croweded fields when the light of sources are blended together.

Our pipeline calculates PSF photometry using `DAOPHOT` [55]. First `FIND` routine is used for a crude identification of the luminous objects in the frame with approximate centroids calculated. Then the pipeline runs `PHOT` routine to calculate the aperture photometry for the objects found in the `FIND` routine. Next, `PICK` routine picks the top source candidates to feed into `PSF` routine for PSF calculation. The standalone program `ALLSTAR` is then run on the single frame to fit the stars simultaneously with the PSF found by `PSF` routine.

We now have the PSF instrumental magnitudes calculated by `ALLSTAR` program based on the information in this single frame. But we usually have multiple exposures for the same sky region. And we can make use of the fact that the positions of the same star stay the same across all frames for a better estimation of the star's centroid. This way the star's centroid, especially the centroid of the SN of interest when the SN becomes dimmer, can be better determined and results in higher photometric precision. Without a common position, the fainter photometry is biased brighter as the centrioding algorithm will tend toward peaks due to low S/N in the PSF location.

To maintain a consistent positions for the same set of stars across multiple frames, our pipeline first runs `DAOMATCH` to find the rough coordinate transformations between frames using the most brightest stars by allowing translations, scale changes, and linear transformations. Then the coordinate transformation is refined by `DAOMASTER` routine using the entire star list, allowing quadratic and cubic transformation additionally.

`ALLFRAME` is run at last. `ALLFRAME` performs simultaneous profile fits for all stars in given images while maintaining a consistent star list and their positions for all images. Rather than solving for an independent position for each star in each image like in `ALLSTAR`, `ALLFRAME` solves for a single position for each star, and transforms that to the coordinate system of other images using the transformations found by `DAOMASTER`. The instrumental magnitudes solved by `ALLFRAME` are the final instrumental magnitudes product and can then be converted to standard magnitudes through the use of either standard stars or calibrated stars in standard catalogs.

3. ANALYSIS METHODS*

3.1 Light curve fitting technique

All analyses of SNe Ia photometry are essentially based on parameters extracted from the light curves. However, due to the lack of high cadence photometric observations, directly measurements of such parameters are always not possible. Many efforts have been made to fit the discrete light curves. The existing light curve fitting models can be broadly categorized into two groups: light curve fitter based on spectral modeling, and light curve fitter directly modeling light curve data. For light curve fitters based on spectral modeling, such as SALT[56], SALT2[57], and SiFTO[58], usually a spectral template is given, then they work in flux space by manipulating the SED models to match the photometry in the observer frame. For light curve fitters based on modeling the photometry data directly, such as MLCS/MLCS2k2[59, 60], stretch[61, 62], Δm_{15}[18, 63], and CMAGIC[64], the fitting process is done in photometry space instead of SED space. Majority light curve fitters take the latter approach, which is simpler than fitting in SED space. But K-corrections (see subsection 3.2.2) need to be calculated and applied explicitly to transfer the model from rest frame to observer's frame, unlike light curve fitters in SED space where SED models are adjusted to match colors in the observer's frame directly.

We use FPCA (functional principle component analysis) light curve fitter introduced by [4] in our analysis. FPCA light curve fitter is a purely data-driven model. It models light curve in photometry space, without any information of spectra. FPCA light curve fitter decomposes a SN Ia light curve as a linear combination of a mean function and a few principle component functions, which are trained from a collection of well observed

*Part of this section is reprinted from Using 1991T/1999aa-like Type Ia Supernovae as Standardizable Candles by Yang, et al. 2022. The Astrophysical Journal, 938, 83, and Characterization of Type Ia Supernova Light Curves Using Principal Component Analysis of Sparse Functional Data by He, et al. 2018. The Astrophysical Journal, 857, 110, under a CC By license.

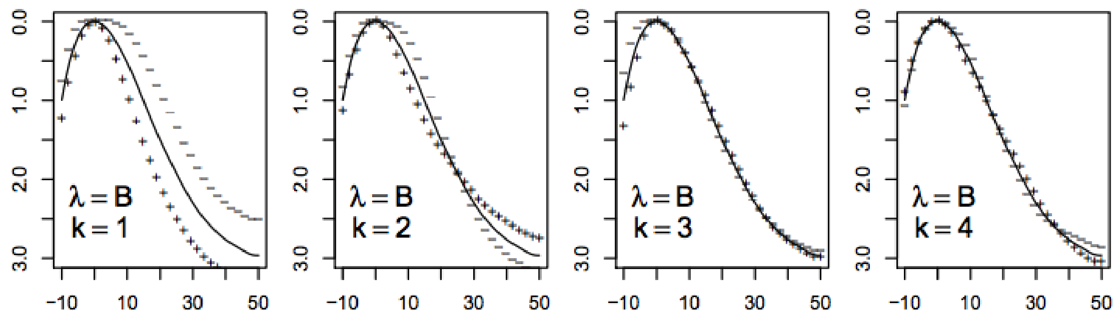


Figure 3.1 The mean and principle component functions in B band of FPCA light curve fitter. The solid line is the mean function $\phi_0(t-t_0)$. The "+" line represents $\phi_0(t-t_0)+2\sigma_i\phi_i(t-t_0)$, and the "-" line represents $\phi_0(t-t_0)-2\sigma_i\phi_i(t-t_0)$, where σ_i is the standard deviation of the principle component function's coefficients in the training data. Image adapted from [4].

SN Ia light curves. Then the entire light curve is just represented by the coefficients of the principle component functions.

With FPCA light curve fitter, the light curves in each band are fitted as follows:

$$m(t-t_0) \;=\; m_0 \;+\; \phi_0(t-t_0) \;+\; \sum_{i=1}^{K}\beta_i\phi_i(t-t_0) \quad , \tag{3.1}$$

where $m(t-t_0)$ is the magnitude at time t in a specific band, t_0 is the time of maximum light, and m_0 is the maximum magnitude. ϕ_i for $i=0$ to K are principle component functions, where ϕ_0 is the mean function that captures the general light curve shape, and ϕ_i for $i=1$ to K are K fixed principal component functions that capture any additional variations of the observed light curves from the mean function ϕ_0. Lower order functions of ϕ_i capture more variability [4].

We solve the parameters that characterize the fitted light curve (m_0, β_1, ..., β_K) by minimizing χ^2 using the least-squares fitting package `pycmpfit`. However, when the data

https://github.com/cosmonaut/pycmpfit

are sparse, overfitting may occur, leading to unphysical incorrect light curve models. To avoid such problem, we impose the following constraints on the constructed light curve shape: it must monotonically increase before maximum, and monotonically decrease 35 days after maximum. SN parameters such as Δm_{15} and peak magnitudes can then be measured from the fitted light curve model.

3.2 Photometric corrections

Imagine a beam of light gets emitted from the source at a redshift of z and travels to the detector mounted on a ground-based telescope. The wavelength of the light will be constantly stretched as it travels to the detector because of the cosmological redshift, until it reaches the detector where it will be stretched by a factor of $1 + z$. On top of that, the light will be extincted (absorbed and scattered) by dust and gas along the line-of-sight. Above effects must be corrected if one wants to compare the intrinsic properties of observed sources.

The effect of redshift and extinction along the line-of-sight are entangled together and cannot be corrected separately in principle. But to first approximation, the extinction happens mostly in the host galaxy of the source and the Milky Way, while the effect of redshift mainly happens between the host galaxy and the Milky Way. Thus we can divide the correction into three pieces – we first correct the extinction by the Milky Way, then correct the effect of the redshift, and finally correct the extinction caused by the host galaxy.

3.2.1 Milky Way extinction

Extinction is the combined effect of absorption and scattering by dust and gas in the interstellar medium along the line-of-sight, causing the object looks dimmer. The total extinction is defined as the difference in magnitude caused by extinction. For example, the total extinction in V is usually denoted as $A(V) = V_{observed} - V_{intrinsic}$. Interstellar dust absorbs and scatters blue light more than red lights, leaving the distant object redder.

This effect is also called interstellar reddening, and the change in color is called color excess $E(B-V) = A_B - A_V = (B-V)_{observed} - (B-V)_{intrinsic}$.

The extinction curve, or the reddening law, commonly plotted as $E(\lambda - V)/E(B-V)$ vs $1/\lambda$, depends approximately on one parameter, the total-to-selective extinction ratio $R_V = A_V/E(B-V)$ [65], which correlates with the size of dust grains. R_V is different for different line-of-sight. For the Milky Way, the average value of R_V is 3.1.

In this thesis, for the Milky Way extinction correction, we adopted the Milky Way dust map given by [66] and a [67] reddening law, assuming the Milky Way $R_V = 3.1$.

3.2.2 K-corrections

The correction of the redshift effect is called K-correction [68, 69]. Since light's wavelength get stretched, when they reach the detector through the filter which has a fixed transmission rate at different wavelength, the result photometry are essentially measuring different part of the SED (see example in Figure 3.2).

One needs to have the spectroscopic observation at the time of the photometric observation to calculate K-correction precisely. However, such spectra are often not available. Fortunately, the evolution of SN Ia is remarkably similar and the K-correction magnitude is mainly driven by the color of the SN [68], which we can take advantage of to give a good estimate of the K-correction. To do so, a spectral template is adopted (here we adopt the ones in [70]). Then the template spectra is multiplied by a smooth function to match the observed photometric colors of the SN. And the mangled template spectra are used for K-correction calculation by calculating the difference in the synthetic photometry through given filters when the spectra are placed at rest frame and the given redshift. The smooth function used to mangle the template spectra in our analysis is the reddening law [71] assuming $R_V = 3.1$, since the color difference between SN Ia is believed to be mainly caused by reddening.

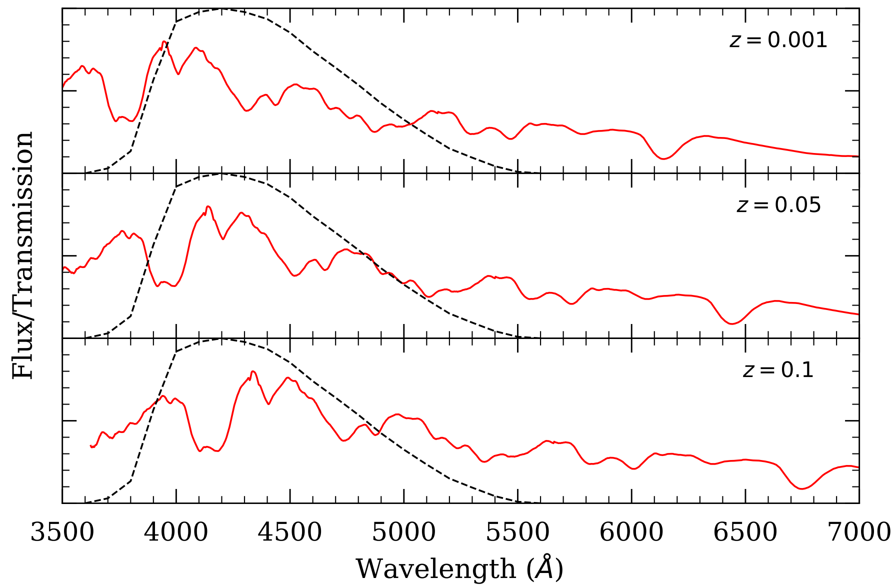


Figure 3.2 Comparison between B-band filter transmission curve (black dashed line) and spectrum (red line) of the typical SN Ia SN2011fe at maximum light placed at different redshifts (upper panel: z=0.01, middle panel: z=0.05, lower panel: z=0.1)

3.2.3 Host Reddening

Now that we have corrected the Milky Way reddening effect and the redshift effect, we are only left with the reddening of the host galaxy to take care of. While there are well measured reddening maps of our host galaxy Milky Way to use for correction of Milky Way extinction, it is more difficult to account for the host galaxy reddening.

One way to estimate the host reddening of SNe Ia is to assume the intrinsic colors of SNe Ia are uniquely determined by the light curve widths as measured by the $\Delta m_{15}(B)$ value. Since extinction can only make objects redder, one can expect there to be a "blue edge" in the distribution of the observed colors when the observed colors are plotted together with the $\Delta m_{15}(B)$. With a large sample of SNe Ia, we may assume this blue edge to represent the intrinsic colors of SNe Ia for a given $\Delta m_{15}(B)$, and the reddening due to dust in the host galaxy $E(B-V)_{host}$ can be deduced by the difference between the observed colors and the this ridge line (see Fig. 4.4). And the total-to-selective extinction ratio R_V can be derived from minimizing the scatters on SNe Ia Hubble diagram.

3.3 Si II $\lambda\lambda$ 6355 and Calculation of Pseudo-equivalent widths

SNe Ia spectra contain rich information about the explosion and the local environment. They can be used to study many physical properties, such as the element distributions, the ejecta kinematics, and the photospheric temperature. SNe Ia spectra are characterized by intermediate mass elements such as S II, Si II, and Ca II. Among many spectral lines in SNe Ia spectra, Si II $\lambda\lambda$ 6355 is of particular interest to SN Ia astronomers. Si II $\lambda\lambda$ 6355 is the most prominent feature during photospheric phase (weeks after explosion when the ejecta is still optically thick) and is well separated from other lines, making it an excellent starting point to study SNe Ia spectra. In fact, many classifications of SNe Ia in efforts to explore the diversity and improve the accuracy of distance determination of SNe Ia are based on Si II $\lambda\lambda 6355$ line. For example, [24] classified SN Ia into two groups: HV (high velocity) group for SNe Ia with Si II $\lambda\lambda$ 6355 velocity higher than 11800 km/s, and NV(normal velocity) group for SNe Ia with Si II $\lambda\lambda$ 6355 velocity in between 8000 km/s and 11800 km/s. [21] classified SN Ia into four subclasses based on pEW measurements of Si II $\lambda\lambda$ 5972 and Si II $\lambda\lambda$ 6355: "Core-Normal" SNe Ia like SN1994D, "Broad-Line" SNe Ia with broader Si II $\lambda\lambda$ 6355 absorptions indicating larger expansion velocities like SN1984A, "Cool" SNe Ia with deeper Si II $\lambda\lambda$ 5972 lines associated with low luminosity like SN1991bg, and "Shallow-Silicon" SNe Ia with both weak Si II $\lambda\lambda$ 5972 and Si II $\lambda\lambda$ 6355 like SN1991T. The photospheric-velocity feature (PVF) of Si II $\lambda\lambda$ 6355 is also a great tracer of the velocity of SNe Ia ejecta.

The definition of equivalent width(EW) is given by

$$EW = \int \frac{F_c - F_s}{F_c} d\lambda$$

where $F_c(\lambda)$ is the flux of the underlying continuum, and $F_s(\lambda)$ is the actual flux of the spectrum. Although the definition is quite straightforward, it is not trivial to calculate the EW of SNe Ia spectra as the continuum is often unknown. In practice of calculating EW for lines in SNe Ia spectra, the most common way is to define a pseudo-continuum by the straight line connecting two points that define the end of the line feature. The EW calculated based on the pseudo-continuum is called pseudo-EW(pEW). The endpoints are usually manually picked by estimating the local maxima position around the absorption line. However, those endpoints are not easy to define due to the lack of high S/N spectra most of the time, making the pseudo-continuum position and hence the pEW calculation unreliable.

In our analysis, we first bin the spectrum into bins with a width of 40Å, and calculate the average flux in each bin to remove false spikes. Then we find the local maxima on the binned spectrum. The bluer endpoint is found in [5820Å, 6000Å] and the redder endpoint is found in [6200Å, 6540Å]. The pseudo-continuum is then selected as the straight line connecting the two endpoints.

To get an error budget on the measured pEW, we smooth the spectra using the wavelet transformation algorithm introduced in [72]. A wavelet is a wave-form of limited time or spatial duration that has an average value of zero and nonzero norm. Wavelet transform decomposes a function into a set of wavelet scales, enabling us to analyze data where features vary over different scales. [72] uses the *à trous* wavelet transform algorithm and we follow here. After decomposition, the original spectrum c_0 at a wavelength k can be expressed as

$$c_0(k) = c_J(k) + \sum_{J=1}^{J-1} w_j(k)$$

where

$$w_i(k) = c_{i-1}(k) - c_i(k)$$

and $c_i(k)$ is the smoothed flux data at a given resolution i and at a wavelength (position)

k with

$$c_i(k) = \sum_l h(l) c_{i-1}(k + 2^{i-1} l)$$

where h is a discrete low pass filter (or convolution mask). We follow the convolution mask used in [72] and use a symmetric triangle function applied at five bins with weights 3/8, 1/4, and 1/16. As noted in [72], wavelets are dominated by observational noise at small scales and SN signal only starts to become significant for wavelet scales $j \geq 3$. Thus, we use c_4 as the smoothed spectrum and measure pEW on c_4 (see smoothed spectrum example in Figure 3.3).

Now we have the original spectrum and the smoothed spectrum, to estimate the error on measured pEW, we assign an error percentage (so that the flux error equals the error percentage multiply the smoothed flux, see lower panel of Figure 3.3) at each pixel using the standard deviation of original flux to smoothed flux ratio within ± 50Å. Then we generate large number of spectra with added artificial noise sampled from Gaussian distribution with zero mean and standard deviation of flux error calculated above, and measure pEW on each spectrum with artificial noise, then use the standard deviation of measured pEW on the large number of spectra with artificial noise as our estimate of pEW error.

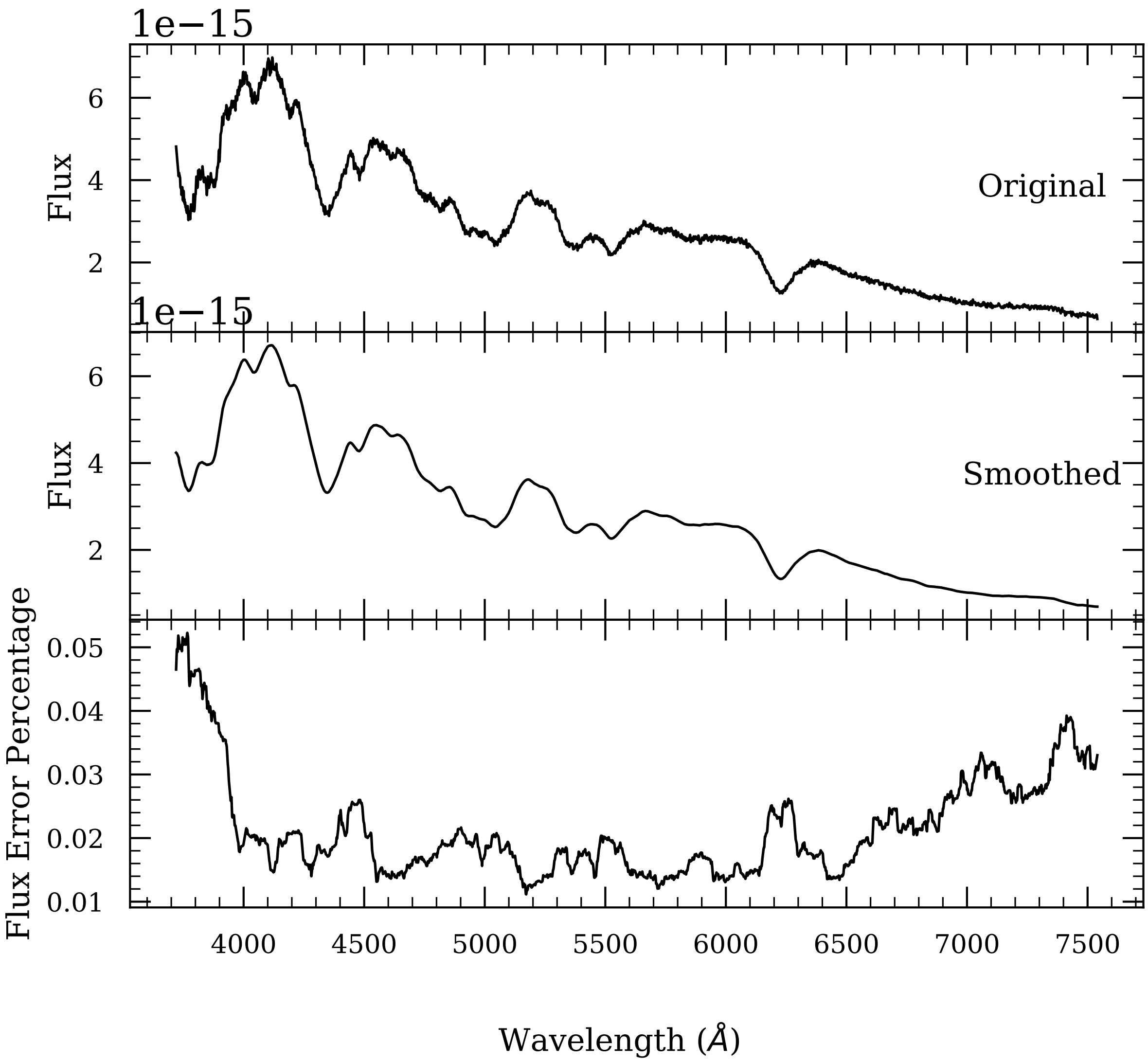


Figure 3.3 Example of spectrum smoothing using spectrum of SN1999aa observed at MJD=51232 days. Upper panel is the original spectrum, middle panel is the smoothed spectrum, and lower panel is the flux error percentage (see section 3.3).

4. USING 1991T/1999AA-LIKE TYPE IA SUPERNOVAE AS STANDARDIZABLE CANDLES*

4.1 Introduction

Type Ia supernovae (SNe Ia) have played an important role in modern cosmology as cosmological distance indicators which led to the discovery of the accelerating expansion of the Universe and ever-improving values of the Hubble constant [73, 13, 14, 74, 75, 76]. Although they are not perfect standard candles, their luminosities can be calibrated using light curve shapes and colors of SNe Ia (e.g. see [17, 59, 77, 78]), by means of which the precision of distance determination can be improved to $5 \sim 10\%$. In subsection 1.2.3 we mentioned a subtype of SNe Ia called 91T-like SNe. 91T-like SNe show weak features of IMEs and prominent Fe II/III lines. The 99aa-like SNe are similar to 91T-like SNe with the subtle difference of having weak Ca II H&K and Si II absorption lines before maximum light. Their pre-maximum spectral evolution is intermediate of 91T-like SNe Ia and normal SNe Ia [79, 80]. Whether 91T-like SNe are extreme events of SNe Ia or together with 99aa-like SNe they form a separate class arising from systematically different progenitors is still unknown. In this study we consider them together as 91T/99aa-like SNe Ia. So far, cosmological studies using SNe Ia usually exclude spectroscopically peculiar SNe Ia including 91T/99aa-like SNe Ia. However, the intrinsic rate of peculiar SNe Ia can be as high as 36% with $\sim 20\%$ being 91T/99aa-like SNe Ia [81]. Since they are among the most luminous SNe Ia and are located in regions with comparatively young stars [77], future flux-limited surveys such as LSST/Rubin, WFIRST/Roman, and JWST will inevitably be biased towards finding this class. A potential Malmquist bias then becomes one of the critical issues for these future surveys if the luminosities are not properly

*Part of this section is reprinted from Using 1991T/1999aa-like Type Ia Supernovae as Standardizable Candles by Yang, et al. 2022. The Astrophysical Journal, 938, 83, and Characterization of Type Ia Supernova Light Curves Using Principal Component Analysis of Sparse Functional Data by He, et al. 2018. The Astrophysical Journal, 857, 110, under a CC By license.

taken into account. Not only 91T/99aa-like objects are more luminous, previous studies have also shown that Hubble residuals of 91T/99aa-like objects are in average brighter than the residuals of normal SNe Ia even after light curve shape and color corrections [82, 83]. Understanding the intrinsic properties of these SNe Ia is crucial to mitigate inevitable systematic errors in supernova cosmology.

In this work, we present the photometry of 16 91T/99aa-like SNe observed extensively in $Bg'Vr'i'$ as part of the Las Cumbres Observatory [84] Supernova Key Project and Global Supernova Project. Together we gather 21 91T/99aa-like objects (as well as additional data of our Las Cumbres 91T/99aa-like object SN2016hvl) and 87 normal SNe Ia from the literature. With this sample, we analyse the standardizability of 91T/99aa-like objects as relative distance indicators and search for potential systematic effects that may bias the cosmological measurement. The remainder of this paper is organized as follows. In section 4.2, we present the photometric observations, data reduction, calibration, and light curve fitting techniques. The spectral and line strength calculations of Si II $\lambda\lambda6355$ are presented in section 4.3. In section 4.4 we introduce the method to standardize the peak luminosity of SNe Ia. In section 4.5 we present the residual Hubble diagram made with our sample, and the use of Si II $\lambda\lambda6355$ for distance measurements. The paper concludes with a summary and discussion in section 4.6. Throughout this paper, we assume a Hubble constant of H_0 = 72 km/s/Mpc and a standard cosmology of $\Omega_M = 0.28, \Omega_\Lambda = 0.72$.

4.2 Photometry

4.2.1 Data

4.2.1.1 Las Cumbres Data

Here we adopt a loose classification scheme of 91T/99aa-like SNe, where an SN Ia is classified as 91T/99aa-like as long as it is reported as a 91T/99aa-like object from at least one source (listed in Table 4.1 and Table 4.2) in the literature. As will be shown later

Table 4.1 General Properties of Las Cumbres 91T/99aa-like Supernovae.

SN Name	$\alpha(2000)^a$	$\delta(2000)^a$	Host Galaxy[a]	$z_{helio}{}^b$	Discovery Reference	Spectroscopic Reference
SN2014dl	16:29:46.09	+08:38:30.6	UGC 10414	0.03297	CBET 3995	CBET 3995
SN2014eg	02:45:09.27	-55:44:16.9	ESO 154-G10	0.01863	CBET 4062	CBET 4062
PS15sv	16:13:11.74	+01:35:31.1	...	0.033	ATEL 7280	ATEL 7308
LSQ15aae	16:30:15.70	+05:55:58.7	2MASX J16301506+0555514[c]	0.0516[c]	LSQ	ATEL 7325
SN2016gcl	23:37:56.62	+27:16:37.7	AGC 331536	0.028	TNSTR-2016-644	TNSCR-2016-655
SN2016hvl	06:44:02.16	+12:23:47.8	UGC 3524	0.01308	TNSTR-2016-884	TNSCR-2016-892
SN2017awz	11:07:35.50	+22:51:04.7	SDSS J110735.46+225104.2	0.02222	TNSTR-2017-200	TNSCR-2017-210
SN2017dfb	15:39:05.04	+05:34:17.0	ARK 481	0.02593	TNSTR-2017-449	TNSCR-2017-476
SN2017glx	19:43:40.30	+56:06:36.4	NGC 6824	0.01183	TNSTR-2017-963	TNSCR-2017-970
SN2017hng	04:21:40.58	-03:32:26.5	2MASX J04214029-0332267	0.039	TNSTR-2017-115	TNSCR-2017-117
SN2018apo	12:45:05.30	-44:00:23.0	ESO 268- G 037	0.01625	TNSTR-2018-440	TNSCR-2018-468
SN2018bie	12:35:44.33	-00:13:16.0	...	0.022	TNSTR-2018-609	TNSCR-2018-626
SN2018cnw	16:59:05.06	+47:14:11.0	...	0.02416	TNSTR-2018-832	TNSCR-2018-833
SN2019dks	11:44:05.59	-04:40:25.3	...	0.057	TNSTR-2019-566	TNSCR-2019-601
SN2019gwa	15:58:41.18	+11:14:25.1	...	0.054988	TNSTR-2019-930	TNSCR-2019-965
SN2019vrq	03:04:21.46	-16:01:26.4	GALEXASC J030421.67-160124.7	0.01308	TNSTR-2019-247	TNSCR-2019-248

[a] Basic information for each SN, including its J2000 right ascension and declination, and its host galaxy, were sourced from TNS or the discovery references.
[b] Host-galaxy heliocentric redshifts are from the NASA/IPAC Extragalactic (NED) or TNS Database unless otherwise indicated.
[c] [85]

Table 4.2. General Properties of 91T/99aa-like SNe Ia in the Literature.

SN Name	Host Galaxy	z_{helio}[a]	Photometry Reference	Classification Reference
SN1991T	NGC 4527	0.00579	1	IAUC 5239
SN1995bd	UGC 3151	0.0146	2	IAUC 6278
SN1998ab	NGC 4704	0.02715	4	IAUC 7054
SN1998es	NGC 632	0.01057	4, 5	IAUC 7054
SN1999aa	NGC 2595	0.01446	4, 5	IAUC 7108
SN1999ac	NGC 6063	0.0095	4, 5	IAUC 7122
SN1999aw	Anon 1101-06	0.0379[6]	8	7
SN1999dq	NGC 976	0.01433	4, 5	IAUC 7250
SN1999gp	UGC 1993	0.02675	4, 5	7
SN2001V	NGC 3987	0.01502	5, 6	7
SN2001eh	UGC 1162	0.03704	5, 6	7
SN2002hu	MCG +06-6-12	0.0374[9]	6	7
SN2003fa	ARK 527	0.039[5]	5, 6	7
SN2004br	NGC 4493	0.02308	5	10
SN2005M	NGC 2930	0.022[5]	5, 6, 11	IAUC 8474
SN2005eq	MCG -01-9-6	0.02891	5, 6, 11	7
SN2005hj	SDSS J012648.45-011417.3	0.05738	6, 11	7
SN2007S	UGC 5378	0.01385	6, 11, 12	CBET 839
SN2007cq	2MASX J22144070+0504435	0.02604	5, 6, 12	7
SN2011hr	NGC 2691	0.01339	13	CBET 2901
SN2016hvl	UGC 3524	0.01308	14, 15, 16	ATEL 9720
iPTF14bdn	UGC 8503	0.01558	12, 17	17

[a]Heliocentric redshift are taken from the NASA/IPAC Extragalactic Database (NED) unless indicated otherwise.

Note. — (1) [86]; (2) [87]; (3) [88]; (4) [89]; (5) [90]; (6) [91]; (7) [92]; (8) [93]; (9) [92]; (10) [94]; (11) [49]; (12) [95]; (13) [96]; (14) [5]; (15) [6]; (16) [97]; (17) [98].

in this paper, the definition of 91T/99aa-like SNe can be replaced by a more quantitative scheme and the results of our analysis will not be affected by this initial classification.

The general properties of our 16 Las Cumbres Observatory 91T/99aa-like SNe are given in Table 4.1. The Las Cumbres Observatory operates a fleet of 1-m class telescopes distributed around the globe. Las Cumbres Observatory images were pre-processed by the `BANZAI` pipeline [99] (after June 2016) and `ORAC` pipeline (before June 2016), during which bad pixel masking, bias subtraction, dark subtraction, and flat-field correction are done. Most SNe in the sample are located in the vicinity of their host galaxy nuclei. As we introduced in chapter 2, without template subtraction, the galaxy background with nonuniform brightness can significantly degrade the photometric accuracy. To remove the galaxy background contamination, we subtract a reference image in the same passband for each exposure of the SN. Since the pre-explosion observations are generally unavailable for Las Cumbres Observatory telescopes, we adopt the observations taken after the SNe have sufficiently faded (typically more than one year after explosion) to create the reference image. More specifically, the late-time observations are coadded and subsequently aligned to the science frame using `SWarp` [51]. We use the Saccadic Fast Fourier Transform algorithm (`SFFT` hereafter, [53]) to perform the galaxy subtractions. The SFFT method is a novel approach that presents the question of image subtraction in the Fourier domain, which brings a significant computational speed-up by leveraging GPU acceleration. Unlike the widely used `HOTPANTS` image subtraction program, SFFT uses a delta function basis which allows for kernel flexibility and requires minimal user-adjustable parameters. In our work, `SFFT` successfully carries out the galaxy subtraction for all images with the default software configuration (see SFFT GitHub). By contrast, [97] found that `HOTPANTS` produced satisfactory subtractions only for two thirds supernovae in their sample observed by Las Cumbres Observatory in their work.

`https://github.com/thomasvrussell/sfft`

For precision photometry, a small stamp centered at the SN position (typically 200 pixels $\times$ 200 pixels) is cut out from the difference image and pasted back to the original science image. The cutout stamp is added with a constant background to match the background level of the science image. Point spread function (PSF) photometry is then done on the new set of images with pasted stamps using `DAOPHOT` [55] (see section 2.5).

Photometric measurements are calibrated by means of field stars in the APASS catalog DR9 [100] with catalog magnitudes in the range 10 mag $< m <$18 mag and uncertainties $\Delta m \leq 0.1$ mag in each calibration band. The APASS catalog calibration was done using Landolt and SDSS standard stars. Therefore, the Las Cumbres Observatory magnitudes presented here are based on the Vega standard system for B and V, and the Sloan BD17 system for $g'r'i'$ commonly called AB magnitudes. Photometric coefficients appropriate to the Las Cumbres Observatory 1-m telescopes (see Table B1 in [101]) were used to convert APASS catalog magnitudes to values in the Las Cumbres Observatory natural system. We use the color terms to convert the APASS magnitude to Las Cumbres Observatory natural system magnitude as follows:

$$m_{nat} \ = \ m_{APASS} \ + \ C \times color \ , \tag{4.1}$$

where m_{nat} is the natural system magnitude, m_{APASS} is the APASS magnitude, and C and "color" are the appropriate color term and color for each filter. Zero points for each exposure were then determined by the difference between instrumental magnitudes of field stars and the corresponding APASS magnitudes converted to the Las Cumbres Observatory natural system. After that, the supernovae natural system photometry is brought onto standard systems using S-corrections (see subsection 4.2.2). Final photometry data

APASS DR9 does not contain any U or R band magnitudes. We have U and R data for three objects. For completeness, here we use the transformation given by [102] to derive U and R magnitudes of reference stars from filters with known magnitudes. Also, note that [101] did not provide color terms for U and R. Thus we did not convert the magnitudes of reference stars to the natural system.

(both in natural system and in standard system) are given in Table B.1 and Table B.2. Light curves are shown in Figure 4.1 together with light curve fits (see subsection 4.2.3). Photometry in U and R filters without color term corrections and S-corrections are also provided in Table B.3 for completeness.

4.2.1.2 ANDICAM Data

In Table 4.3 we present complementary BV photometry for two objects, SN2019dks and SN2018bie, obtained under programmes NOAO-18A-0047, NOAO-18B-0016, and NOAO-19A-0081 with the *A Novel Double Imaging Camera* (ANDICAM, [103]) instrument mounted on the 1.3m telescope and operated by the SMARTS Consortium at the Cerro Tololo Inter-American Observatory (CTIO). Images were reduced by the SMARTS consortium using standard routines, and were retrieved from their ftp server. Photometry on the reduced images were performed following standard procedures. Aperture photometry was performed on the SN and field stars, and then the instrumental magnitudes of the stars were calibrated to the APASS catalogue; once the magnitude conversion was found, we applied ANDICAM color terms and applied an airmass correction to find the SN magnitude in each image.

4.2.1.3 Data from the Literature

To supplement our 91T/99aa-like SNe sample we gathered all SNe Ia that are classified as 91T/99aa-like from at least one source and have at least one B-band data point in the Open Supernova Catalogue [104]. Then we make the quality cut following these criteria: 1) B and V data must be present; 2) at least one band of i, R, and I must have data (in order to calculate K-corrections in the V-band (see subsection 4.2.4)); 3) for the above three bands, there must be at least one data point after 15 days post maximum (to ensure a good light curve fit); and 4) for the above three bands, there must be at least six data points observed in each band. After making the cuts, we are left with 21 91T/99aa-like

SN2013dh is excluded, as it is a possible Iax supernova (see ATEL 5143). SN1997br is also excluded due to bad light curve fits.

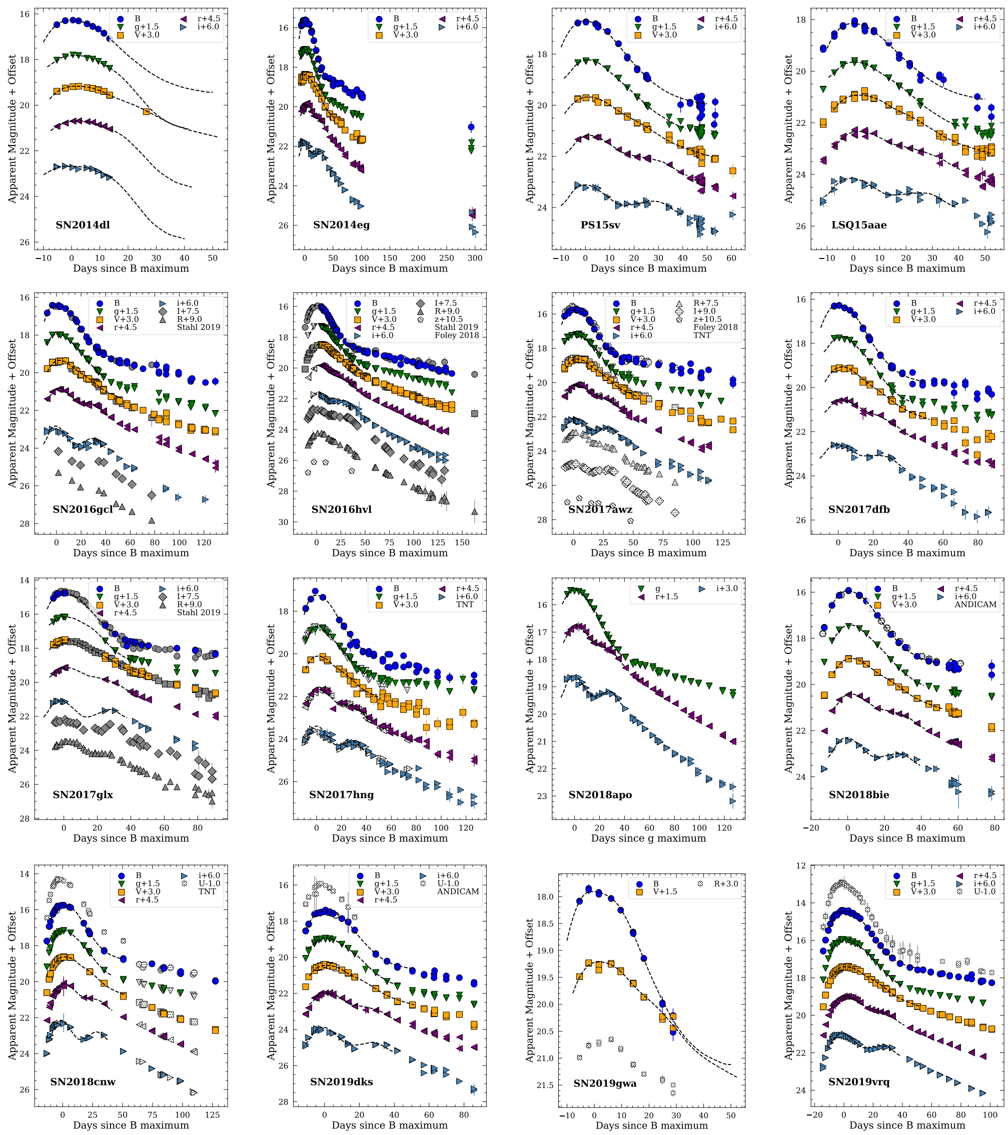


Figure 4.1 Light curves of Las Cumbres Observatory 91T/99aa-like supernovae in natural systems. Light curve fits for $BVg'r'i'$ bands using FPCA [4] are shown as dashed lines overlayed on top of their corresponding data points. For completeness, we also plot U and R photometry when available, though for those two filters, we did not correct for color terms. For SNe with data from non-Las Cumbres observing programs, they are included in the figure for comparison, with the sources of the data shown in the insert legends at the upper-right corner of each panel. The relevant references are: Stahl 2019: [5], Foley 2018: [6], and TNT: Tsinghua-NAOC Telescope.

Table 4.3. ANDICAM SNe photometry in standard systems.

SN	MJD	Filter	Magnitude	Magnitude Error
SN2018bie	58251.0668	B	17.802	0.067
SN2018bie	58261.1015	B	16.123	0.026
SN2018bie	58271.0232	B	16.146	0.062
SN2018bie	58278.0392	B	16.713	0.029
SN2018bie	58283.004	B	17.251	0.053
SN2018bie	58285.9925	B	17.548	0.066
SN2018bie	58289.0281	B	17.819	0.034
SN2018bie	58292.985	B	18.129	0.08
SN2018bie	58296.9623	B	18.408	0.035
SN2018bie	58304.9651	B	18.781	0.052
SN2018bie	58308.9624	B	18.9	0.1
SN2018bie	58312.9721	B	19.007	0.082
SN2018bie	58320.954	B	19.055	0.175
SN2018bie	58325.9612	B	19.092	0.118
SN2019dks	58595.1002	B	17.543	0.046
SN2019dks	58597.0843	B	17.48	0.054
SN2019dks	58600.05	B	17.532	0.056
SN2019dks	58602.0576	B	17.57	0.048
SN2019dks	58604.1016	B	17.679	0.053
SN2019dks	58595.1097	V	17.49	0.049
SN2019dks	58597.0938	V	17.411	0.034
SN2019dks	58600.0595	V	17.466	0.042
SN2019dks	58602.0681	V	17.498	0.053
SN2019dks	58604.1111	V	17.583	0.05

objects. Their general properties are listed in Table 4.2.

To compare 91T/99aa-like SNe with normal SNe Ia, we include normal SNe Ia from [89, 91, 105, 90] and [5]. All above papers provide photometry data in standard system, so no further S-correction is needed (see subsection 4.2.2). Data are further selected according to the same criteria in the above paragraph, with extra criteria: for each of the three bands mentioned above, there must be at least two data points before maximum, and we tighten the constraint on the minimum total number of data points in each band from six to eight. After applying these requirements, we are left with 87 normal SNe Ia.

4.2.2 S-corrections

Photometric systems of different telescope and instrument combinations never match exactly. Since we try to compare photometry of supernovae taken by different instruments, each one of which defines its own photometric system, it is necessary to transform all of the data to a common standard system. Although the color equations are meant to transform between natural system magnitudes and standard system magnitudes, they lose accuracy when transforming natural system magnitudes of supernovae onto the standard system, as color terms are derived from stellar objects while the spectral energy distributions (SEDs) of supernovae are quite different from stellar spectra. This problem is mitigated through the use of S-corrections [106, 107].

S-corrections specifically account for differences in filter band passes for non-stellar objects. The magnitude correction is calculated by finding the difference between synthetic photometry generated by integrating the spectra or spectral templates in the old system and new systems:

$$S_{s,corr} = m_{s,standard} - m_{s,natural} \tag{4.2}$$

where $S_{s,corr}$ is the photometric S-correction in magnitudes in filter s, $m_{s,standard}$ is the synthetic photometry of the object's SED using the standard filter band pass, and $m_{s,natural}$ is the synthetic magnitude calculated using the natural filter band pass. Thus, passbands $S(\lambda)$ of the two systems and the SED at each photometric epoch are both needed to calculate S-corrections. For our Las Cumbres Observatory instrumental system, we use the filter transmission curves and quantum efficiencies given by [97]. For the standard band passes, we adopt filter functions given by [108] for $BVRI$ and [109] for $g'r'i'$. Since we do not have spectra at all photometry epochs, we use spectral templates from [70] and color match them with observed photometry using the same method described in subsection 4.2.4. We use those as our SED approximations for our sample. These spectral templates only cover -19 $\sim$ 70 days with respect to B-band maximum. For data outside this range, we simply use the earliest or latest SED as the SED approximations for data points earlier/later than the range.

4.2.3 Light curve fitting

Direct measurements of the peak magnitudes and the 15 day decline rates ($\Delta m_{15}(B)$) are uncertain for most SNe Ia light curve because of the lack of high cadence photometric observations. Thus, different models have been used to fit the discrete light curves. Here we use the functional principal component analysis (FPCA) template fitting technique introduced by [4] (see also section 3.1 for more details).

Two types of templates were introduced in [4]. One is "filter-specific templates", where the templates for each filter were trained with data only in that filter. The other is "filter-vague templates", where the templates were trained with data from all filters ($BVRI$) together. Since [4] only introduced the filter-specific templates for $BVRI$ filters, in this work, filter-specific templates were used for the $B-$ and $V-$bands and filter-vague templates were used for the $g'r'i'$ bands. The first two principal components account for more that 90% of the variability of the light curves (see Figure 4.2). So we only use the first two

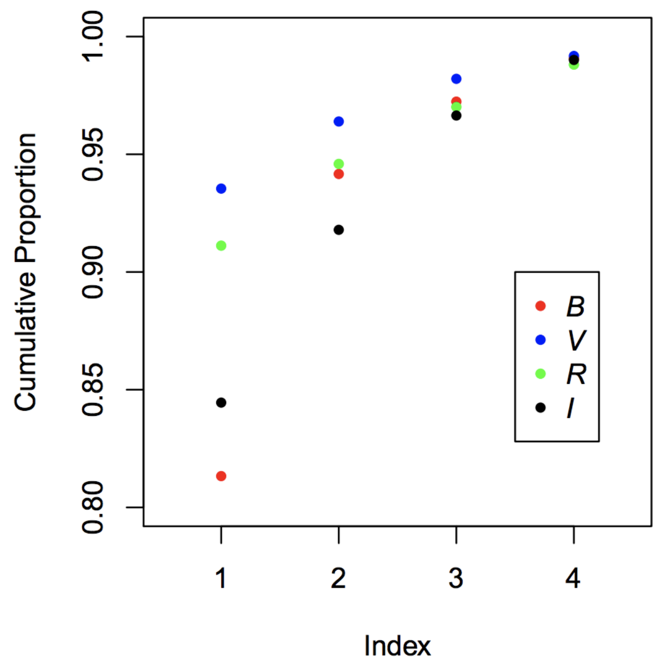


Figure 4.2 The cumulatively explained proportion of variability of first four light curve fitting principal components. Image from [4].

principal components to fit the light curves. The light curve is then fully parameterized by $(m_0, t_0, \beta_1, \beta_2)$ in our case. The best coefficients are found by minimizing χ^2 using the least-squares fitting package `pycmpfit`, with additional constraints that the fitted light curve must monotonically increase before maximum, and monotonically decrease 35 days after maximum. The decline rate $\Delta m_{15}(B)$ is then measured from the fitted light curves (For error calculation on $\Delta m_{15}(B)$, see Appendix in [110]. The fitted parameters and measured $\Delta m_{15}(B)$ for our sample are listed in Table 4.4 and Table 4.5.

4.2.4 K-corrections

As discussed in section 3.2, before we calculate and apply the K-correction to the observed photometric light curves, the light curves are first corrected for extinction along the line-of-sight in the Milky Way (MW). Then the light curves are further corrected by removing the time dilation due to Hubble expansion. Corrected light curves are then fit-

https://github.com/cosmonaut/pycmpfit

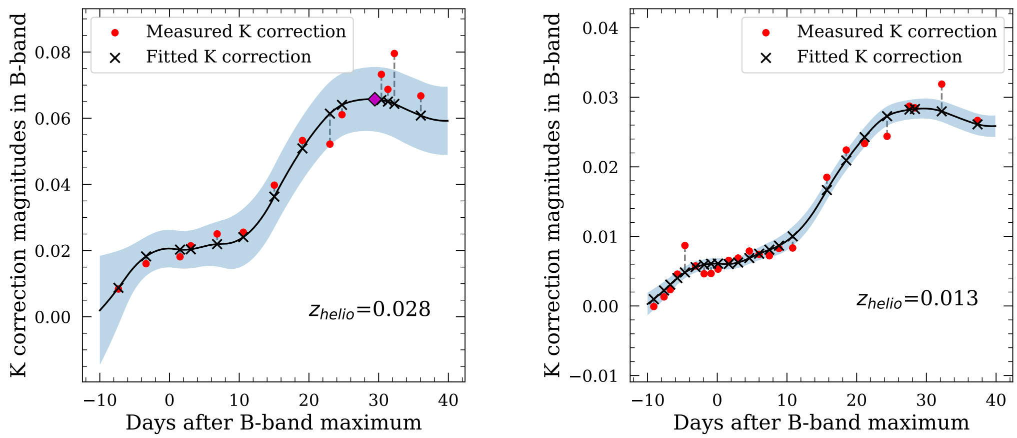


Figure 4.3 Examples of K-correction calculation for SN2016gcl (left) and SN2019vrq (right). The red data points are the K-correction values measured from mangled Hsiao's template. The black line is the FPCA fit to the red data points. The shaded region is the error of the FPCA fit. And the black crosses are the adopted K-correction values derived from the fitted FPCA curve. By fitting a smooth curve to the measured K-correction, we can not only get the error estimates, but also the K-correction values of the epochs when colors are not available to which the spectra need to be mangled to match (one example is the purple diamond on the left panel).

ted using the FPCA light curve fitting technique described above. The time of B-band maximum is then used to determine the rest-frame phase of the SN photometry to select the corresponding [70] template spectrum to be used for K-corrections. In practice, the reddening is unknown before K-correction. The template is mangled using a smooth function to match the observed $B-V$ color when determining the B-band K-corrections, and $V-i'/I/R$ when determining the V-band K-corrections to minimize extrapolation errors. The smooth function used to mangle the template spectra is the [71] reddening law assuming $R_V = 3.1$. The K-corrections are then measured by the difference in the synthetic magnitudes of the mangled spectrum at redshift of zero and the given redshift of the SN (shown as red data points in Figure 4.3). The filter-vague FPCA decomposition of [4] shows that the light curves of SNe Ia can be decomposed into a single set of FPCA vectors independent of the filter bands employed. This implies that the K-correction itself can also be decomposed into the same FPCA basis. The measured K-correction magnitudes at different epochs are further fitted using the [4] FPCA templates with the mean component taken out and the maximum epoch fixed by the previous FPCA fit using `pycmpfit` χ^2 minimization. The final adopted values of the K-corrections (black cross in Figure 4.3) and their corresponding errors (shaded region in Figure 4.3) at desired epochs are then calculated from the fitted curve.

4.2.5 Host Reddening

Fig. 4.4 shows the MW- and K-corrected $B_{max} - V_{max}$ vs. $\Delta m_{15}(B)$. We estimate the position of the "blue edge" (see subsection 3.2.3) by fitting a second order polynomial ($B_{max} - V_{max} = A \times (\Delta m_{15}(B) - 1.1)^2 + C$ where A and C are parameters.) to the ridge line that divides the SN sample into two groups with the bluer group having 10 % of the total number of the SNe in the sample. To do so robustly, 500 bootstrapped samples are generated with replacement from the data set, leading to 500 estimates of the blue ridge lines. The median and standard deviation of these 500 ridge lines are used as the line of the intrinsic color and its corresponding uncertainties, respectively. Uncertainties of the host galaxy extinction are then estimated by the quadrature sum of uncertainties in $B_{max} - V_{max}$ and the uncertainties of the lower boundaries of the intrinsic colors. The equation for the final ridge line is

$$(B_{max} - V_{max})(mag) = 0.188 \times (\Delta m_{15}(B)(mag) - 1.1)^2 - 0.021.$$

4.3 Spectra

Spectra of our 91T/99aa-like sample are plotted in Figure 4.5 at different epochs relative to the B band maximum. For SN2018apo we do not have B-band photometry, so the maximum date was determined using g band photometry. These spectra were collected from the Open Supernova Catalogue [104]. The spectra are grouped into 5 groups each showing the data within 2 days of (a) -13 days, (b) -8 days, (c) -4 days, (d) 0 days, and (e) +6 days from B-band maximum for our 91T/99aa-like sample. The Si II 6355Å

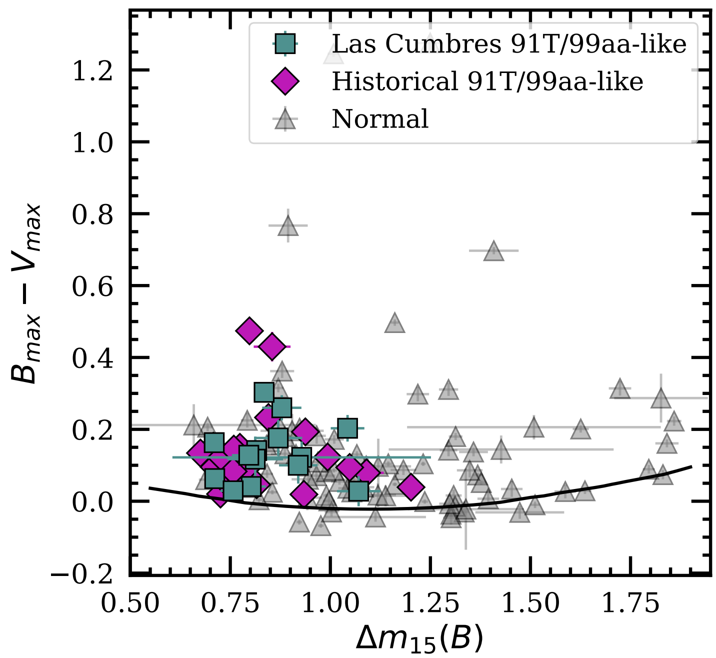


Figure 4.4 Observed $B_{max} - V_{max}$ (MW extinction and K-corrected) versus $\Delta m_{15}(B)$. Extinction can only cause $B_{max} - V_{max}$ to increase in value, thus the lower envelope (plotted as black solid line) can be used as an extinction free curve to correct for host extinction (subsection 4.2.5). 91T/99aa-like data points are plotted in green squares, and historical 91T/99aa-like data points are plotted in purple diamonds. Normal SNe Ia are plotted in grey triangles.

pseudo-equivalent widths (pEWs) of our sample are calculated using the method introduced in section 3.3. The strength of the Si II $6355 \pm 5\text{Å}$ around maximum increases from top to bottom for each group. Spectra of SN1991T, SN1999aa, and the spectroscopically normal SN 2004eo at the relevant phases are plotted in bold lines together with each group for comparisons.

Not all 91T/99aa-like events classified by their spectra are slow decliners. The 91T/99aa-like objects with $\Delta m_{15}(B) > 1.0$ mag are plotted in red in Figure 4.5. It is readily seen that some of the SNe with the shallowest Si II $\lambda\lambda$6355 lines are actually not slow decliners. The slowest decliners among 91T/99aa-like objects with $\Delta m_{15}(B) < 0.8$ mag are plotted in dashed grey line. Although still showing shallower Si II lines, the spectra of 91T/99aa-like objects show all the major spectral features of normal SNe Ia at about 6 days after maximum. This suggests strongly that they share similar ejecta structures with spectroscopically normal SNe Ia and are likely originate from similar physical systems and processes.

4.4 Standardization

The discovery of the accelerating expansion of the universe using SNe Ia was based on the discovery of the relationship between the SNe Ia peak luminosity magnitude and the light curve decline rate [17] and the peak luminosity magnitude and color relationship found later [111, 112], which make SNe Ia standardizable candles. 91T/99aa-like SNe Ia are inevitably over-represented in flux-limited surveys. Understanding the intrinsic properties of these SNe is therefore crucial to controlling the systematic errors when using SNe Ia to measure distances.

A Hubble diagram using SNe Ia can be used to constrain the cosmological acceleration parameters, but it requires a high-redshift SNe Ia sample to be able to differentiate between different cosmology models [113]. However, a nearby SNe Ia sample is also necessary to evaluate the precision of SNe Ia as standardizable candles, specifically, the

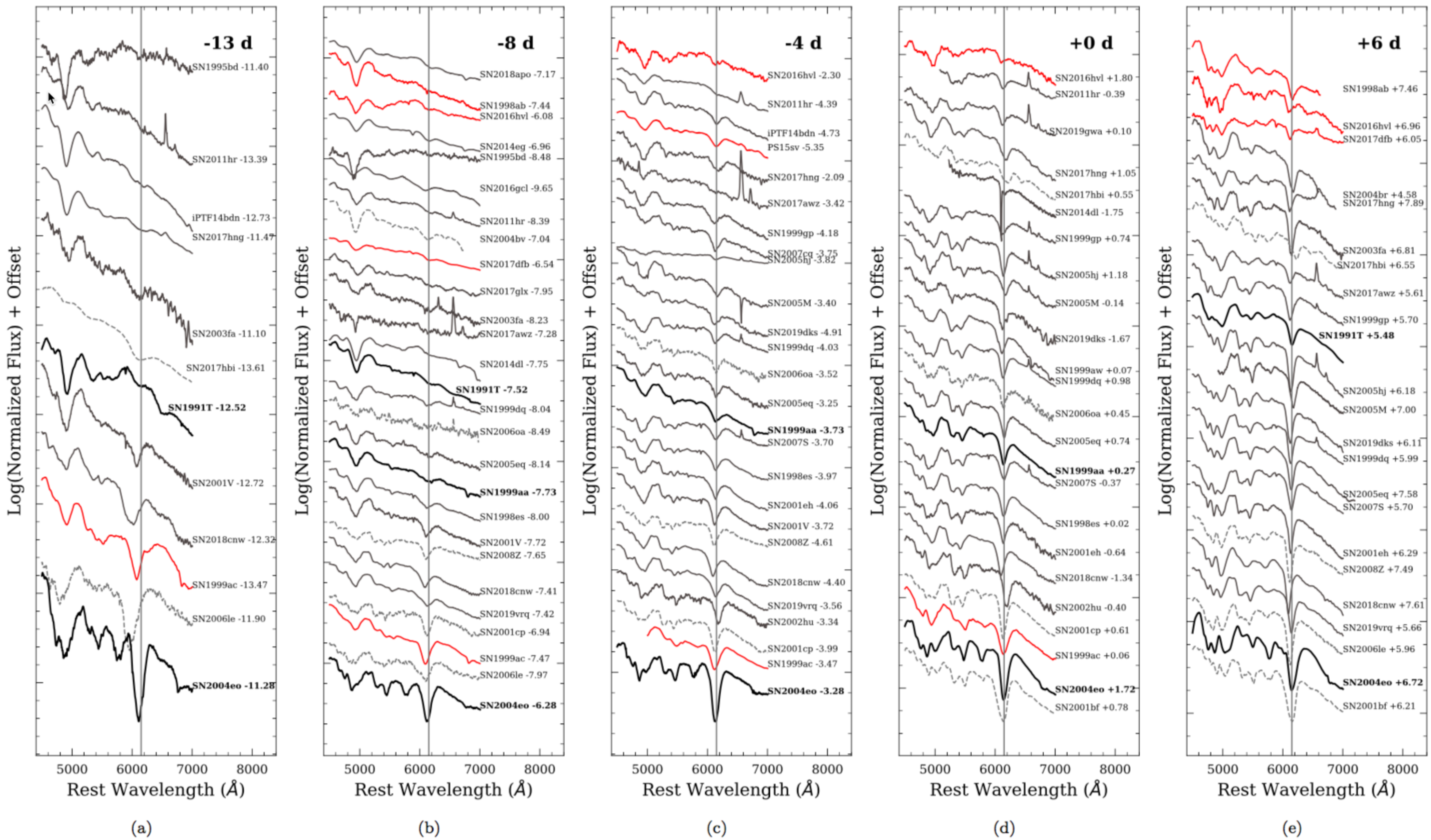


Figure 4.5 Spectra within 2 days of (a) -13 days; (b) -8 days; (c) -4 days; (d) 0 days; and (e) +6 days of our 91T/99aa-like sample. The Si II 6355 ± 5 around maximum increases from top to bottom for each panel. SN 1991T, SN 1999aa, and the typical normal Type Ia SN 2004eo are plotted in bold. 91T/99aa-like objects with $\Delta m_{15}(B) > 1.0$ mag are plotted in red. And normal objects in our sample with $\Delta m_{15}(B) < 0.8$ mag are also plotted in dashed grey lines. A vertical grey line at 6150 is also plotted to guide the eye.

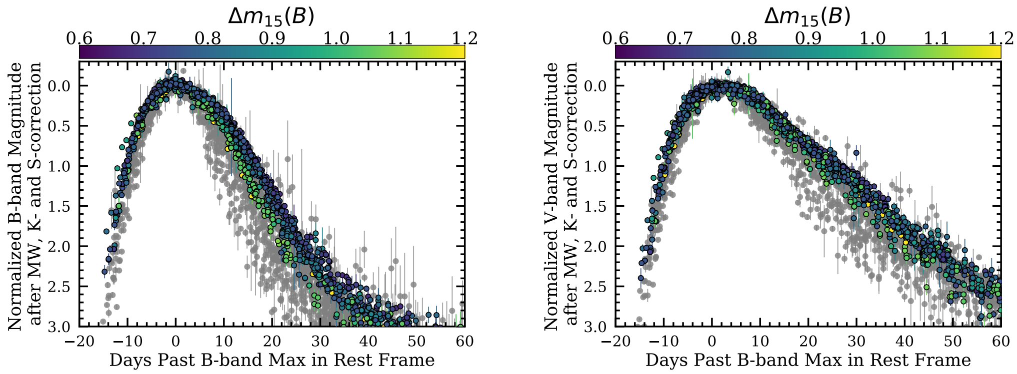


Figure 4.6 B- and V-band light curves for the SNe used in this paper. The light curves have been shifted vertically for better visualization. The grey data points are normal SNe Ia, while the data points of 91T/99aa-like SNe Ia are color coded by $\Delta m_{15}(B)$.

standardizability of 91T/99aa-like objects in our case.

In this section, we evaluate the precision to which 91T/99aa-like SNe Ia may be used as standardizable candles. Recently, more sophisticated modeling and parameterization of SNe Ia are used for SNe Ia standardization, for example SALT2 [57, 114, 115], SNEMO [116], and SUGAR [117]. Here we adopt the simple yet classical two-parameter parameterization using the decline rate $\Delta m_{15}(B)$ and host color excess $E(B-V)_{host}$ for standardization:

$$m_B^* \ = \ m_B(0)^* \ + \ b[\Delta m_{15}(B) - 1.1] + R_B E(B-V)_{host} \ \ , \tag{4.3}$$

where $m_B^* = m_B - R_B E(B-V)_{gal} - K_B$ is the Milky Way and K-corrected apparent peak magnitudes of SNe Ia in the B-band, $m_B(0)^*$ is the expected apparent peak magnitude of our fiducial SN Ia at redshift z, with decline rate $\Delta m_{15}(B)$ = 1.1 and host galaxy reddening $E(B-V)_{host} = 0$. Here we adopt the approximation of $m_B(0)^* = 5log_{10}(cz) + k$

since all SNe in our sample have $z \leq 0.1$. Thus, we immediately have

$$H_0 = 10^{0.2(M_B(0)+k+25)}$$

where $M_B(0)$ is the absolute peak magnitude of a fiducial SN Ia. The global parameters are then (b, R_B, k) where k is the intercept of the Hubble diagram. The Phillips luminosity-decline relationship [17] is represented by the parameter b, the luminosity-color relationship is determined by R_B, and k contains the information of Hubble constant at present, or equivalently, the absolute magnitude of the fiducial SN Ia.

In the analyses presented here, heliocentric redshifts were converted into the CMB frame using the velocity vector determined by [118] to calculate luminosity distances. The uncertainty in the redshifts due to peculiar velocities is assumed to be $\sigma_z = 0.001$ (300 km/s in velocity).

Parameters in Equation 4.3 are determined by fitting SNe in our sample with $z_{cmb} > 0.01$ using χ^2 minimization of

$$\chi^2 = \sum_{i=1}^{N} \frac{(m^*_{Bcorr} - m_B(0)^*)^2}{\sigma^2_{m^*_{Bcorr,i}} + \sigma^2_{intrinsic} + \sigma^2_{pec}} \ , \tag{4.4}$$

where $m^*_{Bcorr} = m^*_B - b\Delta(m_{15}(B) - 1.1) - R_B E(B-V)$, σ_{pec} accounts for peculiar velocity (v_{pec} = 300 km s^{-1}),

$$\sigma^2_{m^*_{Bcorr}} = \sigma^2_{m^*_B} + b^2\sigma^2_{\Delta m_{15}(B)} + R^2_B \sigma^2_{E(B-V)} \ , \tag{4.5}$$

and $\sigma_{intrinsic}$ is an additional parameter that accounts for possible intrinsic scatter in SNe Ia, which is determined so that the final $\chi^2_\nu = 1$.

Table 4.4 Parameters of 91T/99aa-like SNe Ia in our sample.

SN (subtype)[a]	z_{CMB}	pEW^b (Å)	$E(B-V)_{host}$ (mag)	Hubble Residual (mag)	$t_{max}(B)$ (MJD)	$\Delta m_{15}(B)$ (mag)	$m_{max}(B)$ (mag)	PC1(B)	PC2(B)	$t_{max}(V)$ (MJD)	$\Delta m_{15}(V)$ (mag)	$m_{max}(V)$ (mag)	PC1(V)	PC2(V)
LSQ15aae	0.0518	...	0.27 (0.04)	-0.35 (0.31)	57116.45 (0.35)	0.88 (0.05)	17.77 (0.03)	-0.28 (0.32)	-0.03 (0.20)	57118.78 (0.35)	0.58 (0.04)	17.51 (0.02)	-0.39 (0.24)	0.00 (0.12)
PS15sv (3)	0.0333	32.0	0.05 (0.04)	-0.26 (0.33)	57114.35 (0.85)	1.07 (0.05)	16.31 (0.04)	1.25 (0.51)	-0.35 (0.21)	57115.85 (0.32)	0.69 (0.03)	16.28 (0.02)	0.52 (0.19)	0.04 (0.08)
SN1991T (4)	0.0069	42.2	0.21 (0.02)	-2.00 (0.47)	48375.52 (0.18)	0.94 (0.01)	11.60 (0.01)	-0.13 (0.09)	-0.06 (0.04)	48378.19 (0.12)	0.62 (0.01)	11.41 (0.01)	-0.34 (0.07)	0.19 (0.04)
SN1995bd (2)	0.0144	20.1	0.44 (0.04)	-0.38 (0.35)	50085.74 (0.21)	0.85 (0.05)	15.51 (0.03)	-0.98 (0.31)	0.24 (0.13)	50087.50 (0.22)	0.69 (0.04)	15.08 (0.02)	-0.29 (0.23)	0.43 (0.11)
SN1998ab (0)	0.0279	4.5	0.10 (0.05)	-0.37 (0.34)	50913.82 (0.16)	1.09 (0.04)	16.00 (0.03)	1.48 (0.28)	-0.46 (0.09)	50915.94 (0.25)	0.62 (0.04)	15.92 (0.03)	0.12 (0.25)	-0.10 (0.11)
SN1998es (5)	0.0096	53.0	0.14 (0.01)	-0.01 (0.35)	51142.20 (0.04)	0.71 (0.01)	13.87 (0.01)	-0.78 (0.08)	-0.67 (0.04)	51144.30 (0.05)	0.52 (0.01)	13.72 (0.01)	-0.76 (0.05)	-0.10 (0.03)
SN1999aa (5)	0.0152	52.4	0.01 (0.01)	0.29 (0.32)	51231.73 (0.04)	0.73 (0.01)	14.76 (0.01)	-0.55 (0.05)	-0.74 (0.03)	51233.92 (0.05)	0.54 (0.01)	14.74 (0.00)	-0.51 (0.04)	-0.12 (0.02)
SN1999ac (8)	0.0098	80.4	0.06 (0.02)	0.01 (0.37)	51249.47 (0.03)	1.20 (0.01)	14.07 (0.01)	1.09 (0.05)	0.20 (0.03)	51252.63 (0.07)	0.65 (0.01)	14.03 (0.00)	0.41 (0.04)	-0.12 (0.03)
SN1999aw (4)	0.0392	48.7	0.12 (0.02)	-0.11 (0.29)	51253.93 (0.23)	0.68 (0.01)	16.72 (0.01)	-1.90 (0.11)	0.15 (0.04)	51255.63 (0.24)	0.57 (0.02)	16.59 (0.01)	-1.27 (0.10)	0.45 (0.07)
SN1999dq (4)	0.0135	49.8	0.15 (0.01)	-0.25 (0.32)	51435.47 (0.04)	0.77 (0.01)	14.45 (0.01)	-0.03 (0.06)	-0.91 (0.05)	51437.38 (0.06)	0.54 (0.01)	14.30 (0.01)	-0.74 (0.05)	-0.02 (0.03)
SN1999gp (4)	0.0260	41.8	0.09 (0.01)	0.02 (0.30)	51549.39 (0.05)	0.79 (0.01)	15.97 (0.01)	-0.80 (0.07)	-0.17 (0.06)	51551.71 (0.09)	0.53 (0.01)	15.88 (0.00)	-1.31 (0.07)	0.28 (0.05)
SN2001V (5)	0.0160	55.2	0.12 (0.04)	-0.33 (0.34)	51972.71 (0.19)	0.75 (0.04)	14.63 (0.04)	-0.19 (0.30)	-0.92 (0.06)	51975.15 (0.11)	0.54 (0.02)	14.50 (0.01)	-0.44 (0.10)	-0.18 (0.06)
SN2001eh (5)	0.0361	53.9	0.08 (0.01)	-0.01 (0.29)	52168.06 (0.24)	0.71 (0.01)	16.57 (0.01)	-1.35 (0.13)	-0.11 (0.06)	52170.52 (0.12)	0.53 (0.01)	16.47 (0.00)	-1.42 (0.07)	0.37 (0.05)
SN2002hu (6)	0.0292	65.8	0.04 (0.02)	0.43 (0.30)	52591.65 (0.18)	0.93 (0.02)	16.57 (0.01)	0.59 (0.16)	-0.54 (0.09)	52593.62 (0.27)	0.60 (0.02)	16.55 (0.01)	-0.00 (0.22)	-0.16 (0.12)
SN2003fa (3)	0.0402	38.4	0.04 (0.02)	-0.13 (0.29)	52806.52 (0.04)	0.77 (0.01)	16.58 (0.01)	-0.39 (0.08)	-0.57 (0.06)	52808.67 (0.07)	0.53 (0.01)	16.53 (0.01)	-0.63 (0.09)	-0.14 (0.05)
SN2004br (3)	0.0244	37.0	0.04 (0.01)	-0.16 (0.30)	53147.72 (0.19)	0.75 (0.01)	15.44 (0.00)	-0.25 (0.14)	-0.84 (0.08)	53150.31 (0.21)	0.55 (0.02)	15.40 (0.01)	-0.59 (0.16)	-0.02 (0.10)
SN2005M (4)	0.0256	46.1	0.05 (0.01)	0.07 (0.30)	53405.40 (0.08)	0.82 (0.01)	15.87 (0.01)	-0.64 (0.07)	-0.18 (0.04)	53407.33 (0.08)	0.55 (0.01)	15.82 (0.01)	-0.52 (0.06)	-0.10 (0.04)
SN2005eq (5)	0.0284	51.7	0.11 (0.02)	0.08 (0.30)	53653.65 (0.10)	0.73 (0.01)	16.25 (0.01)	-0.93 (0.09)	-0.38 (0.04)	53655.39 (0.09)	0.53 (0.01)	16.12 (0.01)	-0.75 (0.07)	-0.07 (0.04)
SN2005hj (4)	0.0559	43.1	0.14 (0.02)	-0.13 (0.29)	53673.82 (0.65)	0.76 (0.03)	17.62 (0.01)	-1.20 (0.31)	0.10 (0.13)	53675.14 (0.46)	0.55 (0.02)	17.48 (0.01)	-0.57 (0.19)	-0.06 (0.10)
SN2007S (5)	0.0151	53.0	0.47 (0.01)	-0.22 (0.33)	54143.70 (0.09)	0.80 (0.01)	15.84 (0.01)	-0.93 (0.08)	-0.09 (0.04)	54145.94 (0.06)	0.57 (0.01)	15.36 (0.01)	-0.60 (0.06)	0.06 (0.03)
SN2007cq (4)	0.0248	42.9	0.14 (0.02)	-0.32 (0.30)	54280.20 (0.13)	0.99 (0.01)	15.86 (0.01)	0.81 (0.12)	-0.43 (0.07)	54282.87 (0.08)	0.69 (0.01)	15.74 (0.01)	1.08 (0.09)	-0.32 (0.05)
SN2011hr (2)	0.0145	27.6	0.24 (0.02)	-0.40 (0.33)	55888.39 (0.06)	0.85 (0.02)	14.82 (0.01)	-0.23 (0.12)	-0.41 (0.04)	55889.92 (0.09)	0.54 (0.01)	14.59 (0.01)	-0.91 (0.07)	0.13 (0.04)
SN2014dl (3)	0.0332	39.5	0.14 (0.05)	-0.78 (0.42)	56934.75 (0.65)	0.93 (0.32)	15.97 (0.03)	0.53 (6.50)	-0.51 (3.74)	56937.40 (0.78)	0.57 (0.08)	15.85 (0.03)	-0.37 (1.69)	-0.09 (0.85)
SN2014eg (1)	0.0183	14.3	0.31 (0.02)	-0.46 (0.31)	56991.21 (0.11)	0.83 (0.01)	15.50 (0.01)	0.13 (0.11)	-0.72 (0.06)	56993.84 (0.15)	0.58 (0.02)	15.19 (0.01)	-0.01 (0.12)	-0.22 (0.07)
SN2016gcl (2)	0.0268	26.9	0.05 (0.03)	0.28 (0.31)	57649.15 (0.16)	0.71 (0.03)	16.10 (0.02)	-1.25 (0.17)	-0.22 (0.06)	57650.97 (0.18)	0.53 (0.02)	16.04 (0.01)	-1.09 (0.13)	0.16 (0.06)
SN2016hvl (1)	0.0135	12.8	0.12 (0.03)	-0.55 (0.34)	57709.69 (0.12)	1.05 (0.03)	14.27 (0.02)	0.46 (0.17)	0.06 (0.07)	57713.10 (0.21)	0.59 (0.02)	14.18 (0.01)	-0.28 (0.11)	0.01 (0.05)
SN2017awz (3)	0.0233	39.5	0.15 (0.02)	-0.31 (0.31)	57811.94 (0.19)	0.82 (0.03)	15.60 (0.02)	-0.21 (0.17)	-0.53 (0.09)	57815.05 (0.18)	0.59 (0.02)	15.46 (0.01)	-0.17 (0.12)	-0.10 (0.07)
SN2017dfb (3)	0.0264	34.5	0.22 (0.04)	-0.68 (0.33)	57871.54 (1.01)	1.04 (0.04)	15.96 (0.03)	1.96 (0.60)	-1.09 (0.25)	57873.99 (0.46)	0.73 (0.03)	15.75 (0.02)	1.07 (0.22)	-0.09 (0.13)
SN2017glx (3)	0.0112	35.1	0.19 (0.05)	-0.24 (0.38)	58008.65 (0.25)	0.87 (0.06)	14.28 (0.02)	0.03 (0.23)	-0.50 (0.14)	58010.12 (0.63)	0.58 (0.08)	14.10 (0.04)	-0.34 (0.40)	-0.06 (0.22)
SN2017hng (3)	0.0387	35.5	0.12 (0.06)	-0.00 (0.37)	58062.47 (0.27)	0.81 (0.07)	16.93 (0.05)	-0.93 (0.40)	0.09 (0.18)	58063.64 (0.60)	0.51 (0.06)	16.81 (0.04)	-1.20 (0.36)	0.15 (0.18)
SN2018bie	0.0232	...	0.12 (0.05)	-0.08 (0.35)	58264.93 (0.20)	0.92 (0.05)	15.81 (0.03)	0.35 (0.30)	-0.46 (0.10)	58266.95 (0.45)	0.65 (0.05)	15.71 (0.04)	0.11 (0.33)	0.08 (0.15)
SN2018cnw (5)	0.0241	58.3	0.15 (0.03)	-0.32 (0.31)	58300.85 (0.10)	0.71 (0.03)	15.60 (0.01)	-0.91 (0.14)	-0.51 (0.09)	58302.91 (0.21)	0.56 (0.03)	15.44 (0.02)	-0.42 (0.19)	-0.11 (0.10)
SN2019dks (4)	0.0583	48.4	0.04 (0.03)	-0.28 (0.30)	58598.20 (0.17)	0.80 (0.04)	17.27 (0.02)	0.02 (0.21)	-0.65 (0.12)	58599.58 (0.32)	0.56 (0.04)	17.23 (0.02)	-0.37 (0.22)	-0.10 (0.14)
SN2019gwa (3)	0.0554	35.1	0.13 (0.04)	-0.15 (0.32)	58651.23 (0.27)	0.80 (0.04)	17.57 (0.03)	0.33 (0.39)	-0.94 (0.26)	58654.24 (0.44)	0.56 (0.05)	17.44 (0.03)	-0.39 (0.60)	-0.09 (0.43)
SN2019vrq (5)	0.0125	58.4	0.02 (0.02)	0.13 (0.34)	58830.86 (0.14)	0.76 (0.03)	14.24 (0.02)	-0.42 (0.18)	-0.69 (0.09)	58832.31 (0.13)	0.55 (0.02)	14.21 (0.01)	-0.50 (0.11)	-0.07 (0.06)
iPTF14bdn (3)	0.0164	30.9	0.08 (0.03)	-0.10 (0.34)	56821.73 (0.11)	0.76 (0.03)	14.77 (0.02)	-0.89 (0.20)	-0.32 (0.08)	56824.14 (0.26)	0.56 (0.03)	14.69 (0.03)	-0.40 (0.22)	-0.10 (0.09)

[a] Sub-type classification based on the strength of pEW_{max}(Si II $\lambda\lambda$6355). The classification is the floor hexadecimal integer of pEW_{max}(Si II $\lambda\lambda$6355)/10 (see subsection 4.5.3 for more details).

[b] pEW of Si II λ6355 line around maximum light.

Table 4.5: Parameters of normal SNe Ia in our sample.

SN (subtype)	z_{CMB}	pEW (Å)	$E(B-V)_{host}$ (mag)	Hubble Residual (mag)	$t_{max}(B)$ (MJD)	$\Delta m_{15}(B)$ (mag)	$m_{max}(B)$ (mag)	PC1(B)	PC2(B)	$t_{max}(V)$ (MJD)	$\Delta m_{15}(V)$ (mag)	$m_{max}(V)$ (mag)	PC1(V)	PC2(V)
SN1998dh (C)	0.0078	121.6	0.12 (0.02)	0.09 (0.25)	51029.19 (0.03)	1.23 (0.01)	13.88 (0.00)	2.01 (0.05)	-0.40 (0.03)	51031.57 (0.04)	0.69 (0.01)	13.77 (0.01)	0.90 (0.04)	-0.25 (0.02)
SN1998dm (6)	0.0060	68.4	0.33 (0.02)	1.07 (0.32)	51060.38 (0.07)	0.87 (0.01)	14.68 (0.01)	0.14 (0.10)	-0.61 (0.04)	51062.06 (0.05)	0.60 (0.01)	14.37 (0.01)	-0.08 (0.06)	-0.07 (0.02)
SN1999cp (9)	0.0099	99.6	0.04 (0.02)	0.10 (0.25)	51363.46 (0.04)	0.99 (0.01)	13.93 (0.00)	0.90 (0.06)	-0.60 (0.04)	51364.71 (0.05)	0.66 (0.01)	13.91 (0.00)	0.15 (0.05)	0.09 (0.03)
SN1999dk (C)	0.0140	126.4	0.12 (0.02)	-0.15 (0.18)	51414.78 (0.13)	1.09 (0.02)	14.79 (0.01)	1.48 (0.16)	-0.54 (0.09)	51416.88 (0.15)	0.68 (0.02)	14.69 (0.01)	0.63 (0.13)	-0.13 (0.06)
SN2000cn (B)	0.0227	118.6	0.17 (0.02)	-0.05 (0.12)	51707.17 (0.04)	1.63 (0.02)	16.53 (0.01)	4.78 (0.23)	-0.62 (0.15)	51709.58 (0.08)	0.96 (0.01)	16.33 (0.01)	3.79 (0.22)	-0.61 (0.11)
SN2000cw (B)	0.0288	111.4	0.11 (0.02)	0.11 (0.12)	51748.18 (0.19)	1.18 (0.03)	16.66 (0.01)	2.31 (0.46)	-0.64 (0.34)	51751.05 (0.22)	0.69 (0.02)	16.57 (0.01)	1.23 (0.34)	-0.45 (0.19)
SN2000dk (C)	0.0160	121.6	-0.01 (0.02)	0.05 (0.15)	51812.27 (0.06)	1.64 (0.02)	15.30 (0.01)	4.29 (0.15)	-0.22 (0.09)	51814.42 (0.06)	0.95 (0.01)	15.28 (0.01)	3.33 (0.09)	-0.44 (0.06)
SN2000dn (9)	0.0307	98.7	0.08 (0.04)	0.06 (0.15)	51824.74 (0.14)	1.06 (0.04)	16.55 (0.02)	1.32 (0.36)	-0.47 (0.25)	51827.22 (0.17)	0.69 (0.03)	16.49 (0.02)	0.94 (0.24)	-0.23 (0.14)
SN2000dr (C)	0.0180	124.9	0.08 (0.03)	-0.04 (0.16)	51834.31 (0.09)	1.84 (0.03)	15.94 (0.01)	5.00 (0.00)	0.27 (0.16)	51836.42 (0.14)	1.00 (0.02)	15.77 (0.01)	3.52 (0.19)	-0.32 (0.12)
SN2000fa (9)	0.0215	90.9	0.19 (0.02)	-0.05 (0.13)	51891.96 (0.14)	0.89 (0.02)	15.91 (0.01)	0.30 (0.13)	-0.59 (0.07)	51893.77 (0.22)	0.60 (0.01)	15.73 (0.01)	-0.03 (0.09)	-0.13 (0.05)
SN2001bf (C)	0.0147	125.5	0.05 (0.01)	0.15 (0.16)	52044.22 (0.05)	0.78 (0.01)	14.70 (0.01)	-0.30 (0.08)	-0.65 (0.04)	52045.99 (0.07)	0.51 (0.01)	14.65 (0.01)	-0.87 (0.05)	-0.06 (0.04)
SN2001ck (8)	0.0356	85.5	0.09 (0.03)	-0.09 (0.13)	52072.55 (0.22)	0.97 (0.05)	16.68 (0.02)	1.32 (0.54)	-0.94 (0.35)	52074.50 (0.20)	0.65 (0.03)	16.61 (0.01)	0.25 (0.25)	-0.01 (0.15)
SN2001cp (7)	0.0220	72.8	0.10 (0.02)	0.08 (0.13)	52088.39 (0.12)	0.79 (0.02)	15.69 (0.01)	-0.64 (0.17)	-0.32 (0.12)	52089.98 (0.11)	0.60 (0.01)	15.59 (0.01)	-0.42 (0.13)	0.14 (0.09)
SN2001dl	0.0199	...	0.37 (0.02)	0.46 (0.14)	52130.82 (0.13)	0.88 (0.03)	16.84 (0.01)	0.23 (0.22)	-0.57 (0.13)	52132.42 (0.14)	0.64 (0.02)	16.48 (0.01)	0.04 (0.14)	0.04 (0.09)
SN2001ep (A)	0.0129	109.4	0.08 (0.01)	-0.01 (0.18)	52199.54 (0.03)	1.37 (0.01)	14.85 (0.00)	2.91 (0.06)	-0.41 (0.06)	52202.14 (0.06)	0.72 (0.01)	14.78 (0.00)	1.33 (0.05)	-0.31 (0.04)
SN2002cr (9)	0.0099	99.7	0.02 (0.02)	0.19 (0.25)	52408.57 (0.03)	1.24 (0.01)	14.16 (0.00)	2.12 (0.04)	-0.46 (0.03)	52410.80 (0.04)	0.69 (0.01)	14.16 (0.00)	0.93 (0.04)	-0.26 (0.02)
SN2002de (7)	0.0282	75.0	0.22 (0.02)	-0.01 (0.11)	52433.16 (0.10)	0.92 (0.01)	16.64 (0.01)	0.55 (0.14)	-0.57 (0.10)	52435.49 (0.12)	0.62 (0.01)	16.44 (0.00)	0.03 (0.11)	-0.07 (0.07)
SN2002eb (6)	0.0268	66.3	0.03 (0.01)	0.10 (0.11)	52493.91 (0.05)	0.86 (0.01)	15.98 (0.00)	0.33 (0.07)	-0.74 (0.05)	52496.31 (0.10)	0.54 (0.01)	15.96 (0.01)	-0.64 (0.08)	-0.08 (0.06)
SN2002el	0.0281	...	0.03 (0.02)	-0.22 (0.12)	52508.47 (0.07)	1.31 (0.02)	16.11 (0.01)	3.48 (0.19)	-1.07 (0.13)	52510.66 (0.11)	0.73 (0.02)	16.09 (0.01)	1.46 (0.16)	-0.37 (0.09)
SN2002er (9)	0.0090	91.5	0.16 (0.02)	-0.05 (0.26)	52524.49 (0.07)	1.30 (0.02)	14.22 (0.01)	2.55 (0.13)	-0.51 (0.07)	52526.84 (0.09)	0.72 (0.02)	14.08 (0.01)	1.07 (0.10)	-0.19 (0.06)
SN2002fk (7)	0.0065	72.2	-0.05 (0.02)	0.55 (0.32)	52547.64 (0.05)	0.98 (0.01)	13.17 (0.00)	0.96 (0.05)	-0.73 (0.02)	52549.20 (0.07)	0.63 (0.01)	13.24 (0.00)	0.14 (0.04)	-0.07 (0.03)
SN2002ha (A)	0.0130	104.0	-0.02 (0.02)	0.19 (0.17)	52581.19 (0.06)	1.33 (0.01)	14.70 (0.01)	3.07 (0.07)	-0.71 (0.05)	52583.25 (0.06)	0.81 (0.01)	14.73 (0.01)	2.22 (0.07)	-0.43 (0.04)
SN2002jg (A)	0.0149	103.8	0.70 (0.02)	-0.09 (0.16)	52609.96 (0.08)	1.41 (0.06)	17.17 (0.01)	2.60 (0.94)	0.00 (0.52)	52612.23 (0.08)	0.86 (0.01)	16.47 (0.01)	2.34 (0.15)	-0.27 (0.08)
SN2003cg (9)	0.0052	93.4	1.27 (0.02)	-0.73 (0.56)	52729.45 (0.06)	1.01 (0.01)	15.83 (0.01)	1.14 (0.13)	-0.72 (0.08)	52731.40 (0.05)	0.68 (0.01)	14.58 (0.00)	0.64 (0.05)	-0.11 (0.03)
SN2003du (8)	0.0063	84.2	-0.04 (0.02)	0.97 (0.37)	52765.57 (0.06)	0.92 (0.01)	13.49 (0.01)	0.45 (0.05)	-0.59 (0.02)	52767.44 (0.08)	0.61 (0.01)	13.55 (0.00)	0.17 (0.04)	-0.22 (0.02)
SN2003gt (7)	0.0150	72.9	0.10 (0.02)	-0.00 (0.16)	52861.90 (0.04)	0.99 (0.01)	14.95 (0.01)	1.20 (0.07)	-0.80 (0.04)	52863.85 (0.06)	0.64 (0.01)	14.87 (0.01)	0.45 (0.06)	-0.19 (0.03)
SN2003he (9)	0.0238	96.6	0.15 (0.02)	0.16 (0.12)	52875.93 (0.11)	0.91 (0.01)	16.19 (0.01)	0.57 (0.12)	-0.65 (0.07)	52878.72 (0.12)	0.60 (0.01)	16.06 (0.01)	-0.05 (0.08)	-0.09 (0.06)
SN2004as (D)	0.0321	130.7	0.19 (0.02)	-0.03 (0.11)	53084.73 (0.10)	1.01 (0.02)	16.89 (0.01)	0.36 (0.16)	0.04 (0.10)	53087.82 (0.11)	0.67 (0.02)	16.72 (0.01)	0.82 (0.11)	-0.30 (0.08)

Sub-type classification based on the strength of pEW_{max}(Si II $\lambda\lambda$6355). The classification is the floor hexadecimal integer of pEW_{max}(Si II $\lambda\lambda$6355)/10 (see subsection 4.5.3 for more details).

pEW of Si II λ6355 line around maximum light.

SN2004at (8)	0.0235	87.0	-0.01 (0.02)	0.09 (0.13)	53091.88 (0.08)	1.00 (0.02)	15.66 (0.01)	1.13 (0.13)	-0.65 (0.09)	53094.02 (0.11)	0.64 (0.01)	15.69 (0.01)	0.25 (0.11)	-0.10 (0.07)
SN2004bv (3)	0.0102	33.8	0.19 (0.02)	-0.22 (0.21)	53159.54 (0.05)	0.69 (0.01)	13.97 (0.01)	-1.03 (0.08)	-0.54 (0.05)	53162.12 (0.06)	0.55 (0.01)	13.76 (0.01)	-0.53 (0.06)	-0.10 (0.03)
SN2004eo (A)	0.0150	103.8	0.06 (0.01)	-0.07 (0.15)	53278.28 (0.03)	1.38 (0.01)	15.05 (0.00)	2.87 (0.13)	-0.32 (0.08)	53280.75 (0.07)	0.72 (0.01)	15.00 (0.00)	1.48 (0.09)	-0.41 (0.05)
SN2004fz (8)	0.0161	85.4	-0.00 (0.02)	-0.16 (0.15)	53333.47 (0.05)	1.31 (0.01)	14.87 (0.01)	3.52 (0.08)	-1.16 (0.07)	53336.36 (0.07)	0.75 (0.01)	14.89 (0.01)	1.90 (0.13)	-0.56 (0.09)
SN2005cf (8)	0.0066	86.9	0.05 (0.02)	0.26 (0.37)	53533.67 (0.02)	1.05 (0.01)	13.29 (0.00)	1.15 (0.04)	-0.50 (0.02)	53535.88 (0.05)	0.62 (0.01)	13.26 (0.00)	0.49 (0.04)	-0.32 (0.02)
SN2005de (9)	0.0147	97.2	0.13 (0.02)	0.29 (0.17)	53598.47 (0.03)	1.14 (0.01)	15.40 (0.01)	1.76 (0.07)	-0.48 (0.06)	53600.96 (0.05)	0.64 (0.01)	15.30 (0.01)	0.77 (0.06)	-0.45 (0.04)
SN2005el (8)	0.0150	89.5	-0.02 (0.01)	0.07 (0.16)	53646.85 (0.03)	1.30 (0.01)	14.86 (0.00)	2.92 (0.05)	-0.74 (0.03)	53648.14 (0.04)	0.79 (0.01)	14.89 (0.00)	1.68 (0.04)	-0.18 (0.02)
SN2005eu (2)	0.0342	28.6	0.07 (0.03)	-0.05 (0.12)	53659.88 (0.10)	0.80 (0.03)	16.44 (0.02)	0.19 (0.20)	-0.90 (0.12)	53661.73 (0.13)	0.62 (0.02)	16.37 (0.01)	-0.01 (0.12)	-0.02 (0.08)
SN2005kc (8)	0.0139	88.0	0.32 (0.02)	-0.06 (0.18)	53697.68 (0.17)	1.22 (0.03)	15.63 (0.02)	1.81 (0.19)	-0.27 (0.12)	53699.33 (0.17)	0.71 (0.02)	15.33 (0.01)	0.51 (0.14)	0.08 (0.09)
SN2005ki (A)	0.0202	101.2	0.01 (0.02)	-0.08 (0.15)	53705.54 (0.09)	1.39 (0.03)	15.53 (0.01)	3.59 (0.13)	-0.79 (0.09)	53706.90 (0.20)	0.85 (0.02)	15.53 (0.01)	2.40 (0.11)	-0.33 (0.08)
SN2005lz (A)	0.0435	106.7	0.14 (0.04)	-0.21 (0.28)	53736.07 (0.57)	1.43 (0.28)	17.54 (0.03)	5.00 (0.00)	-1.58 (1.19)	53736.91 (0.31)	0.78 (0.05)	17.39 (0.02)	0.39 (0.28)	0.43 (0.21)
SN2005mc (7)	0.0259	74.0	0.26 (0.03)	-0.07 (0.14)	53733.61 (0.19)	1.72 (0.03)	17.20 (0.01)	5.00 (0.00)	-0.28 (0.21)	53736.48 (0.17)	1.04 (0.04)	16.89 (0.02)	4.94 (0.30)	-0.89 (0.18)
SN2005mz (9)	0.0171	91.5	0.27 (0.05)	-0.22 (0.21)	53745.74 (0.08)	2.07 (0.04)	16.44 (0.01)	4.81 (0.29)	1.57 (0.20)	53747.50 (0.07)	1.38 (0.02)	16.04 (0.01)	5.00 (0.13)	0.61 (0.09)
SN2006S (6)	0.0331	61.4	0.15 (0.02)	0.06 (0.12)	53769.32 (0.26)	0.89 (0.04)	16.79 (0.01)	-0.00 (0.22)	-0.30 (0.13)	53771.62 (0.22)	0.49 (0.02)	16.66 (0.01)	-0.68 (0.14)	-0.14 (0.10)
SN2006ax (8)	0.0180	84.3	0.02 (0.02)	-0.05 (0.16)	53827.07 (0.05)	1.00 (0.01)	15.03 (0.01)	0.78 (0.08)	-0.44 (0.06)	53828.55 (0.12)	0.65 (0.01)	15.03 (0.01)	0.04 (0.08)	0.13 (0.05)
SN2006dm (A)	0.0208	107.0	0.00 (0.02)	0.14 (0.14)	53928.90 (0.10)	1.59 (0.03)	15.94 (0.01)	3.62 (0.17)	0.12 (0.11)	53930.81 (0.10)	0.88 (0.02)	15.92 (0.01)	2.52 (0.12)	-0.32 (0.07)
SN2006gr (7)	0.0338	70.5	0.17 (0.02)	0.07 (0.11)	54012.23 (0.07)	0.85 (0.02)	16.91 (0.01)	-0.86 (0.14)	0.19 (0.08)	54015.10 (0.12)	0.56 (0.02)	16.75 (0.01)	-0.31 (0.11)	-0.19 (0.07)
SN2006le (9)	0.0168	90.3	0.04 (0.02)	0.16 (0.16)	54047.42 (0.09)	0.79 (0.02)	14.98 (0.01)	-0.57 (0.14)	-0.42 (0.07)	54049.76 (0.10)	0.57 (0.01)	14.94 (0.01)	-0.55 (0.09)	0.03 (0.05)
SN2006lf (A)	0.0128	109.1	-0.01 (0.11)	-0.28 (0.45)	54045.65 (0.46)	1.34 (0.14)	14.23 (0.09)	2.46 (0.85)	-0.20 (0.42)	54047.33 (0.49)	0.81 (0.09)	14.25 (0.06)	2.16 (0.52)	-0.39 (0.25)
SN2006oa (5)	0.0614	51.5	0.19 (0.06)	-0.24 (0.33)	54065.65 (0.96)	0.66 (0.30)	17.82 (0.05)	-1.91 (6.52)	0.16 (4.75)	54069.24 (0.95)	0.56 (0.10)	17.60 (0.03)	-0.63 (2.63)	0.02 (1.20)
SN2006ob (6)	0.0582	66.8	0.19 (0.04)	-0.50 (0.29)	54062.57 (0.56)	1.51 (0.32)	18.11 (0.03)	5.00 (0.00)	-1.12 (1.46)	54066.07 (0.23)	1.03 (0.04)	17.91 (0.02)	5.00 (0.00)	-0.97 (0.18)
SN2007F (8)	0.0246	80.0	0.08 (0.02)	0.05 (0.12)	54123.42 (0.06)	0.84 (0.01)	15.89 (0.01)	0.33 (0.09)	-0.82 (0.06)	54125.34 (0.08)	0.59 (0.01)	15.81 (0.01)	-0.15 (0.06)	-0.09 (0.04)
SN2007af (A)	0.0058	104.2	0.07 (0.02)	0.21 (0.45)	54174.11 (0.05)	1.16 (0.01)	13.13 (0.00)	1.86 (0.05)	-0.54 (0.02)	54176.23 (0.05)	0.67 (0.01)	13.09 (0.00)	0.79 (0.04)	-0.27 (0.02)
SN2007au (D)	0.0213	136.6	0.14 (0.03)	-0.05 (0.16)	54184.07 (0.06)	1.86 (0.02)	16.49 (0.01)	5.00 (0.00)	0.37 (0.10)	54186.79 (0.07)	1.06 (0.01)	16.27 (0.01)	4.26 (0.20)	-0.46 (0.11)
SN2007bm (9)	0.0072	99.7	0.52 (0.02)	-0.38 (0.38)	54224.44 (0.05)	1.16 (0.01)	14.52 (0.01)	1.87 (0.07)	-0.54 (0.04)	54226.32 (0.22)	0.70 (0.01)	14.02 (0.01)	0.98 (0.06)	-0.21 (0.04)
SN2007ci (C)	0.0191	121.6	0.02 (0.03)	-0.01 (0.16)	54246.54 (0.04)	1.80 (0.01)	15.85 (0.01)	5.00 (0.00)	0.02 (0.09)	54249.46 (0.07)	0.98 (0.01)	15.76 (0.01)	4.26 (0.15)	-0.80 (0.09)
SN2007co (B)	0.0266	116.4	0.15 (0.02)	0.02 (0.11)	54264.57 (0.09)	1.07 (0.01)	16.44 (0.01)	1.08 (0.12)	-0.28 (0.07)	54267.02 (0.09)	0.65 (0.01)	16.31 (0.01)	0.48 (0.09)	-0.17 (0.06)
SN2007qe (D)	0.0228	133.0	0.13 (0.02)	0.06 (0.12)	54428.95 (0.03)	0.97 (0.01)	16.00 (0.01)	0.42 (0.07)	-0.26 (0.04)	54431.37 (0.08)	0.60 (0.01)	15.89 (0.01)	-0.39 (0.07)	0.12 (0.04)
SN2008Z (5)	0.0218	55.6	0.22 (0.02)	0.38 (0.14)	54514.95 (0.09)	0.79 (0.02)	16.40 (0.01)	-0.55 (0.15)	-0.39 (0.10)	54516.43 (0.11)	0.62 (0.02)	16.18 (0.01)	-0.35 (0.12)	0.17 (0.07)
SN2008ar (8)	0.0272	83.3	0.06 (0.02)	0.06 (0.12)	54534.32 (0.07)	1.04 (0.02)	16.20 (0.01)	1.20 (0.14)	-0.48 (0.12)	54536.86 (0.15)	0.61 (0.02)	16.16 (0.01)	0.39 (0.10)	-0.35 (0.07)
SN2008ec (B)	0.0147	116.4	0.19 (0.02)	0.02 (0.16)	54674.03 (0.07)	1.31 (0.02)	15.51 (0.01)	2.77 (0.15)	-0.56 (0.09)	54676.18 (0.09)	0.73 (0.01)	15.33 (0.01)	1.24 (0.08)	-0.23 (0.06)
SN2008eq	0.0570	...	0.21 (0.05)	-0.05 (0.19)	54689.56 (0.39)	0.90 (0.08)	18.10 (0.03)	0.48 (0.53)	-0.48 (0.46)	54691.45 (0.67)	0.59 (0.06)	17.90 (0.04)	-0.32 (0.56)	-0.01 (0.35)
SN2008gl (B)	0.0329	110.4	0.10 (0.02)	-0.19 (0.12)	54768.22 (0.13)	1.35 (0.03)	16.74 (0.01)	3.32 (0.26)	-0.71 (0.22)	54770.65 (0.16)	0.80 (0.02)	16.66 (0.01)	2.29 (0.23)	-0.53 (0.14)
SN2008hv (9)	0.0136	95.9	-0.03 (0.02)	0.17 (0.20)	54816.90 (0.10)	1.30 (0.02)	14.71 (0.01)	2.43 (0.14)	-0.36 (0.07)	54818.35 (0.09)	0.79 (0.02)	14.75 (0.01)	1.76 (0.11)	-0.22 (0.04)
SN2009ad (6)	0.0283	61.7	0.08 (0.02)	-0.09 (0.12)	54885.93 (0.14)	0.95 (0.04)	16.13 (0.01)	0.72 (0.17)	-0.59 (0.23)	54887.87 (0.16)	0.66 (0.02)	16.07 (0.01)	-0.11 (0.14)	0.20 (0.10)
SN2009al	0.0232	...	0.20 (0.03)	0.04 (0.15)	54895.95 (0.16)	0.97 (0.02)	16.25 (0.02)	0.15 (0.19)	-0.07 (0.12)	54899.06 (0.17)	0.62 (0.02)	16.07 (0.01)	0.22 (0.15)	-0.15 (0.09)

SN2009bv	0.0375	...	0.03 (0.04)	0.14 (0.15)	54927.32 (0.22)	0.94 (0.04)	16.80 (0.02)	0.81 (0.37)	-0.64 (0.29)	54928.69 (0.24)	0.61 (0.03)	16.79 (0.03)	-0.32 (0.29)	0.13 (0.12)
SN2009eu (C)	0.0301	128.5	0.21 (0.07)	0.06 (0.28)	54984.42 (0.29)	1.83 (0.12)	17.58 (0.05)	3.12 (0.69)	1.82 (0.39)	54986.95 (0.36)	1.05 (0.07)	17.29 (0.04)	2.93 (0.54)	0.23 (0.29)
SN2009hs (B)	0.0268	117.8	0.12 (0.06)	0.12 (0.24)	55048.60 (0.18)	2.09 (0.07)	17.27 (0.04)	5.00 (0.00)	1.62 (0.37)	55051.19 (0.18)	1.23 (0.05)	17.03 (0.03)	4.45 (0.49)	0.21 (0.26)
SN2009kq (A)	0.0128	109.1	0.08 (0.02)	-0.01 (0.20)	55154.57 (0.12)	1.02 (0.02)	14.53 (0.01)	1.10 (0.10)	-0.59 (0.09)	55156.68 (0.11)	0.64 (0.01)	14.47 (0.01)	0.19 (0.08)	-0.08 (0.06)
SN2010Y (9)	0.0113	96.4	-0.00 (0.03)	0.29 (0.23)	55247.91 (0.05)	1.83 (0.01)	14.96 (0.01)	5.00 (0.00)	0.14 (0.07)	55249.78 (0.07)	1.10 (0.01)	14.88 (0.01)	3.83 (0.11)	-0.08 (0.06)
SN2010ai (A)	0.0193	100.8	0.03 (0.02)	0.38 (0.16)	55277.38 (0.07)	1.45 (0.03)	16.01 (0.02)	3.87 (0.24)	-0.72 (0.17)	55279.30 (0.12)	0.83 (0.02)	15.98 (0.01)	2.27 (0.26)	-0.32 (0.16)
SN2010ii (A)	0.0259	109.3	-0.04 (0.02)	0.08 (0.15)	55480.95 (0.17)	1.47 (0.11)	16.14 (0.01)	5.00 (0.00)	-1.47 (0.46)	55482.60 (0.97)	0.96 (0.22)	16.17 (0.01)	4.26 (2.47)	-0.89 (0.94)
SN2011M	0.0168	...	0.04 (0.04)	0.09 (0.19)	55593.30 (0.15)	1.12 (0.04)	15.19 (0.02)	2.09 (0.37)	-0.86 (0.27)	55595.38 (0.43)	0.61 (0.05)	15.17 (0.03)	0.00 (0.60)	-0.08 (0.44)
SN2011by (8)	0.0036	84.3	0.06 (0.03)	1.12 (0.76)	55690.68 (0.09)	1.08 (0.03)	12.89 (0.02)	1.56 (0.15)	-0.70 (0.06)	55692.78 (0.09)	0.67 (0.02)	12.85 (0.01)	0.78 (0.11)	-0.24 (0.05)
SN2011fe (7)	0.0014	75.0	-0.02 (0.02)	0.40 (inf)	55814.74 (0.15)	1.11 (0.13)	9.89 (0.01)	1.42 (2.16)	-0.45 (1.23)	55816.64 (0.27)	0.85 (0.11)	9.94 (0.01)	3.31 (1.73)	-0.88 (0.56)
SN2012cg (5)	0.0021	52.5	0.24 (0.02)	1.11 (inf)	56081.48 (0.06)	0.87 (0.01)	12.16 (0.01)	0.31 (0.07)	-0.79 (0.03)	56083.46 (0.05)	0.62 (0.01)	11.94 (0.00)	-0.21 (0.03)	0.12 (0.02)
SN2013dy	0.0030	...	0.16 (0.01)	1.16 (0.56)	56500.64 (0.04)	0.84 (0.01)	12.70 (0.01)	-0.06 (0.05)	-0.60 (0.02)	56502.52 (0.05)	0.61 (0.01)	12.54 (0.00)	-0.46 (0.03)	0.19 (0.02)
SN2013gh (A)	0.0079	107.2	0.33 (0.02)	-0.10 (0.26)	56528.37 (0.11)	1.30 (0.02)	14.46 (0.01)	4.07 (0.19)	-1.59 (0.13)	56530.75 (0.14)	0.65 (0.01)	14.15 (0.01)	0.55 (0.11)	-0.21 (0.06)
SN2013gq (8)	0.0148	83.9	0.04 (0.03)	-0.12 (0.21)	56384.25 (0.20)	1.14 (0.06)	14.70 (0.02)	1.64 (0.23)	-0.43 (0.20)	56386.70 (0.19)	0.69 (0.03)	14.68 (0.02)	1.07 (0.16)	-0.33 (0.10)
SN2013gy (B)	0.0135	118.2	0.01 (0.02)	0.05 (0.18)	56648.58 (0.07)	1.30 (0.03)	14.71 (0.01)	2.48 (0.14)	-0.41 (0.08)	56650.61 (0.19)	0.66 (0.01)	14.72 (0.01)	0.65 (0.08)	-0.26 (0.05)
SN2014ao (7)	0.0150	77.6	0.78 (0.05)	-0.11 (0.24)	56766.28 (1.21)	0.89 (0.05)	17.04 (0.03)	-2.00 (0.00)	1.24 (0.47)	56769.08 (0.63)	0.70 (0.07)	16.27 (0.04)	0.99 (1.23)	-0.23 (0.67)
SN2015N	0.0181	...	0.12 (0.08)	-0.69 (0.30)	57223.30 (0.63)	1.12 (0.08)	14.83 (0.06)	1.50 (0.62)	-0.38 (0.28)	57225.69 (0.74)	0.56 (0.06)	14.73 (0.05)	-0.54 (0.49)	-0.03 (0.24)
SN2016coj (C)	0.0054	128.4	-0.02 (0.01)	0.33 (0.45)	57548.16 (0.03)	1.51 (0.01)	13.04 (0.01)	3.99 (0.08)	-0.70 (0.05)	57549.76 (0.06)	0.82 (0.01)	13.05 (0.01)	2.36 (0.11)	-0.42 (0.06)
SN2017cfd (A)	0.0121	107.0	0.15 (0.02)	-0.06 (0.20)	57843.99 (0.14)	1.36 (0.04)	14.88 (0.01)	5.00 (0.00)	-2.00 (0.16)	57845.52 (0.19)	0.75 (0.03)	14.74 (0.01)	1.88 (0.24)	-0.50 (0.12)
SN2017drh (C)	0.0059	120.7	1.29 (0.02)	-0.47 (0.38)	57890.32 (0.15)	1.25 (0.03)	16.65 (0.02)	1.68 (0.24)	-0.06 (0.15)	57892.40 (0.13)	0.72 (0.01)	15.37 (0.01)	0.98 (0.09)	-0.11 (0.05)
SN2017erp (9)	0.0066	94.7	0.11 (0.02)	0.11 (0.37)	57934.40 (0.03)	1.01 (0.01)	13.32 (0.01)	1.02 (0.05)	-0.62 (0.03)	57936.51 (0.03)	0.59 (0.01)	13.24 (0.00)	-0.21 (0.03)	-0.05 (0.02)
SN2017hbi (3)	0.0392	39.1	0.05 (0.02)	-0.13 (0.10)	58044.95 (0.11)	0.69 (0.02)	16.47 (0.01)	-2.00 (0.00)	0.30 (0.08)	58047.48 (0.16)	0.46 (0.02)	16.41 (0.01)	-2.00 (0.00)	0.36 (0.09)
SN2018gv (9)	0.0059	93.9	0.01 (0.01)	0.29 (0.45)	58149.54 (0.05)	0.82 (0.01)	12.76 (0.01)	0.06 (0.07)	-0.78 (0.04)	58151.59 (0.05)	0.62 (0.01)	12.75 (0.01)	-0.31 (0.06)	0.17 (0.03)

4.5 Results

4.5.1 Photometric properties of 91T/99aa-like SNe Ia

The B- and V-band light curves of the SNe used in this analysis are plotted together in Figure 4.6. Gray data points are for normal SNe Ia while 91T/99aa-like objects are color coded by the value of $\Delta m_{15}(B)$. As expected, light curves of 91T/99aa-like SNe are typically broader compared to normal SNe Ia. This trend is more pronounced in the V-band.

Host galaxy extinction needs to be taken out if one wants to compare the intrinsic brightness of 91T/99aa-like SNe to normal SNe Ia. The extinction is commonly characterized by the total-to-selective extinction ratio $R_V = A_V/E(B-V)$, where $E(B-V) = A_B - A_V$ (see also section 3.2). Previous studies of the host extinction from SNe Ia yielded diverse values of R_V ranging from $R_V = 1$ to $R_V = 3.5$ (e.g. [112, 78, 119, 91, 24]). For a rough comparison of the intrinsic luminosity distributions between 91T/99aa-like SNe and normal SNe Ia without any standardization, we take a moderate value of $R_{V(host)} = 2$ with $E(B-V)_{host}$ calculated from subsection 4.2.5. In Figure 4.7 we plot the distribution of the decline rate parameter $\Delta m_{15}(B)$, and the extinction- and K-corrected absolute $B-$band magnitudes when assuming host $R_V = 2$ for all 123 SNe Ia included in this work (SN2018apo is not included in this figure as we do not have SN2018apo B-band data.). The distance moduli are calculated using aforementioned assumed cosmology. The weighted mean and standard deviation of the full sample's absolute peak B-band magnitude and $\Delta m_{15}(B)$ are listed in Table 4.6.

The spectroscopically peculiar 91T/99aa-like objects are ~ 0.4 mag brighter than normal SNe Ia after applying K-corrections and correcting for Milky Way extinction and host galaxy extinction. Moreover, these overluminous events seem to have a more uniform

Since our supernovae are nearby ($z < 0.1$), luminosity distances are effectively independent of any sensible combination of Ω_M and Ω_Λ.

Table 4.6. Weighted means and standard deviations of absolute peak magnitudes and $\Delta m_{15}(B)$ in Figure 4.7.

SN subclass	N_{SN}	$\overline{M_B}$	σ_{M_B}	$\overline{\Delta m_{15}(B)}$	$\sigma_{\Delta m_{15}(B)}$
Normal	87	-19.30	0.47	1.09	0.32
91T/99aa-like	36	-19.70	0.32	0.82	0.13

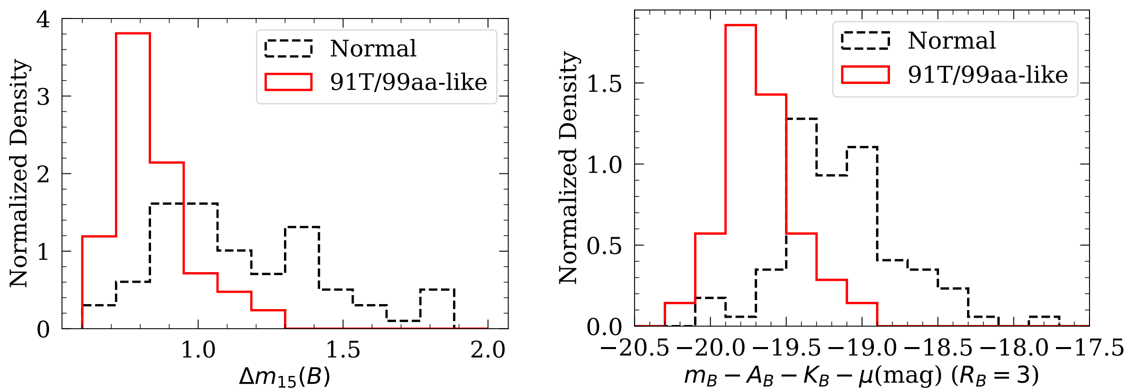


Figure 4.7 *Left*: Histogram of Δm_{15} in B band. *Right*: Histogram of absolute magnitudes at maximum in B band assuming a constant $R_B = 3$.

peak luminosity and a more uniform distribution of values of the decline rate parameter $\Delta m_{15}(B)$, with a standard deviation of about 0.13 mag compared to 0.32 mag for normal SN Ia.

4.5.2 The Hubble diagram

We standardize our sample using the method described in section 4.4 in two cases: for one we assume 91T/99aa-like and normal SNe Ia share the same intrinsic scatter σ_{int}, and for the other we assume each group has a different intrinsic scatters σ_{int}(91T/99aa-like) and σ_{int}(normal) (so that for each group, $\chi^2_\nu \approx 1$ after fitting). Final fitting parameters for both cases are summarized in Table 4.7. And the Hubble residuals for the case with different intrinsic scatters are listed in Table 4.4 and Table 4.5. Below we focus on the case with different intrinsic scatters.

Table 4.7. Fitting parameters of Hubble diagram.

b	R_B	k	σ_{int} (mag)		RMS ($z_{cmb} > 0.01$) (mag)		wRMS ($z_{cmb} > 0.01$) (mag)	
			normal	91T/99aa	normal	91T/99aa	normal	91T/99aa
0.88(0.06)	3.13(0.17)	−3.58(0.03)	0.14	0.14	0.18(0.03)	0.25(0.03)	0.16(0.02)	0.24(0.03)
0.81(0.05)	3.35(0.15)	−3.57(0.02)	0.05	0.28	0.17(0.02)	0.26(0.03)	0.14(0.02)	0.25(0.03)

Note. — First row is the fitting results with constraints of normal SNe Ia and 91T/99aa-like SNe having the same intrinsic scatter σ_{int}. Second row is the fitting results allowing normal SNe Ia and 91T/99aa-like SNe to have different σ_{int} value.

In Figure 4.8, we present the B band residual Hubble diagram, and the histogram of Hubble residuals along with the fitted Gaussian ideogram . The weighted mean Hubble residual for normal SNe Ia and 91T/99aa-like SNe Ia with $z_{cmb} > 0.01$ are 0.03 mag and -0.19 mag respectively, and the peak in Gaussian ideogram for normal SNe Ia and all 91T/99aa-like SNe Ia in our sample are 0.01 mag and -0.17 mag respectively, suggesting that even fully corrected, 91T/99aa-like SNe Ia still are ~ 0.2 mag brighter than normal SNe Ia [82, 83]. Therefore careful classification of 91T/99aa-like SNe is needed to avoid possible pollution to the cosmological sample of SNe Ia, or to introduce an additional parameter to account for the Hubble residual offset in 91T/99aa-like and normal SNe.

The intrinsic scatter for 91T/99aa-like is σ_{int}(91T/99aa-like) $= 0.28$ mag, more than that of normal SNe Ia (σ_{int}(normal) $= 0.05$ mag). The weighted root mean square (wRMS) for 91T/99aa-like SNe Ia is 0.25 ± 0.03 mag while that for normal SNe Ia is 0.14 ± 0.02 mag. It suggests that 91T/99aa-like SNe are also excellent relative distance indicators, though not as precise as normal SNe Ia, and can be used to delineate the Hubble flow to a precision of 12%. However, an additional parameter still needs to be introduced to bring 91T/99aa-like SNe to the same standard value as normal SNe Ia. Note that for absolute distance determination, it requires independent estimates of nearby SN hosts (e.g. [121]), which is beyond the scope of this paper.

See https://pdg.lbl.gov/2015/reviews/rpp2015-rev-rpp-intro.pdf for more discussion on ideogram.

A similar conclusion about the over-luminosity of 91T/99aa-like SNe has been drawn by M. M. Phillips ([120]) based on data from the Carnegie Supernova Project.

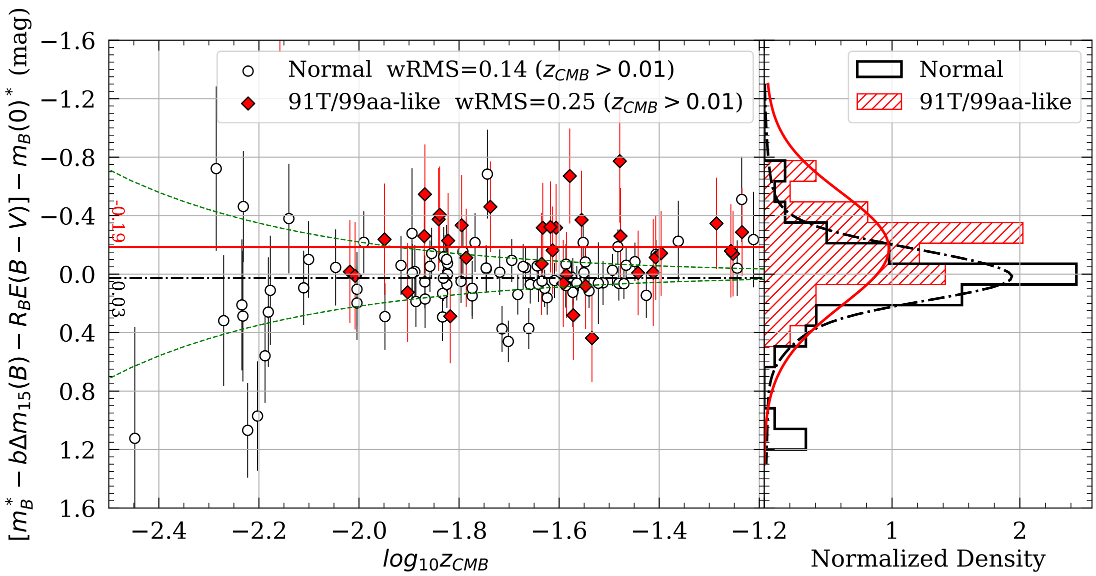


Figure 4.8 Hubble Diagram Residual (left) and residual histogram (right) in B band for 36 91T/99aa-like SNe Ia (in filled circles) and 87 normal SNe Ia (in open circles) when assuming these two groups have different intrinsic scatters (0.28 mag for 91T/99aa-like, and 0.05 mag for normal Iae). *Left:* The weighted mean Hubble residuals for 91T-like SNe Ia and normal SNe Ia are 0.03 mag and -0.18 mag, which are also plotted as horizontal lines on the plot (solid line for 91T-like SNe, dash dotted line for normal SNe Ia). Dashed line denotes the peculiar velocity effect with $v_{pec} = 300 km/s$. *Right:* Distribution of Hubble residuals. Gaussian ideograms of each group are also plotted (solid line for 91T/99aa-like, dash dotted line for normal SNe Ia). The peak of resulting Gaussian ideograms are 0.01 mag and -0.17 mag for normal SNe Ia and 91T/99aa-like SNe Ia respectively.

4.5.3 Si II $\lambda\lambda$6355 pEW

We used pEW measurements of the Si II $\lambda\lambda$6355 line from the spectra in our database that are closest to—and within 10 days from—B band maximum as our Si II $\lambda\lambda$6355 pEW measurement around maximum (pEW_{max}(Si II $\lambda\lambda$6355)). In total, we have such measurements of 79 normal SNe Ia and 35 91T/99aa-like SNe. Final pEW measurements are listed in Table 4.4 and Table 4.5. Hubble residuals versus pEW_{max}(Si II $\lambda\lambda$6355) are plotted in Figure 4.11 (See also [120] for further discussion). As pEW_{max}(Si II $\lambda\lambda$6355) increases from 0 Å to 150 Å, Hubble residuals increase first and then stay nearly constant. Thus we fit a continuous broken line so that Hubble residual linearly increases with pEW_{max}(Si II $\lambda\lambda$6355) first, and stays constant beyond a pEW_{max}(Si II $\lambda\lambda$6355) value. The line is fitted using χ^2 minimization (See section 15.3 in [122]) with `pycmpfit`. The best fitted result is

$$\text{Hubble Residual (mag)} = \begin{cases} 0.009_{\pm 0.003}\ \text{pEW}_{\text{Si II }\lambda\lambda 6355}(\text{Å}) - 0.482_{\pm 0.154}, & \text{pEW}_{\text{Si II }\lambda\lambda 6355} < 55.62\text{Å} \\ 0.036, & \text{Otherwise.} \end{cases}$$

There does not seem to be a correlation between the Hubble residual and $\Delta m_{15}(B)$ as shown in the left panel in Figure 4.10. Thus the broken linear correlation between the Hubble residual and Si II $\lambda\lambda$6355 is unlikely due to the artifacts of standardizations. As shown in the right panel of Figure 4.10, the relation between $\Delta m_{15}(B)$ and pEW_{max}(Si II $\lambda\lambda$6355) is non-linear. Thus the linear correlation of $\Delta m_{15}(B)$ to Hubble residual used in our standardization model cannot fully take out the dependency of Hubble residual on pEW_{max}(Si II $\lambda\lambda$6355).

For our sample of 113 objects with pEW(Si II $\lambda\lambda 6355$) near maximum and B-band light curve data, after taking out the fitted linear relationship between pEW_{max}(Si II $\lambda\lambda$6355) and light curve shape- and color- corrected Hubble residual, the wRMS of the Hubble residuals of the 113 objects decreases from 0.17 mag to 0.14 mag (for 34 91T/99aa-like objects, wRMS decreases from 0.26 mag to 0.22 mag, and for 79 normal objects, wRMS decreases from 0.129 mag to 0.125 mag).

The Hubble residual offset in 91T/99aa-like and normal SNe Ia can then be explained by the positive linear correlation in between the Hubble residual and the pEW, as most SNe Ia have pEW_{max}(Si II $\lambda\lambda$6355)< 55.6Å, and 91T/99aa-like SNe are characterized by the shallow Si II lines.

We suggest a new sub-type classification scheme amongst SNe Ia as follows. The SNe Ia is subdivided using a hexadecimal number with 0 being the extreme SN1991T-like showing undetectable Si II $\lambda\lambda$6355 line, and F being the extreme case with the pEW_{max}(Si II $\lambda\lambda$6355) beyond 160 Å. In between these extreme cases, the sub-types are given by a hexadecimal number that is the integer part of pEW_{max}(Si II $\lambda\lambda$6355)/(10Å). The sub-types of SNe in our sample are listed in Table 4.4 and Table 4.5.

In the right panel of Figure 4.10 we plot the pEW_{max}(Si II $\lambda\lambda$6355) vs $\Delta m_{15}(B)$. As can be seen from the figure, the decline rate $\Delta m_{15}(B)$ does not always increase as pEW_{max}(Si II $\lambda\lambda$6355) increases. There are a few objects with normal decline rate yet have very shallow Si II lines, and objects with slow decline rate but moderate strength of Si II lines. To show that the effect is not some artifacts from fitting, the light curves of normal objects with $\Delta m_{15}(B) < 0.8$ mag (in black circles) and 91T/99aa-like objects with $\Delta m_{15}(B) > 1.0$ mag (in red triangles) are plotted in Figure 4.9, and their spectra are highlighted in Figure 4.5.

4.6 Discussion and Conclusions

Spectroscopically confirmed peculiar SNe Ia such as overluminous 91T/99aa-like SNe Ia have generally been excluded from cosmological use of SNe Ia. However, those overluminous events will be over-represented in future flux-limited surveys. Furthermore, the spectral evolution of 91T/99aa-like objects resembles that of normal SNe Ia after maximum light, which makes keeping the homogeneity of the SNe Ia cosmological sample

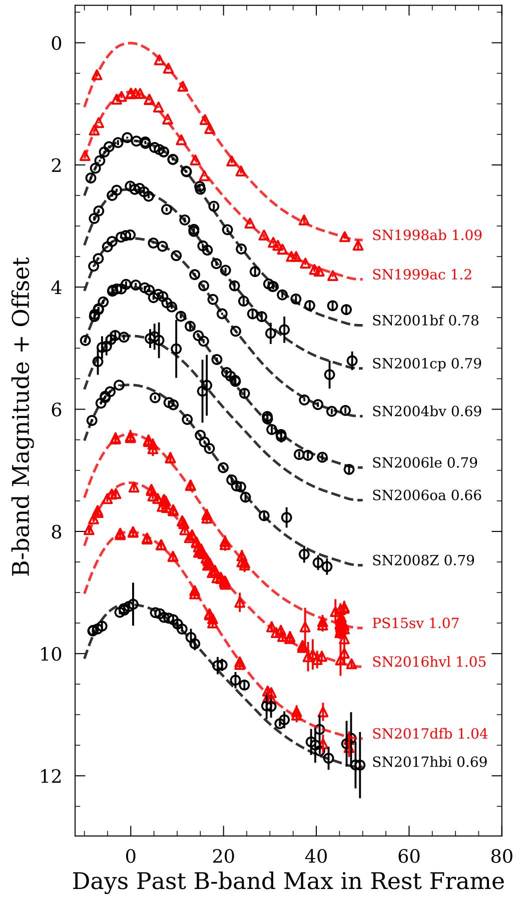


Figure 4.9 B-band light curves and fits of normal SNe Ia (in black circles) with $\Delta m_{15}(B)$ < 0.8 mag and 91T/99aa-like SNe (in red triangles) with $\Delta m_{15}(B)$ > 1.0 mag. $\Delta m_{15}(B)$ values are labeled next to each light curve.

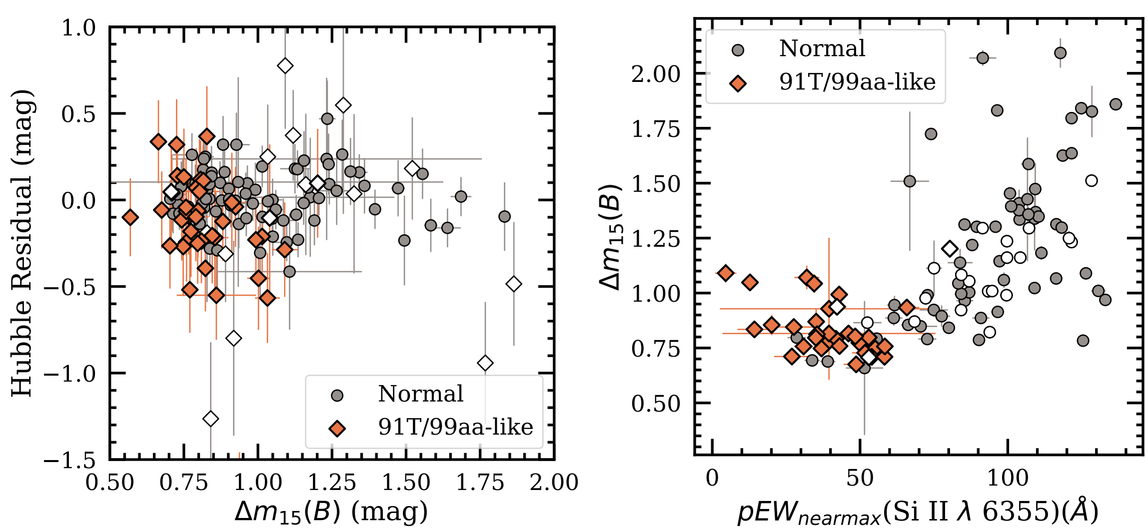


Figure 4.10 *Left:* Hubble residual vs. $\Delta m_{15}(B)$. *Right:* $\Delta m_{15}(B)$ vs. pEW_{max}(Si II $\lambda\lambda$6355).

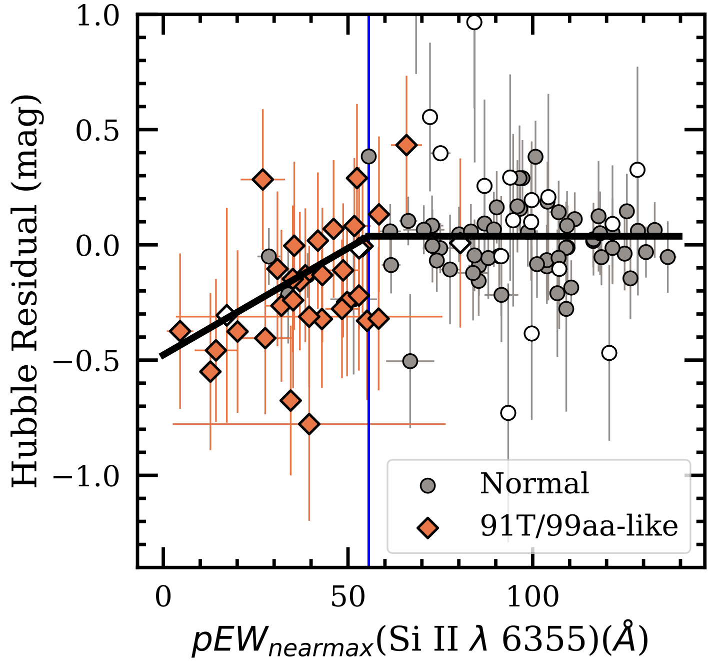


Figure 4.11 Hubble residual vs. pEW_{max}(Si II $\lambda\lambda$6355). Open circles indicate objects with $z_{cmb} < 0.01$. Blue vertical line is where pEW=55.62. Black line shows the best linear fit for objects with pEW $<$ 55.62 (Hubble residual (mag) = $0.009 \times pEW_{max}$Si II$\lambda 6355() - 0.482$), and the weighted mean (=0.036 mag) for objects with pEW $>$ 55.62 .

even more difficult when pre-maximum spectral observations are absent. Hence, it is crucial to understand the intrinsic properties of these over-luminous SNe Ia to mitigate the inevitable systematic errors in luminosity distances.

To address this problem, We obtained multi-epoch optical $BVg'r'i'$ photometric observations of 16 91T/99aa-like SNe Ia taken by Las Cumbres Observatory in the redshift range $z = 0.011 - 0.057$. This sample was analyzed together with 21 well sampled photometric observations of 91T/99aa-like SNe Ia as well as 87 photometrically well sampled normal SNe Ia from the literature. Our main conclusions are as follows:

1. When assuming host $R_V = 2$, after correcting for K-correction, MW extinction and host extinction, the spectroscopically peculiar 91T/99aa-like objects are ∼0.4 mag brighter than the normal SNe Ia.

2. After fully corrected (see section 4.4), 91T/99aa-like objects are still ∼0.2 mag brighter than normal SNe Ia.

3. 91T/99aa-like objects themselves are excellent relative distance indicators and can be used to delineate galaxies in the Hubble flow to 12% in distance.

4. The decline rate $\Delta m_{15}(B)$ does not always increase as pEW_{max}(Si II $\lambda\lambda$6355) increases. For pEW_{max}(Si II $\lambda\lambda$6355)$<$ 55.6 Å, light curves tend to decline faster with shallower Si II $\lambda\lambda$6355 .

5. After fully corrected, the Hubble residual still has a fairly strong linear correlation with pEW_{max}(Si II $\lambda\lambda$6355) for pEW_{max}(Si II $\lambda\lambda$6355)$<$ 55.6Å while the Hubble residual does not correlate with $\Delta m_{15}(B)$. This is due to the non-linear relationship between $\Delta m_{15}(B)$ and pEW_{max}(Si II $\lambda\lambda$6355). So a linear correction of $\Delta m_{15}(B)$ like the one used in our standardization model cannot fully take out the dependence of the Hubble residual on pEW_{max}(Si II $\lambda\lambda$6355) if any.

The current study is based on the optical data. In the near-infrared (NIR), the systematic offset of the Hubble residuals between 91T/99aa-like and normal SNe may be different from the optical. A careful analyses for the NIR properties of 91T/99aa-like SNe is needed.

The spectral evolution of 91T/99aa-like SNe Ia argues that early spectral data are needed for their identification. This may cause the SN Ia samples to be contaminated by the misidentifications of 91T/99aa-like SNe if spectral data before optical maximum are missing. This would lead to large systematic biases in cosmological analyses if the fraction of 91T/99aa-like SNe Ia changes with redshift. High-mass but passive hosts are observed to produce SNe Ia over the full range of decline rates, whereas low-mass, star-forming hosts (which increase with redshift [123, 124, 125]) preferentially give rise to slower declining events like 91T/99aa-like SNe [126, 127]. The fractional evolution of 91T/99aa-like SNe Ia will cause systematic errors of the Hubble residual measured using SNe Ia to be as large as 0.2 mag in the extreme case at high redshifts where SNe Ia are dominated by 91T/99aa-like events. This will be very important on upcoming surveys like LSST/Rubin and WFIRST/Roman for which the projected uncertainties are smaller than the effects reported here.

Based on the post-maximum spectral similarities between 91T/99aa-like SNe Ia and the normal SNe Ia, it may be concluded that the 91T/99aa-like SNe Ia and normal SNe Ia could easily be confused with just photometric data. It is critical to identify them in future supernova surveys which aim at much higher precision than today in cosmological applications. The 0.2 mag correction between 91T/99aa-like SNe and normal SNe Ia also depends on the relative abundances of 91T/99aa-like objects at different pEW_{max}(Si II $\lambda\lambda$6355) since 91T/99aa-like objects with lower pEW_{max}(Si II $\lambda\lambda$6355) have brighter Hubble residuals. Therefore it will be necessary to construct a classification scheme of the 91T/99aa-like SNe. The correlation between the Hubble residual and pEW of Si II

$\lambda\lambda$6355 line seen in Figure 4.11 suggests that the strength of the Si II $\lambda\lambda$6355 line can be employed to sub-classify SNe Ia. Instead of classifying SNe Ia with descriptive monikers such as 91T/99aa-like or shallow silicon, we suggest dividing the SNe Ia Types into sub-classes based on the values of pEW_{max}(Si II $\lambda\lambda$6355). The measured pEW values are typically in the range from 0 to 160 (see Figure 4.11). A single hexadecimal digit can be used to group them in intervals of 10, with the last class being inclusive of all SNe with pEW_{max}(Si II $\lambda\lambda$6355) larger than 160 Å. The sub-classification is natural as the presence of Si II is the basis for SN Ia classification. As the Si II line changes rapidly around maximum light, in the case where it is not easy to obtain spectra around maximum light, we recommend using the data-driven spectral modelling code introduced in [128], which is able to model the spectrum at maximum well given observed spectra at other phases.

Another systematic effect that is routinely addressed recently in cosmological sample is a $\sim$ 0.06 mag correction found from the empirical correlation in between SN Ia corrected Hubble residuals with host galaxy mass (the mass step; [129, 126, 130, 131, 132, 133]). SNe Ia in high-mass, passive hosts appear to be brighter than those in low mass, star-forming hosts. It can be easily seen that 91T/99aa-like SNe Ia have a host mass step that is in the opposite direction since they are associated with active star formation [134]. Thus the fraction of 91T/99aa-like SNe Ia will affect the size of the mass step. These effects need to be carefully taken into account for future surveys to measure cosmological parameters with better control of systematics for future surveys. Our study suggests further that the shallow Si II line SNe Ia cannot be the source of the mass step effect, and that the mass step is caused by the SNe Ia with normal Si II line strength. However, for SNe at high redshifts, the fractional contribution of 91T/99aa-like events may become larger which will lead to a systematic effect that must be taken into account for precision cosmology measurements.

The correlation between luminosity and the pEW of the Si II 6355 line may also suggest that the group of 91T/99aa-like events consists of SNe with related physical origins. One such possibility is that they are similar events that differ in such effects as arising from geometric orientations and subtle physical processes at the explosion. The SNe with more complete nuclear burning which converts Si to Fe group elements show shallower Si II lines (see Figure 4.10, right panel). At the luminous end, with $\Delta m_{15} \lesssim 1$, the light curve shape is insensitive to these effects but the luminosity is correlated with the strength of the Si II 6355Å line (see Figure 4.11). In the context of delayed detonation, this may be further related to the central density at ignition and the mass of the progenitors [135, 136, 137, 138]. Quantitative modeling of these physical processes is beyond the scope of this study. If geometric effect dominates the observed luminosity and Si II 6355 line strength correlation, Figure 4.11 suggests that the side with more advanced nuclear burning shows weaker Si II lines when faced with the observer. The geometry of SNe Ia has been probed by spectropolarimetry, and the degree of continuum polarization is consistently low ($\lesssim 0.2\%$). The level of Si II 6355Å line polarization is around 0.5% in general [139, 140, 141]. There have been no published spectropolarimetry data that can place tight constraints on the geometric shapes of the 91T/99aa-like events, although recent data seem to indicate that they are very lowly polarized similar to other SNe Ia (Y. Yang, private communications). If geometric effect does play a role, spectroscopy during the late time nebular phase can also be of great diagnostic value. Interestingly, these observations are qualitatively consistent with the discovery that the SNe with larger light curve stretch values are both more luminous and less polarized [142, 140]. The more complete burning effectively removes the asymmetries arising from the instabilities during the deflagration phase preceding the detonation.

This work is enabled by observations made from the Las Cumbres Observatory Global Telescope network. The Las Cumbres Observatory team is supported by NSF grants AST-1911225 and AST-1911151. This work also used the computing resources provided by Texas A&M High Performance Research Computing. J.Y. acknowledges generous support from the Texas A&M University and the George P. and Cynthia Woods Institute for Fundamental Physics and Astronomy. We thank the Mitchell Foundation for their support of the Cook's Branch meetings on Supernovae. We thank Mark Phillips for discussions early on in this project pertaining to the over luminosity of 91T-like SNe Ia in the Hubble diagram and the relationship between the Hubble residual and the pEW_{max}(Si II $\lambda\lambda$6355). J.Y. also thanks Yi Yang, Xiaofeng Wang, and Chris Burns for helpful discussion. J.Y. acknowledges the generosity of Nikolaus Volgenau in helping us understand the Las Cumbres telescopes. L.W. is supported by the NSF grant AST-1817099. P.J.B. is supported by NASA grant 80NSSC20K0456, "SOUSA's Sequel: Improving Standard Candles by Improving UV Calibration." L.G. acknowledges financial support from the Spanish Ministerio de Ciencia e Innovación (MCIN), the Agencia Estatal de Investigación (AEI) 10.13039/501100011033, and the European Social Fund (ESF) "Investing in your future" under the 2019 Ramón y Cajal program RYC2019-027683-I and the PID2020-115253GA-I00 HOSTFLOWS project, from Centro Superior de Investigaciones Científicas (CSIC) under the PIE project 20215AT016, and the program Unidad de Excelencia María de Maeztu CEX2020-001058-M. This work is supported by NSF through the grant AST-1613455 to N.S..

5. APPLICATION TO WIDE FIELD SURVEY

We now see the robustness of our photometric reduction pipeline in reducing SNe Ia photometry for images taken by 1-meter telescopes with small field of view. Now we move on to applying our pipeline on images taken by wide field survey using Dark Energy Camera (DECam).

5.1 Introduction

Beyond the luminosity-color relationship, various correlations between SNe Ia and their environments or progenitors that may impact the cosmological use of SNe Ia have been found by recent studies. For instance, the empirical correlation of SN Ia standardized brightness with host galaxy mass [129, 126, 130, 131, 132, 133], with host-galaxy stellar age [126], and with gas-phase metallicity [143, 132]. Efforts need to be put in to understand and correct for those biases in SNe Ia cosmology.

LSST/Rubin will revolutionize optical time domain astrophysics when it starts operating in a few years. The Rubin Observatory Project will conduct a deep survey that observes the entire available sky every few nights for 10 years to address the most profound questions standing in astrophysics. One of the primary science goals of LSST is to discover transients (the survey will find $\sim$300 SNe per night). While the repeatedly observation with great depth will produce decent light curves, the science will be greatly enhanced with additional spectroscopic observations to gain information that is not obtainable from broad band photometry. Due to the transient nature of variables, rapid alerts need to be triggered for interesting objects and passed to spectroscopic facilities for timely follow-ups.

DECam (Dark Energy Camera) Survey of Intermediate Redshift Transients (DESIRT) is a transient survey using DECam for discoveries and follow-up observations. DESIRT covers sky areas that are observed by the Dark Energy Spectroscopic Instrument (DESI) Survey Validation (SV), which will help us learn how to optimize transient observations using DECam and DESI, and provide valuable experience on transients follow-ups in the LSST era.

The photometry pipeline is installed on *Perlmutter*, an HPE Cray EX supercomputer of National Energy Research Scientific Computing Center. We benefit from *Perlmutter*'s computational power to deliver reduced photometry observed by our program in a timely manner for prompt follow up observations.

5.2 Dark Energy Camera

DECam is a wide-field CCD imager built to replace the previous prime focus camera on the Victor 4-meter Telescope at Cerro Tololo Inter-American Observatory. DECam was specifically designed for Dark Energy Survey (DES, the DES observation ran from 2013 to 2019) to constrain the properties of dark energy. The optics include u, g, r, i, z, and Y filters ranging from 340–1070 nm, allowing DES to obtain photometric redshift measurements to $z \approx 1$. DECam is equipped with 62 2048$\times$4096 CCDs (with 60.5 being useful) totalling at 520 megapixels and has a field of view of 3 square degrees with a pixel resolution of 0.263 arcsecond/pixel.

5.3 DESIRT: DECam Survey of Intermediate Redshift Transients

The DECam Survey of Intermediate Redshift Transients (DESIRT) is a time-domain program for transients out to $z \leq 0.3$ using DECam. The survey repeatedly observes in g (50 s), r (70 s), and z (115 s) bands, and then g (50 s) repeated after the first pass of grz with a cadence of three days. During 2021A, we observed with DECam for 97 hours over three months at 31 DECam pointings, convering $\sim$90 sq. deg.

With the resulting large sample chosen with adequate cadence and high S/N, we will decrease the statistical errors, and reveal clues to the underlying physics of the empirical correlations.

5.4 Data Processing

We use the image subtraction software `SFFT` discussed in section 2.3 for transients discovery. Template images used in image subtraction are taken from the Dark Energy Camera Legacy Survey (DECaLS). On a single exposure, the potential candidates are selected by a random-forest based algorithm (with a score higher than 0.4) to excludes artifacts in difference images such as artifacts produced by cosmic rays, bad pixels, etc (see Palmese 2023 in prep. for a detailed discussion). Those potential candidates are also cross matched with online minor planet catalog to exclude minor planets. Then, a potential candidate is identified as a transient candidate and triggers an alert if it is detected as a potential candidate on at least four exposures, or if it is detected as a potential candidate on at least two exposures and the change in position is less than 0.5 arcsecond, or if it is detected as a potential candidate on at least three exposures and the score from random-forest based algorithm is higher than 0.7. Those criteria are for the cut of the first round to narrow down the large pool of potential candidates to the ones that are more likely to be real. Thus specific criteria are not vital and can be re-chosen for a more loose or strict cut. And selected candidates will be picked by eye again to ensure a more reliable pool of transients.

Host galaxies of variable candidates are determined by matching the closest galaxy in DECam Legacy Survey Tractor catalogue. Variable candidates are divided into nuclear variables and off-nuclear variables based on the distance to the host galaxies with candidates closer than 0.3 arcsecond to their host galaxies being nuclear variable candidates and others being off-nuclear variable candidates. Our photometry pipeline is then applied on images to generate light curves for variable candidates. DECam Legacy Survey Tractor catalogue is used for finding zero points to convert instrumental magnitudes to standard magnitudes.

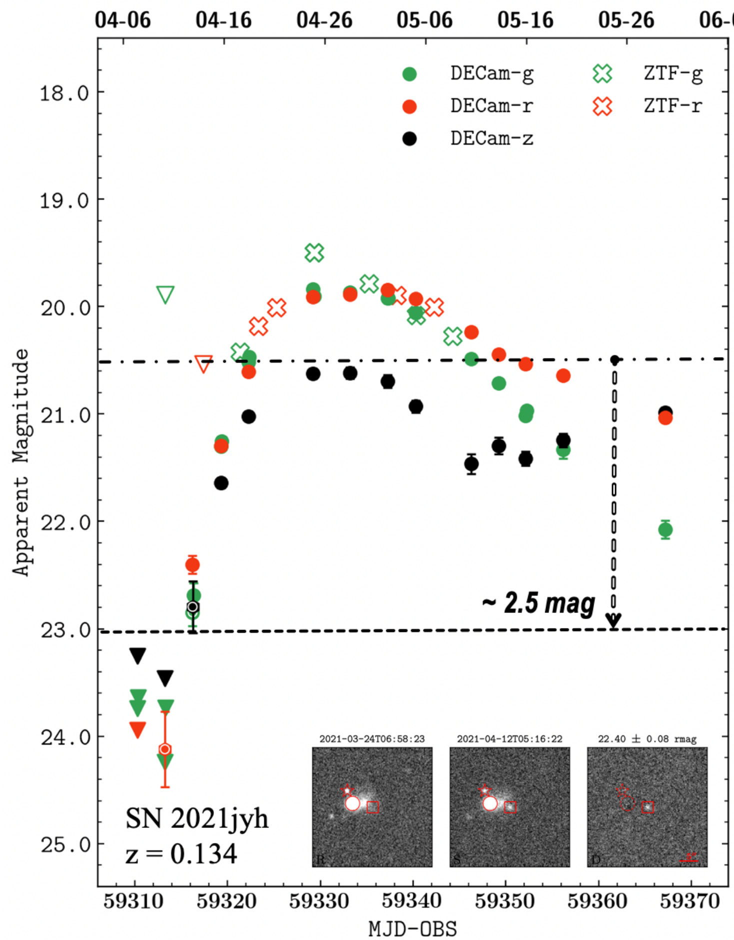
5.5 Results

We found 688 nuclear variable candidates and 235 off-nuclear candidates from our survey in 2021A. More than 350 variable candidates are identified as transient candidates by eye and were reported to TNS (Transient Name Server, an online catalog for discoveries and data of transients). Besides the many normal SNe Ia found by our survey, we also discovered some peculiar SNe Ia including 02cx-like and 91T/99aa-like. Complete data release and analysis will be done in future work. Below we show some examples of those results.

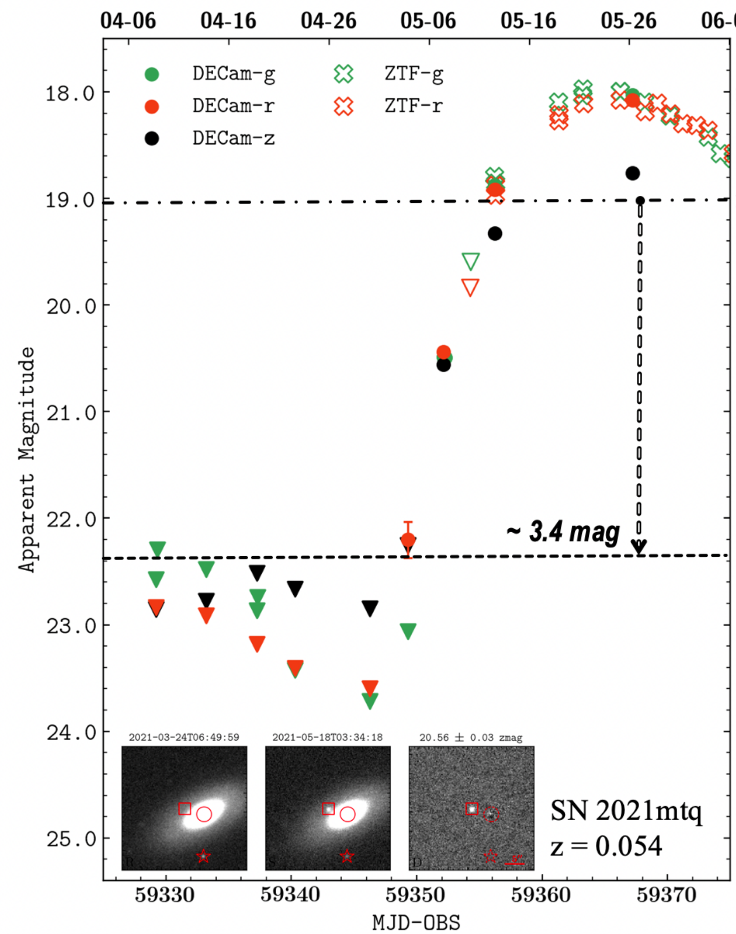
Infant SN Ia: Because of the rolling nature of our survey with pre-selected survey fields, we are able to discover SNe Ia at very early phase and calculate upper limits before first detection. Two examples of early SNe Ia discovered by our survey are SN2021jyh and SN2021mtq, with light curves and finding charts shown in Figure 5.1. The photometry data from ZTF (Zwicky Transient Facility, which is designed to discover transients to a limiting magnitude of 20.5 mag in r band. ZTF data taken from ZTF Explorer) is also plotted on top of our photometry for comparison. SN2021jyh and SN2021mtq were discovered at magnitudes 2.5 mag and 3.4 mag fainter than that of ZTF respectively. And for SN2021mtq, it was discovered a week earlier than ZTF. These early observations of SNe Ia provides us with a unique probe of their progenitor systems.

00cx-like SN Ia: We also discovered a peculiar SN Ia SN2021ihf that is a potential 00cx-like object. The SN2000cx-like SNe are extremely rare events. Since the discovery of SN2000cx, only SN2013bh is found to be a 00cx-like object with peculiar properties resembles that of SN2000cx [144]. Spectroscopically, 00cx-like objects resemble 91T-like events showing weak IME features and strong Fe III lines. However, in contrast to 91T-like objects, 00cx-like events still show strong Fe III features 20 days after maximum [145], indicating a very high photospheric temperature. We took a spectrum of

https://alerce.science/services/ztf-explorer/



(a)



(b)

Figure 5.1 Light curves and finding charts of two SNe Ia (left: SN2021jyh; right: SN2021mtq) discovered by our survey (see Lei Hu 2023 in prep). The triangles are upper limits. For the finding charts embedded in the plot, left panel is the template image, middle panel is the science image, and right panel is the difference image. The position of the host galaxy (red circle), the SN (red square), and the nearest star (red star) are marked in finding charts as well.

SN2021ihf near maximum light with Hobby-Eberly Telescope Low Resolution Spectrograph (HET-LRS) on MJD=59328 days. A joint galaxy and SN Ia template fit shows it to be a supernova similar to SN2000cx at around optical maximum. The light curve evolution also appears to be consistent with that of SN2000cx (see Figure 5.2). As can be seen in the upper panel of Figure 5.2, SN2021ihf locates at the very outskirts of its host galaxy, which is also true for SN2000cx and SN2013bh. Moreover, our joint spectral fit of the host galaxy and the SN spectra shows that the host galaxy of SN2021ihf to be an S0 galaxy (hence a low star-forming galaxy), consistent with the explosion locations of SN2000cx and SN2013bh, which also have low star-forming activity. These analyses are preliminary, and more analysis needs to be done to confirm whether SN2021ihf is a true twin of SN2000cx or not.

91T-like SN Ia: The survey is expected to find a decent amount of 91T/99aa-like SNe Ia as the rate of 91T/99aa-like SNe Ia among all SNe Ia can be as high as $\sim$20% [81]. One example of the 91T/99aa-like SNe we found in our survey is SN2021knj (see Figure 5.3). Spectrum of SN2021knj taken near maximum is shown in the lower panel of Figure 5.3 showing no sign of Si II $\lambda\lambda$6355 . Again, our survey discovered SN2021knj five days earlier than ZTF. With the SNe Ia sample out to $z = 0.3$ found by our survey, we will be able to re-estimate the rate of those peculiar SNe Ia and study the systematics those peculiar SNe Ia may have on cosmology.

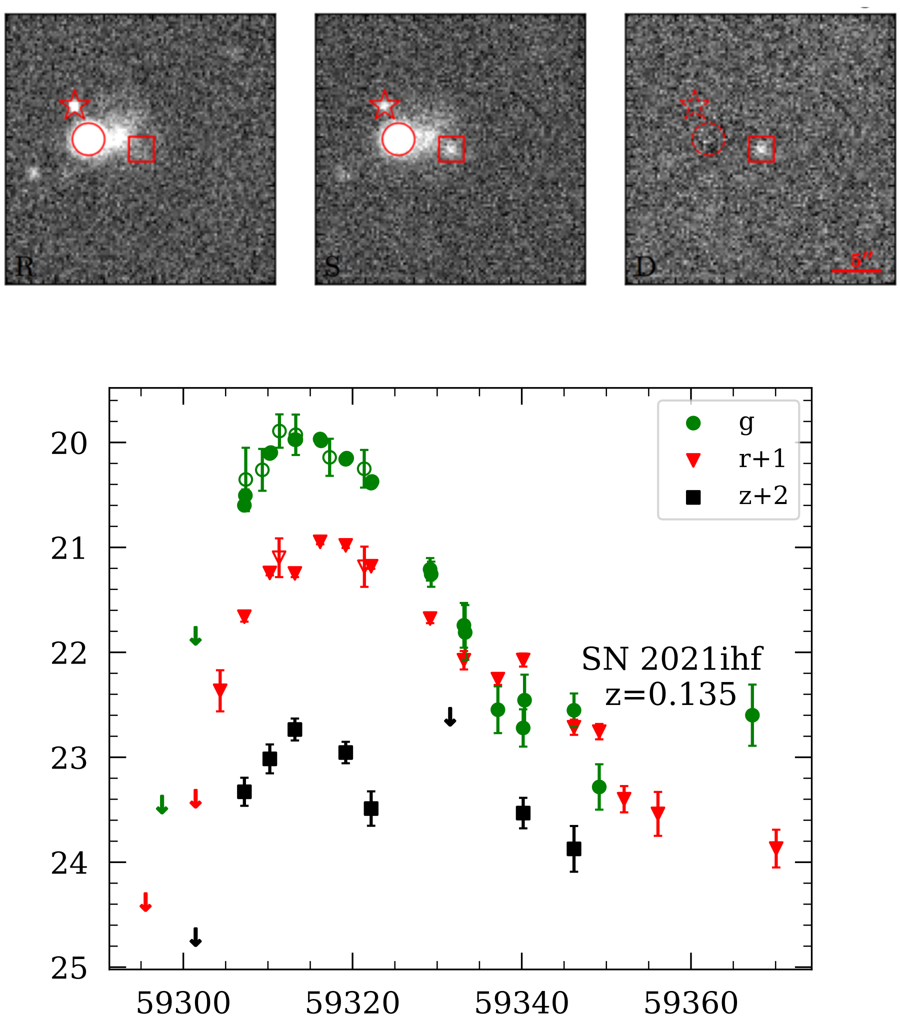


Figure 5.2 Finding chart (upper panel) and light curve (lower panel) of the 00cx-like object SN2021ihf. ZTF data taken from ZTF Explorer are also shown here in open markers for comparison.

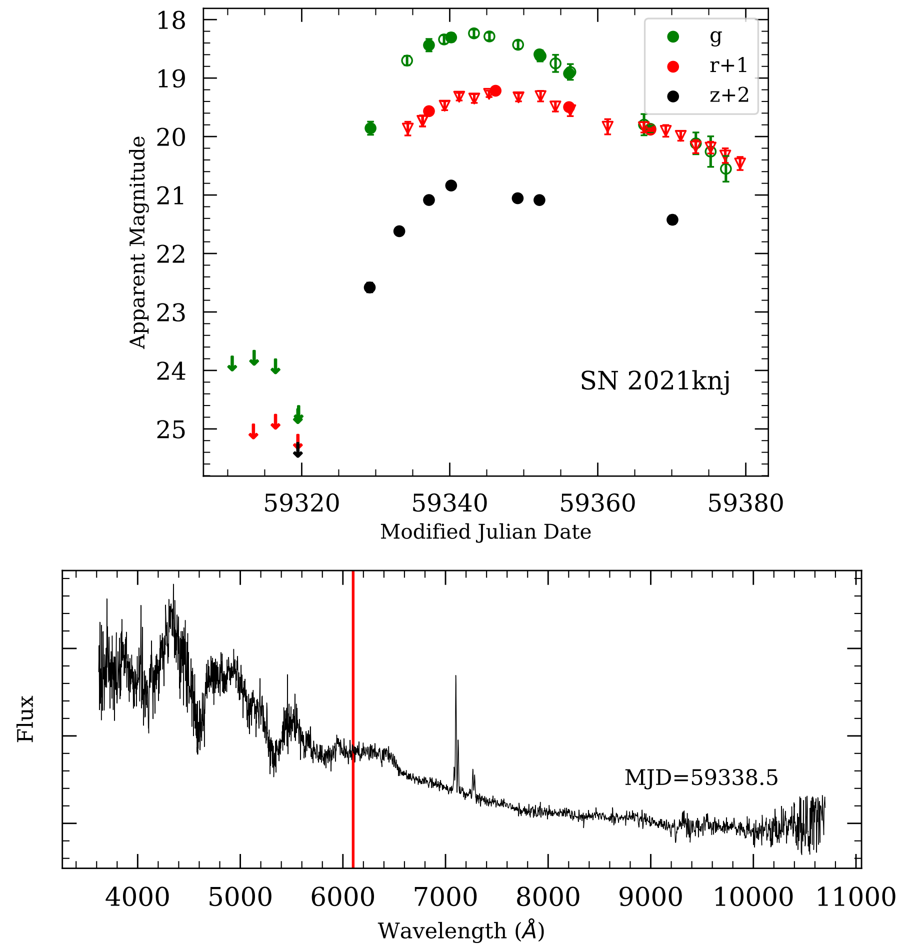


Figure 5.3 Observations of SN2021knj. Upper: Photometry of SN2021knj. Down arrows are upper limits. ZTF data taken from ZTF Explorer are also plotted in open markers for comparison. Lower: Spectrum of SN2021knj at MJD=59338.5 days, taken by Kast spectrograph at Lick Observatory. A red vertical line is plotted at 6100Å to guide the eye.

6. SUMMARY AND CONCLUSIONS

Type Ia supernovae have been crucial to modern cosmology. SNe Ia directly led to the discovery of the accelerating expansion of the universe, and is still the major tool used to determine the local expansion rate H_0 of the universe by serving as distance indicators. The use of SNe Ia as distance indicators hinges on their precise optical photometry, and the assumption that SNe Ia is a homogeneous group with a standard peak magnitude that can be corrected onto using empirical light curve shape and color relationship.

Although the process of data reduction and calibration would introduce systematics to SN Ia measured properties, differences among SNe Ia exist beyond systematics. Among those peculiar SN Ia there is a subgroup called 91T/99aa-like SNe. 91T/99aa-like SNe lie on the luminous end of SNe Ia and show weak to no features of IMEs especially Si II $\lambda\lambda$6355 before maximum. 91T/99aa-like SN are known to be more luminous than normal SN Ia even after light curve shape and color correction, which violates the most basic assumption of using SNe Ia as standardizable candles and hence their use in cosmology. So far, astronomers exclude peculiar SNe Ia like 91T/99aa-like SNe based on spectroscopic observations when doing cosmology. However, the fact 91T/99aa-like SNe have similar spectroscopic evolution after maximum light, and that pre-maximum spectroscopic observations are not always available especially in the coming era of LSST, make the 91T/99aa-like SNe pollution of SN Ia cosmological sample a problem that needs to be carefully examined to use SNe Ia in cosmology safely.

We have presented the photometry of 16 91T/99aa-like SNe observed by Las Cumbres Observatory. Together with 21 well observed 91T/99aa-like SNe from the literature, we study the standardizability of 91T/99aa-like SNe and the possible systematics they may pose on the use of SNe Ia in cosmology. We found that 91T/99aa-like are $\sim$0.2 mag brighter than normal SNe Ia after fully corrected, consistent with previous work. But 91T/99aa-like themselves are excellent distance indicators to a precision of 12%. Moreover, we found that the Hubble residual of SNe Ia after light curve shape and color correction correlates strongly with pEW_{max}(Si II $\lambda\lambda$6355) when pEW_{max}(Si II $\lambda\lambda$6355) is less than 55.6Å. We also suggest a new classification scheme based on pEW_{max}(Si II $\lambda\lambda$6355), since no evidence shows 91T/99aa-like SNe are a distinct group from normal SNe Ia but rather a continuous population from normal SNe Ia.

We also presented the photometry reduction pipeline we used for precision photometry. Our photometry pipeline works on pre-processed images that are corrected by bad pixel masking, bias and overscan subtraction, dark subtraction, and flat-field correction to get calibrated magnitudes. Our photometry pipeline resorts to `SFFT` software for image subtraction process in the Fourier space and uses `ALLFRAME` for doing PSF photometry simultaneously on multiple frames for better precision especially when the target object is faint compared to the background. The photometry is calibrated onto targeted standard system using existing standard catalog magnitudes of field stars. We have shown our photometry pipeline works better than other published work's reduction using the same set of images.

We demonstrated the analysis techniques used in our work. We used the established FPCA light curve templates in the literature for light curve fitting, and extended the use of the FPCA templates into fitting K-corrections and S-corrections as well for interpolation of S- and K-corrections. Moreover, we invented the technique of calculating the error of spectral line pEW by Monte Carlo simulation with errors of spectra estimated from wavelet transformation.

With the success of our photometry pipeline on images taken by 1-meter telescopes at Las Cumbres Observatory, we applied our photometry pipeline to images taken by the bigger, wide-field 4-meter DECam at Cerro Tololo Inter-American Observatory for variables discovered by our DECam survey of Intermediate Redshift Transients project. We discovered 923 variable candidates from survey in 2021A with 235 being off-nuclear candidates. Photometry of those variables were reduced using our photometry pipeline for further analysis. We showed some interesting science that can be done with our sample, including SNe Ia discovered at very young age, 02cx-like SN Ia, and 91T/99aa-like SN Ia. The photometry pipeline will be applied to data taken in 2022 as well. We will also explore the usage of our photometry pipeline in prioritizing variable candidates for timely followups.

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APPENDIX A

STATISTICS

A.1 Gaussian ideogram

Kernel density estimation was used to estimate the distribution density profile, since visualizations of histograms can vary greatly depending on different choices of binning. Here we use a simple variant of the Gaussian kernel density estimation, the Gaussian ideogram, using additional knowledge of the data uncertainty. Each data point in a Gaussian ideogram is represented by a Gaussian with a central value of the data point, standard deviation of the data point, and area proportional to the inverse of that standard deviation. This way the density profile will give less weight to data with large errors and thus not be biased by those outliers with large errors as easily as naive kernel density estimators.

A.2 RMS and wRMS

To quantify the scatter in Hubble residual, unweighted root mean square (RMS) and weighted rms (wRMS) are used. RMS and wRMS in the Hubble residual are defined by

$$RMS = \sqrt{\frac{\sum_{i=1}^{N_{SN}} \Delta\mu_i^2}{N_{SN}}}$$

$$wRMS = \sqrt{\sum_{i=1}^{N_{SN}} \frac{1}{\sigma_i^2}\Delta\mu_i^2} \Bigg/ \sqrt{\sum_{i=1}^{N_{SN}} \frac{1}{\sigma_i^2}}$$

where N_{SN} is the total number of supernovae in the sample and σ_i is the uncertainty in $\Delta\mu_i$, including intrinsic scatter and peculiar velocity. The uncertainties on RMS and wRMS are calculated using bootstrap resampling method. The reduced χ^2 is determined

See https://pdg.lbl.gov/2015/reviews/rpp2015-rev-rpp-intro.pdf for more discussion on ideogram.

by

$$\chi^2_\nu = \chi^2/DoF = \frac{1}{N_{SN}-3}\sum_{i=1}^{N_{SN}}\frac{\Delta\mu_i^2}{\sigma_i^2}$$

The intrinsic scatter σ_{int} is determined such that $\chi^2_\nu = 1$ for the whole sample when assuming normal SNe Ia and 1991T-like SNe Ia have the same σ_{int}, or $\chi^2_\nu = 1$ for normal SNe Ia and 1991T-like SNe Ia respectively when assuming they may have different σ_{int}. The intrinsic scatter σ_{int} is introduced to quantify possible intrinsic differences in the brightness of SNe Ia and not due to external reasons like light curve fitting, reddening or peculiar velocity.

A.3 Linear Regression χ^2 for Data with Errors in Both Variables

We have a set of observed data points (x_i, y_i) $(i = 1, ..., N)$ where both variables are independently measured with independent and identically distributed (iid) Gaussian errors, i.e.

$$x_i = x_i^* + \epsilon_i$$

$$y_i = y_i^* + \eta_i$$

where x_i^* and y_i^* are unobserved true values, and

$$\epsilon_i \overset{iid}{\sim} \mathcal{N}(0, \sigma_{\epsilon_i})$$

$$\eta_i \overset{iid}{\sim} \mathcal{N}(0, \sigma_{\eta_i})$$

Then we have

$$y_i - (ax_i + b) \overset{iid}{\sim} \mathcal{N}(0, \sigma_i)$$

where

$$\sigma_i^2 = Var(y_i - ax_i - b) = \sigma_{\eta_i}^2 + a^2\sigma_{\epsilon_i}^2.$$

Thus

$$\frac{y_i - (ax_i + b)}{\sqrt{\sigma_{\eta_i}^2 + a^2\sigma_{\epsilon_i}^2}} \overset{iid}{\sim} \mathcal{N}(0,1).$$

Therefore we have

$$\sum_{i=1}^{N} \frac{(y_i - ax_i - b)^2}{\sigma_{\eta_i}^2 + a^2\sigma_{\epsilon_i}^2} \sim \chi^2$$

with $DoF = N - 2$.

APPENDIX B

FIRST APPENDIX

Table B.1: Las Cumbres 91T/99aa-like SNe photometry in natural systems.

SN	Filter	MJD	Magnitude	Magnitude Error	Site, Telescope and Instrument
SN2014dl	B	56929.3814	16.473	0.053	coj1m003-kb71
SN2014dl	B	56929.3839	16.473	0.058	coj1m003-kb71
SN2014dl	B	56932.3744	16.303	0.057	coj1m011-kb05
SN2014dl	B	56932.3769	16.292	0.056	coj1m011-kb05
SN2014dl	B	56935.0704	16.272	0.044	elp1m008-kb74
SN2014dl	B	56937.0705	16.299	0.054	elp1m008-kb74
SN2014dl	B	56937.073	16.309	0.053	elp1m008-kb74
SN2014dl	B	56940.0746	16.432	0.045	elp1m008-kb74
SN2014dl	B	56940.0771	16.436	0.043	elp1m008-kb74
SN2014dl	B	56942.0803	16.544	0.05	elp1m008-kb74
SN2014dl	B	56942.0828	16.556	0.052	elp1m008-kb74
SN2014dl	B	56944.0773	16.662	0.045	elp1m008-kb74
SN2014dl	B	56946.0593	16.84	0.046	elp1m008-kb74
SN2014dl	B	56946.0618	16.855	0.042	elp1m008-kb74
SN2014dl	B	56948.0697	17.087	0.049	elp1m008-kb74
SN2014dl	B	56948.0722	17.084	0.05	elp1m008-kb74
SN2014dl	V	56929.3866	16.394	0.05	coj1m003-kb71
SN2014dl	V	56929.3882	16.389	0.05	coj1m003-kb71
SN2014dl	V	56932.3795	16.256	0.044	coj1m011-kb05
SN2014dl	V	56932.3811	16.253	0.038	coj1m011-kb05
SN2014dl	V	56935.0746	16.187	0.05	elp1m008-kb74
SN2014dl	V	56937.0773	16.171	0.046	elp1m008-kb74
SN2014dl	V	56940.0813	16.227	0.041	elp1m008-kb74
SN2014dl	V	56942.0855	16.265	0.039	elp1m008-kb74
SN2014dl	V	56942.0871	16.265	0.038	elp1m008-kb74
SN2014dl	V	56944.0825	16.317	0.038	elp1m008-kb74
SN2014dl	V	56944.084	16.337	0.039	elp1m008-kb74
SN2014dl	V	56946.0644	16.402	0.044	elp1m008-kb74
SN2014dl	V	56946.066	16.39	0.045	elp1m008-kb74
SN2014dl	V	56948.0749	16.572	0.041	elp1m008-kb74
SN2014dl	V	56948.0764	16.555	0.042	elp1m008-kb74
SN2014dl	V	56961.0542	17.288	0.051	elp1m008-kb74
SN2014dl	g	56929.3899	16.526	0.083	coj1m003-kb71
SN2014dl	g	56929.3924	16.533	0.082	coj1m003-kb71
SN2014dl	g	56932.3829	16.379	0.074	coj1m011-kb05
SN2014dl	g	56932.3854	16.377	0.073	coj1m011-kb05
SN2014dl	g	56935.0763	16.299	0.062	elp1m008-kb74
SN2014dl	g	56937.079	16.324	0.066	elp1m008-kb74
SN2014dl	g	56937.0815	16.325	0.068	elp1m008-kb74
SN2014dl	g	56940.0856	16.443	0.071	elp1m008-kb74
SN2014dl	g	56942.0888	16.481	0.076	elp1m008-kb74
SN2014dl	g	56942.0913	16.491	0.071	elp1m008-kb74
SN2014dl	g	56944.0858	16.58	0.067	elp1m008-kb74
SN2014dl	g	56944.0883	16.579	0.068	elp1m008-kb74
SN2014dl	g	56946.0678	16.712	0.067	elp1m008-kb74
SN2014dl	g	56946.0703	16.712	0.068	elp1m008-kb74
SN2014dl	g	56948.0782	16.897	0.068	elp1m008-kb74
SN2014dl	g	56948.0807	16.882	0.07	elp1m008-kb74
SN2014dl	r	56929.395	16.425	0.039	coj1m003-kb71
SN2014dl	r	56929.3966	16.431	0.038	coj1m003-kb71
SN2014dl	r	56932.388	16.277	0.036	coj1m011-kb05
SN2014dl	r	56932.3896	16.296	0.035	coj1m011-kb05

SN2014dl	r	56935.0814	16.192	0.031	elp1m008-kb74
SN2014dl	r	56935.083	16.205	0.044	elp1m008-kb74
SN2014dl	r	56937.0841	16.182	0.044	elp1m008-kb74
SN2014dl	r	56937.0857	16.197	0.04	elp1m008-kb74
SN2014dl	r	56940.0882	16.225	0.036	elp1m008-kb74
SN2014dl	r	56940.0898	16.219	0.038	elp1m008-kb74
SN2014dl	r	56942.0939	16.247	0.058	elp1m008-kb74
SN2014dl	r	56942.0955	16.26	0.036	elp1m008-kb74
SN2014dl	r	56944.0909	16.356	0.035	elp1m008-kb74
SN2014dl	r	56944.0925	16.355	0.034	elp1m008-kb74
SN2014dl	r	56946.0729	16.414	0.04	elp1m008-kb74
SN2014dl	r	56946.0745	16.432	0.04	elp1m008-kb74
SN2014dl	r	56948.0833	16.549	0.037	elp1m008-kb74
SN2014dl	r	56948.0849	16.549	0.038	elp1m008-kb74
SN2014dl	i	56929.3983	16.688	0.074	coj1m003-kb71
SN2014dl	i	56929.3999	16.724	0.073	coj1m003-kb71
SN2014dl	i	56932.3913	16.669	0.062	coj1m011-kb05
SN2014dl	i	56932.3929	16.672	0.061	coj1m011-kb05
SN2014dl	i	56935.0847	16.723	0.069	elp1m008-kb74
SN2014dl	i	56935.0863	16.73	0.07	elp1m008-kb74
SN2014dl	i	56937.0874	16.807	0.072	elp1m008-kb74
SN2014dl	i	56940.0915	16.756	0.067	elp1m008-kb74
SN2014dl	i	56940.0931	16.749	0.068	elp1m008-kb74
SN2014dl	i	56942.0972	16.783	0.065	elp1m008-kb74
SN2014dl	i	56942.0988	16.793	0.061	elp1m008-kb74
SN2014dl	i	56944.0942	16.893	0.063	elp1m008-kb74
SN2014dl	i	56944.0958	16.908	0.062	elp1m008-kb74
SN2014dl	i	56946.0762	17.073	0.07	elp1m008-kb74
SN2014dl	i	56946.0778	17.04	0.067	elp1m008-kb74
SN2014dl	i	56948.0866	17.151	0.064	elp1m008-kb74
SN2014dl	i	56948.0882	17.175	0.068	elp1m008-kb74
SN2014eg	B	56985.2071	15.898	0.033	lsc1m004-fl04
SN2014eg	B	56985.21	15.848	0.034	lsc1m004-fl04
SN2014eg	B	56985.228	15.859	0.035	lsc1m004-fl04
SN2014eg	B	56985.2309	15.889	0.034	lsc1m004-fl04
SN2014eg	B	56985.268	15.865	0.042	lsc1m004-fl04
SN2014eg	B	56985.2709	15.918	0.036	lsc1m004-fl04
SN2014eg	B	56985.2884	15.896	0.038	lsc1m009-fl03
SN2014eg	B	56985.2913	15.891	0.033	lsc1m009-fl03
SN2014eg	B	56988.0248	15.712	0.037	lsc1m009-fl03
SN2014eg	B	56988.0277	15.716	0.037	lsc1m009-fl03
SN2014eg	B	56988.0543	15.704	0.034	lsc1m009-fl03
SN2014eg	B	56988.0572	15.73	0.033	lsc1m009-fl03
SN2014eg	B	56988.1354	15.669	0.034	lsc1m004-fl04
SN2014eg	B	56988.1355	15.705	0.034	lsc1m009-fl03
SN2014eg	B	56988.1382	15.658	0.034	lsc1m004-fl04
SN2014eg	B	56988.1384	15.709	0.033	lsc1m009-fl03
SN2014eg	B	56988.162	15.65	0.034	lsc1m004-fl04
SN2014eg	B	56988.1649	15.655	0.034	lsc1m004-fl04
SN2014eg	B	56988.1844	15.716	0.034	lsc1m009-fl03
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SN2014eg	B	56988.272	15.709	0.033	lsc1m004-fl04
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SN2014eg	B	56991.0998	15.705	0.024	lsc1m009-fl03
SN2014eg	B	56992.0304	15.694	0.038	lsc1m009-fl03
SN2014eg	B	56992.054	15.7	0.042	lsc1m009-fl03
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SN2014eg	B	56992.0948	15.616	0.034	lsc1m004-fl04
SN2014eg	B	56992.109	15.614	0.034	lsc1m009-fl03
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SN2014eg	B	56992.1393	15.639	0.038	lsc1m009-fl03
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SN2014eg	B	57021.0776	18.036	0.038	lsc1m004-fl04
SN2014eg	B	57021.0805	18.012	0.04	lsc1m004-fl04
SN2014eg	B	57027.0372	18.492	0.066	lsc1m009-fl03
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SN2014eg	B	57035.1019	18.586	0.039	lsc1m009-fl03
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SN2014eg	B	57041.0599	18.862	0.058	lsc1m009-fl03
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SN2014eg	B	57069.031	19.297	0.054	lsc1m009-fl03
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SN2014eg	B	57083.0207	19.209	0.082	lsc1m004-fl04
SN2014eg	B	57083.0236	19.131	0.08	lsc1m004-fl04
SN2014eg	B	57089.0161	19.336	0.108	lsc1m009-fl03
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SN2014eg	B	57090.0011	19.444	0.197	lsc1m009-fl03
SN2014eg	B	57090.0039	19.369	0.144	lsc1m009-fl03
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SN2014eg	B	57091.0038	19.347	0.076	lsc1m009-fl03
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SN2014eg	V	56985.2963	15.656	0.049	lsc1m009-fl03
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SN2014eg	V	56988.0602	15.499	0.056	lsc1m009-fl03
SN2014eg	V	56988.0622	15.533	0.056	lsc1m009-fl03
SN2014eg	V	56988.1412	15.522	0.054	lsc1m004-fl04
SN2014eg	V	56988.1414	15.497	0.056	lsc1m009-fl03
SN2014eg	V	56988.1432	15.536	0.054	lsc1m004-fl04
SN2014eg	V	56988.1433	15.485	0.053	lsc1m009-fl03
SN2014eg	V	56988.1679	15.53	0.05	lsc1m004-fl04
SN2014eg	V	56988.1699	15.536	0.055	lsc1m004-fl04
SN2014eg	V	56988.1903	15.504	0.054	lsc1m009-fl03
SN2014eg	V	56988.1922	15.505	0.056	lsc1m009-fl03
SN2014eg	V	56988.1971	15.524	0.056	lsc1m004-fl04
SN2014eg	V	56988.1991	15.498	0.062	lsc1m004-fl04
SN2014eg	V	56988.2177	15.688	0.05	lsc1m009-fl03
SN2014eg	V	56988.2196	15.681	0.051	lsc1m009-fl03
SN2014eg	V	56988.278	15.485	0.056	lsc1m004-fl04
SN2014eg	V	56988.2799	15.491	0.05	lsc1m004-fl04
SN2014eg	V	56989.1734	15.469	0.05	lsc1m004-fl04
SN2014eg	V	56991.1028	15.392	0.052	lsc1m009-fl03
SN2014eg	V	56991.1048	15.359	0.036	lsc1m009-fl03
SN2014eg	V	56992.0334	15.377	0.058	lsc1m009-fl03
SN2014eg	V	56992.0354	15.372	0.057	lsc1m009-fl03
SN2014eg	V	56992.0598	15.372	0.046	lsc1m009-fl03
SN2014eg	V	56992.0618	15.362	0.049	lsc1m009-fl03
SN2014eg	V	56992.0978	15.369	0.038	lsc1m004-fl04
SN2014eg	V	56992.0998	15.369	0.038	lsc1m004-fl04
SN2014eg	V	56992.1149	15.38	0.05	lsc1m009-fl03
SN2014eg	V	56992.1169	15.364	0.049	lsc1m009-fl03
SN2014eg	V	56992.1423	15.372	0.05	lsc1m009-fl03
SN2014eg	V	56992.1443	15.368	0.049	lsc1m009-fl03
SN2014eg	V	56992.1583	15.376	0.044	lsc1m004-fl04
SN2014eg	V	56992.1603	15.383	0.037	lsc1m004-fl04
SN2014eg	V	56993.1628	15.387	0.053	lsc1m009-fl03
SN2014eg	V	56993.1647	15.387	0.053	lsc1m009-fl03
SN2014eg	V	56995.1725	15.393	0.046	lsc1m004-fl04
SN2014eg	V	56995.1745	15.391	0.046	lsc1m004-fl04
SN2014eg	V	56995.2028	15.509	0.045	lsc1m004-fl04
SN2014eg	V	56995.2048	15.503	0.044	lsc1m004-fl04
SN2014eg	V	56999.1777	15.424	0.037	lsc1m004-fl04
SN2014eg	V	56999.1797	15.416	0.037	lsc1m004-fl04
SN2014eg	V	56999.2108	15.403	0.045	lsc1m004-fl04
SN2014eg	V	56999.2128	15.425	0.048	lsc1m004-fl04
SN2014eg	V	57003.1778	15.623	0.044	lsc1m004-fl04
SN2014eg	V	57003.1798	15.637	0.051	lsc1m004-fl04
SN2014eg	V	57003.2041	15.62	0.035	lsc1m004-fl04
SN2014eg	V	57003.2061	15.632	0.051	lsc1m004-fl04
SN2014eg	V	57003.2471	15.65	0.048	lsc1m009-fl03
SN2014eg	V	57003.2491	15.648	0.048	lsc1m009-fl03
SN2014eg	V	57007.2035	15.911	0.049	lsc1m009-fl03
SN2014eg	V	57007.2055	15.909	0.049	lsc1m009-fl03
SN2014eg	V	57011.2312	16.115	0.05	lsc1m009-fl03
SN2014eg	V	57011.2331	16.116	0.056	lsc1m009-fl03
SN2014eg	V	57015.1978	16.319	0.047	lsc1m004-fl04
SN2014eg	V	57015.1997	16.322	0.047	lsc1m004-fl04
SN2014eg	V	57021.0835	16.613	0.037	lsc1m004-fl04
SN2014eg	V	57021.0855	16.619	0.036	lsc1m004-fl04
SN2014eg	V	57027.0431	17.028	0.05	lsc1m009-fl03
SN2014eg	V	57027.0451	16.97	0.053	lsc1m009-fl03
SN2014eg	V	57035.1078	17.375	0.048	lsc1m009-fl03
SN2014eg	V	57035.1098	17.353	0.05	lsc1m009-fl03
SN2014eg	V	57041.0658	17.531	0.052	lsc1m009-fl03
SN2014eg	V	57041.0678	17.516	0.051	lsc1m009-fl03
SN2014eg	V	57041.107	17.516	0.051	lsc1m009-fl03
SN2014eg	V	57041.109	17.513	0.05	lsc1m009-fl03
SN2014eg	V	57042.1332	17.521	0.051	lsc1m009-fl03

SN2014eg	V	57042.1352	17.544	0.051	lsc1m009-fl03
SN2014eg	V	57048.0355	17.641	0.054	lsc1m009-fl03
SN2014eg	V	57049.0427	17.721	0.055	lsc1m009-fl03
SN2014eg	V	57049.0447	17.702	0.053	lsc1m009-fl03
SN2014eg	V	57055.0499	17.744	0.046	lsc1m004-fl04
SN2014eg	V	57055.0519	17.816	0.045	lsc1m004-fl04
SN2014eg	V	57055.0625	17.908	0.05	lsc1m009-fl03
SN2014eg	V	57055.0645	17.843	0.056	lsc1m009-fl03
SN2014eg	V	57062.0833	18.184	0.064	lsc1m004-fl04
SN2014eg	V	57076.0347	18.537	0.068	lsc1m009-fl03
SN2014eg	V	57083.0266	18.511	0.082	lsc1m004-fl04
SN2014eg	V	57083.0285	18.354	0.083	lsc1m004-fl04
SN2014eg	V	57089.0218	18.707	0.076	lsc1m009-fl03
SN2014eg	V	57089.0237	18.72	0.076	lsc1m009-fl03
SN2014eg	V	57090.0068	18.63	0.074	lsc1m009-fl03
SN2014eg	V	57090.0087	18.666	0.074	lsc1m009-fl03
SN2014eg	V	57091.0068	18.691	0.065	lsc1m009-fl03
SN2014eg	V	57091.0089	18.71	0.065	lsc1m009-fl03
SN2014eg	V	57093.0049	18.634	0.071	lsc1m009-fl03
SN2014eg	V	57093.0068	18.65	0.072	lsc1m009-fl03
SN2014eg	g	56985.238	15.938	0.079	lsc1m004-fl04
SN2014eg	g	56985.2409	15.793	0.067	lsc1m004-fl04
SN2014eg	g	56985.278	15.846	0.063	lsc1m004-fl04
SN2014eg	g	56985.2809	15.842	0.062	lsc1m004-fl04
SN2014eg	g	56985.2984	15.842	0.06	lsc1m009-fl03
SN2014eg	g	56985.3013	15.845	0.06	lsc1m009-fl03
SN2014eg	g	56988.0349	15.7	0.062	lsc1m009-fl03
SN2014eg	g	56988.0643	15.683	0.056	lsc1m009-fl03
SN2014eg	g	56988.0672	15.739	0.056	lsc1m009-fl03
SN2014eg	g	56988.1454	15.681	0.062	lsc1m004-fl04
SN2014eg	g	56988.1483	15.681	0.062	lsc1m004-fl04
SN2014eg	g	56988.172	15.695	0.063	lsc1m004-fl04
SN2014eg	g	56988.1749	15.697	0.064	lsc1m004-fl04
SN2014eg	g	56988.1944	15.695	0.061	lsc1m009-fl03
SN2014eg	g	56988.1973	15.701	0.062	lsc1m009-fl03
SN2014eg	g	56988.2013	15.701	0.068	lsc1m004-fl04
SN2014eg	g	56988.2041	15.687	0.064	lsc1m004-fl04
SN2014eg	g	56988.2218	15.78	0.059	lsc1m009-fl03
SN2014eg	g	56988.2246	15.778	0.059	lsc1m009-fl03
SN2014eg	g	56988.2821	15.672	0.061	lsc1m004-fl04
SN2014eg	g	56988.285	15.68	0.061	lsc1m004-fl04
SN2014eg	g	56989.1784	15.62	0.057	lsc1m004-fl04
SN2014eg	g	56991.1069	15.627	0.057	lsc1m009-fl03
SN2014eg	g	56991.1098	15.629	0.056	lsc1m009-fl03
SN2014eg	g	56992.0375	15.612	0.057	lsc1m009-fl03
SN2014eg	g	56992.0404	15.621	0.059	lsc1m009-fl03
SN2014eg	g	56992.0639	15.62	0.057	lsc1m009-fl03
SN2014eg	g	56992.0668	15.617	0.056	lsc1m009-fl03
SN2014eg	g	56992.1019	15.597	0.068	lsc1m004-fl04
SN2014eg	g	56992.1048	15.603	0.067	lsc1m004-fl04
SN2014eg	g	56992.1191	15.626	0.058	lsc1m009-fl03
SN2014eg	g	56992.1219	15.636	0.058	lsc1m009-fl03
SN2014eg	g	56992.1464	15.637	0.057	lsc1m009-fl03
SN2014eg	g	56992.1494	15.63	0.058	lsc1m009-fl03
SN2014eg	g	56992.1624	15.61	0.067	lsc1m004-fl04
SN2014eg	g	56992.1653	15.608	0.064	lsc1m004-fl04
SN2014eg	g	56993.1669	15.64	0.058	lsc1m009-fl03
SN2014eg	g	56993.1698	15.632	0.058	lsc1m009-fl03
SN2014eg	g	56995.1766	15.63	0.057	lsc1m004-fl04
SN2014eg	g	56995.2069	15.76	0.057	lsc1m004-fl04
SN2014eg	g	56995.2098	15.722	0.057	lsc1m004-fl04
SN2014eg	g	56999.1818	15.738	0.058	lsc1m004-fl04
SN2014eg	g	56999.1847	15.736	0.06	lsc1m004-fl04
SN2014eg	g	56999.2149	15.734	0.058	lsc1m004-fl04
SN2014eg	g	56999.2178	15.737	0.058	lsc1m004-fl04
SN2014eg	g	57003.1819	15.965	0.058	lsc1m004-fl04
SN2014eg	g	57003.2083	15.984	0.061	lsc1m004-fl04
SN2014eg	g	57003.2112	15.977	0.057	lsc1m004-fl04

SN2014eg	g	57003.2517	15.99	0.057	lsc1m009-fl03
SN2014eg	g	57003.2545	15.99	0.056	lsc1m009-fl03
SN2014eg	g	57007.2076	16.334	0.056	lsc1m009-fl03
SN2014eg	g	57007.2105	16.337	0.057	lsc1m009-fl03
SN2014eg	g	57011.2352	16.687	0.058	lsc1m009-fl03
SN2014eg	g	57011.2381	16.671	0.057	lsc1m009-fl03
SN2014eg	g	57015.2018	17.037	0.058	lsc1m004-fl04
SN2014eg	g	57015.2047	17.057	0.058	lsc1m004-fl04
SN2014eg	g	57019.0627	17.519	0.061	lsc1m009-fl03
SN2014eg	g	57019.0656	17.502	0.059	lsc1m009-fl03
SN2014eg	g	57021.0876	17.556	0.057	lsc1m004-fl04
SN2014eg	g	57021.0905	17.545	0.056	lsc1m004-fl04
SN2014eg	g	57027.0473	17.908	0.058	lsc1m009-fl03
SN2014eg	g	57027.0502	17.967	0.06	lsc1m009-fl03
SN2014eg	g	57035.1119	18.193	0.058	lsc1m009-fl03
SN2014eg	g	57035.1148	18.184	0.058	lsc1m009-fl03
SN2014eg	g	57041.0699	18.233	0.059	lsc1m009-fl03
SN2014eg	g	57041.0728	18.236	0.059	lsc1m009-fl03
SN2014eg	g	57041.1111	18.28	0.058	lsc1m009-fl03
SN2014eg	g	57041.114	18.288	0.058	lsc1m009-fl03
SN2014eg	g	57042.1373	18.338	0.06	lsc1m009-fl03
SN2014eg	g	57042.1402	18.342	0.059	lsc1m009-fl03
SN2014eg	g	57049.0468	18.431	0.058	lsc1m009-fl03
SN2014eg	g	57049.0497	18.43	0.058	lsc1m009-fl03
SN2014eg	g	57055.0667	18.506	0.059	lsc1m009-fl03
SN2014eg	g	57055.0696	18.548	0.058	lsc1m009-fl03
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SN2014eg	g	57076.0368	18.922	0.07	lsc1m009-fl03
SN2014eg	g	57076.0396	18.833	0.07	lsc1m009-fl03
SN2014eg	g	57083.0306	18.928	0.077	lsc1m004-fl04
SN2014eg	g	57083.0335	18.87	0.072	lsc1m004-fl04
SN2014eg	g	57089.0257	18.98	0.073	lsc1m009-fl03
SN2014eg	g	57089.0285	18.989	0.071	lsc1m009-fl03
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SN2014eg	g	57090.0283	19.049	0.065	lsc1m004-fl04
SN2014eg	g	57284.3729	20.603	0.117	lsc1m004-fl04
SN2014eg	g	57284.3768	20.747	0.13	lsc1m004-fl04
SN2014eg	g	57285.0479	20.312	0.26	cpt1m012-kb75
SN2014eg	g	57672.5725	22.214	0.265	coj1m011-fl12
SN2014eg	r	56985.3043	15.726	0.032	lsc1m009-fl03
SN2014eg	r	56985.3062	15.725	0.03	lsc1m009-fl03
SN2014eg	r	56988.0702	15.58	0.021	lsc1m009-fl03
SN2014eg	r	56988.0722	15.587	0.025	lsc1m009-fl03
SN2014eg	r	56988.1457	15.562	0.044	lsc1m009-fl03
SN2014eg	r	56988.1477	15.561	0.042	lsc1m009-fl03
SN2014eg	r	56988.1513	15.544	0.04	lsc1m004-fl04
SN2014eg	r	56988.1533	15.552	0.039	lsc1m004-fl04
SN2014eg	r	56988.1779	15.555	0.039	lsc1m004-fl04
SN2014eg	r	56988.1799	15.56	0.041	lsc1m004-fl04
SN2014eg	r	56988.2003	15.63	0.04	lsc1m009-fl03
SN2014eg	r	56988.2023	15.629	0.049	lsc1m009-fl03
SN2014eg	r	56988.2072	15.552	0.039	lsc1m004-fl04
SN2014eg	r	56988.2091	15.548	0.039	lsc1m004-fl04
SN2014eg	r	56988.2277	15.512	0.025	lsc1m009-fl03
SN2014eg	r	56988.2296	15.511	0.025	lsc1m009-fl03
SN2014eg	r	56988.2879	15.55	0.037	lsc1m004-fl04
SN2014eg	r	56988.2899	15.553	0.038	lsc1m004-fl04
SN2014eg	r	56989.1814	15.453	0.024	lsc1m004-fl04
SN2014eg	r	56989.1834	15.45	0.026	lsc1m004-fl04
SN2014eg	r	56991.1128	15.398	0.02	lsc1m009-fl03
SN2014eg	r	56991.1148	15.395	0.02	lsc1m009-fl03
SN2014eg	r	56992.0434	15.35	0.021	lsc1m009-fl03
SN2014eg	r	56992.0453	15.356	0.02	lsc1m009-fl03
SN2014eg	r	56992.0698	15.356	0.026	lsc1m009-fl03
SN2014eg	r	56992.0718	15.355	0.027	lsc1m009-fl03
SN2014eg	r	56992.1078	15.366	0.046	lsc1m004-fl04
SN2014eg	r	56992.1097	15.364	0.048	lsc1m004-fl04

SN2014eg	r	56992.125	15.371	0.026	lsc1m009-fl03
SN2014eg	r	56992.1269	15.374	0.025	lsc1m009-fl03
SN2014eg	r	56992.1524	15.373	0.026	lsc1m009-fl03
SN2014eg	r	56992.1544	15.377	0.025	lsc1m009-fl03
SN2014eg	r	56992.1683	15.356	0.025	lsc1m004-fl04
SN2014eg	r	56992.1703	15.368	0.047	lsc1m004-fl04
SN2014eg	r	56993.1728	15.343	0.026	lsc1m009-fl03
SN2014eg	r	56993.1747	15.345	0.032	lsc1m009-fl03
SN2014eg	r	56995.1825	15.319	0.029	lsc1m004-fl04
SN2014eg	r	56995.1846	15.324	0.026	lsc1m004-fl04
SN2014eg	r	56995.2128	15.334	0.026	lsc1m004-fl04
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SN2014eg	r	56999.1877	15.463	0.034	lsc1m004-fl04
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SN2014eg	r	56999.2208	15.462	0.03	lsc1m004-fl04
SN2014eg	r	56999.2228	15.458	0.036	lsc1m004-fl04
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SN2014eg	r	57003.2576	15.752	0.04	lsc1m009-fl03
SN2014eg	r	57003.2595	15.762	0.033	lsc1m009-fl03
SN2014eg	r	57007.2135	15.961	0.024	lsc1m009-fl03
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SN2014eg	r	57011.2411	15.994	0.023	lsc1m009-fl03
SN2014eg	r	57011.2431	15.998	0.025	lsc1m009-fl03
SN2014eg	r	57015.2077	16.048	0.026	lsc1m004-fl04
SN2014eg	r	57015.2097	16.046	0.024	lsc1m004-fl04
SN2014eg	r	57019.0686	16.214	0.028	lsc1m009-fl03
SN2014eg	r	57019.0706	16.208	0.027	lsc1m009-fl03
SN2014eg	r	57021.0935	16.229	0.025	lsc1m004-fl04
SN2014eg	r	57021.0954	16.223	0.026	lsc1m004-fl04
SN2014eg	r	57027.0552	16.602	0.024	lsc1m009-fl03
SN2014eg	r	57035.1178	17.036	0.027	lsc1m009-fl03
SN2014eg	r	57035.1198	17.027	0.026	lsc1m009-fl03
SN2014eg	r	57041.0775	17.164	0.026	lsc1m009-fl03
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SN2014eg	r	57042.1432	17.272	0.024	lsc1m009-fl03
SN2014eg	r	57042.1452	17.263	0.025	lsc1m009-fl03
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SN2014eg	r	57049.0547	17.493	0.026	lsc1m009-fl03
SN2014eg	r	57055.0726	17.669	0.029	lsc1m009-fl03
SN2014eg	r	57062.0913	17.89	0.049	lsc1m004-fl04
SN2014eg	r	57062.0932	18.013	0.046	lsc1m004-fl04
SN2014eg	r	57076.0426	18.346	0.05	lsc1m009-fl03
SN2014eg	r	57076.0445	18.448	0.056	lsc1m009-fl03
SN2014eg	r	57083.0364	18.47	0.045	lsc1m004-fl04
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SN2014eg	r	57089.0314	18.553	0.051	lsc1m009-fl03
SN2014eg	r	57089.0333	18.624	0.053	lsc1m009-fl03
SN2014eg	r	57090.0313	18.716	0.047	lsc1m004-fl04
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SN2014eg	r	57286.2073	21.015	0.27	lsc1m009-fl03
SN2014eg	r	57286.2113	20.811	0.237	lsc1m009-fl03
SN2014eg	i	56985.3083	15.919	0.042	lsc1m009-fl03
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SN2014eg	i	56988.0762	15.829	0.031	lsc1m009-fl03
SN2014eg	i	56988.1498	15.867	0.058	lsc1m009-fl03
SN2014eg	i	56988.1517	15.871	0.062	lsc1m009-fl03
SN2014eg	i	56988.1554	15.84	0.062	lsc1m004-fl04
SN2014eg	i	56988.1573	15.869	0.067	lsc1m004-fl04
SN2014eg	i	56988.182	15.853	0.064	lsc1m004-fl04
SN2014eg	i	56988.184	15.848	0.064	lsc1m004-fl04
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SN2014eg	i	56988.2064	15.862	0.055	lsc1m009-fl03
SN2014eg	i	56988.2113	15.855	0.065	lsc1m004-fl04
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SN2014eg	i	56989.1856	15.78	0.055	lsc1m004-fl04
SN2014eg	i	56989.1877	15.741	0.06	lsc1m004-fl04
SN2014eg	i	56991.1168	15.814	0.036	lsc1m009-fl03
SN2014eg	i	56991.1188	15.801	0.037	lsc1m009-fl03
SN2014eg	i	56992.0474	15.802	0.039	lsc1m009-fl03
SN2014eg	i	56992.0494	15.797	0.038	lsc1m009-fl03
SN2014eg	i	56992.0739	15.812	0.054	lsc1m009-fl03
SN2014eg	i	56992.0759	15.815	0.054	lsc1m009-fl03
SN2014eg	i	56992.1118	15.815	0.057	lsc1m004-fl04
SN2014eg	i	56992.1138	15.837	0.055	lsc1m004-fl04
SN2014eg	i	56992.129	15.83	0.054	lsc1m009-fl03
SN2014eg	i	56992.131	15.822	0.052	lsc1m009-fl03
SN2014eg	i	56992.1565	15.843	0.054	lsc1m009-fl03
SN2014eg	i	56992.1585	15.844	0.054	lsc1m009-fl03
SN2014eg	i	56992.1724	15.822	0.054	lsc1m004-fl04
SN2014eg	i	56992.1744	15.837	0.053	lsc1m004-fl04
SN2014eg	i	56993.1768	15.836	0.055	lsc1m009-fl03
SN2014eg	i	56993.1788	15.825	0.052	lsc1m009-fl03
SN2014eg	i	56995.2169	15.834	0.054	lsc1m004-fl04
SN2014eg	i	56995.2189	15.838	0.055	lsc1m004-fl04
SN2014eg	i	56999.1918	16.016	0.054	lsc1m004-fl04
SN2014eg	i	56999.2249	15.993	0.054	lsc1m004-fl04
SN2014eg	i	56999.2269	16.03	0.05	lsc1m004-fl04
SN2014eg	i	57003.2182	16.33	0.056	lsc1m004-fl04
SN2014eg	i	57003.2616	16.355	0.056	lsc1m009-fl03
SN2014eg	i	57003.2636	16.397	0.075	lsc1m009-fl03
SN2014eg	i	57007.2176	16.493	0.054	lsc1m009-fl03
SN2014eg	i	57007.2196	16.493	0.056	lsc1m009-fl03
SN2014eg	i	57011.2452	16.349	0.032	lsc1m009-fl03
SN2014eg	i	57011.2471	16.389	0.033	lsc1m009-fl03
SN2014eg	i	57015.2118	16.272	0.056	lsc1m004-fl04
SN2014eg	i	57015.2138	16.242	0.055	lsc1m004-fl04
SN2014eg	i	57019.0726	16.275	0.055	lsc1m009-fl03
SN2014eg	i	57019.0746	16.277	0.055	lsc1m009-fl03
SN2014eg	i	57021.0975	16.274	0.054	lsc1m004-fl04
SN2014eg	i	57021.0995	16.27	0.054	lsc1m004-fl04
SN2014eg	i	57027.0574	16.583	0.038	lsc1m009-fl03
SN2014eg	i	57027.0595	16.591	0.044	lsc1m009-fl03
SN2014eg	i	57035.1219	17.109	0.052	lsc1m009-fl03
SN2014eg	i	57035.1238	17.089	0.052	lsc1m009-fl03
SN2014eg	i	57041.1211	17.316	0.04	lsc1m009-fl03
SN2014eg	i	57041.1231	17.378	0.04	lsc1m009-fl03
SN2014eg	i	57042.1473	17.399	0.04	lsc1m009-fl03
SN2014eg	i	57042.1493	17.409	0.041	lsc1m009-fl03
SN2014eg	i	57049.0579	17.675	0.056	lsc1m009-fl03
SN2014eg	i	57049.0598	17.606	0.056	lsc1m009-fl03
SN2014eg	i	57055.0767	17.889	0.057	lsc1m009-fl03
SN2014eg	i	57055.0787	17.896	0.056	lsc1m009-fl03
SN2014eg	i	57062.0953	18.215	0.073	lsc1m004-fl04
SN2014eg	i	57062.0972	18.198	0.062	lsc1m004-fl04
SN2014eg	i	57076.0466	18.735	0.086	lsc1m009-fl03
SN2014eg	i	57076.0485	18.681	0.083	lsc1m009-fl03
SN2014eg	i	57083.0404	18.767	0.097	lsc1m004-fl04
SN2014eg	i	57083.0423	18.832	0.101	lsc1m004-fl04
SN2014eg	i	57090.0351	19.026	0.099	lsc1m004-fl04
SN2014eg	i	57090.037	19.041	0.1	lsc1m004-fl04
SN2014eg	i	57286.2154	19.341	0.11	lsc1m009-fl03
SN2014eg	i	57286.2193	20.082	0.193	lsc1m009-fl03
SN2014eg	i	57292.2017	20.349	0.298	lsc1m004-fl04
SN2014eg	i	57345.3164	20.429	0.254	lsc1m004-fl04
PS15sv	B	57110.9532	16.791	0.085	cpt1m010-kb70
PS15sv	B	57110.956	16.775	0.085	cpt1m010-kb70
PS15sv	B	57114.2824	16.733	0.102	elp1m008-kb74
PS15sv	B	57114.2849	16.754	0.085	elp1m008-kb74
PS15sv	B	57118.2982	16.807	0.084	elp1m008-kb74

PS15sv	B	57118.3007	16.83	0.085	elp1m008-kb74
PS15sv	B	57119.2693	16.878	0.09	elp1m008-kb74
PS15sv	B	57119.2717	16.95	0.117	elp1m008-kb74
PS15sv	B	57123.1716	17.115	0.085	lsc1m005-kb78
PS15sv	B	57123.1741	17.111	0.084	lsc1m005-kb78
PS15sv	B	57127.6622	17.59	0.076	coj1m003-kb71
PS15sv	B	57127.6647	17.598	0.076	coj1m003-kb71
PS15sv	B	57131.2955	18.161	0.085	elp1m008-kb74
PS15sv	B	57131.2979	18.105	0.086	elp1m008-kb74
PS15sv	B	57135.3532	18.569	0.092	lsc1m005-kb78
PS15sv	B	57135.3557	18.62	0.093	lsc1m005-kb78
PS15sv	B	57139.0967	18.822	0.088	cpt1m012-kb75
PS15sv	B	57139.0993	18.92	0.088	cpt1m012-kb75
PS15sv	B	57139.6994	18.973	0.108	coj1m003-kb71
PS15sv	B	57139.7019	18.934	0.107	coj1m003-kb71
PS15sv	B	57153.18	19.978	0.312	elp1m008-kb74
PS15sv	B	57157.0802	19.879	0.104	lsc1m005-kb78
PS15sv	B	57157.0827	19.934	0.101	lsc1m005-kb78
PS15sv	B	57159.9336	19.708	0.198	cpt1m012-kb75
PS15sv	B	57160.934	20.055	0.1	cpt1m010-kb70
PS15sv	B	57160.9378	19.915	0.098	cpt1m010-kb70
PS15sv	B	57161.0551	19.852	0.102	cpt1m012-kb75
PS15sv	B	57161.0591	19.891	0.109	cpt1m012-kb75
PS15sv	B	57161.0678	19.675	0.094	lsc1m005-kb78
PS15sv	B	57161.0701	20.501	0.257	cpt1m010-kb70
PS15sv	B	57161.0715	20.03	0.103	lsc1m005-kb78
PS15sv	B	57161.074	19.951	0.176	cpt1m010-kb70
PS15sv	B	57161.1308	20.011	0.101	lsc1m005-kb78
PS15sv	B	57161.1344	19.927	0.098	lsc1m005-kb78
PS15sv	B	57161.1622	19.845	0.095	lsc1m005-kb78
PS15sv	B	57161.1659	19.974	0.099	lsc1m005-kb78
PS15sv	B	57161.2252	19.871	0.096	lsc1m005-kb78
PS15sv	B	57161.2289	19.802	0.094	lsc1m005-kb78
PS15sv	B	57161.2567	19.973	0.099	lsc1m005-kb78
PS15sv	B	57161.2603	19.865	0.096	lsc1m005-kb78
PS15sv	B	57161.3133	19.864	0.098	lsc1m005-kb78
PS15sv	B	57161.8431	19.932	0.131	cpt1m010-kb70
PS15sv	B	57161.847	19.656	0.106	cpt1m010-kb70
PS15sv	B	57161.9058	19.639	0.1	cpt1m010-kb70
PS15sv	B	57161.9096	20.155	0.12	cpt1m010-kb70
PS15sv	B	57161.9128	20.392	0.154	cpt1m012-kb75
PS15sv	B	57161.9167	19.993	0.113	cpt1m012-kb75
PS15sv	B	57166.9725	20.751	0.17	cpt1m010-kb70
PS15sv	B	57167.4029	19.87	0.169	elp1m008-kb74
PS15sv	B	57167.4065	20.386	0.284	elp1m008-kb74
PS15sv	V	57110.9592	16.741	0.038	cpt1m010-kb70
PS15sv	V	57110.9608	16.768	0.03	cpt1m010-kb70
PS15sv	V	57114.2875	16.706	0.031	elp1m008-kb74
PS15sv	V	57114.2891	16.712	0.032	elp1m008-kb74
PS15sv	V	57118.3033	16.758	0.031	elp1m008-kb74
PS15sv	V	57118.3049	16.7	0.031	elp1m008-kb74
PS15sv	V	57119.2744	16.891	0.144	elp1m008-kb74
PS15sv	V	57123.1768	16.909	0.03	lsc1m005-kb78
PS15sv	V	57123.1784	16.896	0.03	lsc1m005-kb78
PS15sv	V	57127.6673	17.235	0.027	coj1m003-kb71
PS15sv	V	57127.6689	17.206	0.027	coj1m003-kb71
PS15sv	V	57131.3006	17.42	0.032	elp1m008-kb74
PS15sv	V	57131.3021	17.469	0.032	elp1m008-kb74
PS15sv	V	57135.3583	17.7	0.054	lsc1m005-kb78
PS15sv	V	57135.3599	17.686	0.054	lsc1m005-kb78
PS15sv	V	57139.1022	17.875	0.054	cpt1m012-kb75
PS15sv	V	57139.1039	17.798	0.053	cpt1m012-kb75
PS15sv	V	57139.7045	17.938	0.048	coj1m003-kb71
PS15sv	V	57139.706	17.954	0.064	coj1m003-kb71
PS15sv	V	57148.4981	18.166	0.045	coj1m011-kb79
PS15sv	V	57148.4996	18.363	0.045	coj1m011-kb79
PS15sv	V	57153.1826	18.571	0.099	elp1m008-kb74
PS15sv	V	57153.1842	18.484	0.1	elp1m008-kb74

PS15sv	V	57157.0854	18.771	0.042	lsc1m005-kb78
PS15sv	V	57157.087	18.82	0.042	lsc1m005-kb78
PS15sv	V	57159.9375	18.896	0.049	cpt1m012-kb75
PS15sv	V	57159.9401	18.753	0.045	cpt1m012-kb75
PS15sv	V	57160.9418	18.864	0.06	cpt1m010-kb70
PS15sv	V	57160.9444	18.861	0.059	cpt1m010-kb70
PS15sv	V	57161.0636	18.905	0.094	cpt1m012-kb75
PS15sv	V	57161.0664	18.952	0.086	cpt1m012-kb75
PS15sv	V	57161.0753	18.861	0.042	lsc1m005-kb78
PS15sv	V	57161.0778	18.836	0.043	lsc1m005-kb78
PS15sv	V	57161.0783	18.857	0.078	cpt1m010-kb70
PS15sv	V	57161.0809	18.877	0.075	cpt1m010-kb70
PS15sv	V	57161.1382	18.712	0.122	lsc1m005-kb78
PS15sv	V	57161.1407	18.888	0.041	lsc1m005-kb78
PS15sv	V	57161.1697	18.934	0.043	lsc1m005-kb78
PS15sv	V	57161.1722	18.901	0.042	lsc1m005-kb78
PS15sv	V	57161.2328	18.845	0.042	lsc1m005-kb78
PS15sv	V	57161.2353	18.87	0.042	lsc1m005-kb78
PS15sv	V	57161.2641	18.855	0.041	lsc1m005-kb78
PS15sv	V	57161.2666	18.844	0.042	lsc1m005-kb78
PS15sv	V	57161.3171	18.864	0.042	lsc1m005-kb78
PS15sv	V	57161.3196	18.934	0.042	lsc1m005-kb78
PS15sv	V	57161.851	18.857	0.057	cpt1m010-kb70
PS15sv	V	57161.8538	18.938	0.063	cpt1m010-kb70
PS15sv	V	57161.8821	18.931	0.064	cpt1m010-kb70
PS15sv	V	57161.8849	19.283	0.091	cpt1m010-kb70
PS15sv	V	57161.9205	19.008	0.06	cpt1m012-kb75
PS15sv	V	57161.9232	18.832	0.045	cpt1m012-kb75
PS15sv	V	57166.9831	19.114	0.053	cpt1m010-kb70
PS15sv	V	57167.4103	19.072	0.05	elp1m008-kb74
PS15sv	V	57167.4128	19.11	0.054	elp1m008-kb74
PS15sv	V	57174.6599	19.567	0.276	coj1m003-kb71
PS15sv	g	57110.9626	16.846	0.043	cpt1m010-kb70
PS15sv	g	57110.9651	16.833	0.043	cpt1m010-kb70
PS15sv	g	57114.2908	16.791	0.044	elp1m008-kb74
PS15sv	g	57114.2933	16.759	0.044	elp1m008-kb74
PS15sv	g	57118.3066	16.835	0.043	elp1m008-kb74
PS15sv	g	57118.3091	16.82	0.043	elp1m008-kb74
PS15sv	g	57123.1801	17.07	0.044	lsc1m005-kb78
PS15sv	g	57123.1826	17.071	0.044	lsc1m005-kb78
PS15sv	g	57127.6706	17.437	0.042	coj1m003-kb71
PS15sv	g	57127.6731	17.453	0.042	coj1m003-kb71
PS15sv	g	57131.3039	17.818	0.044	elp1m008-kb74
PS15sv	g	57131.3064	17.812	0.044	elp1m008-kb74
PS15sv	g	57135.3616	18.203	0.041	lsc1m005-kb78
PS15sv	g	57135.3641	18.173	0.042	lsc1m005-kb78
PS15sv	g	57139.106	18.498	0.044	cpt1m012-kb75
PS15sv	g	57139.1086	18.503	0.045	cpt1m012-kb75
PS15sv	g	57139.7078	18.57	0.057	coj1m003-kb71
PS15sv	g	57139.7103	18.559	0.056	coj1m003-kb71
PS15sv	g	57148.5013	18.96	0.054	coj1m011-kb79
PS15sv	g	57148.5038	19.263	0.059	coj1m011-kb79
PS15sv	g	57153.1859	19.435	0.104	elp1m008-kb74
PS15sv	g	57153.1884	19.133	0.075	elp1m008-kb74
PS15sv	g	57157.0888	19.427	0.05	lsc1m005-kb78
PS15sv	g	57157.0913	19.379	0.049	lsc1m005-kb78
PS15sv	g	57159.9432	19.532	0.097	cpt1m012-kb75
PS15sv	g	57159.9469	19.442	0.053	cpt1m012-kb75
PS15sv	g	57160.9473	19.615	0.049	cpt1m010-kb70
PS15sv	g	57160.9511	19.529	0.05	cpt1m010-kb70
PS15sv	g	57161.0692	19.758	0.095	cpt1m012-kb75
PS15sv	g	57161.0731	19.575	0.083	cpt1m012-kb75
PS15sv	g	57161.0805	19.548	0.051	lsc1m005-kb78
PS15sv	g	57161.0837	19.584	0.099	cpt1m010-kb70
PS15sv	g	57161.0842	19.489	0.05	lsc1m005-kb78
PS15sv	g	57161.088	19.592	0.082	cpt1m010-kb70
PS15sv	g	57161.1434	19.6	0.049	lsc1m005-kb78
PS15sv	g	57161.1471	19.585	0.049	lsc1m005-kb78

PS15sv	g	57161.1749	19.608	0.05	lsc1m005-kb78
PS15sv	g	57161.1786	19.613	0.049	lsc1m005-kb78
PS15sv	g	57161.238	19.504	0.049	lsc1m005-kb78
PS15sv	g	57161.2416	19.571	0.049	lsc1m005-kb78
PS15sv	g	57161.2693	19.675	0.051	lsc1m005-kb78
PS15sv	g	57161.273	19.565	0.049	lsc1m005-kb78
PS15sv	g	57161.3223	19.546	0.05	lsc1m005-kb78
PS15sv	g	57161.8579	19.618	0.055	cpt1m010-kb70
PS15sv	g	57161.8617	19.629	0.057	cpt1m010-kb70
PS15sv	g	57161.8879	19.368	0.057	cpt1m010-kb70
PS15sv	g	57161.8917	19.41	0.105	cpt1m010-kb70
PS15sv	g	57161.9195	19.444	0.05	cpt1m010-kb70
PS15sv	g	57161.9232	19.59	0.056	cpt1m010-kb70
PS15sv	g	57161.9261	19.694	0.059	cpt1m012-kb75
PS15sv	g	57161.9299	19.579	0.053	cpt1m012-kb75
PS15sv	g	57166.986	19.616	0.054	cpt1m010-kb70
PS15sv	g	57166.9898	19.718	0.054	cpt1m010-kb70
PS15sv	g	57167.4154	19.679	0.055	elp1m008-kb74
PS15sv	g	57167.4191	19.682	0.101	elp1m008-kb74
PS15sv	r	57110.9686	16.835	0.035	cpt1m010-kb70
PS15sv	r	57110.9702	16.836	0.035	cpt1m010-kb70
PS15sv	r	57114.2959	16.745	0.035	elp1m008-kb74
PS15sv	r	57114.2975	16.719	0.035	elp1m008-kb74
PS15sv	r	57118.3121	16.756	0.036	elp1m008-kb74
PS15sv	r	57118.3138	16.747	0.041	elp1m008-kb74
PS15sv	r	57119.2828	16.751	0.039	elp1m008-kb74
PS15sv	r	57119.2844	16.746	0.036	elp1m008-kb74
PS15sv	r	57123.1853	16.926	0.035	lsc1m005-kb78
PS15sv	r	57123.1869	16.934	0.035	lsc1m005-kb78
PS15sv	r	57127.6773	17.234	0.036	coj1m003-kb71
PS15sv	r	57131.309	17.384	0.036	elp1m008-kb74
PS15sv	r	57131.3106	17.445	0.037	elp1m008-kb74
PS15sv	r	57135.3668	17.501	0.034	lsc1m005-kb78
PS15sv	r	57135.3683	17.549	0.034	lsc1m005-kb78
PS15sv	r	57139.1114	17.56	0.036	cpt1m012-kb75
PS15sv	r	57139.113	17.56	0.037	cpt1m012-kb75
PS15sv	r	57139.713	17.628	0.043	coj1m003-kb71
PS15sv	r	57139.7145	17.564	0.04	coj1m003-kb71
PS15sv	r	57148.5064	17.825	0.044	coj1m011-kb79
PS15sv	r	57148.508	17.826	0.039	coj1m011-kb79
PS15sv	r	57153.1911	18.12	0.062	elp1m008-kb74
PS15sv	r	57157.094	18.379	0.041	lsc1m005-kb78
PS15sv	r	57157.0955	18.334	0.04	lsc1m005-kb78
PS15sv	r	57159.951	18.414	0.041	cpt1m012-kb75
PS15sv	r	57159.9536	18.319	0.042	cpt1m012-kb75
PS15sv	r	57160.955	18.53	0.04	cpt1m010-kb70
PS15sv	r	57160.9577	18.498	0.04	cpt1m010-kb70
PS15sv	r	57161.077	18.544	0.062	cpt1m012-kb75
PS15sv	r	57161.0796	18.496	0.058	cpt1m012-kb75
PS15sv	r	57161.088	18.507	0.04	lsc1m005-kb78
PS15sv	r	57161.0905	18.492	0.04	lsc1m005-kb78
PS15sv	r	57161.0957	18.556	0.081	cpt1m010-kb70
PS15sv	r	57161.1509	18.515	0.04	lsc1m005-kb78
PS15sv	r	57161.1534	18.503	0.04	lsc1m005-kb78
PS15sv	r	57161.1824	18.483	0.04	lsc1m005-kb78
PS15sv	r	57161.1849	18.495	0.04	lsc1m005-kb78
PS15sv	r	57161.2454	18.478	0.039	lsc1m005-kb78
PS15sv	r	57161.2479	18.451	0.039	lsc1m005-kb78
PS15sv	r	57161.2768	18.467	0.04	lsc1m005-kb78
PS15sv	r	57161.2792	18.559	0.041	lsc1m005-kb78
PS15sv	r	57161.3298	18.857	0.134	lsc1m005-kb78
PS15sv	r	57161.3323	18.254	0.08	lsc1m005-kb78
PS15sv	r	57161.8658	18.811	0.074	cpt1m010-kb70
PS15sv	r	57161.8685	18.57	0.062	cpt1m010-kb70
PS15sv	r	57161.8958	18.414	0.044	cpt1m010-kb70
PS15sv	r	57161.8984	18.459	0.044	cpt1m010-kb70
PS15sv	r	57161.9274	18.497	0.045	cpt1m010-kb70
PS15sv	r	57161.9301	18.533	0.042	cpt1m010-kb70

PS15sv	r	57161.9338	18.529	0.042	cpt1m012-kb75
PS15sv	r	57161.9365	18.456	0.041	cpt1m012-kb75
PS15sv	r	57166.9938	18.661	0.045	cpt1m010-kb70
PS15sv	r	57166.9965	18.667	0.046	cpt1m010-kb70
PS15sv	r	57167.4229	18.699	0.063	elp1m008-kb74
PS15sv	r	57167.4254	18.778	0.071	elp1m008-kb74
PS15sv	r	57174.675	19.048	0.164	coj1m003-kb71
PS15sv	i	57110.9722	17.152	0.129	cpt1m010-kb70
PS15sv	i	57110.9738	17.105	0.129	cpt1m010-kb70
PS15sv	i	57114.2992	17.228	0.128	elp1m008-kb74
PS15sv	i	57114.3008	17.228	0.129	elp1m008-kb74
PS15sv	i	57118.3165	17.214	0.139	elp1m008-kb74
PS15sv	i	57119.2861	17.24	0.164	elp1m008-kb74
PS15sv	i	57119.2876	17.252	0.174	elp1m008-kb74
PS15sv	i	57123.1886	17.583	0.129	lsc1m005-kb78
PS15sv	i	57123.1902	17.6	0.129	lsc1m005-kb78
PS15sv	i	57127.679	17.854	0.128	coj1m003-kb71
PS15sv	i	57127.6805	17.945	0.128	coj1m003-kb71
PS15sv	i	57131.3123	17.852	0.133	elp1m008-kb74
PS15sv	i	57131.3138	17.866	0.133	elp1m008-kb74
PS15sv	i	57135.3701	17.843	0.128	lsc1m005-kb78
PS15sv	i	57135.3716	17.901	0.129	lsc1m005-kb78
PS15sv	i	57139.1149	17.729	0.138	cpt1m012-kb75
PS15sv	i	57139.7162	17.835	0.152	coj1m003-kb71
PS15sv	i	57139.7178	17.9	0.143	coj1m003-kb71
PS15sv	i	57148.5096	17.952	0.133	coj1m011-kb79
PS15sv	i	57148.5112	18.01	0.133	coj1m011-kb79
PS15sv	i	57153.1943	18.205	0.176	elp1m008-kb74
PS15sv	i	57153.1959	18.14	0.168	elp1m008-kb74
PS15sv	i	57157.0972	18.422	0.151	lsc1m005-kb78
PS15sv	i	57157.0988	18.611	0.159	lsc1m005-kb78
PS15sv	i	57159.9566	18.395	0.134	cpt1m012-kb75
PS15sv	i	57160.9605	18.6	0.132	cpt1m010-kb70
PS15sv	i	57161.0824	18.676	0.181	cpt1m012-kb75
PS15sv	i	57161.0931	18.663	0.132	lsc1m005-kb78
PS15sv	i	57161.0956	18.543	0.131	lsc1m005-kb78
PS15sv	i	57161.156	18.661	0.132	lsc1m005-kb78
PS15sv	i	57161.1585	18.765	0.134	lsc1m005-kb78
PS15sv	i	57161.1876	18.565	0.131	lsc1m005-kb78
PS15sv	i	57161.1901	18.671	0.132	lsc1m005-kb78
PS15sv	i	57161.2505	18.627	0.133	lsc1m005-kb78
PS15sv	i	57161.253	18.78	0.134	lsc1m005-kb78
PS15sv	i	57161.2819	18.657	0.133	lsc1m005-kb78
PS15sv	i	57161.2844	18.627	0.133	lsc1m005-kb78
PS15sv	i	57161.3375	19.047	0.178	lsc1m005-kb78
PS15sv	i	57161.8714	18.482	0.155	cpt1m010-kb70
PS15sv	i	57161.9015	18.429	0.137	cpt1m010-kb70
PS15sv	i	57161.933	18.844	0.139	cpt1m010-kb70
PS15sv	i	57161.9396	18.61	0.135	cpt1m012-kb75
PS15sv	i	57166.9995	18.897	0.138	cpt1m010-kb70
PS15sv	i	57167.428	18.943	0.196	elp1m008-kb74
PS15sv	i	57167.4305	18.936	0.179	elp1m008-kb74
PS15sv	i	57174.6776	18.278	0.196	coj1m003-kb71
LSQ15aae	B	57104.4568	19.095	0.102	elp1m008-kb74
LSQ15aae	B	57104.4593	19.16	0.105	elp1m008-kb74
LSQ15aae	B	57108.6865	18.545	0.132	coj1m011-kb05
LSQ15aae	B	57108.689	18.657	0.098	coj1m011-kb05
LSQ15aae	B	57111.9743	18.27	0.059	cpt1m012-kb75
LSQ15aae	B	57111.9768	18.229	0.061	cpt1m012-kb75
LSQ15aae	B	57116.3395	18.09	0.057	lsc1m005-kb78
LSQ15aae	B	57116.3813	18.189	0.058	lsc1m005-kb78
LSQ15aae	B	57116.3839	18.039	0.057	lsc1m005-kb78
LSQ15aae	B	57120.1225	18.238	0.058	cpt1m010-kb70
LSQ15aae	B	57120.1252	18.318	0.058	cpt1m010-kb70
LSQ15aae	B	57120.3014	18.448	0.063	elp1m008-kb74
LSQ15aae	B	57120.3039	18.308	0.064	elp1m008-kb74
LSQ15aae	B	57123.7026	18.416	0.059	coj1m003-kb71
LSQ15aae	B	57123.7051	18.48	0.059	coj1m003-kb71

LSQ15aae	B	57129.3357	18.86	0.06	lsc1m005-kb78
LSQ15aae	B	57129.3382	18.915	0.059	lsc1m005-kb78
LSQ15aae	B	57133.2769	19.503	0.122	elp1m008-kb74
LSQ15aae	B	57133.2794	19.36	0.12	elp1m008-kb74
LSQ15aae	B	57137.3088	19.692	0.07	elp1m008-kb74
LSQ15aae	B	57137.3113	19.794	0.168	elp1m008-kb74
LSQ15aae	B	57141.3475	20.156	0.081	elp1m008-kb74
LSQ15aae	B	57141.35	20.358	0.093	elp1m008-kb74
LSQ15aae	B	57148.5718	20.224	0.13	coj1m003-kb71
LSQ15aae	B	57148.5743	20.141	0.133	coj1m003-kb71
LSQ15aae	B	57150.1065	20.331	0.262	cpt1m010-kb70
LSQ15aae	B	57162.9443	20.986	0.148	cpt1m010-kb70
LSQ15aae	B	57162.948	21.427	0.163	cpt1m010-kb70
LSQ15aae	B	57168.2774	21.764	0.22	elp1m008-kb74
LSQ15aae	B	57168.281	21.41	0.158	elp1m008-kb74
LSQ15aae	V	57104.4619	19.064	0.101	elp1m008-kb74
LSQ15aae	V	57104.4635	18.96	0.096	elp1m008-kb74
LSQ15aae	V	57108.6917	18.465	0.091	coj1m011-kb05
LSQ15aae	V	57108.6932	18.301	0.126	coj1m011-kb05
LSQ15aae	V	57111.9795	18.126	0.059	cpt1m012-kb75
LSQ15aae	V	57111.9811	18.08	0.059	cpt1m012-kb75
LSQ15aae	V	57116.3447	17.907	0.055	lsc1m005-kb78
LSQ15aae	V	57116.3464	17.892	0.055	lsc1m005-kb78
LSQ15aae	V	57116.3866	17.926	0.055	lsc1m005-kb78
LSQ15aae	V	57116.3882	18.061	0.056	lsc1m005-kb78
LSQ15aae	V	57120.1299	17.75	0.061	cpt1m010-kb70
LSQ15aae	V	57120.3065	18.002	0.063	elp1m008-kb74
LSQ15aae	V	57120.3081	18.002	0.063	elp1m008-kb74
LSQ15aae	V	57123.7077	18.065	0.052	coj1m003-kb71
LSQ15aae	V	57123.7093	18.042	0.053	coj1m003-kb71
LSQ15aae	V	57129.3409	18.316	0.056	lsc1m005-kb78
LSQ15aae	V	57129.3424	18.297	0.055	lsc1m005-kb78
LSQ15aae	V	57133.2821	18.557	0.065	elp1m008-kb74
LSQ15aae	V	57133.2836	18.467	0.06	elp1m008-kb74
LSQ15aae	V	57137.3139	18.786	0.085	elp1m008-kb74
LSQ15aae	V	57137.3155	18.687	0.075	elp1m008-kb74
LSQ15aae	V	57141.3526	19.009	0.065	elp1m008-kb74
LSQ15aae	V	57141.3542	18.899	0.063	elp1m008-kb74
LSQ15aae	V	57148.5769	19.515	0.108	coj1m003-kb71
LSQ15aae	V	57148.5785	19.417	0.142	coj1m003-kb71
LSQ15aae	V	57150.1166	19.556	0.281	cpt1m010-kb70
LSQ15aae	V	57154.5105	19.751	0.081	coj1m003-kb71
LSQ15aae	V	57154.513	19.559	0.078	coj1m003-kb71
LSQ15aae	V	57158.4339	19.996	0.171	elp1m008-kb74
LSQ15aae	V	57158.4364	20.13	0.115	elp1m008-kb74
LSQ15aae	V	57162.9522	20.015	0.098	cpt1m010-kb70
LSQ15aae	V	57162.9549	20.295	0.115	cpt1m010-kb70
LSQ15aae	V	57164.8586	20.002	0.113	cpt1m010-kb70
LSQ15aae	V	57164.8614	20.107	0.149	cpt1m010-kb70
LSQ15aae	V	57164.9002	20.331	0.121	cpt1m012-kb75
LSQ15aae	V	57164.903	20.239	0.117	cpt1m012-kb75
LSQ15aae	V	57166.877	20.0	0.106	cpt1m010-kb70
LSQ15aae	V	57166.8797	20.081	0.124	cpt1m010-kb70
LSQ15aae	V	57167.8841	20.18	0.133	cpt1m010-kb70
LSQ15aae	V	57167.8867	20.074	0.143	cpt1m010-kb70
LSQ15aae	V	57168.2848	20.173	0.1	elp1m008-kb74
LSQ15aae	V	57168.2873	19.922	0.087	elp1m008-kb74
LSQ15aae	V	57168.3799	19.977	0.086	elp1m008-kb74
LSQ15aae	V	57168.3824	20.144	0.096	elp1m008-kb74
LSQ15aae	g	57104.4652	19.196	0.076	elp1m008-kb74
LSQ15aae	g	57104.4677	19.214	0.078	elp1m008-kb74
LSQ15aae	g	57108.695	18.563	0.085	coj1m011-kb05
LSQ15aae	g	57111.9828	18.236	0.055	cpt1m012-kb75
LSQ15aae	g	57111.9853	18.29	0.055	cpt1m012-kb75
LSQ15aae	g	57116.3482	18.095	0.054	lsc1m005-kb78
LSQ15aae	g	57116.3508	18.185	0.054	lsc1m005-kb78
LSQ15aae	g	57116.3925	18.088	0.054	lsc1m005-kb78
LSQ15aae	g	57120.1321	18.213	0.057	cpt1m010-kb70

LSQ15aae	g	57120.1348	18.238	0.054	cpt1m010-kb70
LSQ15aae	g	57120.3098	18.202	0.056	elp1m008-kb74
LSQ15aae	g	57120.3123	18.316	0.056	elp1m008-kb74
LSQ15aae	g	57123.711	18.382	0.055	coj1m003-kb71
LSQ15aae	g	57123.7135	18.376	0.055	coj1m003-kb71
LSQ15aae	g	57129.3442	18.769	0.054	lsc1m005-kb78
LSQ15aae	g	57129.3467	18.751	0.054	lsc1m005-kb78
LSQ15aae	g	57133.2854	19.11	0.076	elp1m008-kb74
LSQ15aae	g	57133.2878	19.062	0.062	elp1m008-kb74
LSQ15aae	g	57137.3172	19.362	0.081	elp1m008-kb74
LSQ15aae	g	57137.3196	19.32	0.058	elp1m008-kb74
LSQ15aae	g	57141.3559	19.838	0.061	elp1m008-kb74
LSQ15aae	g	57141.3584	19.668	0.06	elp1m008-kb74
LSQ15aae	g	57154.5157	20.641	0.081	coj1m003-kb71
LSQ15aae	g	57154.5193	20.474	0.078	coj1m003-kb71
LSQ15aae	g	57158.439	20.65	0.103	elp1m008-kb74
LSQ15aae	g	57158.4427	20.42	0.088	elp1m008-kb74
LSQ15aae	g	57162.9577	20.832	0.084	cpt1m010-kb70
LSQ15aae	g	57162.9614	20.741	0.08	cpt1m010-kb70
LSQ15aae	g	57164.906	20.904	0.093	cpt1m012-kb75
LSQ15aae	g	57164.9099	21.032	0.112	cpt1m012-kb75
LSQ15aae	g	57166.8826	20.884	0.113	cpt1m010-kb70
LSQ15aae	g	57166.8864	21.012	0.125	cpt1m010-kb70
LSQ15aae	g	57167.8895	20.98	0.11	cpt1m010-kb70
LSQ15aae	g	57167.8932	20.987	0.224	cpt1m010-kb70
LSQ15aae	g	57168.2899	20.628	0.077	elp1m008-kb74
LSQ15aae	g	57168.2936	20.886	0.086	elp1m008-kb74
LSQ15aae	g	57168.3851	20.986	0.091	elp1m008-kb74
LSQ15aae	g	57168.3887	20.846	0.083	elp1m008-kb74
LSQ15aae	r	57104.4704	18.906	0.098	elp1m008-kb74
LSQ15aae	r	57104.472	19.001	0.109	elp1m008-kb74
LSQ15aae	r	57108.7001	18.431	0.108	coj1m011-kb05
LSQ15aae	r	57108.7017	18.321	0.089	coj1m011-kb05
LSQ15aae	r	57111.988	18.1	0.052	cpt1m012-kb75
LSQ15aae	r	57111.9896	18.011	0.055	cpt1m012-kb75
LSQ15aae	r	57116.3537	17.818	0.05	lsc1m005-kb78
LSQ15aae	r	57116.3553	17.758	0.05	lsc1m005-kb78
LSQ15aae	r	57116.3955	17.99	0.051	lsc1m005-kb78
LSQ15aae	r	57116.3971	17.948	0.052	lsc1m005-kb78
LSQ15aae	r	57120.1375	17.828	0.052	cpt1m010-kb70
LSQ15aae	r	57120.1393	17.785	0.052	cpt1m010-kb70
LSQ15aae	r	57120.3149	17.855	0.055	elp1m008-kb74
LSQ15aae	r	57120.3165	18.031	0.057	elp1m008-kb74
LSQ15aae	r	57123.7161	17.902	0.051	coj1m003-kb71
LSQ15aae	r	57129.3493	18.23	0.052	lsc1m005-kb78
LSQ15aae	r	57129.3509	18.23	0.052	lsc1m005-kb78
LSQ15aae	r	57133.2905	18.351	0.054	elp1m008-kb74
LSQ15aae	r	57133.2921	18.406	0.056	elp1m008-kb74
LSQ15aae	r	57137.3223	18.501	0.055	elp1m008-kb74
LSQ15aae	r	57137.3239	18.471	0.07	elp1m008-kb74
LSQ15aae	r	57141.361	18.584	0.054	elp1m008-kb74
LSQ15aae	r	57141.3626	18.664	0.055	elp1m008-kb74
LSQ15aae	r	57148.5853	18.775	0.152	coj1m003-kb71
LSQ15aae	r	57148.5869	19.066	0.166	coj1m003-kb71
LSQ15aae	r	57154.5256	19.121	0.061	coj1m003-kb71
LSQ15aae	r	57158.4465	19.515	0.081	elp1m008-kb74
LSQ15aae	r	57158.4489	19.345	0.101	elp1m008-kb74
LSQ15aae	r	57162.9654	19.576	0.076	cpt1m010-kb70
LSQ15aae	r	57162.9682	19.655	0.074	cpt1m010-kb70
LSQ15aae	r	57164.8721	19.464	0.246	cpt1m010-kb70
LSQ15aae	r	57164.9139	19.938	0.101	cpt1m012-kb75
LSQ15aae	r	57164.9166	19.998	0.092	cpt1m012-kb75
LSQ15aae	r	57166.8905	19.733	0.088	cpt1m010-kb70
LSQ15aae	r	57166.8931	19.759	0.108	cpt1m010-kb70
LSQ15aae	r	57167.8974	19.57	0.07	cpt1m010-kb70
LSQ15aae	r	57167.9	19.717	0.08	cpt1m010-kb70
LSQ15aae	r	57168.2973	19.692	0.072	elp1m008-kb74
LSQ15aae	r	57168.2998	19.763	0.074	elp1m008-kb74

LSQ15aae	r	57168.3925	19.838	0.087	elp1m008-kb74
LSQ15aae	r	57168.395	19.881	0.083	elp1m008-kb74
LSQ15aae	i	57104.4737	19.089	0.178	elp1m008-kb74
LSQ15aae	i	57104.4752	19.006	0.172	elp1m008-kb74
LSQ15aae	i	57108.7034	18.587	0.228	coj1m011-kb05
LSQ15aae	i	57108.705	18.264	0.134	coj1m011-kb05
LSQ15aae	i	57111.9914	18.182	0.09	cpt1m012-kb75
LSQ15aae	i	57111.993	18.244	0.091	cpt1m012-kb75
LSQ15aae	i	57116.3574	18.22	0.09	lsc1m005-kb78
LSQ15aae	i	57116.4005	18.219	0.091	lsc1m005-kb78
LSQ15aae	i	57120.3182	18.45	0.108	elp1m008-kb74
LSQ15aae	i	57120.3197	18.331	0.1	elp1m008-kb74
LSQ15aae	i	57123.7194	18.445	0.092	coj1m003-kb71
LSQ15aae	i	57123.7209	18.387	0.09	coj1m003-kb71
LSQ15aae	i	57129.3526	18.789	0.097	lsc1m005-kb78
LSQ15aae	i	57129.3542	18.797	0.095	lsc1m005-kb78
LSQ15aae	i	57133.2938	18.976	0.11	elp1m008-kb74
LSQ15aae	i	57133.2953	18.7	0.097	elp1m008-kb74
LSQ15aae	i	57137.3256	18.716	0.13	elp1m008-kb74
LSQ15aae	i	57137.3271	18.576	0.13	elp1m008-kb74
LSQ15aae	i	57141.3643	18.777	0.096	elp1m008-kb74
LSQ15aae	i	57141.3658	18.995	0.102	elp1m008-kb74
LSQ15aae	i	57148.5886	18.958	0.224	coj1m003-kb71
LSQ15aae	i	57148.5902	19.017	0.292	coj1m003-kb71
LSQ15aae	i	57154.5282	19.138	0.103	coj1m003-kb71
LSQ15aae	i	57154.5307	19.118	0.1	coj1m003-kb71
LSQ15aae	i	57158.4541	19.008	0.142	elp1m008-kb74
LSQ15aae	i	57162.9711	19.604	0.122	cpt1m010-kb70
LSQ15aae	i	57164.9194	19.916	0.149	cpt1m012-kb75
LSQ15aae	i	57166.8968	20.228	0.264	cpt1m010-kb70
LSQ15aae	i	57167.9028	19.708	0.133	cpt1m010-kb70
LSQ15aae	i	57168.3025	19.882	0.138	elp1m008-kb74
LSQ15aae	i	57168.3977	19.561	0.118	elp1m008-kb74
LSQ15aae	i	57168.4002	19.82	0.132	elp1m008-kb74
SN2016gcl	B	57641.2295	16.832	0.032	lsc1m009-fl03
SN2016gcl	B	57641.2323	16.822	0.03	lsc1m009-fl03
SN2016gcl	B	57645.4169	16.417	0.032	elp1m008-fl05
SN2016gcl	B	57645.4197	16.424	0.032	elp1m008-fl05
SN2016gcl	B	57650.5698	16.441	0.034	coj1m011-fl12
SN2016gcl	B	57650.5725	16.425	0.032	coj1m011-fl12
SN2016gcl	B	57652.2016	16.494	0.031	lsc1m004-fl04
SN2016gcl	B	57652.2044	16.497	0.035	lsc1m004-fl04
SN2016gcl	B	57656.1943	16.598	0.038	lsc1m004-fl04
SN2016gcl	B	57656.1971	16.595	0.037	lsc1m004-fl04
SN2016gcl	B	57660.1637	16.856	0.038	lsc1m004-fl04
SN2016gcl	B	57660.1665	16.855	0.039	lsc1m004-fl04
SN2016gcl	B	57664.3635	17.173	0.035	elp1m008-fl05
SN2016gcl	B	57664.3663	17.179	0.031	elp1m008-fl05
SN2016gcl	B	57665.368	17.292	0.035	elp1m008-fl05
SN2016gcl	B	57665.3708	17.299	0.028	elp1m008-fl05
SN2016gcl	B	57669.1243	17.706	0.032	lsc1m009-fl03
SN2016gcl	B	57669.1271	17.674	0.034	lsc1m009-fl03
SN2016gcl	B	57673.295	18.135	0.052	elp1m008-fl05
SN2016gcl	B	57673.2977	18.087	0.051	elp1m008-fl05
SN2016gcl	B	57675.1249	18.274	0.115	lsc1m009-fl03
SN2016gcl	B	57675.1276	18.378	0.112	lsc1m009-fl03
SN2016gcl	B	57681.0974	18.629	0.047	lsc1m009-fl03
SN2016gcl	B	57681.1001	18.724	0.044	lsc1m009-fl03
SN2016gcl	B	57682.085	18.639	0.048	lsc1m004-fl04
SN2016gcl	B	57682.0878	18.63	0.05	lsc1m004-fl04
SN2016gcl	B	57683.0631	18.878	0.055	lsc1m009-fl03
SN2016gcl	B	57683.0659	18.936	0.054	lsc1m009-fl03
SN2016gcl	B	57687.0532	18.932	0.057	lsc1m004-fl04
SN2016gcl	B	57687.056	18.961	0.056	lsc1m004-fl04
SN2016gcl	B	57687.0947	19.046	0.042	lsc1m009-fl03
SN2016gcl	B	57687.0986	19.036	0.047	lsc1m009-fl03
SN2016gcl	B	57693.2466	19.272	0.048	elp1m008-fl05
SN2016gcl	B	57693.2506	19.25	0.047	elp1m008-fl05

SN2016gcl	B	57699.2638	19.408	0.061	elp1m008-fl05
SN2016gcl	B	57699.2677	19.444	0.059	elp1m008-fl05
SN2016gcl	B	57700.2294	19.336	0.058	elp1m008-fl05
SN2016gcl	B	57700.2334	19.488	0.066	elp1m008-fl05
SN2016gcl	B	57706.1669	19.398	0.118	elp1m008-fl05
SN2016gcl	B	57706.1708	19.5	0.155	elp1m008-fl05
SN2016gcl	B	57712.2122	19.58	0.048	elp1m008-fl05
SN2016gcl	B	57712.2161	19.62	0.054	elp1m008-fl05
SN2016gcl	B	57719.2399	19.787	0.096	elp1m008-fl05
SN2016gcl	B	57730.2021	19.581	0.265	elp1m008-fl05
SN2016gcl	B	57732.178	20.033	0.157	elp1m008-fl05
SN2016gcl	B	57732.182	19.948	0.177	elp1m008-fl05
SN2016gcl	B	57738.0375	19.836	0.082	elp1m008-fl05
SN2016gcl	B	57738.0426	20.084	0.074	elp1m008-fl05
SN2016gcl	B	57738.1912	19.685	0.169	elp1m008-fl05
SN2016gcl	B	57748.1214	20.082	0.076	elp1m008-fl05
SN2016gcl	B	57748.1265	19.973	0.074	elp1m008-fl05
SN2016gcl	B	57758.0934	20.46	0.13	elp1m008-fl05
SN2016gcl	B	57758.0986	20.37	0.131	elp1m008-fl05
SN2016gcl	B	57759.0974	20.313	0.134	elp1m008-fl05
SN2016gcl	B	57759.1025	20.305	0.137	elp1m008-fl05
SN2016gcl	B	57770.0566	20.517	0.135	elp1m008-fl05
SN2016gcl	B	57778.0611	20.457	0.226	elp1m008-fl05
SN2016gcl	V	57641.2352	16.79	0.031	lsc1m009-fl03
SN2016gcl	V	57641.2371	16.778	0.035	lsc1m009-fl03
SN2016gcl	V	57645.4226	16.431	0.03	elp1m008-fl05
SN2016gcl	V	57645.4245	16.445	0.03	elp1m008-fl05
SN2016gcl	V	57650.5755	16.388	0.03	coj1m011-fl12
SN2016gcl	V	57650.5773	16.38	0.03	coj1m011-fl12
SN2016gcl	V	57652.2073	16.376	0.029	lsc1m004-fl04
SN2016gcl	V	57652.2091	16.387	0.027	lsc1m004-fl04
SN2016gcl	V	57656.2	16.357	0.031	lsc1m004-fl04
SN2016gcl	V	57656.2018	16.37	0.031	lsc1m004-fl04
SN2016gcl	V	57660.1694	16.592	0.02	lsc1m004-fl04
SN2016gcl	V	57660.1712	16.624	0.026	lsc1m004-fl04
SN2016gcl	V	57664.3693	16.877	0.027	elp1m008-fl05
SN2016gcl	V	57664.3712	16.858	0.026	elp1m008-fl05
SN2016gcl	V	57665.3737	16.921	0.027	elp1m008-fl05
SN2016gcl	V	57665.3756	16.922	0.025	elp1m008-fl05
SN2016gcl	V	57669.13	17.084	0.031	lsc1m009-fl03
SN2016gcl	V	57669.1319	17.1	0.027	lsc1m009-fl03
SN2016gcl	V	57673.3007	17.304	0.034	elp1m008-fl05
SN2016gcl	V	57673.3026	17.313	0.033	elp1m008-fl05
SN2016gcl	V	57675.1306	17.365	0.058	lsc1m009-fl03
SN2016gcl	V	57675.1324	17.306	0.059	lsc1m009-fl03
SN2016gcl	V	57680.1084	17.476	0.041	lsc1m004-fl04
SN2016gcl	V	57680.1103	17.502	0.046	lsc1m004-fl04
SN2016gcl	V	57681.1032	17.502	0.032	lsc1m009-fl03
SN2016gcl	V	57681.105	17.526	0.037	lsc1m009-fl03
SN2016gcl	V	57682.0907	17.571	0.027	lsc1m004-fl04
SN2016gcl	V	57682.0925	17.611	0.026	lsc1m004-fl04
SN2016gcl	V	57683.0688	17.623	0.025	lsc1m009-fl03
SN2016gcl	V	57683.0707	17.623	0.022	lsc1m009-fl03
SN2016gcl	V	57687.059	17.871	0.032	lsc1m004-fl04
SN2016gcl	V	57687.0608	17.913	0.034	lsc1m004-fl04
SN2016gcl	V	57687.1027	17.899	0.02	lsc1m009-fl03
SN2016gcl	V	57687.1055	17.911	0.029	lsc1m009-fl03
SN2016gcl	V	57693.2547	18.247	0.039	elp1m008-fl05
SN2016gcl	V	57693.2575	18.27	0.035	elp1m008-fl05
SN2016gcl	V	57699.2718	18.428	0.035	elp1m008-fl05
SN2016gcl	V	57699.2746	18.538	0.041	elp1m008-fl05
SN2016gcl	V	57700.2375	18.464	0.044	elp1m008-fl05
SN2016gcl	V	57700.2403	18.48	0.047	elp1m008-fl05
SN2016gcl	V	57706.1749	18.632	0.074	elp1m008-fl05
SN2016gcl	V	57706.1777	18.733	0.081	elp1m008-fl05
SN2016gcl	V	57712.2203	18.815	0.036	elp1m008-fl05
SN2016gcl	V	57712.223	18.838	0.037	elp1m008-fl05
SN2016gcl	V	57719.248	18.989	0.082	elp1m008-fl05

SN2016gcl	V	57728.1993	19.234	0.079	elp1m008-fl05
SN2016gcl	V	57728.2025	19.197	0.079	elp1m008-fl05
SN2016gcl	V	57732.1861	19.421	0.131	elp1m008-fl05
SN2016gcl	V	57732.1889	19.505	0.136	elp1m008-fl05
SN2016gcl	V	57738.0479	19.473	0.05	elp1m008-fl05
SN2016gcl	V	57738.0518	19.447	0.046	elp1m008-fl05
SN2016gcl	V	57738.1993	19.131	0.125	elp1m008-fl05
SN2016gcl	V	57738.2021	19.607	0.185	elp1m008-fl05
SN2016gcl	V	57748.1318	19.678	0.066	elp1m008-fl05
SN2016gcl	V	57748.1357	19.762	0.072	elp1m008-fl05
SN2016gcl	V	57758.1039	20.057	0.122	elp1m008-fl05
SN2016gcl	V	57758.108	19.875	0.113	elp1m008-fl05
SN2016gcl	V	57759.1078	19.951	0.124	elp1m008-fl05
SN2016gcl	V	57759.1118	19.912	0.135	elp1m008-fl05
SN2016gcl	V	57769.0548	20.054	0.125	elp1m008-fl05
SN2016gcl	V	57769.0832	19.99	0.113	elp1m008-fl05
SN2016gcl	V	57770.0619	20.058	0.084	elp1m008-fl05
SN2016gcl	V	57770.0658	20.04	0.088	elp1m008-fl05
SN2016gcl	V	57778.0666	20.148	0.157	elp1m008-fl05
SN2016gcl	V	57778.0705	20.076	0.142	elp1m008-fl05
SN2016gcl	g	57641.2391	16.897	0.044	lsc1m009-fl03
SN2016gcl	g	57641.2419	16.908	0.046	lsc1m009-fl03
SN2016gcl	g	57645.4266	16.502	0.048	elp1m008-fl05
SN2016gcl	g	57645.4294	16.496	0.048	elp1m008-fl05
SN2016gcl	g	57650.5793	16.498	0.047	coj1m011-fl12
SN2016gcl	g	57650.5821	16.479	0.048	coj1m011-fl12
SN2016gcl	g	57652.2112	16.493	0.045	lsc1m004-fl04
SN2016gcl	g	57652.2139	16.508	0.044	lsc1m004-fl04
SN2016gcl	g	57656.2039	16.594	0.041	lsc1m004-fl04
SN2016gcl	g	57656.2066	16.604	0.041	lsc1m004-fl04
SN2016gcl	g	57660.1732	16.802	0.039	lsc1m004-fl04
SN2016gcl	g	57660.176	16.8	0.038	lsc1m004-fl04
SN2016gcl	g	57664.3732	17.094	0.042	elp1m008-fl05
SN2016gcl	g	57664.3761	17.081	0.042	elp1m008-fl05
SN2016gcl	g	57665.3776	17.16	0.043	elp1m008-fl05
SN2016gcl	g	57665.3804	17.16	0.042	elp1m008-fl05
SN2016gcl	g	57669.1338	17.453	0.051	lsc1m009-fl03
SN2016gcl	g	57669.1366	17.463	0.051	lsc1m009-fl03
SN2016gcl	g	57673.3046	17.752	0.046	elp1m008-fl05
SN2016gcl	g	57673.3074	17.78	0.044	elp1m008-fl05
SN2016gcl	g	57675.1344	17.895	0.068	lsc1m009-fl03
SN2016gcl	g	57675.1372	17.834	0.067	lsc1m009-fl03
SN2016gcl	g	57681.1072	18.349	0.048	lsc1m009-fl03
SN2016gcl	g	57681.11	18.342	0.047	lsc1m009-fl03
SN2016gcl	g	57682.0947	18.379	0.048	lsc1m004-fl04
SN2016gcl	g	57682.0974	18.38	0.044	lsc1m004-fl04
SN2016gcl	g	57683.0727	18.476	0.051	lsc1m009-fl03
SN2016gcl	g	57683.0755	18.449	0.049	lsc1m009-fl03
SN2016gcl	g	57687.0628	18.744	0.048	lsc1m004-fl04
SN2016gcl	g	57687.0656	18.696	0.047	lsc1m004-fl04
SN2016gcl	g	57687.1085	18.734	0.051	lsc1m009-fl03
SN2016gcl	g	57687.1124	18.746	0.051	lsc1m009-fl03
SN2016gcl	g	57693.2605	19.041	0.05	elp1m008-fl05
SN2016gcl	g	57693.2645	19.004	0.047	elp1m008-fl05
SN2016gcl	g	57700.2433	19.134	0.058	elp1m008-fl05
SN2016gcl	g	57700.2473	19.243	0.108	elp1m008-fl05
SN2016gcl	g	57706.1807	19.435	0.107	elp1m008-fl05
SN2016gcl	g	57706.1847	19.286	0.102	elp1m008-fl05
SN2016gcl	g	57712.226	19.223	0.059	elp1m008-fl05
SN2016gcl	g	57712.23	19.342	0.052	elp1m008-fl05
SN2016gcl	g	57732.192	19.581	0.1	elp1m008-fl05
SN2016gcl	g	57732.1959	20.047	0.167	elp1m008-fl05
SN2016gcl	g	57738.056	19.827	0.05	elp1m008-fl05
SN2016gcl	g	57738.0611	19.839	0.051	elp1m008-fl05
SN2016gcl	g	57738.205	19.769	0.138	elp1m008-fl05
SN2016gcl	g	57738.209	19.924	0.162	elp1m008-fl05
SN2016gcl	g	57748.1399	20.079	0.065	elp1m008-fl05
SN2016gcl	g	57748.145	20.017	0.069	elp1m008-fl05

SN2016gcl	g	57758.1122	20.151	0.107	elp1m008-fl05
SN2016gcl	g	57758.1173	20.343	0.132	elp1m008-fl05
SN2016gcl	g	57759.116	20.119	0.102	elp1m008-fl05
SN2016gcl	g	57759.1211	20.192	0.118	elp1m008-fl05
SN2016gcl	g	57770.07	20.393	0.074	elp1m008-fl05
SN2016gcl	g	57770.0751	20.316	0.068	elp1m008-fl05
SN2016gcl	g	57778.0747	20.654	0.143	elp1m008-fl05
SN2016gcl	g	57778.0798	20.68	0.152	elp1m008-fl05
SN2016gcl	r	57641.2448	16.879	0.032	lsc1m009-fl03
SN2016gcl	r	57641.2466	16.889	0.032	lsc1m009-fl03
SN2016gcl	r	57645.4323	16.524	0.109	elp1m008-fl05
SN2016gcl	r	57645.4342	16.506	0.108	elp1m008-fl05
SN2016gcl	r	57650.585	16.366	0.033	coj1m011-fl12
SN2016gcl	r	57650.5869	16.398	0.032	coj1m011-fl12
SN2016gcl	r	57652.2169	16.389	0.031	lsc1m004-fl04
SN2016gcl	r	57652.2187	16.376	0.035	lsc1m004-fl04
SN2016gcl	r	57656.2096	16.45	0.034	lsc1m004-fl04
SN2016gcl	r	57656.2114	16.474	0.035	lsc1m004-fl04
SN2016gcl	r	57660.1789	16.686	0.033	lsc1m004-fl04
SN2016gcl	r	57660.1808	16.656	0.032	lsc1m004-fl04
SN2016gcl	r	57664.379	16.95	0.028	elp1m008-fl05
SN2016gcl	r	57664.3809	16.965	0.029	elp1m008-fl05
SN2016gcl	r	57665.3833	16.987	0.029	elp1m008-fl05
SN2016gcl	r	57665.3852	16.995	0.029	elp1m008-fl05
SN2016gcl	r	57669.1395	17.137	0.033	lsc1m009-fl03
SN2016gcl	r	57669.1414	17.123	0.032	lsc1m009-fl03
SN2016gcl	r	57673.3103	17.189	0.03	elp1m008-fl05
SN2016gcl	r	57673.3122	17.156	0.03	elp1m008-fl05
SN2016gcl	r	57675.1401	17.142	0.073	lsc1m009-fl03
SN2016gcl	r	57675.1419	17.249	0.062	lsc1m009-fl03
SN2016gcl	r	57681.113	17.214	0.067	lsc1m009-fl03
SN2016gcl	r	57681.1149	17.236	0.041	lsc1m009-fl03
SN2016gcl	r	57682.1004	17.275	0.032	lsc1m004-fl04
SN2016gcl	r	57682.1022	17.258	0.035	lsc1m004-fl04
SN2016gcl	r	57683.0784	17.324	0.028	lsc1m009-fl03
SN2016gcl	r	57683.0802	17.313	0.029	lsc1m009-fl03
SN2016gcl	r	57687.0686	17.555	0.035	lsc1m004-fl04
SN2016gcl	r	57687.0704	17.605	0.034	lsc1m004-fl04
SN2016gcl	r	57687.1165	17.524	0.032	lsc1m009-fl03
SN2016gcl	r	57687.1193	17.514	0.035	lsc1m009-fl03
SN2016gcl	r	57693.2686	17.888	0.031	elp1m008-fl05
SN2016gcl	r	57693.2714	17.84	0.032	elp1m008-fl05
SN2016gcl	r	57700.2514	18.192	0.051	elp1m008-fl05
SN2016gcl	r	57700.2542	18.216	0.08	elp1m008-fl05
SN2016gcl	r	57706.1888	18.316	0.058	elp1m008-fl05
SN2016gcl	r	57706.1915	18.475	0.066	elp1m008-fl05
SN2016gcl	r	57712.2341	18.516	0.111	elp1m008-fl05
SN2016gcl	r	57712.2369	18.514	0.112	elp1m008-fl05
SN2016gcl	r	57732.2001	19.196	0.123	elp1m008-fl05
SN2016gcl	r	57732.2028	18.93	0.123	elp1m008-fl05
SN2016gcl	r	57738.0663	19.268	0.042	elp1m008-fl05
SN2016gcl	r	57738.0703	19.318	0.046	elp1m008-fl05
SN2016gcl	r	57738.2131	19.324	0.099	elp1m008-fl05
SN2016gcl	r	57738.2159	19.046	0.103	elp1m008-fl05
SN2016gcl	r	57748.1502	19.487	0.058	elp1m008-fl05
SN2016gcl	r	57748.1542	19.64	0.065	elp1m008-fl05
SN2016gcl	r	57759.1264	19.808	0.122	elp1m008-fl05
SN2016gcl	r	57759.1304	19.806	0.12	elp1m008-fl05
SN2016gcl	r	57770.0804	20.05	0.087	elp1m008-fl05
SN2016gcl	r	57770.0843	20.097	0.082	elp1m008-fl05
SN2016gcl	r	57778.0851	20.544	0.251	elp1m008-fl05
SN2016gcl	r	57778.0891	20.288	0.201	elp1m008-fl05
SN2016gcl	i	57641.2486	17.055	0.074	lsc1m009-fl03
SN2016gcl	i	57641.2505	17.144	0.036	lsc1m009-fl03
SN2016gcl	i	57645.4362	16.997	0.068	elp1m008-fl05
SN2016gcl	i	57645.4381	16.997	0.068	elp1m008-fl05
SN2016gcl	i	57650.5889	17.096	0.039	coj1m011-fl12
SN2016gcl	i	57650.5907	17.122	0.043	coj1m011-fl12

SN2016gcl	i	57652.2207	17.158	0.049	lsc1m004-fl04
SN2016gcl	i	57652.2226	17.164	0.036	lsc1m004-fl04
SN2016gcl	i	57656.2134	17.222	0.034	lsc1m004-fl04
SN2016gcl	i	57656.2152	17.217	0.035	lsc1m004-fl04
SN2016gcl	i	57660.1828	17.48	0.036	lsc1m004-fl04
SN2016gcl	i	57660.1846	17.49	0.037	lsc1m004-fl04
SN2016gcl	i	57664.3831	17.857	0.048	elp1m008-fl05
SN2016gcl	i	57664.3849	17.836	0.044	elp1m008-fl05
SN2016gcl	i	57665.3872	17.882	0.04	elp1m008-fl05
SN2016gcl	i	57665.3891	17.85	0.039	elp1m008-fl05
SN2016gcl	i	57669.1434	17.976	0.041	lsc1m009-fl03
SN2016gcl	i	57669.1452	17.904	0.042	lsc1m009-fl03
SN2016gcl	i	57673.3142	17.789	0.057	elp1m008-fl05
SN2016gcl	i	57673.3161	17.823	0.053	elp1m008-fl05
SN2016gcl	i	57675.1439	17.754	0.085	lsc1m009-fl03
SN2016gcl	i	57675.1458	17.986	0.105	lsc1m009-fl03
SN2016gcl	i	57681.1169	17.666	0.044	lsc1m009-fl03
SN2016gcl	i	57681.1187	17.632	0.04	lsc1m009-fl03
SN2016gcl	i	57682.1042	17.588	0.042	lsc1m004-fl04
SN2016gcl	i	57682.1061	17.632	0.044	lsc1m004-fl04
SN2016gcl	i	57683.0822	17.674	0.041	lsc1m009-fl03
SN2016gcl	i	57683.0841	17.699	0.042	lsc1m009-fl03
SN2016gcl	i	57687.0725	17.798	0.045	lsc1m004-fl04
SN2016gcl	i	57687.0743	17.764	0.042	lsc1m004-fl04
SN2016gcl	i	57687.1222	17.8	0.04	lsc1m009-fl03
SN2016gcl	i	57687.125	17.78	0.037	lsc1m009-fl03
SN2016gcl	i	57693.2743	18.162	0.043	elp1m008-fl05
SN2016gcl	i	57693.2771	18.194	0.039	elp1m008-fl05
SN2016gcl	i	57700.2572	18.552	0.061	elp1m008-fl05
SN2016gcl	i	57706.1945	18.965	0.129	elp1m008-fl05
SN2016gcl	i	57706.1973	18.977	0.131	elp1m008-fl05
SN2016gcl	i	57712.2398	19.105	0.081	elp1m008-fl05
SN2016gcl	i	57712.2426	19.028	0.078	elp1m008-fl05
SN2016gcl	i	57738.0744	20.187	0.14	elp1m008-fl05
SN2016gcl	i	57738.0784	20.106	0.113	elp1m008-fl05
SN2016gcl	i	57748.1583	20.61	0.243	elp1m008-fl05
SN2016gcl	i	57770.0924	20.725	0.232	elp1m008-fl05
SN2016hvl	B	57714.1934	16.002	0.064	lsc1m005-fl15
SN2016hvl	B	57714.1952	16.01	0.064	lsc1m005-fl15
SN2016hvl	B	57714.5831	16.08	0.09	coj1m011-fl12
SN2016hvl	B	57714.585	16.028	0.062	coj1m011-fl12
SN2016hvl	B	57715.573	16.091	0.056	coj1m011-fl12
SN2016hvl	B	57715.5749	16.099	0.052	coj1m011-fl12
SN2016hvl	B	57716.9338	16.169	0.06	cpt1m013-fl14
SN2016hvl	B	57716.9357	16.181	0.06	cpt1m013-fl14
SN2016hvl	B	57717.3003	16.195	0.065	lsc1m005-fl15
SN2016hvl	B	57717.3179	16.212	0.053	lsc1m004-fl04
SN2016hvl	B	57717.3198	16.227	0.055	lsc1m004-fl04
SN2016hvl	B	57718.9536	16.329	0.061	cpt1m010-fl16
SN2016hvl	B	57718.9556	16.339	0.061	cpt1m010-fl16
SN2016hvl	B	57720.9292	16.53	0.063	cpt1m010-fl16
SN2016hvl	B	57720.9311	16.528	0.062	cpt1m010-fl16
SN2016hvl	B	57721.2816	16.568	0.058	lsc1m009-fl03
SN2016hvl	B	57721.2834	16.564	0.057	lsc1m009-fl03
SN2016hvl	B	57723.0733	16.762	0.062	cpt1m013-fl14
SN2016hvl	B	57723.0751	16.759	0.062	cpt1m013-fl14
SN2016hvl	B	57724.02	16.873	0.064	cpt1m012-fl06
SN2016hvl	B	57724.0218	16.906	0.063	cpt1m012-fl06
SN2016hvl	B	57725.0735	17.025	0.064	cpt1m010-fl16
SN2016hvl	B	57725.0753	17.011	0.064	cpt1m010-fl16
SN2016hvl	B	57726.159	17.151	0.069	lsc1m005-fl15
SN2016hvl	B	57726.1609	17.157	0.065	lsc1m005-fl15
SN2016hvl	B	57726.9013	17.244	0.057	cpt1m012-fl06
SN2016hvl	B	57726.9031	17.224	0.057	cpt1m012-fl06
SN2016hvl	B	57728.0722	17.352	0.065	cpt1m010-fl16
SN2016hvl	B	57728.0741	17.36	0.064	cpt1m010-fl16
SN2016hvl	B	57729.3333	17.463	0.047	lsc1m009-fl03
SN2016hvl	B	57729.3351	17.455	0.052	lsc1m009-fl03

SN2016hvl	B	57730.1444	17.516	0.051	lsc1m009-fl03
SN2016hvl	B	57730.1471	17.593	0.054	lsc1m009-fl03
SN2016hvl	B	57730.3322	17.514	0.055	lsc1m009-fl03
SN2016hvl	B	57730.3341	17.541	0.052	lsc1m009-fl03
SN2016hvl	B	57733.8833	17.906	0.077	cpt1m010-fl16
SN2016hvl	B	57733.8861	17.907	0.078	cpt1m010-fl16
SN2016hvl	B	57739.516	18.281	0.079	coj1m011-fl12
SN2016hvl	B	57739.5188	18.262	0.073	coj1m011-fl12
SN2016hvl	B	57742.8577	18.444	0.065	cpt1m012-fl06
SN2016hvl	B	57742.8604	18.41	0.062	cpt1m012-fl06
SN2016hvl	B	57745.2573	18.468	0.058	lsc1m004-fl04
SN2016hvl	B	57745.2612	18.501	0.058	lsc1m004-fl04
SN2016hvl	B	57746.2366	18.532	0.054	lsc1m004-fl04
SN2016hvl	B	57746.2406	18.541	0.054	lsc1m004-fl04
SN2016hvl	B	57746.299	18.52	0.058	lsc1m004-fl04
SN2016hvl	B	57746.303	18.586	0.058	lsc1m004-fl04
SN2016hvl	B	57746.8468	18.578	0.062	cpt1m012-fl06
SN2016hvl	B	57746.8507	18.619	0.065	cpt1m012-fl06
SN2016hvl	B	57747.2054	18.606	0.05	lsc1m009-fl03
SN2016hvl	B	57747.2093	18.598	0.052	lsc1m009-fl03
SN2016hvl	B	57747.2816	18.61	0.051	lsc1m009-fl03
SN2016hvl	B	57753.1114	18.768	0.057	lsc1m004-fl04
SN2016hvl	B	57753.1154	18.798	0.057	lsc1m004-fl04
SN2016hvl	B	57757.8167	18.867	0.075	cpt1m013-fl14
SN2016hvl	B	57757.8206	18.882	0.075	cpt1m013-fl14
SN2016hvl	B	57757.9101	18.879	0.067	cpt1m010-fl16
SN2016hvl	B	57757.9141	18.955	0.081	cpt1m010-fl16
SN2016hvl	B	57759.8649	18.92	0.094	cpt1m013-fl14
SN2016hvl	B	57759.8688	18.979	0.093	cpt1m013-fl14
SN2016hvl	B	57760.8684	18.976	0.099	cpt1m010-fl16
SN2016hvl	B	57760.8724	18.918	0.094	cpt1m010-fl16
SN2016hvl	B	57761.8057	18.889	0.086	cpt1m012-fl06
SN2016hvl	B	57761.8096	19.039	0.1	cpt1m012-fl06
SN2016hvl	B	57769.8267	19.081	0.071	cpt1m013-fl14
SN2016hvl	B	57769.8307	19.033	0.071	cpt1m013-fl14
SN2016hvl	B	57770.6239	19.064	0.076	coj1m011-fl12
SN2016hvl	B	57770.6278	19.115	0.075	coj1m011-fl12
SN2016hvl	B	57778.785	19.222	0.095	cpt1m013-fl14
SN2016hvl	B	57778.789	19.197	0.08	cpt1m013-fl14
SN2016hvl	B	57784.7852	19.303	0.081	cpt1m010-fl16
SN2016hvl	B	57784.7891	19.25	0.075	cpt1m010-fl16
SN2016hvl	B	57789.8648	19.376	0.141	cpt1m010-fl16
SN2016hvl	B	57789.8688	19.503	0.164	cpt1m010-fl16
SN2016hvl	B	57795.8824	19.773	0.257	cpt1m013-fl14
SN2016hvl	B	57795.8863	19.315	0.17	cpt1m013-fl14
SN2016hvl	B	57802.5114	19.528	0.074	coj1m011-fl12
SN2016hvl	B	57802.5153	19.532	0.079	coj1m011-fl12
SN2016hvl	B	57808.2168	19.622	0.07	elp1m008-fl05
SN2016hvl	B	57808.2209	19.579	0.072	elp1m008-fl05
SN2016hvl	B	57808.5176	19.572	0.085	coj1m003-fl11
SN2016hvl	B	57808.5215	19.609	0.086	coj1m003-fl11
SN2016hvl	B	57813.8536	19.841	0.099	cpt1m010-fl16
SN2016hvl	B	57813.8576	19.878	0.108	cpt1m010-fl16
SN2016hvl	B	57814.7885	19.698	0.062	cpt1m012-fl06
SN2016hvl	B	57814.7925	19.781	0.06	cpt1m012-fl06
SN2016hvl	B	57815.786	19.726	0.076	cpt1m010-fl16
SN2016hvl	B	57815.7899	19.841	0.084	cpt1m010-fl16
SN2016hvl	B	57821.3904	19.831	0.283	coj1m003-fl11
SN2016hvl	B	57821.3944	19.844	0.252	coj1m003-fl11
SN2016hvl	B	57827.7893	19.983	0.088	cpt1m012-fl06
SN2016hvl	B	57827.7932	19.999	0.089	cpt1m012-fl06
SN2016hvl	B	57834.4302	20.152	0.105	coj1m003-fl11
SN2016hvl	B	57834.4353	20.08	0.153	coj1m003-fl11
SN2016hvl	B	57835.7887	20.225	0.09	cpt1m010-fl16
SN2016hvl	B	57835.7939	20.162	0.089	cpt1m010-fl16
SN2016hvl	B	57842.3721	19.993	0.256	coj1m011-fl12
SN2016hvl	B	57842.3772	20.184	0.196	coj1m011-fl12
SN2016hvl	B	57848.7272	20.354	0.194	cpt1m012-fl06

SN2016hvl	V	57714.1973	15.459	0.053	lsc1m005-fl15
SN2016hvl	V	57714.1991	15.464	0.05	lsc1m005-fl15
SN2016hvl	V	57714.587	15.47	0.087	coj1m011-fl12
SN2016hvl	V	57714.5888	15.468	0.081	coj1m011-fl12
SN2016hvl	V	57715.5769	15.486	0.053	coj1m011-fl12
SN2016hvl	V	57715.5787	15.487	0.056	coj1m011-fl12
SN2016hvl	V	57716.9377	15.488	0.048	cpt1m013-fl14
SN2016hvl	V	57716.9395	15.494	0.052	cpt1m013-fl14
SN2016hvl	V	57717.3218	15.536	0.052	lsc1m004-fl04
SN2016hvl	V	57717.3236	15.534	0.048	lsc1m004-fl04
SN2016hvl	V	57718.9576	15.556	0.051	cpt1m010-fl16
SN2016hvl	V	57718.9595	15.553	0.052	cpt1m010-fl16
SN2016hvl	V	57720.9331	15.65	0.052	cpt1m010-fl16
SN2016hvl	V	57720.935	15.646	0.049	cpt1m010-fl16
SN2016hvl	V	57721.2854	15.656	0.077	lsc1m009-fl03
SN2016hvl	V	57721.2872	15.652	0.077	lsc1m009-fl03
SN2016hvl	V	57723.0772	15.786	0.047	cpt1m013-fl14
SN2016hvl	V	57723.079	15.78	0.049	cpt1m013-fl14
SN2016hvl	V	57724.0238	15.846	0.045	cpt1m012-fl06
SN2016hvl	V	57724.0257	15.842	0.047	cpt1m012-fl06
SN2016hvl	V	57725.0773	15.921	0.044	cpt1m010-fl16
SN2016hvl	V	57725.0792	15.909	0.047	cpt1m010-fl16
SN2016hvl	V	57726.1629	15.996	0.051	lsc1m005-fl15
SN2016hvl	V	57726.1647	15.998	0.058	lsc1m005-fl15
SN2016hvl	V	57726.9052	16.018	0.045	cpt1m012-fl06
SN2016hvl	V	57726.907	16.014	0.046	cpt1m012-fl06
SN2016hvl	V	57728.0761	16.056	0.075	cpt1m010-fl16
SN2016hvl	V	57728.078	16.074	0.074	cpt1m010-fl16
SN2016hvl	V	57729.3371	16.146	0.045	lsc1m009-fl03
SN2016hvl	V	57729.339	16.134	0.045	lsc1m009-fl03
SN2016hvl	V	57730.1503	16.194	0.051	lsc1m009-fl03
SN2016hvl	V	57730.1521	16.197	0.047	lsc1m009-fl03
SN2016hvl	V	57730.3361	16.193	0.05	lsc1m009-fl03
SN2016hvl	V	57730.338	16.19	0.05	lsc1m009-fl03
SN2016hvl	V	57733.889	16.347	0.051	cpt1m010-fl16
SN2016hvl	V	57733.8909	16.375	0.052	cpt1m010-fl16
SN2016hvl	V	57739.5217	16.613	0.054	coj1m011-fl12
SN2016hvl	V	57739.5236	16.664	0.062	coj1m011-fl12
SN2016hvl	V	57742.8634	16.809	0.052	cpt1m012-fl06
SN2016hvl	V	57742.8653	16.821	0.045	cpt1m012-fl06
SN2016hvl	V	57745.2653	16.948	0.074	lsc1m004-fl04
SN2016hvl	V	57745.2681	16.952	0.074	lsc1m004-fl04
SN2016hvl	V	57746.2446	17.001	0.051	lsc1m004-fl04
SN2016hvl	V	57746.2474	17.012	0.056	lsc1m004-fl04
SN2016hvl	V	57746.8548	17.023	0.044	cpt1m012-fl06
SN2016hvl	V	57746.8576	17.031	0.046	cpt1m012-fl06
SN2016hvl	V	57747.2134	17.061	0.046	lsc1m009-fl03
SN2016hvl	V	57747.2162	17.059	0.044	lsc1m009-fl03
SN2016hvl	V	57747.2882	17.053	0.052	lsc1m009-fl03
SN2016hvl	V	57747.2914	17.048	0.048	lsc1m009-fl03
SN2016hvl	V	57753.1195	17.345	0.047	lsc1m004-fl04
SN2016hvl	V	57753.1222	17.335	0.053	lsc1m004-fl04
SN2016hvl	V	57757.8247	17.499	0.054	cpt1m013-fl14
SN2016hvl	V	57757.8275	17.5	0.054	cpt1m013-fl14
SN2016hvl	V	57757.9188	17.487	0.053	cpt1m010-fl16
SN2016hvl	V	57759.873	17.546	0.06	cpt1m013-fl14
SN2016hvl	V	57759.8757	17.55	0.059	cpt1m013-fl14
SN2016hvl	V	57760.8765	17.556	0.053	cpt1m010-fl16
SN2016hvl	V	57760.8793	17.568	0.058	cpt1m010-fl16
SN2016hvl	V	57761.8138	17.62	0.053	cpt1m012-fl06
SN2016hvl	V	57761.8165	17.668	0.051	cpt1m012-fl06
SN2016hvl	V	57769.8348	17.811	0.055	cpt1m013-fl14
SN2016hvl	V	57769.8376	17.823	0.054	cpt1m013-fl14
SN2016hvl	V	57770.6319	17.957	0.061	coj1m011-fl12
SN2016hvl	V	57770.6347	17.89	0.055	coj1m011-fl12
SN2016hvl	V	57778.793	18.046	0.054	cpt1m013-fl14
SN2016hvl	V	57778.7958	18.04	0.058	cpt1m013-fl14
SN2016hvl	V	57784.7932	18.255	0.058	cpt1m010-fl16

SN2016hvl	V	57784.796	18.228	0.057	cpt1m010-fl16
SN2016hvl	V	57789.8731	18.473	0.085	cpt1m010-fl16
SN2016hvl	V	57789.8759	18.363	0.077	cpt1m010-fl16
SN2016hvl	V	57795.8904	18.586	0.099	cpt1m013-fl14
SN2016hvl	V	57795.8932	18.428	0.095	cpt1m013-fl14
SN2016hvl	V	57802.5194	18.687	0.058	coj1m011-fl12
SN2016hvl	V	57802.5222	18.669	0.06	coj1m011-fl12
SN2016hvl	V	57808.225	18.817	0.059	elp1m008-fl05
SN2016hvl	V	57808.228	18.78	0.06	elp1m008-fl05
SN2016hvl	V	57808.5256	18.863	0.069	coj1m003-fl11
SN2016hvl	V	57808.5284	18.868	0.072	coj1m003-fl11
SN2016hvl	V	57813.8617	19.012	0.091	cpt1m010-fl16
SN2016hvl	V	57813.8645	18.938	0.081	cpt1m010-fl16
SN2016hvl	V	57814.7966	18.964	0.075	cpt1m012-fl06
SN2016hvl	V	57814.7994	19.001	0.076	cpt1m012-fl06
SN2016hvl	V	57815.794	18.983	0.057	cpt1m010-fl16
SN2016hvl	V	57815.7968	18.99	0.057	cpt1m010-fl16
SN2016hvl	V	57821.3985	19.098	0.147	coj1m003-fl11
SN2016hvl	V	57821.4012	19.22	0.156	coj1m003-fl11
SN2016hvl	V	57827.7974	19.283	0.064	cpt1m012-fl06
SN2016hvl	V	57827.8002	19.171	0.064	cpt1m012-fl06
SN2016hvl	V	57834.4406	19.319	0.079	coj1m003-fl11
SN2016hvl	V	57835.7991	19.399	0.067	cpt1m010-fl16
SN2016hvl	V	57835.8031	19.503	0.075	cpt1m010-fl16
SN2016hvl	V	57842.3824	19.436	0.094	coj1m011-fl12
SN2016hvl	V	57842.3863	19.64	0.106	coj1m011-fl12
SN2016hvl	V	57848.7376	19.689	0.163	cpt1m012-fl06
SN2016hvl	V	57848.7415	19.381	0.167	cpt1m012-fl06
SN2016hvl	g	57714.2012	15.798	0.067	lsc1m005-fl15
SN2016hvl	g	57714.203	15.798	0.066	lsc1m005-fl15
SN2016hvl	g	57714.5908	15.811	0.084	coj1m011-fl12
SN2016hvl	g	57714.5927	15.819	0.08	coj1m011-fl12
SN2016hvl	g	57715.5808	15.851	0.078	coj1m011-fl12
SN2016hvl	g	57715.5826	15.844	0.078	coj1m011-fl12
SN2016hvl	g	57716.9416	15.87	0.065	cpt1m013-fl14
SN2016hvl	g	57716.9435	15.884	0.063	cpt1m013-fl14
SN2016hvl	g	57717.3257	15.922	0.071	lsc1m004-fl04
SN2016hvl	g	57717.3275	15.934	0.071	lsc1m004-fl04
SN2016hvl	g	57718.9254	15.982	0.069	cpt1m012-fl06
SN2016hvl	g	57718.9273	15.972	0.068	cpt1m012-fl06
SN2016hvl	g	57718.9616	15.987	0.067	cpt1m010-fl16
SN2016hvl	g	57718.9634	15.986	0.069	cpt1m010-fl16
SN2016hvl	g	57720.9371	16.118	0.068	cpt1m010-fl16
SN2016hvl	g	57720.9389	16.11	0.067	cpt1m010-fl16
SN2016hvl	g	57721.2893	16.123	0.074	lsc1m009-fl03
SN2016hvl	g	57721.2911	16.112	0.074	lsc1m009-fl03
SN2016hvl	g	57723.0811	16.279	0.065	cpt1m013-fl14
SN2016hvl	g	57723.0829	16.297	0.063	cpt1m013-fl14
SN2016hvl	g	57724.0278	16.385	0.063	cpt1m012-fl06
SN2016hvl	g	57724.0296	16.379	0.063	cpt1m012-fl06
SN2016hvl	g	57725.0813	16.477	0.064	cpt1m010-fl16
SN2016hvl	g	57725.0831	16.481	0.065	cpt1m010-fl16
SN2016hvl	g	57726.1667	16.591	0.071	lsc1m005-fl15
SN2016hvl	g	57726.1686	16.577	0.076	lsc1m005-fl15
SN2016hvl	g	57726.9091	16.633	0.065	cpt1m012-fl06
SN2016hvl	g	57726.9109	16.648	0.067	cpt1m012-fl06
SN2016hvl	g	57728.08	16.731	0.074	cpt1m010-fl16
SN2016hvl	g	57728.0819	16.734	0.074	cpt1m010-fl16
SN2016hvl	g	57729.341	16.796	0.078	lsc1m009-fl03
SN2016hvl	g	57729.3428	16.778	0.078	lsc1m009-fl03
SN2016hvl	g	57730.1542	16.866	0.081	lsc1m009-fl03
SN2016hvl	g	57730.1569	16.848	0.08	lsc1m009-fl03
SN2016hvl	g	57730.34	16.872	0.078	lsc1m009-fl03
SN2016hvl	g	57730.3418	16.864	0.078	lsc1m009-fl03
SN2016hvl	g	57733.8929	17.15	0.073	cpt1m010-fl16
SN2016hvl	g	57733.8957	17.162	0.075	cpt1m010-fl16
SN2016hvl	g	57739.5256	17.551	0.081	coj1m011-fl12
SN2016hvl	g	57739.5284	17.447	0.082	coj1m011-fl12

SN2016hvl	g	57742.8673	17.728	0.066	cpt1m012-fl06
SN2016hvl	g	57742.8701	17.741	0.065	cpt1m012-fl06
SN2016hvl	g	57745.271	17.871	0.075	lsc1m004-fl04
SN2016hvl	g	57745.2749	17.866	0.074	lsc1m004-fl04
SN2016hvl	g	57746.2504	17.904	0.069	lsc1m004-fl04
SN2016hvl	g	57746.2543	17.904	0.069	lsc1m004-fl04
SN2016hvl	g	57746.8606	17.954	0.065	cpt1m012-fl06
SN2016hvl	g	57746.8645	17.95	0.065	cpt1m012-fl06
SN2016hvl	g	57747.2191	17.932	0.074	lsc1m009-fl03
SN2016hvl	g	57747.2231	17.934	0.074	lsc1m009-fl03
SN2016hvl	g	57753.1252	18.164	0.07	lsc1m004-fl04
SN2016hvl	g	57753.1291	18.17	0.068	lsc1m004-fl04
SN2016hvl	g	57757.8305	18.315	0.065	cpt1m013-fl14
SN2016hvl	g	57757.8344	18.276	0.068	cpt1m013-fl14
SN2016hvl	g	57757.9229	18.294	0.068	cpt1m010-fl16
SN2016hvl	g	57759.8787	18.372	0.073	cpt1m013-fl14
SN2016hvl	g	57759.8827	18.346	0.101	cpt1m013-fl14
SN2016hvl	g	57760.8823	18.273	0.072	cpt1m010-fl16
SN2016hvl	g	57760.8863	18.405	0.07	cpt1m010-fl16
SN2016hvl	g	57761.8195	18.426	0.076	cpt1m012-fl06
SN2016hvl	g	57761.8235	18.413	0.077	cpt1m012-fl06
SN2016hvl	g	57769.8406	18.554	0.061	cpt1m013-fl14
SN2016hvl	g	57769.8445	18.53	0.058	cpt1m013-fl14
SN2016hvl	g	57770.6377	18.544	0.084	coj1m011-fl12
SN2016hvl	g	57770.6416	18.534	0.083	coj1m011-fl12
SN2016hvl	g	57778.7988	18.689	0.065	cpt1m013-fl14
SN2016hvl	g	57778.8028	18.678	0.067	cpt1m013-fl14
SN2016hvl	g	57784.799	18.778	0.068	cpt1m010-fl16
SN2016hvl	g	57784.803	18.741	0.063	cpt1m010-fl16
SN2016hvl	g	57789.8789	18.825	0.089	cpt1m010-fl16
SN2016hvl	g	57789.8829	18.887	0.097	cpt1m010-fl16
SN2016hvl	g	57795.8962	18.841	0.098	cpt1m013-fl14
SN2016hvl	g	57795.9002	18.988	0.114	cpt1m013-fl14
SN2016hvl	g	57802.5252	19.071	0.081	coj1m011-fl12
SN2016hvl	g	57802.5291	19.046	0.081	coj1m011-fl12
SN2016hvl	g	57808.5314	19.2	0.081	coj1m003-fl11
SN2016hvl	g	57808.5353	19.198	0.083	coj1m003-fl11
SN2016hvl	g	57813.8675	19.231	0.074	cpt1m010-fl16
SN2016hvl	g	57813.8714	19.2	0.079	cpt1m010-fl16
SN2016hvl	g	57814.8024	19.258	0.076	cpt1m012-fl06
SN2016hvl	g	57814.8063	19.244	0.075	cpt1m012-fl06
SN2016hvl	g	57815.7998	19.25	0.069	cpt1m010-fl16
SN2016hvl	g	57815.8038	19.269	0.069	cpt1m010-fl16
SN2016hvl	g	57821.4042	19.344	0.14	coj1m003-fl11
SN2016hvl	g	57821.4082	19.456	0.131	coj1m003-fl11
SN2016hvl	g	57827.8032	19.385	0.078	cpt1m012-fl06
SN2016hvl	g	57827.8071	19.54	0.078	cpt1m012-fl06
SN2016hvl	g	57835.8072	19.524	0.073	cpt1m010-fl16
SN2016hvl	g	57835.8124	19.59	0.073	cpt1m010-fl16
SN2016hvl	g	57842.3905	19.586	0.092	coj1m011-fl12
SN2016hvl	g	57842.3956	19.73	0.099	coj1m011-fl12
SN2016hvl	g	57848.7457	20.104	0.18	cpt1m012-fl06
SN2016hvl	r	57714.205	15.342	0.059	lsc1m005-fl15
SN2016hvl	r	57714.5947	15.328	0.069	coj1m011-fl12
SN2016hvl	r	57714.5965	15.327	0.069	coj1m011-fl12
SN2016hvl	r	57715.5847	15.368	0.058	coj1m011-fl12
SN2016hvl	r	57715.5865	15.375	0.058	coj1m011-fl12
SN2016hvl	r	57716.9455	15.402	0.055	cpt1m013-fl14
SN2016hvl	r	57716.9474	15.4	0.055	cpt1m013-fl14
SN2016hvl	r	57717.3295	15.407	0.07	lsc1m004-fl04
SN2016hvl	r	57717.3314	15.415	0.07	lsc1m004-fl04
SN2016hvl	r	57718.9293	15.491	0.055	cpt1m012-fl06
SN2016hvl	r	57718.9312	15.484	0.056	cpt1m012-fl06
SN2016hvl	r	57718.9655	15.478	0.056	cpt1m010-fl16
SN2016hvl	r	57718.9675	15.486	0.055	cpt1m010-fl16
SN2016hvl	r	57720.9409	15.592	0.057	cpt1m010-fl16
SN2016hvl	r	57720.9428	15.601	0.057	cpt1m010-fl16
SN2016hvl	r	57721.2931	15.612	0.07	lsc1m009-fl03

SN2016hvl	r	57721.295	15.616	0.071	lsc1m009-fl03
SN2016hvl	r	57723.085	15.724	0.055	cpt1m013-fl14
SN2016hvl	r	57723.0868	15.707	0.055	cpt1m013-fl14
SN2016hvl	r	57724.0317	15.769	0.052	cpt1m012-fl06
SN2016hvl	r	57724.0335	15.781	0.055	cpt1m012-fl06
SN2016hvl	r	57725.0851	15.813	0.054	cpt1m010-fl16
SN2016hvl	r	57725.087	15.81	0.055	cpt1m010-fl16
SN2016hvl	r	57726.1706	15.834	0.07	lsc1m005-fl15
SN2016hvl	r	57726.1724	15.843	0.071	lsc1m005-fl15
SN2016hvl	r	57726.9129	15.87	0.057	cpt1m012-fl06
SN2016hvl	r	57726.9148	15.86	0.057	cpt1m012-fl06
SN2016hvl	r	57728.0839	15.881	0.071	cpt1m010-fl16
SN2016hvl	r	57728.0858	15.88	0.07	cpt1m010-fl16
SN2016hvl	r	57729.3448	15.931	0.058	lsc1m009-fl03
SN2016hvl	r	57729.3467	15.932	0.059	lsc1m009-fl03
SN2016hvl	r	57730.1599	15.952	0.058	lsc1m009-fl03
SN2016hvl	r	57730.1617	15.955	0.059	lsc1m009-fl03
SN2016hvl	r	57730.3438	15.948	0.056	lsc1m009-fl03
SN2016hvl	r	57730.3457	15.955	0.058	lsc1m009-fl03
SN2016hvl	r	57733.8987	16.065	0.058	cpt1m010-fl16
SN2016hvl	r	57733.9005	16.048	0.058	cpt1m010-fl16
SN2016hvl	r	57739.5313	16.257	0.059	coj1m011-fl12
SN2016hvl	r	57739.5331	16.24	0.059	coj1m011-fl12
SN2016hvl	r	57742.8731	16.387	0.06	cpt1m012-fl06
SN2016hvl	r	57742.8749	16.384	0.057	cpt1m012-fl06
SN2016hvl	r	57745.279	16.535	0.07	lsc1m004-fl04
SN2016hvl	r	57745.2818	16.527	0.07	lsc1m004-fl04
SN2016hvl	r	57746.2584	16.569	0.069	lsc1m004-fl04
SN2016hvl	r	57746.2612	16.565	0.07	lsc1m004-fl04
SN2016hvl	r	57746.8687	16.64	0.055	cpt1m012-fl06
SN2016hvl	r	57746.8715	16.624	0.055	cpt1m012-fl06
SN2016hvl	r	57747.2272	16.642	0.071	lsc1m009-fl03
SN2016hvl	r	57747.23	16.646	0.07	lsc1m009-fl03
SN2016hvl	r	57747.2959	16.668	0.057	lsc1m009-fl03
SN2016hvl	r	57753.1332	16.962	0.07	lsc1m004-fl04
SN2016hvl	r	57753.136	16.965	0.069	lsc1m004-fl04
SN2016hvl	r	57757.8386	17.174	0.057	cpt1m013-fl14
SN2016hvl	r	57757.8414	17.184	0.056	cpt1m013-fl14
SN2016hvl	r	57760.8904	17.303	0.055	cpt1m010-fl16
SN2016hvl	r	57760.8932	17.294	0.06	cpt1m010-fl16
SN2016hvl	r	57761.8276	17.357	0.06	cpt1m012-fl06
SN2016hvl	r	57761.8304	17.326	0.058	cpt1m012-fl06
SN2016hvl	r	57769.8487	17.604	0.056	cpt1m013-fl14
SN2016hvl	r	57769.8514	17.592	0.054	cpt1m013-fl14
SN2016hvl	r	57770.6457	17.621	0.07	coj1m011-fl12
SN2016hvl	r	57770.6485	17.603	0.063	coj1m011-fl12
SN2016hvl	r	57778.8069	17.866	0.058	cpt1m013-fl14
SN2016hvl	r	57778.8096	17.899	0.055	cpt1m013-fl14
SN2016hvl	r	57784.8071	18.048	0.06	cpt1m010-fl16
SN2016hvl	r	57784.8099	18.062	0.06	cpt1m010-fl16
SN2016hvl	r	57789.8871	18.161	0.069	cpt1m010-fl16
SN2016hvl	r	57789.8899	18.223	0.072	cpt1m010-fl16
SN2016hvl	r	57795.9043	18.392	0.082	cpt1m013-fl14
SN2016hvl	r	57795.9071	18.318	0.083	cpt1m013-fl14
SN2016hvl	r	57802.5332	18.641	0.064	coj1m011-fl12
SN2016hvl	r	57802.536	18.608	0.065	coj1m011-fl12
SN2016hvl	r	57808.5394	18.833	0.072	coj1m003-fl11
SN2016hvl	r	57808.5422	18.736	0.067	coj1m003-fl11
SN2016hvl	r	57813.8755	18.919	0.091	cpt1m010-fl16
SN2016hvl	r	57813.8783	18.962	0.127	cpt1m010-fl16
SN2016hvl	r	57814.8105	18.979	0.072	cpt1m012-fl06
SN2016hvl	r	57814.8132	19.014	0.072	cpt1m012-fl06
SN2016hvl	r	57815.8079	18.973	0.072	cpt1m010-fl16
SN2016hvl	r	57815.8107	18.942	0.072	cpt1m010-fl16
SN2016hvl	r	57821.4122	19.118	0.13	coj1m003-fl11
SN2016hvl	r	57821.415	19.05	0.122	coj1m003-fl11
SN2016hvl	r	57827.8112	19.373	0.074	cpt1m012-fl06
SN2016hvl	r	57827.814	19.365	0.074	cpt1m012-fl06

SN2016hvl	r	57835.8176	19.602	0.076	cpt1m010-fl16
SN2016hvl	r	57835.8216	19.49	0.074	cpt1m010-fl16
SN2016hvl	r	57842.4008	19.546	0.113	coj1m011-fl12
SN2016hvl	r	57842.4048	19.659	0.116	coj1m011-fl12
SN2016hvl	i	57714.5985	15.728	0.103	coj1m011-fl12
SN2016hvl	i	57714.601	15.71	0.119	coj1m011-fl12
SN2016hvl	i	57715.5885	15.765	0.081	coj1m011-fl12
SN2016hvl	i	57715.5911	15.848	0.081	coj1m011-fl12
SN2016hvl	i	57716.9494	15.801	0.087	cpt1m013-fl14
SN2016hvl	i	57716.952	15.791	0.085	cpt1m013-fl14
SN2016hvl	i	57717.3334	15.829	0.082	lsc1m004-fl04
SN2016hvl	i	57717.3359	15.809	0.101	lsc1m004-fl04
SN2016hvl	i	57718.9332	15.902	0.081	cpt1m012-fl06
SN2016hvl	i	57718.9358	15.903	0.087	cpt1m012-fl06
SN2016hvl	i	57718.9695	15.906	0.081	cpt1m010-fl16
SN2016hvl	i	57718.972	15.906	0.08	cpt1m010-fl16
SN2016hvl	i	57720.9448	16.024	0.079	cpt1m010-fl16
SN2016hvl	i	57720.9474	16.024	0.08	cpt1m010-fl16
SN2016hvl	i	57721.2969	16.018	0.101	lsc1m009-fl03
SN2016hvl	i	57721.2995	16.027	0.101	lsc1m009-fl03
SN2016hvl	i	57723.0888	16.11	0.085	cpt1m013-fl14
SN2016hvl	i	57723.0914	16.13	0.085	cpt1m013-fl14
SN2016hvl	i	57724.0355	16.158	0.081	cpt1m012-fl06
SN2016hvl	i	57724.0381	16.143	0.08	cpt1m012-fl06
SN2016hvl	i	57725.089	16.169	0.079	cpt1m010-fl16
SN2016hvl	i	57725.0916	16.16	0.079	cpt1m010-fl16
SN2016hvl	i	57726.1744	16.141	0.101	lsc1m005-fl15
SN2016hvl	i	57726.177	16.125	0.101	lsc1m005-fl15
SN2016hvl	i	57726.9168	16.145	0.083	cpt1m012-fl06
SN2016hvl	i	57726.9194	16.153	0.085	cpt1m012-fl06
SN2016hvl	i	57728.0878	16.117	0.103	cpt1m010-fl16
SN2016hvl	i	57728.0903	16.128	0.101	cpt1m010-fl16
SN2016hvl	i	57729.3486	16.145	0.081	lsc1m009-fl03
SN2016hvl	i	57729.3512	16.138	0.085	lsc1m009-fl03
SN2016hvl	i	57730.1637	16.147	0.076	lsc1m009-fl03
SN2016hvl	i	57730.1665	16.147	0.079	lsc1m009-fl03
SN2016hvl	i	57730.3477	16.144	0.084	lsc1m009-fl03
SN2016hvl	i	57730.3502	16.134	0.083	lsc1m009-fl03
SN2016hvl	i	57733.9026	16.189	0.081	cpt1m010-fl16
SN2016hvl	i	57733.9054	16.164	0.082	cpt1m010-fl16
SN2016hvl	i	57739.5351	16.25	0.091	coj1m011-fl12
SN2016hvl	i	57739.5379	16.268	0.084	coj1m011-fl12
SN2016hvl	i	57742.877	16.35	0.082	cpt1m012-fl06
SN2016hvl	i	57742.8797	16.334	0.085	cpt1m012-fl06
SN2016hvl	i	57745.2848	16.442	0.099	lsc1m004-fl04
SN2016hvl	i	57745.2876	16.448	0.099	lsc1m004-fl04
SN2016hvl	i	57746.2643	16.521	0.083	lsc1m004-fl04
SN2016hvl	i	57746.2671	16.489	0.099	lsc1m004-fl04
SN2016hvl	i	57746.8744	16.536	0.084	cpt1m012-fl06
SN2016hvl	i	57746.8772	16.556	0.082	cpt1m012-fl06
SN2016hvl	i	57747.2329	16.514	0.152	lsc1m009-fl03
SN2016hvl	i	57747.2357	16.562	0.105	lsc1m009-fl03
SN2016hvl	i	57753.1389	16.668	0.52	lsc1m004-fl04
SN2016hvl	i	57753.1417	16.918	0.1	lsc1m004-fl04
SN2016hvl	i	57757.8443	17.202	0.082	cpt1m013-fl14
SN2016hvl	i	57757.8471	17.206	0.085	cpt1m013-fl14
SN2016hvl	i	57760.8961	17.284	0.083	cpt1m010-fl16
SN2016hvl	i	57760.8989	17.318	0.081	cpt1m010-fl16
SN2016hvl	i	57761.8333	17.381	0.087	cpt1m012-fl06
SN2016hvl	i	57761.8361	17.402	0.086	cpt1m012-fl06
SN2016hvl	i	57769.8544	17.719	0.086	cpt1m013-fl14
SN2016hvl	i	57770.6515	17.718	0.089	coj1m011-fl12
SN2016hvl	i	57770.6542	17.742	0.104	coj1m011-fl12
SN2016hvl	i	57778.8126	18.034	0.083	cpt1m013-fl14
SN2016hvl	i	57778.8154	18.016	0.084	cpt1m013-fl14
SN2016hvl	i	57784.8128	18.296	0.086	cpt1m010-fl16
SN2016hvl	i	57784.8156	18.269	0.086	cpt1m010-fl16
SN2016hvl	i	57789.8929	18.472	0.118	cpt1m010-fl16

SN2016hvl	i	57789.8957	18.402	0.107	cpt1m010-fl16
SN2016hvl	i	57795.91	18.57	0.108	cpt1m013-fl14
SN2016hvl	i	57795.9128	18.666	0.121	cpt1m013-fl14
SN2016hvl	i	57802.5389	18.82	0.102	coj1m011-fl12
SN2016hvl	i	57802.5417	18.78	0.111	coj1m011-fl12
SN2016hvl	i	57808.5451	19.172	0.117	coj1m003-fl11
SN2016hvl	i	57808.5479	19.232	0.12	coj1m003-fl11
SN2016hvl	i	57813.8812	19.175	0.141	cpt1m010-fl16
SN2016hvl	i	57813.884	19.089	0.123	cpt1m010-fl16
SN2016hvl	i	57815.8136	19.291	0.107	cpt1m010-fl16
SN2016hvl	i	57815.8164	19.242	0.13	cpt1m010-fl16
SN2016hvl	i	57821.418	19.472	0.181	coj1m003-fl11
SN2016hvl	i	57821.4207	19.345	0.148	coj1m003-fl11
SN2016hvl	i	57827.8169	19.561	0.109	cpt1m012-fl06
SN2016hvl	i	57827.8197	19.652	0.109	cpt1m012-fl06
SN2016hvl	i	57835.8257	19.613	0.128	cpt1m010-fl16
SN2016hvl	i	57835.8297	19.959	0.16	cpt1m010-fl16
SN2016hvl	i	57842.4089	19.651	0.174	coj1m011-fl12
SN2016hvl	i	57842.4128	20.002	0.216	coj1m011-fl12
SN2017awz	B	57804.2453	16.123	0.046	lsc1m005-fl15
SN2017awz	B	57804.2471	16.107	0.045	lsc1m005-fl15
SN2017awz	B	57807.548	15.868	0.041	coj1m011-fl12
SN2017awz	B	57807.5498	15.958	0.059	coj1m011-fl12
SN2017awz	B	57810.1321	15.774	0.041	elp1m008-fl05
SN2017awz	B	57810.134	15.749	0.039	elp1m008-fl05
SN2017awz	B	57813.8935	15.731	0.038	cpt1m010-fl16
SN2017awz	B	57813.8953	15.733	0.042	cpt1m010-fl16
SN2017awz	B	57814.5288	15.79	0.041	coj1m003-fl11
SN2017awz	B	57814.5306	15.781	0.043	coj1m003-fl11
SN2017awz	B	57814.9581	15.762	0.043	cpt1m012-fl06
SN2017awz	B	57814.96	15.761	0.046	cpt1m012-fl06
SN2017awz	B	57815.9151	15.771	0.045	cpt1m012-fl06
SN2017awz	B	57815.9169	15.768	0.045	cpt1m012-fl06
SN2017awz	B	57818.2459	15.811	0.05	elp1m008-fl05
SN2017awz	B	57818.2478	15.881	0.047	elp1m008-fl05
SN2017awz	B	57820.9652	15.964	0.044	cpt1m010-fl16
SN2017awz	B	57820.9671	15.975	0.038	cpt1m010-fl16
SN2017awz	B	57824.8683	16.356	0.07	cpt1m012-fl06
SN2017awz	B	57824.8702	16.36	0.062	cpt1m012-fl06
SN2017awz	B	57826.102	16.49	0.043	lsc1m004-fl04
SN2017awz	B	57826.1039	16.477	0.041	lsc1m004-fl04
SN2017awz	B	57829.1279	16.89	0.046	lsc1m004-fl04
SN2017awz	B	57829.1297	16.855	0.045	lsc1m004-fl04
SN2017awz	B	57833.2009	17.329	0.049	lsc1m005-fl15
SN2017awz	B	57833.2027	17.327	0.051	lsc1m005-fl15
SN2017awz	B	57838.8614	17.929	0.051	cpt1m012-fl06
SN2017awz	B	57838.8632	17.912	0.053	cpt1m012-fl06
SN2017awz	B	57838.875	17.844	0.054	cpt1m013-fl14
SN2017awz	B	57838.8769	17.82	0.052	cpt1m013-fl14
SN2017awz	B	57842.8284	18.092	0.05	cpt1m010-fl16
SN2017awz	B	57842.8302	18.189	0.057	cpt1m010-fl16
SN2017awz	B	57846.8034	18.378	0.065	cpt1m010-fl16
SN2017awz	B	57846.8052	18.341	0.061	cpt1m010-fl16
SN2017awz	B	57852.1119	18.581	0.181	lsc1m004-fl04
SN2017awz	B	57852.1138	18.803	0.178	lsc1m004-fl04
SN2017awz	B	57853.8255	18.532	0.121	cpt1m010-fl16
SN2017awz	B	57853.8274	18.553	0.12	cpt1m010-fl16
SN2017awz	B	57858.0154	18.667	0.067	lsc1m004-fl04
SN2017awz	B	57858.0173	18.648	0.065	lsc1m004-fl04
SN2017awz	B	57858.0221	18.517	0.089	lsc1m005-fl15
SN2017awz	B	57864.0097	18.801	0.086	lsc1m004-fl04
SN2017awz	B	57864.0115	18.62	0.073	lsc1m004-fl04
SN2017awz	B	57870.2795	18.936	0.096	elp1m008-fl05
SN2017awz	B	57870.2823	18.89	0.108	elp1m008-fl05
SN2017awz	B	57882.769	18.979	0.126	cpt1m012-fl06
SN2017awz	B	57882.7718	18.928	0.11	cpt1m012-fl06
SN2017awz	B	57894.3866	19.284	0.089	coj1m003-fl11
SN2017awz	B	57894.3894	19.01	0.073	coj1m003-fl11

SN2017awz	B	57901.712	19.195	0.072	cpt1m012-fl06
SN2017awz	B	57901.7148	19.459	0.091	cpt1m012-fl06
SN2017awz	B	57909.712	19.338	0.164	cpt1m010-fl16
SN2017awz	B	57909.7149	18.897	0.112	cpt1m010-fl16
SN2017awz	B	57918.1888	19.613	0.167	elp1m008-fl05
SN2017awz	B	57918.1916	19.726	0.109	elp1m008-fl05
SN2017awz	B	57918.6959	19.416	0.111	cpt1m012-fl06
SN2017awz	B	57918.6987	19.738	0.109	cpt1m012-fl06
SN2017awz	B	57924.7047	19.259	0.096	cpt1m012-fl06
SN2017awz	B	57945.1268	19.839	0.269	elp1m008-fl05
SN2017awz	B	57945.1297	20.076	0.288	elp1m008-fl05
SN2017awz	V	57804.2491	16.212	0.055	lsc1m005-fl15
SN2017awz	V	57804.2506	16.142	0.024	lsc1m005-fl15
SN2017awz	V	57807.5518	15.86	0.027	coj1m011-fl12
SN2017awz	V	57807.5533	15.866	0.023	coj1m011-fl12
SN2017awz	V	57810.136	15.73	0.025	elp1m008-fl05
SN2017awz	V	57810.1376	15.728	0.023	elp1m008-fl05
SN2017awz	V	57813.8974	15.641	0.028	cpt1m010-fl16
SN2017awz	V	57813.8989	15.639	0.024	cpt1m010-fl16
SN2017awz	V	57814.5326	15.666	0.024	coj1m003-fl11
SN2017awz	V	57814.5342	15.687	0.027	coj1m003-fl11
SN2017awz	V	57814.962	15.62	0.027	cpt1m012-fl06
SN2017awz	V	57814.9635	15.637	0.022	cpt1m012-fl06
SN2017awz	V	57815.919	15.609	0.023	cpt1m012-fl06
SN2017awz	V	57815.9205	15.62	0.023	cpt1m012-fl06
SN2017awz	V	57818.2498	15.671	0.037	elp1m008-fl05
SN2017awz	V	57818.2514	15.643	0.037	elp1m008-fl05
SN2017awz	V	57820.9691	15.693	0.028	cpt1m010-fl16
SN2017awz	V	57820.9706	15.669	0.026	cpt1m010-fl16
SN2017awz	V	57824.8722	15.93	0.031	cpt1m012-fl06
SN2017awz	V	57824.8737	15.916	0.029	cpt1m012-fl06
SN2017awz	V	57825.8646	16.063	0.109	cpt1m010-fl16
SN2017awz	V	57826.1059	16.001	0.054	lsc1m004-fl04
SN2017awz	V	57826.1074	15.994	0.05	lsc1m004-fl04
SN2017awz	V	57829.1317	16.187	0.029	lsc1m004-fl04
SN2017awz	V	57829.1332	16.195	0.029	lsc1m004-fl04
SN2017awz	V	57833.2048	16.452	0.028	lsc1m005-fl15
SN2017awz	V	57833.2063	16.442	0.03	lsc1m005-fl15
SN2017awz	V	57838.8789	16.717	0.03	cpt1m013-fl14
SN2017awz	V	57838.8804	16.692	0.028	cpt1m013-fl14
SN2017awz	V	57842.8323	16.882	0.032	cpt1m010-fl16
SN2017awz	V	57842.8338	16.875	0.029	cpt1m010-fl16
SN2017awz	V	57846.8073	17.142	0.035	cpt1m010-fl16
SN2017awz	V	57846.8088	17.182	0.072	cpt1m010-fl16
SN2017awz	V	57852.1158	17.283	0.094	lsc1m004-fl04
SN2017awz	V	57853.8295	17.35	0.047	cpt1m010-fl16
SN2017awz	V	57853.831	17.44	0.061	cpt1m010-fl16
SN2017awz	V	57858.0193	17.617	0.039	lsc1m004-fl04
SN2017awz	V	57858.0208	17.636	0.039	lsc1m004-fl04
SN2017awz	V	57858.0259	17.74	0.144	lsc1m005-fl15
SN2017awz	V	57858.0274	17.763	0.085	lsc1m005-fl15
SN2017awz	V	57864.0135	17.812	0.04	lsc1m004-fl04
SN2017awz	V	57864.015	17.744	0.041	lsc1m004-fl04
SN2017awz	V	57870.2852	18.091	0.071	elp1m008-fl05
SN2017awz	V	57870.2871	17.908	0.05	elp1m008-fl05
SN2017awz	V	57882.7748	18.416	0.066	cpt1m012-fl06
SN2017awz	V	57882.7766	18.235	0.067	cpt1m012-fl06
SN2017awz	V	57894.3923	18.751	0.162	coj1m003-fl11
SN2017awz	V	57901.7178	18.652	0.06	cpt1m012-fl06
SN2017awz	V	57901.7196	18.682	0.06	cpt1m012-fl06
SN2017awz	V	57909.7179	19.107	0.169	cpt1m010-fl16
SN2017awz	V	57909.7198	18.662	0.123	cpt1m010-fl16
SN2017awz	V	57918.1827	19.082	0.107	elp1m008-fl05
SN2017awz	V	57918.7017	19.35	0.054	cpt1m012-fl06
SN2017awz	V	57918.7036	19.272	0.096	cpt1m012-fl06
SN2017awz	V	57924.7146	19.348	0.111	cpt1m012-fl06
SN2017awz	V	57924.7174	19.311	0.096	cpt1m012-fl06
SN2017awz	V	57935.131	19.132	0.162	elp1m008-fl05

SN2017awz	V	57945.1327	19.244	0.163	elp1m008-fl05
SN2017awz	V	57945.1346	19.758	0.231	elp1m008-fl05
SN2017awz	g	57804.2523	16.1	0.053	lsc1m005-fl15
SN2017awz	g	57804.2542	16.113	0.048	lsc1m005-fl15
SN2017awz	g	57807.555	15.862	0.051	coj1m011-fl12
SN2017awz	g	57807.5569	15.886	0.07	coj1m011-fl12
SN2017awz	g	57810.1393	15.749	0.058	elp1m008-fl05
SN2017awz	g	57810.1412	15.756	0.062	elp1m008-fl05
SN2017awz	g	57813.9006	15.709	0.05	cpt1m010-fl16
SN2017awz	g	57813.9025	15.692	0.033	cpt1m010-fl16
SN2017awz	g	57814.5359	15.749	0.063	coj1m003-fl11
SN2017awz	g	57814.5377	15.74	0.06	coj1m003-fl11
SN2017awz	g	57814.9653	15.683	0.039	cpt1m012-fl06
SN2017awz	g	57814.9671	15.72	0.044	cpt1m012-fl06
SN2017awz	g	57815.9222	15.714	0.062	cpt1m012-fl06
SN2017awz	g	57815.9241	15.701	0.039	cpt1m012-fl06
SN2017awz	g	57818.2532	15.764	0.036	elp1m008-fl05
SN2017awz	g	57818.255	15.779	0.036	elp1m008-fl05
SN2017awz	g	57820.9724	15.855	0.058	cpt1m010-fl16
SN2017awz	g	57820.9743	15.858	0.059	cpt1m010-fl16
SN2017awz	g	57824.8754	16.127	0.059	cpt1m012-fl06
SN2017awz	g	57824.8773	16.132	0.06	cpt1m012-fl06
SN2017awz	g	57826.109	16.225	0.061	lsc1m004-fl04
SN2017awz	g	57826.1109	16.249	0.042	lsc1m004-fl04
SN2017awz	g	57829.135	16.512	0.047	lsc1m004-fl04
SN2017awz	g	57829.1368	16.494	0.044	lsc1m004-fl04
SN2017awz	g	57833.208	16.919	0.053	lsc1m005-fl15
SN2017awz	g	57833.2098	16.906	0.046	lsc1m005-fl15
SN2017awz	g	57838.8822	17.381	0.06	cpt1m013-fl14
SN2017awz	g	57838.884	17.365	0.044	cpt1m013-fl14
SN2017awz	g	57842.8356	17.642	0.053	cpt1m010-fl16
SN2017awz	g	57842.8374	17.708	0.059	cpt1m010-fl16
SN2017awz	g	57846.8105	17.945	0.048	cpt1m010-fl16
SN2017awz	g	57846.8124	17.907	0.059	cpt1m010-fl16
SN2017awz	g	57852.119	18.117	0.103	lsc1m004-fl04
SN2017awz	g	57852.1208	18.021	0.093	lsc1m004-fl04
SN2017awz	g	57853.8327	18.214	0.089	cpt1m010-fl16
SN2017awz	g	57853.8346	18.214	0.095	cpt1m010-fl16
SN2017awz	g	57858.0224	18.209	0.056	lsc1m004-fl04
SN2017awz	g	57858.0243	18.251	0.05	lsc1m004-fl04
SN2017awz	g	57858.0291	18.378	0.094	lsc1m005-fl15
SN2017awz	g	57858.031	18.03	0.291	lsc1m005-fl15
SN2017awz	g	57864.0167	18.354	0.055	lsc1m004-fl04
SN2017awz	g	57864.0186	18.496	0.053	lsc1m004-fl04
SN2017awz	g	57870.2892	18.586	0.051	elp1m008-fl05
SN2017awz	g	57870.292	18.556	0.059	elp1m008-fl05
SN2017awz	g	57882.7787	18.653	0.086	cpt1m012-fl06
SN2017awz	g	57882.7815	18.777	0.099	cpt1m012-fl06
SN2017awz	g	57894.3962	18.931	0.089	coj1m003-fl11
SN2017awz	g	57901.7217	18.941	0.073	cpt1m012-fl06
SN2017awz	g	57901.7245	18.999	0.077	cpt1m012-fl06
SN2017awz	g	57909.7219	19.128	0.108	cpt1m010-fl16
SN2017awz	g	57909.7247	19.086	0.116	cpt1m010-fl16
SN2017awz	g	57918.1947	19.825	0.129	elp1m008-fl05
SN2017awz	g	57918.7056	19.185	0.06	cpt1m012-fl06
SN2017awz	g	57918.7084	19.106	0.068	cpt1m012-fl06
SN2017awz	g	57924.6966	19.289	0.144	cpt1m012-fl06
SN2017awz	g	57935.1341	19.596	0.144	elp1m008-fl05
SN2017awz	g	57935.1382	19.579	0.132	elp1m008-fl05
SN2017awz	r	57804.2562	16.339	0.065	lsc1m005-fl15
SN2017awz	r	57804.2577	16.261	0.04	lsc1m005-fl15
SN2017awz	r	57807.5589	15.928	0.028	coj1m011-fl12
SN2017awz	r	57807.5604	15.92	0.027	coj1m011-fl12
SN2017awz	r	57810.1432	15.759	0.017	elp1m008-fl05
SN2017awz	r	57810.1447	15.741	0.021	elp1m008-fl05
SN2017awz	r	57813.9045	15.635	0.018	cpt1m010-fl16
SN2017awz	r	57813.906	15.639	0.019	cpt1m010-fl16
SN2017awz	r	57814.5397	15.611	0.022	coj1m003-fl11

SN2017awz	r	57814.5412	15.621	0.021	coj1m003-fl11
SN2017awz	r	57814.9692	15.625	0.026	cpt1m012-fl06
SN2017awz	r	57814.9707	15.62	0.027	cpt1m012-fl06
SN2017awz	r	57815.9261	15.649	0.018	cpt1m012-fl06
SN2017awz	r	57815.9276	15.624	0.016	cpt1m012-fl06
SN2017awz	r	57818.2571	15.644	0.025	elp1m008-fl05
SN2017awz	r	57818.2586	15.642	0.023	elp1m008-fl05
SN2017awz	r	57820.9764	15.758	0.019	cpt1m010-fl16
SN2017awz	r	57820.9779	15.76	0.019	cpt1m010-fl16
SN2017awz	r	57824.8794	16.011	0.05	cpt1m012-fl06
SN2017awz	r	57824.8809	16.012	0.045	cpt1m012-fl06
SN2017awz	r	57826.1129	16.077	0.065	lsc1m004-fl04
SN2017awz	r	57826.1144	16.119	0.06	lsc1m004-fl04
SN2017awz	r	57829.1388	16.286	0.024	lsc1m004-fl04
SN2017awz	r	57829.1403	16.284	0.026	lsc1m004-fl04
SN2017awz	r	57833.2118	16.322	0.025	lsc1m005-fl15
SN2017awz	r	57833.2133	16.346	0.023	lsc1m005-fl15
SN2017awz	r	57838.886	16.426	0.021	cpt1m013-fl14
SN2017awz	r	57838.8876	16.399	0.021	cpt1m013-fl14
SN2017awz	r	57842.8396	16.533	0.021	cpt1m010-fl16
SN2017awz	r	57842.8411	16.549	0.021	cpt1m010-fl16
SN2017awz	r	57846.8144	16.774	0.026	cpt1m010-fl16
SN2017awz	r	57846.8159	16.765	0.023	cpt1m010-fl16
SN2017awz	r	57852.1228	17.158	0.053	lsc1m004-fl04
SN2017awz	r	57852.1243	17.004	0.051	lsc1m004-fl04
SN2017awz	r	57853.8366	17.151	0.034	cpt1m010-fl16
SN2017awz	r	57853.8381	17.167	0.036	cpt1m010-fl16
SN2017awz	r	57858.0263	17.314	0.029	lsc1m004-fl04
SN2017awz	r	57858.0278	17.269	0.032	lsc1m004-fl04
SN2017awz	r	57858.033	17.401	0.065	lsc1m005-fl15
SN2017awz	r	57858.0345	17.522	0.113	lsc1m005-fl15
SN2017awz	r	57864.0206	17.656	0.032	lsc1m004-fl04
SN2017awz	r	57864.0221	17.573	0.059	lsc1m004-fl04
SN2017awz	r	57870.295	17.726	0.044	elp1m008-fl05
SN2017awz	r	57870.2968	17.704	0.039	elp1m008-fl05
SN2017awz	r	57882.7845	18.312	0.049	cpt1m012-fl06
SN2017awz	r	57882.7863	18.238	0.034	cpt1m012-fl06
SN2017awz	r	57901.7275	18.819	0.047	cpt1m012-fl06
SN2017awz	r	57901.7293	18.803	0.059	cpt1m012-fl06
SN2017awz	r	57909.7278	18.953	0.117	cpt1m010-fl16
SN2017awz	r	57909.7297	19.049	0.129	cpt1m010-fl16
SN2017awz	r	57918.7114	19.256	0.091	cpt1m012-fl06
SN2017awz	r	57918.7132	19.424	0.113	cpt1m012-fl06
SN2017awz	r	57924.7089	19.118	0.114	cpt1m012-fl06
SN2017awz	r	57924.7116	19.257	0.105	cpt1m012-fl06
SN2017awz	i	57804.2593	16.599	0.069	lsc1m005-fl15
SN2017awz	i	57804.2608	16.617	0.06	lsc1m005-fl15
SN2017awz	i	57807.5621	16.222	0.034	coj1m011-fl12
SN2017awz	i	57807.5636	16.298	0.053	coj1m011-fl12
SN2017awz	i	57810.1464	16.16	0.029	elp1m008-fl05
SN2017awz	i	57810.148	16.19	0.062	elp1m008-fl05
SN2017awz	i	57813.9077	16.143	0.033	cpt1m010-fl16
SN2017awz	i	57813.9092	16.202	0.033	cpt1m010-fl16
SN2017awz	i	57814.5429	16.195	0.034	coj1m003-fl11
SN2017awz	i	57814.5444	16.202	0.033	coj1m003-fl11
SN2017awz	i	57814.9723	16.23	0.05	cpt1m012-fl06
SN2017awz	i	57814.9738	16.202	0.035	cpt1m012-fl06
SN2017awz	i	57815.9293	16.28	0.07	cpt1m012-fl06
SN2017awz	i	57815.9308	16.257	0.059	cpt1m012-fl06
SN2017awz	i	57818.2603	16.251	0.032	elp1m008-fl05
SN2017awz	i	57818.2618	16.283	0.033	elp1m008-fl05
SN2017awz	i	57820.9796	16.386	0.038	cpt1m010-fl16
SN2017awz	i	57820.9811	16.406	0.038	cpt1m010-fl16
SN2017awz	i	57824.8826	16.69	0.062	cpt1m012-fl06
SN2017awz	i	57824.8841	16.791	0.073	cpt1m012-fl06
SN2017awz	i	57826.1161	16.846	0.035	lsc1m004-fl04
SN2017awz	i	57826.1176	16.861	0.037	lsc1m004-fl04
SN2017awz	i	57829.142	16.933	0.064	lsc1m004-fl04

SN2017awz	i	57829.1435	16.867	0.038	lsc1m004-fl04
SN2017awz	i	57833.215	16.683	0.04	lsc1m005-fl15
SN2017awz	i	57833.2165	16.735	0.04	lsc1m005-fl15
SN2017awz	i	57838.8893	16.638	0.032	cpt1m013-fl14
SN2017awz	i	57838.8908	16.638	0.031	cpt1m013-fl14
SN2017awz	i	57842.8428	16.703	0.036	cpt1m010-fl16
SN2017awz	i	57842.8444	16.691	0.035	cpt1m010-fl16
SN2017awz	i	57846.8177	16.851	0.036	cpt1m010-fl16
SN2017awz	i	57846.8192	16.852	0.038	cpt1m010-fl16
SN2017awz	i	57852.126	17.194	0.069	lsc1m004-fl04
SN2017awz	i	57852.1275	17.196	0.076	lsc1m004-fl04
SN2017awz	i	57853.8398	17.245	0.046	cpt1m010-fl16
SN2017awz	i	57853.8413	17.225	0.046	cpt1m010-fl16
SN2017awz	i	57858.0295	17.485	0.058	lsc1m004-fl04
SN2017awz	i	57858.031	17.5	0.045	lsc1m004-fl04
SN2017awz	i	57858.0361	17.525	0.042	lsc1m005-fl15
SN2017awz	i	57858.0376	17.395	0.063	lsc1m005-fl15
SN2017awz	i	57864.0237	17.785	0.053	lsc1m004-fl04
SN2017awz	i	57864.0252	17.757	0.061	lsc1m004-fl04
SN2017awz	i	57870.2989	18.119	0.076	elp1m008-fl05
SN2017awz	i	57870.3008	18.118	0.077	elp1m008-fl05
SN2017awz	i	57882.7884	18.801	0.099	cpt1m012-fl06
SN2017awz	i	57882.7902	18.616	0.099	cpt1m012-fl06
SN2017awz	i	57894.4058	18.606	0.19	coj1m003-fl11
SN2017awz	i	57894.4076	18.898	0.168	coj1m003-fl11
SN2017awz	i	57901.7313	19.081	0.118	cpt1m012-fl06
SN2017awz	i	57901.7332	18.852	0.118	cpt1m012-fl06
SN2017awz	i	57909.7317	19.363	0.214	cpt1m010-fl16
SN2017awz	i	57909.7336	19.352	0.203	cpt1m010-fl16
SN2017awz	i	57918.1848	19.572	0.266	elp1m008-fl05
SN2017awz	i	57918.1867	19.193	0.18	elp1m008-fl05
SN2017awz	i	57924.7205	19.749	0.212	cpt1m012-fl06
SN2017awz	i	57924.7233	19.679	0.199	cpt1m012-fl06
SN2017dfb	B	57869.2045	16.324	0.067	lsc1m009-fl03
SN2017dfb	B	57869.2072	16.299	0.068	lsc1m009-fl03
SN2017dfb	B	57872.0385	16.276	0.077	cpt1m012-fl06
SN2017dfb	B	57872.0413	16.286	0.058	cpt1m012-fl06
SN2017dfb	B	57875.1427	16.401	0.067	lsc1m004-fl04
SN2017dfb	B	57875.1454	16.385	0.054	lsc1m004-fl04
SN2017dfb	B	57878.2572	16.504	0.046	lsc1m004-fl04
SN2017dfb	B	57878.26	16.499	0.05	lsc1m004-fl04
SN2017dfb	B	57880.866	16.703	0.053	cpt1m010-fl16
SN2017dfb	B	57880.8688	16.7	0.056	cpt1m010-fl16
SN2017dfb	B	57885.6764	17.293	0.076	coj1m003-fl11
SN2017dfb	B	57885.6792	17.346	0.075	coj1m003-fl11
SN2017dfb	B	57888.9427	17.717	0.059	cpt1m012-fl06
SN2017dfb	B	57888.9455	17.697	0.073	cpt1m012-fl06
SN2017dfb	B	57889.6426	17.784	0.055	coj1m011-fl12
SN2017dfb	B	57889.6454	17.853	0.056	coj1m011-fl12
SN2017dfb	B	57895.6427	18.519	0.062	coj1m003-fl11
SN2017dfb	B	57895.6455	18.562	0.066	coj1m003-fl11
SN2017dfb	B	57901.8092	19.002	0.077	cpt1m013-fl14
SN2017dfb	B	57901.812	19.11	0.079	cpt1m013-fl14
SN2017dfb	B	57902.601	19.127	0.09	coj1m003-fl11
SN2017dfb	B	57902.6038	19.028	0.083	coj1m003-fl11
SN2017dfb	B	57908.2157	19.329	0.102	lsc1m005-fl15
SN2017dfb	B	57908.2185	19.386	0.115	lsc1m005-fl15
SN2017dfb	B	57914.055	19.842	0.149	lsc1m005-fl15
SN2017dfb	B	57914.0578	19.319	0.146	lsc1m005-fl15
SN2017dfb	B	57919.8126	19.767	0.13	cpt1m012-fl06
SN2017dfb	B	57919.8154	19.899	0.153	cpt1m012-fl06
SN2017dfb	B	57926.4908	19.687	0.118	coj1m003-fl11
SN2017dfb	B	57926.4936	19.825	0.133	coj1m003-fl11
SN2017dfb	B	57932.1601	19.8	0.102	lsc1m005-fl15
SN2017dfb	B	57932.1629	19.728	0.094	lsc1m005-fl15
SN2017dfb	B	57937.8302	20.235	0.291	cpt1m012-fl06
SN2017dfb	B	57937.8329	19.901	0.222	cpt1m012-fl06
SN2017dfb	B	57944.243	19.757	0.229	elp1m008-fl05

SN2017dfb	B	57944.2458	19.876	0.275	elp1m008-fl05
SN2017dfb	B	57951.0421	20.517	0.192	lsc1m005-fl15
SN2017dfb	B	57951.0449	20.277	0.151	lsc1m005-fl15
SN2017dfb	B	57957.4481	20.176	0.176	coj1m003-fl11
SN2017dfb	B	57957.451	20.058	0.156	coj1m003-fl11
SN2017dfb	B	57959.3503	20.308	0.236	coj1m003-fl11
SN2017dfb	V	57869.2102	16.173	0.068	lsc1m009-fl03
SN2017dfb	V	57869.212	16.151	0.068	lsc1m009-fl03
SN2017dfb	V	57872.0442	16.11	0.072	cpt1m012-fl06
SN2017dfb	V	57872.0461	16.098	0.071	cpt1m012-fl06
SN2017dfb	V	57875.1484	16.152	0.051	lsc1m004-fl04
SN2017dfb	V	57875.1502	16.154	0.049	lsc1m004-fl04
SN2017dfb	V	57878.2629	16.122	0.045	lsc1m004-fl04
SN2017dfb	V	57878.2648	16.122	0.045	lsc1m004-fl04
SN2017dfb	V	57880.8718	16.261	0.043	cpt1m010-fl16
SN2017dfb	V	57880.8737	16.255	0.043	cpt1m010-fl16
SN2017dfb	V	57885.6821	16.662	0.056	coj1m003-fl11
SN2017dfb	V	57885.684	16.763	0.055	coj1m003-fl11
SN2017dfb	V	57889.6483	16.838	0.045	coj1m011-fl12
SN2017dfb	V	57889.6502	16.889	0.042	coj1m011-fl12
SN2017dfb	V	57895.6484	17.197	0.042	coj1m003-fl11
SN2017dfb	V	57895.6503	17.201	0.046	coj1m003-fl11
SN2017dfb	V	57901.815	17.536	0.052	cpt1m013-fl14
SN2017dfb	V	57901.8169	17.562	0.049	cpt1m013-fl14
SN2017dfb	V	57902.6067	17.623	0.05	coj1m003-fl11
SN2017dfb	V	57902.6085	17.621	0.047	coj1m003-fl11
SN2017dfb	V	57908.2215	17.979	0.063	lsc1m005-fl15
SN2017dfb	V	57908.2234	17.958	0.064	lsc1m005-fl15
SN2017dfb	V	57914.0412	18.213	0.069	lsc1m005-fl15
SN2017dfb	V	57914.0431	18.244	0.074	lsc1m005-fl15
SN2017dfb	V	57919.8028	18.266	0.06	cpt1m012-fl06
SN2017dfb	V	57919.8047	18.281	0.06	cpt1m012-fl06
SN2017dfb	V	57926.4829	18.499	0.071	coj1m003-fl11
SN2017dfb	V	57926.4848	18.586	0.076	coj1m003-fl11
SN2017dfb	V	57932.1659	18.635	0.069	lsc1m005-fl15
SN2017dfb	V	57932.1678	18.751	0.069	lsc1m005-fl15
SN2017dfb	V	57937.8359	18.885	0.143	cpt1m012-fl06
SN2017dfb	V	57937.8378	18.501	0.107	cpt1m012-fl06
SN2017dfb	V	57944.2488	19.51	0.255	elp1m008-fl05
SN2017dfb	V	57944.2507	18.913	0.144	elp1m008-fl05
SN2017dfb	V	57951.0478	19.368	0.126	lsc1m005-fl15
SN2017dfb	V	57951.0497	20.048	0.251	lsc1m005-fl15
SN2017dfb	V	57957.4539	19.346	0.138	coj1m003-fl11
SN2017dfb	V	57957.4558	19.07	0.118	coj1m003-fl11
SN2017dfb	V	57959.3533	19.226	0.126	coj1m003-fl11
SN2017dfb	V	57959.3552	19.22	0.122	coj1m003-fl11
SN2017dfb	g	57869.214	16.284	0.067	lsc1m009-fl03
SN2017dfb	g	57869.2168	16.274	0.071	lsc1m009-fl03
SN2017dfb	g	57872.0482	16.259	0.064	cpt1m012-fl06
SN2017dfb	g	57872.051	16.255	0.069	cpt1m012-fl06
SN2017dfb	g	57875.1523	16.316	0.054	lsc1m004-fl04
SN2017dfb	g	57875.155	16.327	0.057	lsc1m004-fl04
SN2017dfb	g	57878.2668	16.364	0.049	lsc1m004-fl04
SN2017dfb	g	57878.2696	16.352	0.03	lsc1m004-fl04
SN2017dfb	g	57880.8758	16.528	0.034	cpt1m010-fl16
SN2017dfb	g	57880.8786	16.546	0.045	cpt1m010-fl16
SN2017dfb	g	57885.686	16.908	0.05	coj1m003-fl11
SN2017dfb	g	57885.6888	16.905	0.072	coj1m003-fl11
SN2017dfb	g	57889.6522	17.325	0.046	coj1m011-fl12
SN2017dfb	g	57889.655	17.355	0.045	coj1m011-fl12
SN2017dfb	g	57895.6524	17.987	0.055	coj1m003-fl11
SN2017dfb	g	57895.6551	17.981	0.043	coj1m003-fl11
SN2017dfb	g	57901.819	18.492	0.047	cpt1m013-fl14
SN2017dfb	g	57901.8217	18.413	0.045	cpt1m013-fl14
SN2017dfb	g	57902.6109	18.558	0.053	coj1m003-fl11
SN2017dfb	g	57902.6137	18.735	0.051	coj1m003-fl11
SN2017dfb	g	57908.2255	19.229	0.095	lsc1m005-fl15
SN2017dfb	g	57908.2283	18.984	0.081	lsc1m005-fl15

SN2017dfb	g	57914.0452	19.093	0.093	lsc1m005-fl15
SN2017dfb	g	57914.048	19.024	0.076	lsc1m005-fl15
SN2017dfb	g	57919.8068	19.138	0.062	cpt1m012-fl06
SN2017dfb	g	57919.8096	19.301	0.061	cpt1m012-fl06
SN2017dfb	g	57926.5004	19.162	0.063	coj1m003-fl11
SN2017dfb	g	57926.5032	19.188	0.071	coj1m003-fl11
SN2017dfb	g	57932.1699	19.47	0.069	lsc1m005-fl15
SN2017dfb	g	57932.1727	19.553	0.069	lsc1m005-fl15
SN2017dfb	g	57937.8399	19.463	0.127	cpt1m012-fl06
SN2017dfb	g	57937.8426	19.283	0.104	cpt1m012-fl06
SN2017dfb	g	57944.2528	19.432	0.128	elp1m008-fl05
SN2017dfb	g	57944.2557	19.454	0.127	elp1m008-fl05
SN2017dfb	g	57951.0518	19.971	0.098	lsc1m005-fl15
SN2017dfb	g	57951.0546	19.747	0.086	lsc1m005-fl15
SN2017dfb	g	57957.4579	19.615	0.081	coj1m003-fl11
SN2017dfb	g	57957.4607	19.704	0.098	coj1m003-fl11
SN2017dfb	g	57959.3572	19.717	0.099	coj1m003-fl11
SN2017dfb	g	57959.3601	19.782	0.103	coj1m003-fl11
SN2017dfb	r	57869.2198	16.163	0.049	lsc1m009-fl03
SN2017dfb	r	57869.2216	16.178	0.049	lsc1m009-fl03
SN2017dfb	r	57872.0539	16.09	0.045	cpt1m012-fl06
SN2017dfb	r	57872.0558	16.105	0.046	cpt1m012-fl06
SN2017dfb	r	57875.158	16.074	0.05	lsc1m004-fl04
SN2017dfb	r	57875.1598	16.049	0.049	lsc1m004-fl04
SN2017dfb	r	57878.2725	16.113	0.04	lsc1m004-fl04
SN2017dfb	r	57878.2744	16.12	0.051	lsc1m004-fl04
SN2017dfb	r	57880.8816	16.297	0.058	cpt1m010-fl16
SN2017dfb	r	57880.8835	16.321	0.07	cpt1m010-fl16
SN2017dfb	r	57885.6918	16.551	0.088	coj1m003-fl11
SN2017dfb	r	57885.6936	16.678	0.284	coj1m003-fl11
SN2017dfb	r	57889.6579	16.656	0.054	coj1m011-fl12
SN2017dfb	r	57889.6598	16.68	0.048	coj1m011-fl12
SN2017dfb	r	57895.6581	16.751	0.059	coj1m003-fl11
SN2017dfb	r	57895.6599	16.764	0.063	coj1m003-fl11
SN2017dfb	r	57901.8247	17.063	0.059	cpt1m013-fl14
SN2017dfb	r	57901.8266	17.053	0.056	cpt1m013-fl14
SN2017dfb	r	57902.6166	17.111	0.064	coj1m003-fl11
SN2017dfb	r	57902.6185	17.149	0.069	coj1m003-fl11
SN2017dfb	r	57908.2312	17.502	0.058	lsc1m005-fl15
SN2017dfb	r	57908.2331	17.515	0.055	lsc1m005-fl15
SN2017dfb	r	57914.0609	17.714	0.07	lsc1m005-fl15
SN2017dfb	r	57914.0627	17.714	0.067	lsc1m005-fl15
SN2017dfb	r	57919.7989	17.858	0.06	cpt1m012-fl06
SN2017dfb	r	57919.8008	17.81	0.06	cpt1m012-fl06
SN2017dfb	r	57926.4966	18.159	0.088	coj1m003-fl11
SN2017dfb	r	57926.4984	18.064	0.082	coj1m003-fl11
SN2017dfb	r	57932.1756	18.214	0.067	lsc1m005-fl15
SN2017dfb	r	57932.1775	18.11	0.064	lsc1m005-fl15
SN2017dfb	r	57937.8456	18.419	0.096	cpt1m012-fl06
SN2017dfb	r	57937.8475	18.517	0.102	cpt1m012-fl06
SN2017dfb	r	57944.2587	18.388	0.088	elp1m008-fl05
SN2017dfb	r	57944.2606	18.872	0.128	elp1m008-fl05
SN2017dfb	r	57951.0576	18.842	0.091	lsc1m005-fl15
SN2017dfb	r	57951.0595	18.896	0.096	lsc1m005-fl15
SN2017dfb	r	57957.4637	18.834	0.107	coj1m003-fl11
SN2017dfb	r	57957.4656	18.827	0.116	coj1m003-fl11
SN2017dfb	r	57959.363	18.906	0.117	coj1m003-fl11
SN2017dfb	r	57959.3649	19.027	0.148	coj1m003-fl11
SN2017dfb	i	57869.2236	16.595	0.121	lsc1m009-fl03
SN2017dfb	i	57869.2254	16.61	0.122	lsc1m009-fl03
SN2017dfb	i	57872.0578	16.647	0.122	cpt1m012-fl06
SN2017dfb	i	57872.0597	16.639	0.122	cpt1m012-fl06
SN2017dfb	i	57875.1618	16.66	0.122	lsc1m004-fl04
SN2017dfb	i	57875.1636	16.635	0.121	lsc1m004-fl04
SN2017dfb	i	57878.2764	16.723	0.126	lsc1m004-fl04
SN2017dfb	i	57878.2782	16.775	0.12	lsc1m004-fl04
SN2017dfb	i	57880.8855	16.856	0.112	cpt1m010-fl16
SN2017dfb	i	57880.8874	17.172	0.155	cpt1m010-fl16

SN2017dfb	i	57889.6618	17.135	0.131	coj1m011-fl12
SN2017dfb	i	57889.6636	17.191	0.11	coj1m011-fl12
SN2017dfb	i	57895.6619	16.966	0.136	coj1m003-fl11
SN2017dfb	i	57895.6638	16.953	0.133	coj1m003-fl11
SN2017dfb	i	57901.8286	17.158	0.131	cpt1m013-fl14
SN2017dfb	i	57901.8305	17.152	0.109	cpt1m013-fl14
SN2017dfb	i	57902.6205	17.207	0.129	coj1m003-fl11
SN2017dfb	i	57902.6224	17.221	0.136	coj1m003-fl11
SN2017dfb	i	57908.2352	17.751	0.125	lsc1m005-fl15
SN2017dfb	i	57908.237	17.751	0.124	lsc1m005-fl15
SN2017dfb	i	57914.051	18.086	0.128	lsc1m005-fl15
SN2017dfb	i	57914.0529	18.028	0.131	lsc1m005-fl15
SN2017dfb	i	57919.8185	18.485	0.13	cpt1m012-fl06
SN2017dfb	i	57919.8204	18.138	0.128	cpt1m012-fl06
SN2017dfb	i	57926.4869	18.597	0.16	coj1m003-fl11
SN2017dfb	i	57926.4887	18.521	0.159	coj1m003-fl11
SN2017dfb	i	57932.1796	18.892	0.145	lsc1m005-fl15
SN2017dfb	i	57932.1814	18.502	0.147	lsc1m005-fl15
SN2017dfb	i	57937.8495	19.251	0.235	cpt1m012-fl06
SN2017dfb	i	57937.8514	18.734	0.179	cpt1m012-fl06
SN2017dfb	i	57944.2627	19.641	0.299	elp1m008-fl05
SN2017dfb	i	57944.2646	19.663	0.319	elp1m008-fl05
SN2017dfb	i	57951.0615	19.847	0.302	lsc1m005-fl15
SN2017dfb	i	57957.4676	19.641	0.278	coj1m003-fl11
SN2017dfb	i	57957.4695	19.67	0.265	coj1m003-fl11
SN2017glx	B	58002.2954	15.072	0.04	elp1m008-fl05
SN2017glx	B	58002.2982	15.051	0.037	elp1m008-fl05
SN2017glx	B	58004.2365	14.862	0.049	elp1m008-fl05
SN2017glx	B	58004.2393	14.859	0.034	elp1m008-fl05
SN2017glx	B	58005.2384	14.807	0.045	elp1m008-fl05
SN2017glx	B	58005.2412	14.807	0.044	elp1m008-fl05
SN2017glx	B	58008.2431	14.761	0.044	elp1m008-fl05
SN2017glx	B	58008.2459	14.761	0.049	elp1m008-fl05
SN2017glx	B	58009.2261	14.758	0.045	elp1m008-fl05
SN2017glx	B	58009.2289	14.763	0.047	elp1m008-fl05
SN2017glx	B	58009.2677	14.772	0.045	elp1m008-fl05
SN2017glx	B	58009.2706	14.775	0.046	elp1m008-fl05
SN2017glx	B	58033.2207	16.649	0.045	elp1m008-fl05
SN2017glx	B	58033.2236	16.673	0.047	elp1m008-fl05
SN2017glx	B	58039.2157	17.168	0.032	elp1m008-fl05
SN2017glx	B	58039.2187	17.163	0.032	elp1m008-fl05
SN2017glx	B	58045.2054	17.519	0.037	elp1m008-fl05
SN2017glx	B	58045.2083	17.489	0.036	elp1m008-fl05
SN2017glx	B	58046.1914	17.882	0.068	elp1m008-fl05
SN2017glx	B	58048.1463	17.599	0.035	elp1m008-fl05
SN2017glx	B	58048.1491	17.591	0.034	elp1m008-fl05
SN2017glx	B	58050.1843	17.625	0.036	elp1m008-fl05
SN2017glx	B	58050.1872	17.634	0.037	elp1m008-fl05
SN2017glx	B	58051.179	17.686	0.037	elp1m008-fl05
SN2017glx	B	58051.1818	17.666	0.035	elp1m008-fl05
SN2017glx	B	58055.1173	17.785	0.045	elp1m008-fl05
SN2017glx	B	58055.1201	17.81	0.04	elp1m008-fl05
SN2017glx	B	58059.0791	17.845	0.049	elp1m008-fl05
SN2017glx	B	58059.0819	17.852	0.049	elp1m008-fl05
SN2017glx	B	58076.075	18.01	0.046	elp1m008-fl05
SN2017glx	B	58076.0778	17.997	0.046	elp1m008-fl05
SN2017glx	B	58087.0364	18.103	0.063	elp1m008-fl05
SN2017glx	B	58087.0392	18.141	0.063	elp1m008-fl05
SN2017glx	B	58099.0418	18.296	0.055	elp1m008-fl05
SN2017glx	B	58099.0446	18.374	0.05	elp1m008-fl05
SN2017glx	V	58002.3012	14.766	0.095	elp1m008-fl05
SN2017glx	V	58002.3031	14.776	0.092	elp1m008-fl05
SN2017glx	V	58004.2423	14.668	0.056	elp1m008-fl05
SN2017glx	V	58004.2443	14.653	0.058	elp1m008-fl05
SN2017glx	V	58005.2443	14.603	0.101	elp1m008-fl05
SN2017glx	V	58005.2462	14.603	0.102	elp1m008-fl05
SN2017glx	V	58008.2489	14.525	0.105	elp1m008-fl05
SN2017glx	V	58008.2508	14.522	0.103	elp1m008-fl05

SN2017glx	V	58009.2319	14.522	0.105	elp1m008-fl05
SN2017glx	V	58009.2338	14.515	0.101	elp1m008-fl05
SN2017glx	V	58009.2736	14.512	0.101	elp1m008-fl05
SN2017glx	V	58009.2755	14.495	0.104	elp1m008-fl05
SN2017glx	V	58033.2265	15.606	0.1	elp1m008-fl05
SN2017glx	V	58033.2284	15.459	0.096	elp1m008-fl05
SN2017glx	V	58039.2217	15.761	0.054	elp1m008-fl05
SN2017glx	V	58039.2236	15.94	0.124	elp1m008-fl05
SN2017glx	V	58046.1973	16.13	0.138	elp1m008-fl05
SN2017glx	V	58048.1529	16.298	0.06	elp1m008-fl05
SN2017glx	V	58048.1548	16.284	0.055	elp1m008-fl05
SN2017glx	V	58050.1916	16.338	0.065	elp1m008-fl05
SN2017glx	V	58050.1935	16.394	0.063	elp1m008-fl05
SN2017glx	V	58051.1848	16.438	0.053	elp1m008-fl05
SN2017glx	V	58051.1867	16.433	0.054	elp1m008-fl05
SN2017glx	V	58055.1231	16.348	0.067	elp1m008-fl05
SN2017glx	V	58055.125	16.515	0.057	elp1m008-fl05
SN2017glx	V	58059.0849	16.678	0.123	elp1m008-fl05
SN2017glx	V	58059.0868	16.652	0.112	elp1m008-fl05
SN2017glx	V	58076.0808	17.101	0.068	elp1m008-fl05
SN2017glx	V	58076.0827	17.161	0.069	elp1m008-fl05
SN2017glx	V	58087.0422	17.397	0.061	elp1m008-fl05
SN2017glx	V	58087.0441	17.383	0.068	elp1m008-fl05
SN2017glx	V	58099.0475	17.683	0.067	elp1m008-fl05
SN2017glx	V	58099.0494	17.624	0.066	elp1m008-fl05
SN2017glx	g	58002.3052	14.962	0.06	elp1m008-fl05
SN2017glx	g	58002.308	14.952	0.063	elp1m008-fl05
SN2017glx	g	58004.2464	14.788	0.05	elp1m008-fl05
SN2017glx	g	58004.2492	14.775	0.05	elp1m008-fl05
SN2017glx	g	58005.2483	14.734	0.049	elp1m008-fl05
SN2017glx	g	58005.2511	14.73	0.048	elp1m008-fl05
SN2017glx	g	58008.253	14.672	0.051	elp1m008-fl05
SN2017glx	g	58008.2558	14.667	0.051	elp1m008-fl05
SN2017glx	g	58009.236	14.683	0.051	elp1m008-fl05
SN2017glx	g	58009.2388	14.678	0.053	elp1m008-fl05
SN2017glx	g	58009.2776	14.677	0.052	elp1m008-fl05
SN2017glx	g	58009.2804	14.686	0.051	elp1m008-fl05
SN2017glx	g	58033.2305	16.071	0.055	elp1m008-fl05
SN2017glx	g	58033.2334	16.07	0.056	elp1m008-fl05
SN2017glx	g	58039.2258	16.68	0.055	elp1m008-fl05
SN2017glx	g	58039.2286	16.63	0.054	elp1m008-fl05
SN2017glx	g	58048.1569	17.252	0.061	elp1m008-fl05
SN2017glx	g	58048.1597	17.09	0.053	elp1m008-fl05
SN2017glx	g	58050.1981	17.203	0.056	elp1m008-fl05
SN2017glx	g	58050.2009	17.134	0.054	elp1m008-fl05
SN2017glx	g	58051.1888	17.155	0.052	elp1m008-fl05
SN2017glx	g	58051.1916	17.187	0.053	elp1m008-fl05
SN2017glx	g	58055.127	17.335	0.053	elp1m008-fl05
SN2017glx	g	58055.1299	17.238	0.05	elp1m008-fl05
SN2017glx	g	58059.0889	17.385	0.054	elp1m008-fl05
SN2017glx	g	58059.0917	17.33	0.054	elp1m008-fl05
SN2017glx	g	58076.0848	17.922	0.067	elp1m008-fl05
SN2017glx	g	58076.0876	17.65	0.057	elp1m008-fl05
SN2017glx	g	58087.0462	18.001	0.089	elp1m008-fl05
SN2017glx	g	58087.049	17.943	0.075	elp1m008-fl05
SN2017glx	g	58099.0515	17.972	0.06	elp1m008-fl05
SN2017glx	g	58099.0543	17.985	0.062	elp1m008-fl05
SN2017glx	r	58002.311	14.993	0.047	elp1m008-fl05
SN2017glx	r	58002.313	14.999	0.044	elp1m008-fl05
SN2017glx	r	58004.2522	14.832	0.044	elp1m008-fl05
SN2017glx	r	58004.2541	14.853	0.046	elp1m008-fl05
SN2017glx	r	58005.2541	14.791	0.045	elp1m008-fl05
SN2017glx	r	58005.256	14.774	0.045	elp1m008-fl05
SN2017glx	r	58008.2588	14.654	0.047	elp1m008-fl05
SN2017glx	r	58008.2608	14.648	0.045	elp1m008-fl05
SN2017glx	r	58009.2418	14.643	0.048	elp1m008-fl05
SN2017glx	r	58009.2437	14.636	0.047	elp1m008-fl05
SN2017glx	r	58009.2834	14.637	0.048	elp1m008-fl05

SN2017glx	r	58009.2854	14.625	0.047	elp1m008-fl05
SN2017glx	r	58033.2364	15.332	0.043	elp1m008-fl05
SN2017glx	r	58033.2383	15.355	0.044	elp1m008-fl05
SN2017glx	r	58039.2316	15.538	0.045	elp1m008-fl05
SN2017glx	r	58039.2335	15.541	0.045	elp1m008-fl05
SN2017glx	r	58048.1628	16.051	0.044	elp1m008-fl05
SN2017glx	r	58048.1647	16.044	0.044	elp1m008-fl05
SN2017glx	r	58050.2061	16.215	0.045	elp1m008-fl05
SN2017glx	r	58050.208	16.13	0.046	elp1m008-fl05
SN2017glx	r	58051.1946	16.207	0.045	elp1m008-fl05
SN2017glx	r	58051.1964	16.176	0.045	elp1m008-fl05
SN2017glx	r	58055.1328	16.395	0.046	elp1m008-fl05
SN2017glx	r	58055.1347	16.343	0.046	elp1m008-fl05
SN2017glx	r	58059.0947	16.497	0.045	elp1m008-fl05
SN2017glx	r	58059.0966	16.547	0.046	elp1m008-fl05
SN2017glx	r	58076.0905	16.913	0.052	elp1m008-fl05
SN2017glx	r	58076.0924	16.952	0.051	elp1m008-fl05
SN2017glx	r	58087.0519	17.366	0.059	elp1m008-fl05
SN2017glx	r	58087.0538	17.389	0.057	elp1m008-fl05
SN2017glx	r	58099.0573	17.565	0.115	elp1m008-fl05
SN2017glx	r	58099.0592	17.401	0.139	elp1m008-fl05
SN2017glx	i	58002.315	15.22	0.071	elp1m008-fl05
SN2017glx	i	58002.317	15.225	0.072	elp1m008-fl05
SN2017glx	i	58004.2562	15.113	0.071	elp1m008-fl05
SN2017glx	i	58004.2582	15.139	0.071	elp1m008-fl05
SN2017glx	i	58005.2581	15.109	0.069	elp1m008-fl05
SN2017glx	i	58005.26	15.102	0.07	elp1m008-fl05
SN2017glx	i	58008.2628	15.134	0.07	elp1m008-fl05
SN2017glx	i	58008.2647	15.116	0.07	elp1m008-fl05
SN2017glx	i	58009.2458	15.131	0.071	elp1m008-fl05
SN2017glx	i	58009.2477	15.139	0.073	elp1m008-fl05
SN2017glx	i	58009.2874	15.148	0.072	elp1m008-fl05
SN2017glx	i	58009.2893	15.141	0.072	elp1m008-fl05
SN2017glx	i	58033.2404	15.682	0.069	elp1m008-fl05
SN2017glx	i	58033.2424	15.659	0.07	elp1m008-fl05
SN2017glx	i	58039.2356	15.669	0.072	elp1m008-fl05
SN2017glx	i	58039.2375	15.668	0.078	elp1m008-fl05
SN2017glx	i	58051.1985	16.29	0.07	elp1m008-fl05
SN2017glx	i	58055.1368	16.556	0.073	elp1m008-fl05
SN2017glx	i	58055.1386	16.564	0.071	elp1m008-fl05
SN2017glx	i	58059.0986	16.692	0.072	elp1m008-fl05
SN2017glx	i	58059.1005	16.804	0.074	elp1m008-fl05
SN2017glx	i	58076.0944	17.319	0.085	elp1m008-fl05
SN2017glx	i	58076.0963	17.417	0.089	elp1m008-fl05
SN2017glx	i	58087.0558	17.599	0.093	elp1m008-fl05
SN2017glx	i	58087.0577	17.865	0.102	elp1m008-fl05
SN2017hng	B	58053.2438	17.887	0.049	lsc1m004-fl03
SN2017hng	B	58053.2472	17.856	0.049	lsc1m004-fl03
SN2017hng	B	58057.3302	17.433	0.049	lsc1m004-fl03
SN2017hng	B	58057.3336	17.429	0.048	lsc1m004-fl03
SN2017hng	B	58060.8856	17.056	0.103	cpt1m010-fl16
SN2017hng	B	58067.0143	17.344	0.049	cpt1m010-fl16
SN2017hng	B	58067.0171	17.352	0.049	cpt1m010-fl16
SN2017hng	B	58080.1875	18.412	0.051	lsc1m004-fl03
SN2017hng	B	58080.1903	18.415	0.051	lsc1m004-fl03
SN2017hng	B	58083.9058	18.677	0.053	cpt1m010-fl16
SN2017hng	B	58083.9086	18.725	0.053	cpt1m010-fl16
SN2017hng	B	58088.9752	19.072	0.075	cpt1m010-fl16
SN2017hng	B	58088.978	19.598	0.3	cpt1m010-fl16
SN2017hng	B	58092.0446	19.481	0.076	lsc1m005-fl15
SN2017hng	B	58092.0474	19.456	0.082	lsc1m005-fl15
SN2017hng	B	58094.2426	19.628	0.078	lsc1m005-fl15
SN2017hng	B	58094.2454	19.439	0.069	lsc1m005-fl15
SN2017hng	B	58099.2186	19.917	0.093	lsc1m005-fl15
SN2017hng	B	58099.2214	19.876	0.088	lsc1m005-fl15
SN2017hng	B	58103.889	19.881	0.082	cpt1m010-fl16
SN2017hng	B	58103.8918	20.01	0.09	cpt1m010-fl16
SN2017hng	B	58107.8913	20.094	0.104	cpt1m010-fl16

SN2017hng	B	58107.8941	20.005	0.101	cpt1m010-fl16
SN2017hng	B	58115.1177	20.254	0.118	lsc1m004-fl03
SN2017hng	B	58115.1206	20.357	0.125	lsc1m004-fl03
SN2017hng	B	58119.1198	20.63	0.139	lsc1m004-fl03
SN2017hng	B	58119.1226	20.025	0.096	lsc1m004-fl03
SN2017hng	B	58120.8976	20.025	0.11	cpt1m010-fl16
SN2017hng	B	58120.9004	20.642	0.187	cpt1m010-fl16
SN2017hng	B	58125.1287	20.518	0.124	lsc1m005-fl15
SN2017hng	B	58125.1315	20.596	0.15	lsc1m005-fl15
SN2017hng	B	58131.7843	20.087	0.102	cpt1m012-fl06
SN2017hng	B	58131.7871	20.62	0.159	cpt1m012-fl06
SN2017hng	B	58136.0801	20.53	0.128	lsc1m004-fl03
SN2017hng	B	58136.0841	20.499	0.125	lsc1m004-fl03
SN2017hng	B	58142.1908	20.859	0.175	elp1m008-fl05
SN2017hng	B	58142.1948	20.553	0.137	elp1m008-fl05
SN2017hng	B	58144.0906	20.675	0.176	lsc1m005-fl15
SN2017hng	B	58144.0946	20.599	0.166	lsc1m005-fl15
SN2017hng	B	58150.0976	20.791	0.164	lsc1m004-fl03
SN2017hng	B	58159.1035	20.866	0.18	lsc1m005-fl15
SN2017hng	B	58159.1075	21.072	0.235	lsc1m005-fl15
SN2017hng	B	58168.778	21.127	0.248	cpt1m012-fl06
SN2017hng	B	58168.782	21.111	0.225	cpt1m012-fl06
SN2017hng	B	58188.4136	21.323	0.249	coj1m011-fl12
SN2017hng	B	58188.4176	21.003	0.187	coj1m011-fl12
SN2017hng	V	58053.2508	17.755	0.069	lsc1m004-fl03
SN2017hng	V	58053.2536	17.743	0.079	lsc1m004-fl03
SN2017hng	V	58057.3372	17.278	0.052	lsc1m004-fl03
SN2017hng	V	58057.34	17.283	0.041	lsc1m004-fl03
SN2017hng	V	58067.0201	17.187	0.038	cpt1m010-fl16
SN2017hng	V	58067.022	17.124	0.042	cpt1m010-fl16
SN2017hng	V	58070.5096	17.338	0.049	coj1m003-fl11
SN2017hng	V	58070.5115	17.278	0.04	coj1m003-fl11
SN2017hng	V	58080.1933	17.708	0.042	lsc1m004-fl03
SN2017hng	V	58080.1952	17.715	0.063	lsc1m004-fl03
SN2017hng	V	58083.9116	17.854	0.051	cpt1m010-fl16
SN2017hng	V	58083.9135	17.945	0.046	cpt1m010-fl16
SN2017hng	V	58088.981	18.038	0.107	cpt1m010-fl16
SN2017hng	V	58088.9829	18.273	0.118	cpt1m010-fl16
SN2017hng	V	58092.0504	18.326	0.079	lsc1m005-fl15
SN2017hng	V	58092.0523	18.423	0.084	lsc1m005-fl15
SN2017hng	V	58094.2484	18.342	0.085	lsc1m005-fl15
SN2017hng	V	58094.2503	18.882	0.154	lsc1m005-fl15
SN2017hng	V	58099.2244	18.615	0.069	lsc1m005-fl15
SN2017hng	V	58099.2263	18.589	0.057	lsc1m005-fl15
SN2017hng	V	58103.8948	18.892	0.06	cpt1m010-fl16
SN2017hng	V	58103.8967	18.759	0.066	cpt1m010-fl16
SN2017hng	V	58107.8971	19.045	0.12	cpt1m010-fl16
SN2017hng	V	58107.899	19.149	0.267	cpt1m010-fl16
SN2017hng	V	58113.4652	19.258	0.162	coj1m003-fl11
SN2017hng	V	58113.4671	19.485	0.207	coj1m003-fl11
SN2017hng	V	58115.1235	18.842	0.189	lsc1m004-fl03
SN2017hng	V	58115.1254	19.047	0.156	lsc1m004-fl03
SN2017hng	V	58119.1255	19.001	0.138	lsc1m004-fl03
SN2017hng	V	58119.1274	19.12	0.142	lsc1m004-fl03
SN2017hng	V	58120.9034	19.341	0.181	cpt1m010-fl16
SN2017hng	V	58125.1345	19.25	0.145	lsc1m005-fl15
SN2017hng	V	58125.1364	19.37	0.141	lsc1m005-fl15
SN2017hng	V	58131.7901	19.443	0.119	cpt1m012-fl06
SN2017hng	V	58131.792	19.619	0.121	cpt1m012-fl06
SN2017hng	V	58136.0882	19.333	0.175	lsc1m004-fl03
SN2017hng	V	58136.0911	19.499	0.177	lsc1m004-fl03
SN2017hng	V	58142.1989	19.833	0.247	elp1m008-fl05
SN2017hng	V	58142.2017	19.593	0.15	elp1m008-fl05
SN2017hng	V	58144.0987	19.432	0.175	lsc1m005-fl15
SN2017hng	V	58144.1015	19.285	0.168	lsc1m005-fl15
SN2017hng	V	58150.1058	20.46	0.384	lsc1m004-fl03
SN2017hng	V	58150.1086	19.71	0.275	lsc1m004-fl03
SN2017hng	V	58159.1116	20.288	0.333	lsc1m005-fl15

SN2017hng	V	58168.7861	20.413	0.222	cpt1m012-fl06
SN2017hng	V	58168.7889	20.195	0.172	cpt1m012-fl06
SN2017hng	V	58179.4415	19.75	0.296	coj1m011-fl12
SN2017hng	V	58188.4217	20.257	0.247	coj1m011-fl12
SN2017hng	V	58188.4245	20.305	0.247	coj1m011-fl12
SN2017hng	g	58053.2566	17.855	0.061	lsc1m004-fl03
SN2017hng	g	58053.2594	17.85	0.049	lsc1m004-fl03
SN2017hng	g	58057.343	17.414	0.042	lsc1m004-fl03
SN2017hng	g	58057.3459	17.404	0.038	lsc1m004-fl03
SN2017hng	g	58060.8984	17.381	0.254	cpt1m010-fl16
SN2017hng	g	58067.024	17.279	0.033	cpt1m010-fl16
SN2017hng	g	58067.0268	17.302	0.035	cpt1m010-fl16
SN2017hng	g	58070.5136	17.516	0.047	coj1m003-fl11
SN2017hng	g	58070.5164	17.501	0.046	coj1m003-fl11
SN2017hng	g	58075.0475	17.717	0.197	cpt1m010-fl16
SN2017hng	g	58080.1972	18.145	0.048	lsc1m004-fl03
SN2017hng	g	58080.2001	18.132	0.076	lsc1m004-fl03
SN2017hng	g	58083.9156	18.397	0.042	cpt1m010-fl16
SN2017hng	g	58083.9184	18.369	0.051	cpt1m010-fl16
SN2017hng	g	58088.985	18.743	0.12	cpt1m010-fl16
SN2017hng	g	58088.9878	18.671	0.096	cpt1m010-fl16
SN2017hng	g	58092.0544	18.991	0.07	lsc1m005-fl15
SN2017hng	g	58092.0572	19.051	0.083	lsc1m005-fl15
SN2017hng	g	58094.2523	19.21	0.084	lsc1m005-fl15
SN2017hng	g	58094.2552	19.284	0.084	lsc1m005-fl15
SN2017hng	g	58099.2284	19.278	0.054	lsc1m005-fl15
SN2017hng	g	58099.2312	19.305	0.056	lsc1m005-fl15
SN2017hng	g	58103.8988	19.414	0.058	cpt1m010-fl16
SN2017hng	g	58103.9016	19.488	0.067	cpt1m010-fl16
SN2017hng	g	58107.901	19.534	0.066	cpt1m010-fl16
SN2017hng	g	58107.9038	19.576	0.073	cpt1m010-fl16
SN2017hng	g	58113.4692	19.671	0.118	coj1m003-fl11
SN2017hng	g	58113.472	19.783	0.127	coj1m003-fl11
SN2017hng	g	58115.1275	19.661	0.096	lsc1m004-fl03
SN2017hng	g	58115.1303	19.652	0.11	lsc1m004-fl03
SN2017hng	g	58119.1295	19.895	0.168	lsc1m004-fl03
SN2017hng	g	58119.1323	19.725	0.15	lsc1m004-fl03
SN2017hng	g	58120.9073	19.792	0.222	cpt1m010-fl16
SN2017hng	g	58125.1384	19.87	0.058	lsc1m005-fl15
SN2017hng	g	58131.7941	19.852	0.091	cpt1m012-fl06
SN2017hng	g	58131.7969	19.897	0.097	cpt1m012-fl06
SN2017hng	g	58136.0941	19.848	0.115	lsc1m004-fl03
SN2017hng	g	58136.098	19.873	0.115	lsc1m004-fl03
SN2017hng	g	58142.2047	19.864	0.109	elp1m008-fl05
SN2017hng	g	58142.2087	19.904	0.113	elp1m008-fl05
SN2017hng	g	58144.1045	19.812	0.122	lsc1m005-fl15
SN2017hng	g	58144.1085	19.801	0.176	lsc1m005-fl15
SN2017hng	g	58150.1116	19.934	0.199	lsc1m004-fl03
SN2017hng	g	58150.1156	20.035	0.152	lsc1m004-fl03
SN2017hng	g	58159.1174	19.887	0.18	lsc1m005-fl15
SN2017hng	g	58159.1214	19.983	0.216	lsc1m005-fl15
SN2017hng	g	58168.7919	20.28	0.104	cpt1m012-fl06
SN2017hng	g	58168.7959	20.265	0.095	cpt1m012-fl06
SN2017hng	g	58179.4445	19.688	0.24	coj1m011-fl12
SN2017hng	g	58188.4275	20.243	0.149	coj1m011-fl12
SN2017hng	g	58188.4315	20.179	0.135	coj1m011-fl12
SN2017hng	r	58053.2624	17.853	0.047	lsc1m004-fl03
SN2017hng	r	58053.2653	17.836	0.047	lsc1m004-fl03
SN2017hng	r	58057.3488	17.396	0.045	lsc1m004-fl03
SN2017hng	r	58057.3517	17.396	0.045	lsc1m004-fl03
SN2017hng	r	58060.9042	17.191	0.095	cpt1m010-fl16
SN2017hng	r	58060.907	17.22	0.066	cpt1m010-fl16
SN2017hng	r	58067.0298	17.148	0.042	cpt1m010-fl16
SN2017hng	r	58067.0317	17.181	0.042	cpt1m010-fl16
SN2017hng	r	58070.5194	17.221	0.044	coj1m003-fl11
SN2017hng	r	58070.5213	17.305	0.04	coj1m003-fl11
SN2017hng	r	58075.0524	18.086	0.08	cpt1m010-fl16
SN2017hng	r	58080.203	17.798	0.046	lsc1m004-fl03

SN2017hng	r	58080.2049	17.804	0.046	lsc1m004-fl03
SN2017hng	r	58083.9214	17.841	0.044	cpt1m010-fl16
SN2017hng	r	58083.9232	17.784	0.047	cpt1m010-fl16
SN2017hng	r	58088.9908	17.965	0.06	cpt1m010-fl16
SN2017hng	r	58088.9927	18.052	0.058	cpt1m010-fl16
SN2017hng	r	58092.0602	18.029	0.06	lsc1m005-fl15
SN2017hng	r	58092.062	18.002	0.056	lsc1m005-fl15
SN2017hng	r	58094.2581	18.05	0.046	lsc1m005-fl15
SN2017hng	r	58094.26	18.025	0.048	lsc1m005-fl15
SN2017hng	r	58099.2341	18.188	0.051	lsc1m005-fl15
SN2017hng	r	58099.236	18.162	0.058	lsc1m005-fl15
SN2017hng	r	58103.9045	18.516	0.058	cpt1m010-fl16
SN2017hng	r	58103.9064	18.468	0.06	cpt1m010-fl16
SN2017hng	r	58107.9068	18.669	0.054	cpt1m010-fl16
SN2017hng	r	58107.9087	18.735	0.058	cpt1m010-fl16
SN2017hng	r	58113.4749	18.899	0.078	coj1m003-fl11
SN2017hng	r	58113.4768	18.893	0.067	coj1m003-fl11
SN2017hng	r	58115.1333	18.879	0.064	lsc1m004-fl03
SN2017hng	r	58115.1352	18.902	0.061	lsc1m004-fl03
SN2017hng	r	58119.1353	18.923	0.07	lsc1m004-fl03
SN2017hng	r	58119.1372	18.902	0.067	lsc1m004-fl03
SN2017hng	r	58120.9131	19.214	0.076	cpt1m010-fl16
SN2017hng	r	58120.915	19.1	0.072	cpt1m010-fl16
SN2017hng	r	58125.1442	19.227	0.083	lsc1m005-fl15
SN2017hng	r	58125.1461	19.217	0.079	lsc1m005-fl15
SN2017hng	r	58131.7998	19.365	0.089	cpt1m012-fl06
SN2017hng	r	58131.8017	19.287	0.081	cpt1m012-fl06
SN2017hng	r	58136.1021	19.489	0.098	lsc1m004-fl03
SN2017hng	r	58136.105	19.428	0.093	lsc1m004-fl03
SN2017hng	r	58142.2128	19.539	0.125	elp1m008-fl05
SN2017hng	r	58144.1126	19.511	0.094	lsc1m005-fl15
SN2017hng	r	58144.1154	19.56	0.089	lsc1m005-fl15
SN2017hng	r	58150.1197	19.606	0.104	lsc1m004-fl03
SN2017hng	r	58150.1226	19.847	0.124	lsc1m004-fl03
SN2017hng	r	58159.1256	20.246	0.183	lsc1m005-fl15
SN2017hng	r	58159.1284	20.179	0.141	lsc1m005-fl15
SN2017hng	r	58168.8	20.134	0.15	cpt1m012-fl06
SN2017hng	r	58168.8028	20.378	0.232	cpt1m012-fl06
SN2017hng	r	58188.4356	20.415	0.221	coj1m011-fl12
SN2017hng	r	58188.4384	20.552	0.243	coj1m011-fl12
SN2017hng	i	58053.2682	18.031	0.045	lsc1m004-fl03
SN2017hng	i	58053.2711	18.053	0.045	lsc1m004-fl03
SN2017hng	i	58057.3546	17.646	0.045	lsc1m004-fl03
SN2017hng	i	58057.3575	17.66	0.045	lsc1m004-fl03
SN2017hng	i	58067.0338	17.76	0.045	cpt1m010-fl16
SN2017hng	i	58067.0356	17.701	0.046	cpt1m010-fl16
SN2017hng	i	58070.5233	17.93	0.079	coj1m003-fl11
SN2017hng	i	58070.5252	17.732	0.216	coj1m003-fl11
SN2017hng	i	58075.0544	18.062	0.059	cpt1m010-fl16
SN2017hng	i	58075.0563	17.792	0.058	cpt1m010-fl16
SN2017hng	i	58080.207	18.394	0.052	lsc1m004-fl03
SN2017hng	i	58080.2088	18.359	0.052	lsc1m004-fl03
SN2017hng	i	58083.9253	18.327	0.049	cpt1m010-fl16
SN2017hng	i	58083.9272	18.358	0.048	cpt1m010-fl16
SN2017hng	i	58088.9947	18.135	0.057	cpt1m010-fl16
SN2017hng	i	58088.9966	18.248	0.063	cpt1m010-fl16
SN2017hng	i	58092.0641	18.169	0.053	lsc1m005-fl15
SN2017hng	i	58092.066	18.37	0.07	lsc1m005-fl15
SN2017hng	i	58094.2621	18.2	0.046	lsc1m005-fl15
SN2017hng	i	58094.2639	18.192	0.047	lsc1m005-fl15
SN2017hng	i	58099.238	18.308	0.052	lsc1m005-fl15
SN2017hng	i	58099.2399	18.275	0.049	lsc1m005-fl15
SN2017hng	i	58103.9084	18.571	0.055	cpt1m010-fl16
SN2017hng	i	58103.9103	18.569	0.052	cpt1m010-fl16
SN2017hng	i	58107.9107	18.79	0.052	cpt1m010-fl16
SN2017hng	i	58107.9126	18.787	0.053	cpt1m010-fl16
SN2017hng	i	58115.1372	19.194	0.062	lsc1m004-fl03
SN2017hng	i	58115.1391	19.042	0.058	lsc1m004-fl03

SN2017hng	i	58119.1392	19.542	0.078	lsc1m004-fl03
SN2017hng	i	58119.1411	19.226	0.068	lsc1m004-fl03
SN2017hng	i	58120.917	19.199	0.066	cpt1m010-fl16
SN2017hng	i	58120.9189	19.16	0.063	cpt1m010-fl16
SN2017hng	i	58125.1481	19.464	0.069	lsc1m005-fl15
SN2017hng	i	58125.15	19.539	0.07	lsc1m005-fl15
SN2017hng	i	58131.8038	19.681	0.098	cpt1m012-fl06
SN2017hng	i	58131.8057	19.625	0.124	cpt1m012-fl06
SN2017hng	i	58136.1079	19.803	0.075	lsc1m004-fl03
SN2017hng	i	58136.1107	19.695	0.069	lsc1m004-fl03
SN2017hng	i	58144.1185	19.933	0.111	lsc1m005-fl15
SN2017hng	i	58144.1213	19.371	0.079	lsc1m005-fl15
SN2017hng	i	58150.1255	20.298	0.109	lsc1m004-fl03
SN2017hng	i	58150.1284	20.14	0.097	lsc1m004-fl03
SN2017hng	i	58159.1314	20.086	0.094	lsc1m005-fl15
SN2017hng	i	58159.1342	20.257	0.11	lsc1m005-fl15
SN2017hng	i	58168.8058	20.592	0.293	cpt1m012-fl06
SN2017hng	i	58168.8086	20.723	0.226	cpt1m012-fl06
SN2017hng	i	58177.7838	20.388	0.139	cpt1m012-fl06
SN2017hng	i	58177.7866	20.973	0.194	cpt1m012-fl06
SN2017hng	i	58188.4414	20.697	0.158	coj1m011-fl12
SN2017hng	i	58188.4442	21.033	0.238	coj1m011-fl12
SN2018apo	g	58217.3441	15.624	0.062	lsc1m004-fl03
SN2018apo	g	58217.3453	15.616	0.061	lsc1m004-fl03
SN2018apo	g	58220.0569	15.476	0.053	cpt1m012-fl06
SN2018apo	g	58220.0581	15.471	0.052	cpt1m012-fl06
SN2018apo	g	58223.1201	15.497	0.061	lsc1m004-fl03
SN2018apo	g	58223.1213	15.497	0.057	lsc1m004-fl03
SN2018apo	g	58226.6393	15.512	0.064	coj1m011-fl12
SN2018apo	g	58226.6405	15.515	0.063	coj1m011-fl12
SN2018apo	g	58229.5699	15.573	0.07	coj1m011-fl12
SN2018apo	g	58229.5711	15.567	0.067	coj1m011-fl12
SN2018apo	g	58232.3526	15.719	0.059	coj1m011-fl12
SN2018apo	g	58232.3538	15.702	0.058	coj1m011-fl12
SN2018apo	g	58235.3813	15.909	0.061	coj1m011-fl12
SN2018apo	g	58235.3825	15.944	0.078	coj1m011-fl12
SN2018apo	g	58238.5768	16.164	0.072	coj1m011-fl12
SN2018apo	g	58238.578	16.16	0.071	coj1m011-fl12
SN2018apo	g	58238.7261	16.176	0.052	cpt1m012-fl06
SN2018apo	g	58238.7272	16.14	0.053	cpt1m012-fl06
SN2018apo	g	58242.7457	16.504	0.052	cpt1m010-fl16
SN2018apo	g	58242.7469	16.487	0.051	cpt1m010-fl16
SN2018apo	g	58245.4759	16.737	0.063	coj1m011-fl12
SN2018apo	g	58245.4771	16.758	0.064	coj1m011-fl12
SN2018apo	g	58249.1116	17.109	0.053	lsc1m005-fl15
SN2018apo	g	58249.1127	17.1	0.053	lsc1m005-fl15
SN2018apo	g	58250.7764	17.229	0.056	cpt1m010-fl16
SN2018apo	g	58250.7776	17.222	0.058	cpt1m010-fl16
SN2018apo	g	58253.5366	17.407	0.06	coj1m011-fl12
SN2018apo	g	58253.5378	17.435	0.059	coj1m011-fl12
SN2018apo	g	58258.3475	17.641	0.066	coj1m011-fl12
SN2018apo	g	58258.3487	17.671	0.065	coj1m011-fl12
SN2018apo	g	58263.9917	17.91	0.063	lsc1m004-fl03
SN2018apo	g	58263.9929	17.933	0.063	lsc1m004-fl03
SN2018apo	g	58270.0247	18.126	0.061	lsc1m005-fl15
SN2018apo	g	58270.0259	18.183	0.058	lsc1m005-fl15
SN2018apo	g	58272.098	18.095	0.063	lsc1m004-fl03
SN2018apo	g	58272.0991	18.129	0.063	lsc1m004-fl03
SN2018apo	g	58275.7556	18.214	0.059	cpt1m012-fl06
SN2018apo	g	58275.7568	18.179	0.062	cpt1m012-fl06
SN2018apo	g	58279.8129	18.25	0.066	cpt1m010-fl16
SN2018apo	g	58279.8141	18.219	0.063	cpt1m010-fl16
SN2018apo	g	58285.9497	18.258	0.067	lsc1m004-fl03
SN2018apo	g	58285.9509	18.326	0.068	lsc1m004-fl03
SN2018apo	g	58289.9898	18.506	0.073	lsc1m004-fl03
SN2018apo	g	58289.991	18.407	0.069	lsc1m004-fl03
SN2018apo	g	58291.6931	18.42	0.063	cpt1m012-fl06
SN2018apo	g	58291.695	18.495	0.058	cpt1m012-fl06

SN2018apo	g	58297.0937	18.521	0.075	lsc1m004-fl03
SN2018apo	g	58297.0956	18.497	0.081	lsc1m004-fl03
SN2018apo	g	58303.7764	18.682	0.059	cpt1m010-fl16
SN2018apo	g	58303.7783	18.629	0.057	cpt1m010-fl16
SN2018apo	g	58310.4065	18.704	0.059	coj1m011-fl12
SN2018apo	g	58310.4084	18.754	0.059	coj1m011-fl12
SN2018apo	g	58316.4101	18.805	0.058	coj1m003-fl11
SN2018apo	g	58316.412	18.827	0.058	coj1m003-fl11
SN2018apo	g	58322.4448	18.89	0.073	coj1m003-fl11
SN2018apo	g	58322.4467	18.862	0.072	coj1m003-fl11
SN2018apo	g	58331.028	18.968	0.062	lsc1m004-fl03
SN2018apo	g	58331.032	18.975	0.059	lsc1m004-fl03
SN2018apo	g	58341.7519	19.128	0.061	cpt1m010-fl16
SN2018apo	g	58341.7559	19.174	0.063	cpt1m010-fl16
SN2018apo	g	58349.9844	19.206	0.071	lsc1m005-fl15
SN2018apo	g	58349.9883	19.328	0.077	lsc1m005-fl15
SN2018apo	r	58217.3466	15.541	0.044	lsc1m004-fl03
SN2018apo	r	58217.3478	15.534	0.046	lsc1m004-fl03
SN2018apo	r	58220.0595	15.4	0.049	cpt1m012-fl06
SN2018apo	r	58220.0606	15.402	0.049	cpt1m012-fl06
SN2018apo	r	58223.1227	15.292	0.047	lsc1m004-fl03
SN2018apo	r	58223.1239	15.298	0.049	lsc1m004-fl03
SN2018apo	r	58226.6418	15.285	0.063	coj1m011-fl12
SN2018apo	r	58226.643	15.302	0.161	coj1m011-fl12
SN2018apo	r	58229.5725	15.321	0.049	coj1m011-fl12
SN2018apo	r	58232.3552	15.494	0.047	coj1m011-fl12
SN2018apo	r	58232.3563	15.484	0.052	coj1m011-fl12
SN2018apo	r	58235.3839	15.71	0.065	coj1m011-fl12
SN2018apo	r	58235.3851	15.733	0.056	coj1m011-fl12
SN2018apo	r	58238.5793	15.899	0.055	coj1m011-fl12
SN2018apo	r	58238.5805	15.878	0.042	coj1m011-fl12
SN2018apo	r	58238.7286	15.902	0.056	cpt1m012-fl06
SN2018apo	r	58238.7298	15.899	0.047	cpt1m012-fl06
SN2018apo	r	58242.7482	15.953	0.045	cpt1m010-fl16
SN2018apo	r	58242.7494	15.949	0.047	cpt1m010-fl16
SN2018apo	r	58245.4785	15.991	0.057	coj1m011-fl12
SN2018apo	r	58245.4797	15.987	0.058	coj1m011-fl12
SN2018apo	r	58249.1153	16.157	0.12	lsc1m005-fl15
SN2018apo	r	58250.779	16.101	0.058	cpt1m010-fl16
SN2018apo	r	58250.7801	16.112	0.058	cpt1m010-fl16
SN2018apo	r	58253.5392	16.226	0.05	coj1m011-fl12
SN2018apo	r	58253.5404	16.249	0.052	coj1m011-fl12
SN2018apo	r	58258.35	16.454	0.054	coj1m011-fl12
SN2018apo	r	58258.3512	16.481	0.05	coj1m011-fl12
SN2018apo	r	58263.9942	16.802	0.056	lsc1m004-fl03
SN2018apo	r	58263.9954	16.812	0.051	lsc1m004-fl03
SN2018apo	r	58270.0272	17.057	0.05	lsc1m005-fl15
SN2018apo	r	58270.0284	17.054	0.054	lsc1m005-fl15
SN2018apo	r	58272.1005	17.165	0.053	lsc1m004-fl03
SN2018apo	r	58272.1017	17.145	0.052	lsc1m004-fl03
SN2018apo	r	58275.7581	17.265	0.051	cpt1m012-fl06
SN2018apo	r	58275.7593	17.29	0.051	cpt1m012-fl06
SN2018apo	r	58279.8154	17.378	0.055	cpt1m010-fl16
SN2018apo	r	58279.8166	17.412	0.055	cpt1m010-fl16
SN2018apo	r	58285.9522	17.589	0.052	lsc1m004-fl03
SN2018apo	r	58285.9534	17.58	0.05	lsc1m004-fl03
SN2018apo	r	58289.9924	17.688	0.055	lsc1m004-fl03
SN2018apo	r	58289.9936	17.756	0.055	lsc1m004-fl03
SN2018apo	r	58291.697	17.779	0.059	cpt1m012-fl06
SN2018apo	r	58291.6986	17.769	0.056	cpt1m012-fl06
SN2018apo	r	58297.0976	17.937	0.062	lsc1m004-fl03
SN2018apo	r	58297.0991	17.944	0.06	lsc1m004-fl03
SN2018apo	r	58303.7804	18.121	0.058	cpt1m010-fl16
SN2018apo	r	58303.7819	18.11	0.056	cpt1m010-fl16
SN2018apo	r	58310.4104	18.36	0.055	coj1m011-fl12
SN2018apo	r	58310.412	18.362	0.054	coj1m011-fl12
SN2018apo	r	58316.414	18.504	0.055	coj1m003-fl11
SN2018apo	r	58316.4156	18.596	0.054	coj1m003-fl11

SN2018apo	r	58322.4488	18.745	0.067	coj1m003-fl11
SN2018apo	r	58322.4503	18.636	0.061	coj1m003-fl11
SN2018apo	r	58331.0361	18.936	0.058	lsc1m004-fl03
SN2018apo	r	58331.039	18.948	0.056	lsc1m004-fl03
SN2018apo	r	58341.76	19.305	0.074	cpt1m010-fl16
SN2018apo	r	58341.7628	19.242	0.073	cpt1m010-fl16
SN2018apo	r	58349.9924	19.488	0.109	lsc1m005-fl15
SN2018apo	r	58349.9953	19.515	0.116	lsc1m005-fl15
SN2018apo	i	58217.3492	15.727	0.064	lsc1m004-fl03
SN2018apo	i	58217.3504	15.713	0.069	lsc1m004-fl03
SN2018apo	i	58220.062	15.671	0.07	cpt1m012-fl06
SN2018apo	i	58220.0632	15.659	0.069	cpt1m012-fl06
SN2018apo	i	58223.1252	15.696	0.069	lsc1m004-fl03
SN2018apo	i	58223.1264	15.697	0.068	lsc1m004-fl03
SN2018apo	i	58226.6444	15.924	0.121	coj1m011-fl12
SN2018apo	i	58226.6456	15.659	0.098	coj1m011-fl12
SN2018apo	i	58229.5751	15.84	0.077	coj1m011-fl12
SN2018apo	i	58229.5763	15.835	0.074	coj1m011-fl12
SN2018apo	i	58232.3577	16.033	0.079	coj1m011-fl12
SN2018apo	i	58232.3589	16.052	0.075	coj1m011-fl12
SN2018apo	i	58235.3865	16.255	0.076	coj1m011-fl12
SN2018apo	i	58235.3877	16.311	0.08	coj1m011-fl12
SN2018apo	i	58238.5818	16.359	0.081	coj1m011-fl12
SN2018apo	i	58238.7311	16.397	0.072	cpt1m012-fl06
SN2018apo	i	58238.7323	16.425	0.074	cpt1m012-fl06
SN2018apo	i	58242.7508	16.327	0.072	cpt1m010-fl16
SN2018apo	i	58242.752	16.327	0.072	cpt1m010-fl16
SN2018apo	i	58245.481	16.27	0.07	coj1m011-fl12
SN2018apo	i	58245.4822	16.233	0.078	coj1m011-fl12
SN2018apo	i	58250.7815	16.187	0.084	cpt1m010-fl16
SN2018apo	i	58250.7827	16.18	0.09	cpt1m010-fl16
SN2018apo	i	58253.5418	16.247	0.076	coj1m011-fl12
SN2018apo	i	58253.5429	16.266	0.074	coj1m011-fl12
SN2018apo	i	58258.3526	16.408	0.075	coj1m011-fl12
SN2018apo	i	58258.3538	16.455	0.076	coj1m011-fl12
SN2018apo	i	58263.9968	16.798	0.079	lsc1m004-fl03
SN2018apo	i	58263.998	16.803	0.078	lsc1m004-fl03
SN2018apo	i	58270.0298	17.111	0.07	lsc1m005-fl15
SN2018apo	i	58270.031	17.162	0.076	lsc1m005-fl15
SN2018apo	i	58272.103	17.237	0.073	lsc1m004-fl03
SN2018apo	i	58272.1042	17.228	0.075	lsc1m004-fl03
SN2018apo	i	58275.7607	17.325	0.077	cpt1m012-fl06
SN2018apo	i	58275.7619	17.326	0.078	cpt1m012-fl06
SN2018apo	i	58279.8179	17.545	0.079	cpt1m010-fl16
SN2018apo	i	58279.8191	17.53	0.08	cpt1m010-fl16
SN2018apo	i	58285.9548	17.779	0.078	lsc1m004-fl03
SN2018apo	i	58285.956	17.781	0.074	lsc1m004-fl03
SN2018apo	i	58289.9949	17.938	0.081	lsc1m004-fl03
SN2018apo	i	58289.9961	17.954	0.084	lsc1m004-fl03
SN2018apo	i	58291.7003	18.026	0.088	cpt1m012-fl06
SN2018apo	i	58291.7018	18.014	0.085	cpt1m012-fl06
SN2018apo	i	58297.1008	18.227	0.087	lsc1m004-fl03
SN2018apo	i	58297.1024	18.245	0.094	lsc1m004-fl03
SN2018apo	i	58303.7836	18.479	0.089	cpt1m010-fl16
SN2018apo	i	58303.7851	18.425	0.088	cpt1m010-fl16
SN2018apo	i	58310.4136	18.675	0.09	coj1m011-fl12
SN2018apo	i	58310.4152	18.622	0.085	coj1m011-fl12
SN2018apo	i	58316.4173	18.663	0.1	coj1m003-fl11
SN2018apo	i	58316.4188	18.802	0.093	coj1m003-fl11
SN2018apo	i	58322.452	19.172	0.117	coj1m003-fl11
SN2018apo	i	58322.4535	19.06	0.113	coj1m003-fl11
SN2018apo	i	58331.0419	19.406	0.094	lsc1m004-fl03
SN2018apo	i	58331.0447	19.35	0.092	lsc1m004-fl03
SN2018apo	i	58341.7658	19.518	0.12	cpt1m010-fl16
SN2018apo	i	58341.7686	19.595	0.12	cpt1m010-fl16
SN2018apo	i	58349.9982	20.186	0.276	lsc1m005-fl15
SN2018apo	i	58350.001	19.662	0.178	lsc1m005-fl15
SN2018bie	B	58251.9169	17.519	0.059	cpt1m010-fl16

SN2018bie	B	58251.9197	17.542	0.058	cpt1m010-fl16
SN2018bie	B	58256.0976	16.57	0.059	lsc1m005-fl15
SN2018bie	B	58256.1004	16.577	0.056	lsc1m005-fl15
SN2018bie	B	58260.0108	16.146	0.058	lsc1m005-fl15
SN2018bie	B	58260.0137	16.134	0.059	lsc1m005-fl15
SN2018bie	B	58265.115	15.942	0.058	lsc1m005-fl15
SN2018bie	B	58265.1178	15.917	0.058	lsc1m005-fl15
SN2018bie	B	58271.0102	16.129	0.057	lsc1m005-fl15
SN2018bie	B	58271.013	16.124	0.058	lsc1m005-fl15
SN2018bie	B	58274.8192	16.375	0.058	cpt1m010-fl16
SN2018bie	B	58274.822	16.396	0.058	cpt1m010-fl16
SN2018bie	B	58280.7708	16.997	0.059	cpt1m010-fl16
SN2018bie	B	58280.7736	17.003	0.058	cpt1m010-fl16
SN2018bie	B	58288.0768	17.824	0.057	lsc1m005-fl15
SN2018bie	B	58288.0796	17.837	0.058	lsc1m005-fl15
SN2018bie	B	58292.4031	18.202	0.058	coj1m011-fl12
SN2018bie	B	58292.4059	18.182	0.057	coj1m011-fl12
SN2018bie	B	58296.0142	18.413	0.06	lsc1m005-fl15
SN2018bie	B	58296.017	18.383	0.059	lsc1m005-fl15
SN2018bie	B	58302.3888	18.78	0.055	coj1m003-fl11
SN2018bie	B	58302.3916	18.776	0.059	coj1m003-fl11
SN2018bie	B	58308.7571	18.999	0.058	cpt1m012-fl06
SN2018bie	B	58308.7599	18.975	0.058	cpt1m012-fl06
SN2018bie	B	58312.9553	19.06	0.061	lsc1m005-fl15
SN2018bie	B	58312.9581	19.06	0.06	lsc1m005-fl15
SN2018bie	B	58319.7052	19.29	0.178	cpt1m012-fl06
SN2018bie	B	58319.708	19.148	0.075	cpt1m012-fl06
SN2018bie	B	58321.3674	19.282	0.077	coj1m011-fl12
SN2018bie	B	58321.3703	19.268	0.077	coj1m011-fl12
SN2018bie	B	58322.7022	19.374	0.084	cpt1m010-fl16
SN2018bie	B	58322.705	19.145	0.074	cpt1m010-fl16
SN2018bie	B	58322.7139	19.299	0.065	cpt1m012-fl06
SN2018bie	B	58322.7167	19.08	0.06	cpt1m012-fl06
SN2018bie	B	58323.358	19.275	0.074	coj1m011-fl12
SN2018bie	B	58323.3581	19.265	0.068	coj1m003-fl11
SN2018bie	B	58323.3608	19.301	0.074	coj1m011-fl12
SN2018bie	B	58323.3609	19.213	0.068	coj1m003-fl11
SN2018bie	B	58324.9686	19.341	0.081	lsc1m005-fl15
SN2018bie	B	58342.976	19.583	0.255	lsc1m004-fl03
SN2018bie	B	58342.9788	19.194	0.273	lsc1m004-fl03
SN2018bie	V	58251.9227	17.483	0.065	cpt1m010-fl16
SN2018bie	V	58251.9246	17.455	0.067	cpt1m010-fl16
SN2018bie	V	58256.1034	16.578	0.065	lsc1m005-fl15
SN2018bie	V	58256.1053	16.577	0.066	lsc1m005-fl15
SN2018bie	V	58260.0166	16.145	0.07	lsc1m005-fl15
SN2018bie	V	58260.0185	16.141	0.07	lsc1m005-fl15
SN2018bie	V	58265.1208	15.871	0.071	lsc1m005-fl15
SN2018bie	V	58265.1227	15.894	0.072	lsc1m005-fl15
SN2018bie	V	58271.016	15.968	0.073	lsc1m005-fl15
SN2018bie	V	58271.0178	15.985	0.071	lsc1m005-fl15
SN2018bie	V	58274.825	16.114	0.074	cpt1m010-fl16
SN2018bie	V	58274.8269	16.126	0.075	cpt1m010-fl16
SN2018bie	V	58280.7765	16.483	0.054	cpt1m010-fl16
SN2018bie	V	58280.7784	16.469	0.068	cpt1m010-fl16
SN2018bie	V	58288.0826	16.876	0.07	lsc1m005-fl15
SN2018bie	V	58288.0845	16.904	0.071	lsc1m005-fl15
SN2018bie	V	58292.4089	17.107	0.062	coj1m011-fl12
SN2018bie	V	58292.4108	17.102	0.062	coj1m011-fl12
SN2018bie	V	58296.0199	17.239	0.073	lsc1m005-fl15
SN2018bie	V	58296.0218	17.224	0.071	lsc1m005-fl15
SN2018bie	V	58302.3946	17.605	0.07	coj1m003-fl11
SN2018bie	V	58302.3965	17.604	0.067	coj1m003-fl11
SN2018bie	V	58308.7629	17.827	0.072	cpt1m012-fl06
SN2018bie	V	58308.7648	17.861	0.071	cpt1m012-fl06
SN2018bie	V	58312.9611	18.002	0.07	lsc1m005-fl15
SN2018bie	V	58312.963	18.01	0.069	lsc1m005-fl15
SN2018bie	V	58319.711	18.05	0.083	cpt1m012-fl06
SN2018bie	V	58319.7129	17.965	0.089	cpt1m012-fl06

SN2018bie	V	58321.3732	18.255	0.072	coj1m011-fl12
SN2018bie	V	58321.3751	18.204	0.068	coj1m011-fl12
SN2018bie	V	58322.7079	18.158	0.079	cpt1m010-fl16
SN2018bie	V	58322.7098	18.249	0.091	cpt1m010-fl16
SN2018bie	V	58322.7196	18.221	0.077	cpt1m012-fl06
SN2018bie	V	58322.7215	18.261	0.075	cpt1m012-fl06
SN2018bie	V	58323.3638	18.234	0.074	coj1m011-fl12
SN2018bie	V	58323.3638	18.297	0.069	coj1m003-fl11
SN2018bie	V	58323.3657	18.289	0.072	coj1m011-fl12
SN2018bie	V	58323.3657	18.277	0.071	coj1m003-fl11
SN2018bie	V	58324.9716	18.273	0.076	lsc1m005-fl15
SN2018bie	V	58324.9735	18.237	0.079	lsc1m005-fl15
SN2018bie	V	58342.9817	18.912	0.145	lsc1m004-fl03
SN2018bie	V	58342.9836	18.822	0.109	lsc1m004-fl03
SN2018bie	g	58251.9267	17.538	0.055	cpt1m010-fl16
SN2018bie	g	58251.9295	17.531	0.055	cpt1m010-fl16
SN2018bie	g	58256.1073	16.61	0.051	lsc1m005-fl15
SN2018bie	g	58256.1101	16.603	0.051	lsc1m005-fl15
SN2018bie	g	58260.0206	16.149	0.064	lsc1m005-fl15
SN2018bie	g	58260.0234	16.131	0.058	lsc1m005-fl15
SN2018bie	g	58265.1276	15.979	0.059	lsc1m005-fl15
SN2018bie	g	58271.0199	16.08	0.057	lsc1m005-fl15
SN2018bie	g	58271.0227	16.08	0.057	lsc1m005-fl15
SN2018bie	g	58274.829	16.3	0.051	cpt1m010-fl16
SN2018bie	g	58274.8318	16.295	0.057	cpt1m010-fl16
SN2018bie	g	58280.7805	16.787	0.052	cpt1m010-fl16
SN2018bie	g	58280.7833	16.787	0.051	cpt1m010-fl16
SN2018bie	g	58288.0866	17.419	0.059	lsc1m005-fl15
SN2018bie	g	58288.0894	17.438	0.056	lsc1m005-fl15
SN2018bie	g	58292.4128	17.774	0.057	coj1m011-fl12
SN2018bie	g	58292.4157	17.769	0.067	coj1m011-fl12
SN2018bie	g	58296.0239	18.005	0.056	lsc1m005-fl15
SN2018bie	g	58296.0267	17.998	0.06	lsc1m005-fl15
SN2018bie	g	58302.3986	18.467	0.07	coj1m003-fl11
SN2018bie	g	58302.4014	18.42	0.066	coj1m003-fl11
SN2018bie	g	58308.7668	18.57	0.053	cpt1m012-fl06
SN2018bie	g	58308.7697	18.59	0.053	cpt1m012-fl06
SN2018bie	g	58312.965	18.691	0.06	lsc1m005-fl15
SN2018bie	g	58312.9678	18.678	0.062	lsc1m005-fl15
SN2018bie	g	58321.3772	18.85	0.07	coj1m011-fl12
SN2018bie	g	58321.38	18.862	0.071	coj1m011-fl12
SN2018bie	g	58322.7119	18.735	0.059	cpt1m010-fl16
SN2018bie	g	58322.7147	18.862	0.086	cpt1m010-fl16
SN2018bie	g	58322.7236	18.821	0.073	cpt1m012-fl06
SN2018bie	g	58322.7264	18.898	0.08	cpt1m012-fl06
SN2018bie	g	58323.3677	18.877	0.065	coj1m011-fl12
SN2018bie	g	58323.3678	18.935	0.072	coj1m003-fl11
SN2018bie	g	58323.3705	18.937	0.067	coj1m011-fl12
SN2018bie	g	58323.3706	18.886	0.07	coj1m003-fl11
SN2018bie	g	58324.9756	18.877	0.089	lsc1m005-fl15
SN2018bie	g	58324.9785	18.898	0.073	lsc1m005-fl15
SN2018bie	g	58342.9857	19.053	0.084	lsc1m004-fl03
SN2018bie	g	58342.9885	19.001	0.108	lsc1m004-fl03
SN2018bie	r	58251.9325	17.523	0.042	cpt1m010-fl16
SN2018bie	r	58251.9344	17.511	0.04	cpt1m010-fl16
SN2018bie	r	58256.1131	16.633	0.032	lsc1m005-fl15
SN2018bie	r	58256.115	16.647	0.025	lsc1m005-fl15
SN2018bie	r	58260.0264	16.167	0.058	lsc1m005-fl15
SN2018bie	r	58260.0283	16.162	0.054	lsc1m005-fl15
SN2018bie	r	58265.1305	15.924	0.039	lsc1m005-fl15
SN2018bie	r	58265.1324	15.965	0.02	lsc1m005-fl15
SN2018bie	r	58271.0257	16.0	0.039	lsc1m005-fl15
SN2018bie	r	58271.0276	15.994	0.039	lsc1m005-fl15
SN2018bie	r	58274.8348	16.183	0.045	cpt1m010-fl16
SN2018bie	r	58274.8366	16.183	0.055	cpt1m010-fl16
SN2018bie	r	58280.7863	16.538	0.032	cpt1m010-fl16
SN2018bie	r	58280.7882	16.529	0.033	cpt1m010-fl16
SN2018bie	r	58288.0924	16.688	0.038	lsc1m005-fl15

SN2018bie	r	58288.0943	16.664	0.04	lsc1m005-fl15
SN2018bie	r	58292.4186	16.777	0.027	coj1m011-fl12
SN2018bie	r	58292.4205	16.767	0.031	coj1m011-fl12
SN2018bie	r	58296.0297	16.857	0.044	lsc1m005-fl15
SN2018bie	r	58296.0316	16.866	0.066	lsc1m005-fl15
SN2018bie	r	58302.4044	17.192	0.038	coj1m003-fl11
SN2018bie	r	58302.4062	17.175	0.035	coj1m003-fl11
SN2018bie	r	58308.7726	17.508	0.055	cpt1m012-fl06
SN2018bie	r	58308.7745	17.525	0.039	cpt1m012-fl06
SN2018bie	r	58312.9708	17.675	0.044	lsc1m005-fl15
SN2018bie	r	58312.9727	17.685	0.054	lsc1m005-fl15
SN2018bie	r	58319.7226	17.993	0.108	cpt1m012-fl06
SN2018bie	r	58321.383	18.011	0.039	coj1m011-fl12
SN2018bie	r	58321.3849	17.973	0.032	coj1m011-fl12
SN2018bie	r	58322.7176	17.951	0.048	cpt1m010-fl16
SN2018bie	r	58322.7195	17.975	0.048	cpt1m010-fl16
SN2018bie	r	58322.7294	17.989	0.048	cpt1m012-fl06
SN2018bie	r	58322.7313	17.984	0.042	cpt1m012-fl06
SN2018bie	r	58323.3735	17.98	0.04	coj1m011-fl12
SN2018bie	r	58323.3736	18.058	0.042	coj1m003-fl11
SN2018bie	r	58323.3754	18.004	0.039	coj1m011-fl12
SN2018bie	r	58323.3754	18.027	0.04	coj1m003-fl11
SN2018bie	r	58324.9815	18.06	0.056	lsc1m005-fl15
SN2018bie	r	58324.9834	18.14	0.055	lsc1m005-fl15
SN2018bie	r	58342.9914	18.629	0.155	lsc1m004-fl03
SN2018bie	r	58342.9933	18.746	0.127	lsc1m004-fl03
SN2018bie	i	58251.9364	17.675	0.075	cpt1m010-fl16
SN2018bie	i	58251.9383	17.646	0.077	cpt1m010-fl16
SN2018bie	i	58256.117	16.831	0.071	lsc1m005-fl15
SN2018bie	i	58256.1189	16.818	0.071	lsc1m005-fl15
SN2018bie	i	58260.0303	16.477	0.075	lsc1m005-fl15
SN2018bie	i	58260.0322	16.454	0.075	lsc1m005-fl15
SN2018bie	i	58265.1345	16.423	0.067	lsc1m005-fl15
SN2018bie	i	58265.1364	16.451	0.064	lsc1m005-fl15
SN2018bie	i	58271.0296	16.626	0.074	lsc1m005-fl15
SN2018bie	i	58271.0315	16.636	0.076	lsc1m005-fl15
SN2018bie	i	58274.8387	16.855	0.072	cpt1m010-fl16
SN2018bie	i	58274.8406	16.841	0.076	cpt1m010-fl16
SN2018bie	i	58280.7902	17.187	0.072	cpt1m010-fl16
SN2018bie	i	58280.7921	17.153	0.072	cpt1m010-fl16
SN2018bie	i	58288.0963	17.147	0.062	lsc1m005-fl15
SN2018bie	i	58288.0982	17.126	0.062	lsc1m005-fl15
SN2018bie	i	58292.4226	17.038	0.056	coj1m011-fl12
SN2018bie	i	58292.4245	17.043	0.054	coj1m011-fl12
SN2018bie	i	58296.0336	17.064	0.075	lsc1m005-fl15
SN2018bie	i	58296.0355	17.048	0.076	lsc1m005-fl15
SN2018bie	i	58302.4083	17.251	0.073	coj1m003-fl11
SN2018bie	i	58302.4102	17.252	0.074	coj1m003-fl11
SN2018bie	i	58308.7766	17.642	0.076	cpt1m012-fl06
SN2018bie	i	58308.7784	17.655	0.074	cpt1m012-fl06
SN2018bie	i	58312.9766	17.657	0.167	lsc1m005-fl15
SN2018bie	i	58321.3869	18.365	0.149	coj1m011-fl12
SN2018bie	i	58321.3888	18.26	0.145	coj1m011-fl12
SN2018bie	i	58322.7216	18.147	0.088	cpt1m010-fl16
SN2018bie	i	58322.7234	18.162	0.084	cpt1m010-fl16
SN2018bie	i	58322.7333	18.318	0.089	cpt1m012-fl06
SN2018bie	i	58322.7352	18.339	0.093	cpt1m012-fl06
SN2018bie	i	58323.3774	18.281	0.075	coj1m011-fl12
SN2018bie	i	58323.3775	18.318	0.076	coj1m003-fl11
SN2018bie	i	58323.3793	18.277	0.079	coj1m011-fl12
SN2018bie	i	58323.3794	18.283	0.073	coj1m003-fl11
SN2018bie	i	58324.9854	18.653	0.728	lsc1m005-fl15
SN2018bie	i	58324.9873	18.332	0.084	lsc1m005-fl15
SN2018bie	i	58342.9954	18.631	0.227	lsc1m004-fl03
SN2018bie	i	58342.9973	18.747	0.292	lsc1m004-fl03
SN2018cnw	B	58287.3777	17.739	0.031	elp1m008-fl05
SN2018cnw	B	58287.3828	17.74	0.031	elp1m008-fl05
SN2018cnw	B	58289.3175	16.933	0.03	elp1m008-fl05

SN2018cnw	B	58289.3194	16.925	0.03	elp1m008-fl05
SN2018cnw	B	58290.3308	16.641	0.03	elp1m008-fl05
SN2018cnw	B	58290.3327	16.639	0.031	elp1m008-fl05
SN2018cnw	B	58292.3135	16.253	0.028	elp1m008-fl05
SN2018cnw	B	58292.3154	16.252	0.027	elp1m008-fl05
SN2018cnw	B	58293.1652	16.137	0.031	elp1m008-fl05
SN2018cnw	B	58293.167	16.126	0.031	elp1m008-fl05
SN2018cnw	B	58294.2417	16.001	0.03	elp1m008-fl05
SN2018cnw	B	58294.307	16.002	0.031	elp1m008-fl05
SN2018cnw	B	58294.3089	16.007	0.029	elp1m008-fl05
SN2018cnw	B	58295.3243	15.915	0.03	elp1m008-fl05
SN2018cnw	B	58295.3262	15.904	0.03	elp1m008-fl05
SN2018cnw	B	58296.2056	15.852	0.032	elp1m008-fl05
SN2018cnw	B	58296.2075	15.792	0.032	elp1m008-fl05
SN2018cnw	B	58296.3897	15.833	0.029	elp1m008-fl05
SN2018cnw	B	58296.3916	15.832	0.029	elp1m008-fl05
SN2018cnw	B	58299.2713	15.752	0.028	elp1m008-fl05
SN2018cnw	B	58299.2732	15.756	0.024	elp1m008-fl05
SN2018cnw	B	58301.3897	15.743	0.128	elp1m008-fl05
SN2018cnw	B	58301.3916	15.758	0.031	elp1m008-fl05
SN2018cnw	B	58306.1656	15.84	0.031	elp1m008-fl05
SN2018cnw	B	58306.1671	15.855	0.03	elp1m008-fl05
SN2018cnw	B	58307.1967	15.873	0.03	elp1m008-fl05
SN2018cnw	B	58307.1982	15.88	0.03	elp1m008-fl05
SN2018cnw	B	58318.1833	16.742	0.03	elp1m008-fl05
SN2018cnw	B	58318.1848	16.753	0.031	elp1m008-fl05
SN2018cnw	B	58322.1317	17.186	0.031	elp1m008-fl05
SN2018cnw	B	58322.1332	17.171	0.031	elp1m008-fl05
SN2018cnw	B	58323.2011	17.292	0.039	elp1m008-fl05
SN2018cnw	B	58323.2026	17.353	0.034	elp1m008-fl05
SN2018cnw	B	58323.215	17.336	0.039	elp1m008-fl05
SN2018cnw	B	58323.2165	17.322	0.032	elp1m008-fl05
SN2018cnw	B	58335.2115	18.259	0.031	elp1m008-fl05
SN2018cnw	B	58335.2143	18.304	0.031	elp1m008-fl05
SN2018cnw	B	58351.1845	18.709	0.034	elp1m008-fl05
SN2018cnw	B	58351.1873	18.775	0.036	elp1m008-fl05
SN2018cnw	B	58375.0814	19.001	0.047	elp1m008-fa05
SN2018cnw	B	58375.0853	19.011	0.04	elp1m008-fa05
SN2018cnw	B	58385.0722	19.207	0.073	elp1m008-fa05
SN2018cnw	B	58385.0762	19.261	0.068	elp1m008-fa05
SN2018cnw	B	58399.0601	19.56	0.072	elp1m008-fa05
SN2018cnw	B	58399.0641	19.431	0.05	elp1m008-fa05
SN2018cnw	B	58428.0412	19.94	0.144	elp1m008-fa05
SN2018cnw	B	58428.0452	19.979	0.096	elp1m008-fa05
SN2018cnw	V	58287.3881	17.615	0.031	elp1m008-fl05
SN2018cnw	V	58287.3914	17.61	0.03	elp1m008-fl05
SN2018cnw	V	58289.3214	16.848	0.031	elp1m008-fl05
SN2018cnw	V	58289.323	16.859	0.029	elp1m008-fl05
SN2018cnw	V	58290.3348	16.574	0.027	elp1m008-fl05
SN2018cnw	V	58290.3363	16.563	0.027	elp1m008-fl05
SN2018cnw	V	58292.3175	16.198	0.027	elp1m008-fl05
SN2018cnw	V	58292.319	16.191	0.025	elp1m008-fl05
SN2018cnw	V	58293.1706	16.06	0.035	elp1m008-fl05
SN2018cnw	V	58294.3109	15.943	0.023	elp1m008-fl05
SN2018cnw	V	58294.3125	15.961	0.021	elp1m008-fl05
SN2018cnw	V	58296.3936	15.792	0.027	elp1m008-fl05
SN2018cnw	V	58296.3951	15.795	0.026	elp1m008-fl05
SN2018cnw	V	58298.2317	15.718	0.18	elp1m008-fl05
SN2018cnw	V	58298.2332	15.713	0.041	elp1m008-fl05
SN2018cnw	V	58299.2753	15.673	0.026	elp1m008-fl05
SN2018cnw	V	58299.2768	15.654	0.024	elp1m008-fl05
SN2018cnw	V	58301.3936	15.611	0.095	elp1m008-fl05
SN2018cnw	V	58301.3951	15.643	0.084	elp1m008-fl05
SN2018cnw	V	58307.1999	15.659	0.049	elp1m008-fl05
SN2018cnw	V	58307.2011	15.647	0.029	elp1m008-fl05
SN2018cnw	V	58323.2043	16.452	0.029	elp1m008-fl05
SN2018cnw	V	58323.2055	16.446	0.025	elp1m008-fl05
SN2018cnw	V	58323.2182	16.443	0.025	elp1m008-fl05

SN2018cnw	V	58323.2194	16.45	0.026	elp1m008-fl05
SN2018cnw	V	58335.2173	17.093	0.029	elp1m008-fl05
SN2018cnw	V	58335.2192	17.085	0.033	elp1m008-fl05
SN2018cnw	V	58351.1903	17.762	0.042	elp1m008-fl05
SN2018cnw	V	58351.1922	17.825	0.04	elp1m008-fl05
SN2018cnw	V	58375.0895	18.439	0.043	elp1m008-fa05
SN2018cnw	V	58375.0913	18.429	0.042	elp1m008-fa05
SN2018cnw	V	58385.0803	18.752	0.073	elp1m008-fa05
SN2018cnw	V	58385.0821	18.796	0.07	elp1m008-fa05
SN2018cnw	V	58399.0682	19.103	0.047	elp1m008-fa05
SN2018cnw	V	58399.071	19.094	0.048	elp1m008-fa05
SN2018cnw	V	58428.0493	19.656	0.084	elp1m008-fa05
SN2018cnw	V	58428.0521	19.717	0.079	elp1m008-fa05
SN2018cnw	g	58287.3948	17.678	0.034	elp1m008-fl05
SN2018cnw	g	58287.3981	17.678	0.026	elp1m008-fl05
SN2018cnw	g	58289.3247	16.889	0.025	elp1m008-fl05
SN2018cnw	g	58289.3266	16.893	0.024	elp1m008-fl05
SN2018cnw	g	58290.338	16.604	0.024	elp1m008-fl05
SN2018cnw	g	58290.3399	16.612	0.024	elp1m008-fl05
SN2018cnw	g	58292.3207	16.235	0.026	elp1m008-fl05
SN2018cnw	g	58292.3226	16.219	0.024	elp1m008-fl05
SN2018cnw	g	58293.1723	16.11	0.025	elp1m008-fl05
SN2018cnw	g	58293.1742	16.107	0.026	elp1m008-fl05
SN2018cnw	g	58294.3142	15.963	0.025	elp1m008-fl05
SN2018cnw	g	58294.3161	15.975	0.029	elp1m008-fl05
SN2018cnw	g	58295.3315	15.894	0.031	elp1m008-fl05
SN2018cnw	g	58295.3334	15.884	0.028	elp1m008-fl05
SN2018cnw	g	58296.2128	15.807	0.029	elp1m008-fl05
SN2018cnw	g	58296.2146	15.842	0.031	elp1m008-fl05
SN2018cnw	g	58296.3969	15.824	0.027	elp1m008-fl05
SN2018cnw	g	58296.3988	15.825	0.027	elp1m008-fl05
SN2018cnw	g	58298.235	15.762	0.115	elp1m008-fl05
SN2018cnw	g	58299.2785	15.715	0.025	elp1m008-fl05
SN2018cnw	g	58299.2804	15.707	0.028	elp1m008-fl05
SN2018cnw	g	58301.3969	15.691	0.166	elp1m008-fl05
SN2018cnw	g	58301.3988	15.646	0.08	elp1m008-fl05
SN2018cnw	g	58307.2024	15.789	0.024	elp1m008-fl05
SN2018cnw	g	58307.204	15.787	0.023	elp1m008-fl05
SN2018cnw	g	58318.1891	16.495	0.025	elp1m008-fl05
SN2018cnw	g	58318.1906	16.494	0.025	elp1m008-fl05
SN2018cnw	g	58322.1388	16.807	0.03	elp1m008-fl05
SN2018cnw	g	58322.1404	16.825	0.03	elp1m008-fl05
SN2018cnw	g	58323.2069	16.93	0.033	elp1m008-fl05
SN2018cnw	g	58323.2208	16.913	0.028	elp1m008-fl05
SN2018cnw	g	58323.2223	16.927	0.033	elp1m008-fl05
SN2018cnw	g	58335.2212	17.871	0.031	elp1m008-fl05
SN2018cnw	g	58335.224	17.859	0.031	elp1m008-fl05
SN2018cnw	g	58351.1942	18.433	0.037	elp1m008-fl05
SN2018cnw	g	58351.197	18.369	0.038	elp1m008-fl05
SN2018cnw	g	58375.0934	18.749	0.03	elp1m008-fa05
SN2018cnw	g	58375.0973	18.738	0.027	elp1m008-fa05
SN2018cnw	g	58385.0842	18.972	0.046	elp1m008-fa05
SN2018cnw	g	58385.0881	18.872	0.041	elp1m008-fa05
SN2018cnw	g	58399.0746	19.12	0.029	elp1m008-fa05
SN2018cnw	g	58399.0785	19.111	0.03	elp1m008-fa05
SN2018cnw	r	58287.4015	17.652	0.022	elp1m008-fl05
SN2018cnw	r	58287.4048	17.655	0.022	elp1m008-fl05
SN2018cnw	r	58289.3286	16.924	0.024	elp1m008-fl05
SN2018cnw	r	58290.3419	16.666	0.025	elp1m008-fl05
SN2018cnw	r	58290.3435	16.672	0.025	elp1m008-fl05
SN2018cnw	r	58292.3246	16.299	0.022	elp1m008-fl05
SN2018cnw	r	58292.3262	16.303	0.021	elp1m008-fl05
SN2018cnw	r	58293.1778	16.196	0.028	elp1m008-fl05
SN2018cnw	r	58294.3181	16.053	0.022	elp1m008-fl05
SN2018cnw	r	58294.3197	16.043	0.022	elp1m008-fl05
SN2018cnw	r	58295.3354	15.974	0.022	elp1m008-fl05
SN2018cnw	r	58295.337	15.936	0.041	elp1m008-fl05
SN2018cnw	r	58296.2167	15.889	0.034	elp1m008-fl05

SN2018cnw	r	58296.2182	15.914	0.029	elp1m008-fl05
SN2018cnw	r	58296.4008	15.902	0.025	elp1m008-fl05
SN2018cnw	r	58296.4024	15.898	0.025	elp1m008-fl05
SN2018cnw	r	58299.2825	15.737	0.02	elp1m008-fl05
SN2018cnw	r	58301.4008	15.58	0.239	elp1m008-fl05
SN2018cnw	r	58301.4024	15.751	0.55	elp1m008-fl05
SN2018cnw	r	58307.2057	15.737	0.027	elp1m008-fl05
SN2018cnw	r	58307.2069	15.743	0.026	elp1m008-fl05
SN2018cnw	r	58318.1923	16.388	0.024	elp1m008-fl05
SN2018cnw	r	58323.224	16.424	0.025	elp1m008-fl05
SN2018cnw	r	58323.2252	16.428	0.024	elp1m008-fl05
SN2018cnw	r	58335.227	16.729	0.024	elp1m008-fl05
SN2018cnw	r	58335.2289	16.727	0.024	elp1m008-fl05
SN2018cnw	r	58351.2	17.475	0.028	elp1m008-fl05
SN2018cnw	r	58351.2019	17.457	0.028	elp1m008-fl05
SN2018cnw	r	58375.1014	18.216	0.026	elp1m008-fa05
SN2018cnw	r	58375.1033	18.264	0.028	elp1m008-fa05
SN2018cnw	r	58385.0922	18.493	0.042	elp1m008-fa05
SN2018cnw	r	58385.0941	18.559	0.043	elp1m008-fa05
SN2018cnw	r	58399.0826	18.956	0.029	elp1m008-fa05
SN2018cnw	r	58399.0854	18.957	0.033	elp1m008-fa05
SN2018cnw	i	58287.4082	18.013	0.03	elp1m008-fl05
SN2018cnw	i	58287.4115	17.979	0.028	elp1m008-fl05
SN2018cnw	i	58289.3319	17.242	0.03	elp1m008-fl05
SN2018cnw	i	58289.3334	17.211	0.03	elp1m008-fl05
SN2018cnw	i	58290.3452	16.985	0.029	elp1m008-fl05
SN2018cnw	i	58290.3467	16.977	0.03	elp1m008-fl05
SN2018cnw	i	58292.3279	16.611	0.031	elp1m008-fl05
SN2018cnw	i	58292.3294	16.632	0.03	elp1m008-fl05
SN2018cnw	i	58293.1795	16.545	0.027	elp1m008-fl05
SN2018cnw	i	58293.181	16.557	0.03	elp1m008-fl05
SN2018cnw	i	58294.2455	16.434	0.027	elp1m008-fl05
SN2018cnw	i	58294.247	16.437	0.029	elp1m008-fl05
SN2018cnw	i	58294.3214	16.421	0.03	elp1m008-fl05
SN2018cnw	i	58294.3229	16.436	0.03	elp1m008-fl05
SN2018cnw	i	58295.3386	16.406	0.027	elp1m008-fl05
SN2018cnw	i	58295.3402	16.4	0.027	elp1m008-fl05
SN2018cnw	i	58296.2199	16.421	0.032	elp1m008-fl05
SN2018cnw	i	58296.2215	16.388	0.034	elp1m008-fl05
SN2018cnw	i	58296.404	16.377	0.032	elp1m008-fl05
SN2018cnw	i	58296.4056	16.397	0.03	elp1m008-fl05
SN2018cnw	i	58301.404	16.279	0.523	elp1m008-fl05
SN2018cnw	i	58301.4056	16.351	0.038	elp1m008-fl05
SN2018cnw	i	58307.2082	16.547	0.034	elp1m008-fl05
SN2018cnw	i	58307.2094	16.514	0.033	elp1m008-fl05
SN2018cnw	i	58318.1948	17.218	0.031	elp1m008-fl05
SN2018cnw	i	58318.196	17.212	0.031	elp1m008-fl05
SN2018cnw	i	58322.1446	17.143	0.033	elp1m008-fl05
SN2018cnw	i	58323.2266	17.103	0.041	elp1m008-fl05
SN2018cnw	i	58323.2278	17.095	0.039	elp1m008-fl05
SN2018cnw	i	58335.2309	16.97	0.027	elp1m008-fl05
SN2018cnw	i	58335.2328	16.969	0.029	elp1m008-fl05
SN2018cnw	i	58351.2039	17.869	0.039	elp1m008-fl05
SN2018cnw	i	58351.2058	17.887	0.038	elp1m008-fl05
SN2018cnw	i	58375.1053	18.829	0.048	elp1m008-fa05
SN2018cnw	i	58375.1072	18.838	0.049	elp1m008-fa05
SN2018cnw	i	58385.0961	19.139	0.072	elp1m008-fa05
SN2018cnw	i	58385.098	19.201	0.077	elp1m008-fa05
SN2018cnw	i	58399.0884	19.533	0.074	elp1m008-fa05
SN2018cnw	i	58399.0912	19.508	0.068	elp1m008-fa05
SN2019dks	B	58586.7504	18.528	0.054	cpt1m010-fa16
SN2019dks	B	58586.753	18.55	0.064	cpt1m010-fa16
SN2019dks	B	58588.4588	18.18	0.058	coj1m003-fa11
SN2019dks	B	58588.4614	18.15	0.055	coj1m003-fa11
SN2019dks	B	58591.8142	17.616	0.052	cpt1m010-fa16
SN2019dks	B	58592.8773	17.583	0.053	cpt1m010-fa16
SN2019dks	B	58592.8799	17.561	0.053	cpt1m010-fa16
SN2019dks	B	58594.3721	17.532	0.053	coj1m003-fa11

SN2019dks	B	58594.3748	17.547	0.133	coj1m003-fa11
SN2019dks	B	58595.5615	17.498	0.082	coj1m011-fa12
SN2019dks	B	58595.5641	17.504	0.053	coj1m011-fa12
SN2019dks	B	58598.144	17.383	0.053	lsc1m005-fa15
SN2019dks	B	58598.1467	17.483	0.057	lsc1m005-fa15
SN2019dks	B	58600.5462	17.498	0.052	coj1m011-fa12
SN2019dks	B	58600.5488	17.498	0.052	coj1m011-fa12
SN2019dks	B	58600.5735	17.473	0.04	coj1m003-fa11
SN2019dks	B	58600.5762	17.493	0.036	coj1m003-fa11
SN2019dks	B	58602.5359	17.558	0.052	coj1m011-fa12
SN2019dks	B	58602.5385	17.577	0.052	coj1m011-fa12
SN2019dks	B	58607.4855	17.858	0.052	coj1m011-fa12
SN2019dks	B	58607.4882	17.856	0.052	coj1m011-fa12
SN2019dks	B	58611.1418	18.032	0.611	lsc1m005-fa15
SN2019dks	B	58611.1444	18.053	0.054	lsc1m005-fa15
SN2019dks	B	58614.8751	18.511	0.053	cpt1m010-fa16
SN2019dks	B	58614.8778	18.482	0.053	cpt1m010-fa16
SN2019dks	B	58626.9647	19.792	0.054	lsc1m004-fa03
SN2019dks	B	58626.9673	19.846	0.055	lsc1m004-fa03
SN2019dks	B	58633.4135	20.231	0.059	coj1m003-fa11
SN2019dks	B	58633.4161	20.208	0.057	coj1m003-fa11
SN2019dks	B	58639.3963	20.567	0.081	coj1m003-fa11
SN2019dks	B	58639.399	20.491	0.077	coj1m003-fa11
SN2019dks	B	58648.0083	20.731	0.218	lsc1m005-fa15
SN2019dks	B	58648.011	20.779	0.084	lsc1m005-fa15
SN2019dks	B	58654.6926	20.996	0.101	cpt1m010-fa16
SN2019dks	B	58654.6952	20.938	0.078	cpt1m010-fa16
SN2019dks	B	58660.3928	20.936	0.1	coj1m011-fa12
SN2019dks	B	58660.3954	21.135	0.126	coj1m011-fa12
SN2019dks	B	58660.6964	20.745	0.202	cpt1m010-fa16
SN2019dks	B	58667.3963	21.032	0.114	coj1m011-fa12
SN2019dks	B	58667.4012	21.227	0.07	coj1m011-fa12
SN2019dks	B	58674.9636	21.131	0.144	lsc1m005-fa15
SN2019dks	B	58683.3511	21.387	0.183	coj1m011-fa12
SN2019dks	B	58683.3561	21.49	0.173	coj1m011-fa12
SN2019dks	V	58586.7558	18.633	0.068	cpt1m010-fa16
SN2019dks	V	58588.4659	18.083	0.064	coj1m003-fa11
SN2019dks	V	58591.8196	17.638	0.041	cpt1m010-fa16
SN2019dks	V	58591.8213	17.741	0.041	cpt1m010-fa16
SN2019dks	V	58592.8827	17.557	0.048	cpt1m010-fa16
SN2019dks	V	58592.8844	17.577	0.049	cpt1m010-fa16
SN2019dks	V	58594.3776	17.563	0.031	coj1m003-fa11
SN2019dks	V	58594.3793	17.539	0.044	coj1m003-fa11
SN2019dks	V	58595.5669	17.487	0.042	coj1m011-fa12
SN2019dks	V	58595.5686	17.498	0.048	coj1m011-fa12
SN2019dks	V	58598.1512	17.391	0.06	lsc1m005-fa15
SN2019dks	V	58600.5516	17.462	0.034	coj1m011-fa12
SN2019dks	V	58600.5533	17.45	0.035	coj1m011-fa12
SN2019dks	V	58600.579	17.449	0.033	coj1m003-fa11
SN2019dks	V	58600.5807	17.467	0.034	coj1m003-fa11
SN2019dks	V	58602.5413	17.497	0.044	coj1m011-fa12
SN2019dks	V	58602.543	17.509	0.044	coj1m011-fa12
SN2019dks	V	58607.491	17.709	0.044	coj1m011-fa12
SN2019dks	V	58607.4927	17.705	0.044	coj1m011-fa12
SN2019dks	V	58611.1472	17.897	0.045	lsc1m005-fa15
SN2019dks	V	58611.1489	17.846	0.045	lsc1m005-fa15
SN2019dks	V	58614.8805	18.097	0.047	cpt1m010-fa16
SN2019dks	V	58614.8822	18.096	0.047	cpt1m010-fa16
SN2019dks	V	58626.9701	18.722	0.035	lsc1m004-fa03
SN2019dks	V	58626.9718	18.736	0.049	lsc1m004-fa03
SN2019dks	V	58633.4189	19.045	0.037	coj1m003-fa11
SN2019dks	V	58633.4206	19.106	0.043	coj1m003-fa11
SN2019dks	V	58639.4018	19.47	0.051	coj1m003-fa11
SN2019dks	V	58639.4035	19.43	0.05	coj1m003-fa11
SN2019dks	V	58648.0137	19.655	0.123	lsc1m005-fa15
SN2019dks	V	58648.0154	19.63	0.117	lsc1m005-fa15
SN2019dks	V	58654.698	19.845	0.053	cpt1m010-fa16
SN2019dks	V	58654.6997	19.864	0.055	cpt1m010-fa16

SN2019dks	V	58660.3982	20.128	0.074	coj1m011-fa12
SN2019dks	V	58660.3999	20.127	0.084	coj1m011-fa12
SN2019dks	V	58660.6992	20.105	0.151	cpt1m010-fa16
SN2019dks	V	58660.7008	19.925	0.123	cpt1m010-fa16
SN2019dks	V	58667.4063	20.301	0.059	coj1m011-fa12
SN2019dks	V	58667.4101	20.199	0.056	coj1m011-fa12
SN2019dks	V	58674.9726	20.169	0.077	lsc1m005-fa15
SN2019dks	V	58683.3612	20.831	0.126	coj1m011-fa12
SN2019dks	V	58683.365	20.705	0.108	coj1m011-fa12
SN2019dks	g	58586.7593	18.555	0.048	cpt1m010-fa16
SN2019dks	g	58586.762	18.565	0.053	cpt1m010-fa16
SN2019dks	g	58588.4678	18.097	0.063	coj1m003-fa11
SN2019dks	g	58588.4704	18.193	0.053	coj1m003-fa11
SN2019dks	g	58591.8231	17.759	0.047	cpt1m010-fa16
SN2019dks	g	58591.8258	17.686	0.047	cpt1m010-fa16
SN2019dks	g	58592.8862	17.569	0.047	cpt1m010-fa16
SN2019dks	g	58592.8888	17.499	0.048	cpt1m010-fa16
SN2019dks	g	58594.3811	17.55	0.053	coj1m003-fa11
SN2019dks	g	58594.3838	17.526	0.052	coj1m003-fa11
SN2019dks	g	58595.5705	17.48	0.067	coj1m011-fa12
SN2019dks	g	58598.153	17.504	0.076	lsc1m005-fa15
SN2019dks	g	58598.1556	17.436	0.051	lsc1m005-fa15
SN2019dks	g	58600.5552	17.487	0.058	coj1m011-fa12
SN2019dks	g	58600.5578	17.491	0.057	coj1m011-fa12
SN2019dks	g	58600.5826	17.48	0.055	coj1m003-fa11
SN2019dks	g	58600.5852	17.467	0.057	coj1m003-fa11
SN2019dks	g	58602.5449	17.538	0.052	coj1m011-fa12
SN2019dks	g	58602.5475	17.542	0.052	coj1m011-fa12
SN2019dks	g	58607.4945	17.79	0.052	coj1m011-fa12
SN2019dks	g	58607.4972	17.775	0.052	coj1m011-fa12
SN2019dks	g	58611.1508	17.998	0.048	lsc1m005-fa15
SN2019dks	g	58611.1534	18.006	0.048	lsc1m005-fa15
SN2019dks	g	58614.8841	18.333	0.048	cpt1m010-fa16
SN2019dks	g	58614.8867	18.304	0.047	cpt1m010-fa16
SN2019dks	g	58621.1525	19.162	0.248	lsc1m005-fa15
SN2019dks	g	58626.9737	19.372	0.047	lsc1m004-fa03
SN2019dks	g	58626.9763	19.343	0.047	lsc1m004-fa03
SN2019dks	g	58633.4225	19.846	0.06	coj1m003-fa11
SN2019dks	g	58633.4251	19.836	0.054	coj1m003-fa11
SN2019dks	g	58639.4054	20.076	0.062	coj1m003-fa11
SN2019dks	g	58639.408	20.132	0.054	coj1m003-fa11
SN2019dks	g	58648.0173	20.46	0.152	lsc1m005-fa15
SN2019dks	g	58648.0199	20.337	0.069	lsc1m005-fa15
SN2019dks	g	58654.7016	20.559	0.052	cpt1m010-fa16
SN2019dks	g	58654.7042	20.442	0.051	cpt1m010-fa16
SN2019dks	g	58660.4017	20.592	0.076	coj1m011-fa12
SN2019dks	g	58660.4044	20.617	0.077	coj1m011-fa12
SN2019dks	g	58660.7027	20.717	0.107	cpt1m010-fa16
SN2019dks	g	58660.7053	20.547	0.088	cpt1m010-fa16
SN2019dks	g	58667.4141	20.76	0.058	coj1m011-fa12
SN2019dks	g	58667.419	20.733	0.058	coj1m011-fa12
SN2019dks	g	58674.9765	20.785	0.075	lsc1m005-fa15
SN2019dks	g	58674.9814	20.593	0.077	lsc1m005-fa15
SN2019dks	g	58683.3689	21.144	0.091	coj1m011-fa12
SN2019dks	g	58683.3738	21.088	0.086	coj1m011-fa12
SN2019dks	r	58586.7648	18.617	0.041	cpt1m010-fa16
SN2019dks	r	58586.7664	18.671	0.039	cpt1m010-fa16
SN2019dks	r	58588.4732	18.303	0.031	coj1m003-fa11
SN2019dks	r	58588.4749	18.299	0.03	coj1m003-fa11
SN2019dks	r	58591.8285	17.746	0.029	cpt1m010-fa16
SN2019dks	r	58591.8302	17.756	0.029	cpt1m010-fa16
SN2019dks	r	58592.8916	17.733	0.034	cpt1m010-fa16
SN2019dks	r	58592.8934	17.768	0.029	cpt1m010-fa16
SN2019dks	r	58594.3866	17.616	0.029	coj1m003-fa11
SN2019dks	r	58594.3883	17.601	0.029	coj1m003-fa11
SN2019dks	r	58595.5759	17.489	0.044	coj1m011-fa12
SN2019dks	r	58595.5776	17.537	0.035	coj1m011-fa12
SN2019dks	r	58598.1584	17.466	0.033	lsc1m005-fa15

SN2019dks	r	58600.5606	17.493	0.037	coj1m011-fa12
SN2019dks	r	58600.5623	17.488	0.034	coj1m011-fa12
SN2019dks	r	58600.588	17.471	0.035	coj1m003-fa11
SN2019dks	r	58600.5897	17.462	0.035	coj1m003-fa11
SN2019dks	r	58602.5503	17.64	0.087	coj1m011-fa12
SN2019dks	r	58602.552	17.526	0.028	coj1m011-fa12
SN2019dks	r	58607.5	17.755	0.028	coj1m011-fa12
SN2019dks	r	58607.5017	17.744	0.028	coj1m011-fa12
SN2019dks	r	58611.1562	17.977	0.028	lsc1m005-fa15
SN2019dks	r	58611.1579	17.961	0.028	lsc1m005-fa15
SN2019dks	r	58614.8895	18.202	0.028	cpt1m010-fa16
SN2019dks	r	58614.8912	18.217	0.029	cpt1m010-fa16
SN2019dks	r	58621.157	18.42	0.207	lsc1m005-fa15
SN2019dks	r	58626.9791	18.429	0.03	lsc1m004-fa03
SN2019dks	r	58626.9808	18.441	0.03	lsc1m004-fa03
SN2019dks	r	58633.4279	18.649	0.03	coj1m003-fa11
SN2019dks	r	58633.4297	18.666	0.03	coj1m003-fa11
SN2019dks	r	58639.4108	18.969	0.03	coj1m003-fa11
SN2019dks	r	58639.4125	18.997	0.032	coj1m003-fa11
SN2019dks	r	58648.0227	19.161	0.041	lsc1m005-fa15
SN2019dks	r	58648.0244	19.328	0.046	lsc1m005-fa15
SN2019dks	r	58654.707	19.564	0.032	cpt1m010-fa16
SN2019dks	r	58654.7087	19.62	0.033	cpt1m010-fa16
SN2019dks	r	58660.4072	19.706	0.052	coj1m011-fa12
SN2019dks	r	58660.4089	19.642	0.052	coj1m011-fa12
SN2019dks	r	58660.7081	19.81	0.087	cpt1m010-fa16
SN2019dks	r	58660.7098	19.733	0.074	cpt1m010-fa16
SN2019dks	r	58667.4241	20.022	0.038	coj1m011-fa12
SN2019dks	r	58667.4279	19.894	0.037	coj1m011-fa12
SN2019dks	r	58674.9866	19.926	0.076	lsc1m005-fa15
SN2019dks	r	58674.9903	20.554	0.201	lsc1m005-fa15
SN2019dks	r	58683.379	20.5	0.086	coj1m011-fa12
SN2019dks	r	58683.3827	20.47	0.088	coj1m011-fa12
SN2019dks	i	58586.7683	18.919	0.051	cpt1m010-fa16
SN2019dks	i	58586.77	18.821	0.051	cpt1m010-fa16
SN2019dks	i	58588.4768	18.456	0.051	coj1m003-fa11
SN2019dks	i	58588.4785	18.447	0.05	coj1m003-fa11
SN2019dks	i	58591.8321	18.125	0.047	cpt1m010-fa16
SN2019dks	i	58591.8338	18.033	0.048	cpt1m010-fa16
SN2019dks	i	58592.8952	17.948	0.049	cpt1m010-fa16
SN2019dks	i	58592.8969	17.959	0.049	cpt1m010-fa16
SN2019dks	i	58594.3902	18.0	0.047	coj1m003-fa11
SN2019dks	i	58594.3919	18.031	0.051	coj1m003-fa11
SN2019dks	i	58595.5795	18.053	0.049	coj1m011-fa12
SN2019dks	i	58595.5812	17.951	0.052	coj1m011-fa12
SN2019dks	i	58600.5659	18.166	0.051	coj1m011-fa12
SN2019dks	i	58602.5539	18.197	0.047	coj1m011-fa12
SN2019dks	i	58602.5556	18.218	0.049	coj1m011-fa12
SN2019dks	i	58607.5036	18.434	0.047	coj1m011-fa12
SN2019dks	i	58607.5053	18.39	0.05	coj1m011-fa12
SN2019dks	i	58611.1597	18.754	0.048	lsc1m005-fa15
SN2019dks	i	58611.1614	18.828	0.048	lsc1m005-fa15
SN2019dks	i	58614.8931	19.085	0.052	cpt1m010-fa16
SN2019dks	i	58614.8948	19.065	0.052	cpt1m010-fa16
SN2019dks	i	58626.9826	18.856	0.05	lsc1m004-fa03
SN2019dks	i	58626.9843	18.846	0.047	lsc1m004-fa03
SN2019dks	i	58633.4315	18.84	0.052	coj1m003-fa11
SN2019dks	i	58633.4332	18.878	0.051	coj1m003-fa11
SN2019dks	i	58639.4144	19.159	0.064	coj1m003-fa11
SN2019dks	i	58639.416	19.195	0.051	coj1m003-fa11
SN2019dks	i	58648.0262	19.698	0.091	lsc1m005-fa15
SN2019dks	i	58648.0279	19.652	0.084	lsc1m005-fa15
SN2019dks	i	58654.7105	19.969	0.072	cpt1m010-fa16
SN2019dks	i	58654.7122	20.405	0.092	cpt1m010-fa16
SN2019dks	i	58660.4108	20.252	0.156	coj1m011-fa12
SN2019dks	i	58660.4125	20.147	0.141	coj1m011-fa12
SN2019dks	i	58660.7117	20.307	0.182	cpt1m010-fa16
SN2019dks	i	58660.7134	20.143	0.174	cpt1m010-fa16

SN2019dks	i	58667.4318	20.494	0.151	coj1m011-fa12
SN2019dks	i	58667.4356	20.246	0.151	coj1m011-fa12
SN2019dks	i	58674.9943	20.868	0.162	lsc1m005-fa15
SN2019dks	i	58683.3867	21.369	0.298	coj1m011-fa12
SN2019dks	i	58683.3905	21.28	0.266	coj1m011-fa12
SN2019gwa	B	58645.4817	18.08	0.048	coj1m011-fa12
SN2019gwa	B	58645.4843	18.091	0.048	coj1m011-fa12
SN2019gwa	B	58648.8249	17.847	0.075	cpt1m013-fa14
SN2019gwa	B	58648.8275	17.878	0.081	cpt1m013-fa14
SN2019gwa	B	58652.5519	17.92	0.048	coj1m003-fa11
SN2019gwa	B	58652.5545	17.96	0.054	coj1m003-fa11
SN2019gwa	B	58657.0524	18.033	0.048	lsc1m005-fa15
SN2019gwa	B	58657.0551	18.038	0.047	lsc1m005-fa15
SN2019gwa	B	58660.5516	18.249	0.044	coj1m011-fa12
SN2019gwa	B	58660.5542	18.254	0.042	coj1m011-fa12
SN2019gwa	B	58665.0932	18.656	0.05	lsc1m005-fa15
SN2019gwa	B	58665.0958	18.662	0.048	lsc1m005-fa15
SN2019gwa	B	58665.1437	18.676	0.051	elp1m008-fa05
SN2019gwa	B	58665.1463	18.689	0.051	elp1m008-fa05
SN2019gwa	B	58669.0177	19.153	0.056	lsc1m005-fa15
SN2019gwa	B	58669.0203	19.144	0.057	lsc1m005-fa15
SN2019gwa	B	58675.8198	20.004	0.155	cpt1m010-fa16
SN2019gwa	B	58675.8225	19.973	0.089	cpt1m010-fa16
SN2019gwa	B	58679.7149	20.206	0.128	cpt1m012-fa06
SN2019gwa	B	58679.7176	20.523	0.16	cpt1m012-fa06
SN2019gwa	V	58645.4871	17.988	0.044	coj1m011-fa12
SN2019gwa	V	58645.4888	17.986	0.044	coj1m011-fa12
SN2019gwa	V	58648.8303	17.74	0.069	cpt1m013-fa14
SN2019gwa	V	58648.832	17.728	0.069	cpt1m013-fa14
SN2019gwa	V	58652.5573	17.757	0.053	coj1m003-fa11
SN2019gwa	V	58652.559	17.866	0.047	coj1m003-fa11
SN2019gwa	V	58657.0579	17.739	0.038	lsc1m005-fa15
SN2019gwa	V	58657.0596	17.759	0.04	lsc1m005-fa15
SN2019gwa	V	58660.557	17.871	0.038	coj1m011-fa12
SN2019gwa	V	58660.5587	17.899	0.04	coj1m011-fa12
SN2019gwa	V	58665.0986	18.105	0.044	lsc1m005-fa15
SN2019gwa	V	58665.1004	18.109	0.044	lsc1m005-fa15
SN2019gwa	V	58665.1491	18.112	0.047	elp1m008-fa05
SN2019gwa	V	58665.1508	18.118	0.047	elp1m008-fa05
SN2019gwa	V	58669.0231	18.37	0.048	lsc1m005-fa15
SN2019gwa	V	58669.0248	18.366	0.047	lsc1m005-fa15
SN2019gwa	V	58675.8252	18.78	0.055	cpt1m010-fa16
SN2019gwa	V	58675.8269	18.726	0.054	cpt1m010-fa16
SN2019gwa	V	58679.7204	18.728	0.056	cpt1m012-fa06
SN2019gwa	V	58679.722	18.94	0.057	cpt1m012-fa06
SN2019vrq	B	58816.5803	16.575	0.065	coj1m011-fa12
SN2019vrq	B	58816.582	16.565	0.064	coj1m011-fa12
SN2019vrq	B	58818.1678	15.99	0.054	elp1m008-fa05
SN2019vrq	B	58818.1695	15.981	0.071	elp1m008-fa05
SN2019vrq	B	58820.0725	15.47	0.065	lsc1m004-fa03
SN2019vrq	B	58820.0742	15.473	0.065	lsc1m004-fa03
SN2019vrq	B	58821.4454	15.123	0.058	coj1m011-fa12
SN2019vrq	B	58821.4471	15.119	0.06	coj1m011-fa12
SN2019vrq	B	58822.9552	14.834	0.072	cpt1m013-fa14
SN2019vrq	B	58822.9569	14.824	0.072	cpt1m013-fa14
SN2019vrq	B	58823.8761	14.731	0.068	cpt1m012-fa06
SN2019vrq	B	58823.8774	14.719	0.068	cpt1m012-fa06
SN2019vrq	B	58824.9176	14.623	0.076	cpt1m013-fa14
SN2019vrq	B	58824.9189	14.62	0.07	cpt1m013-fa14
SN2019vrq	B	58826.0321	14.656	0.042	lsc1m004-fa03
SN2019vrq	B	58826.0335	14.656	0.065	lsc1m004-fa03
SN2019vrq	B	58827.6056	14.511	0.056	coj1m011-fa12
SN2019vrq	B	58827.6069	14.509	0.073	coj1m011-fa12
SN2019vrq	B	58828.8382	14.42	0.055	cpt1m012-fa06
SN2019vrq	B	58828.8396	14.412	0.074	cpt1m012-fa06
SN2019vrq	B	58828.8732	14.404	0.06	cpt1m012-fa06
SN2019vrq	B	58828.8745	14.418	0.065	cpt1m012-fa06
SN2019vrq	B	58829.8834	14.397	0.068	cpt1m012-fa06

SN2019vrq	B	58829.8847	14.401	0.059	cpt1m012-fa06
SN2019vrq	B	58830.9067	14.431	0.072	cpt1m012-fa06
SN2019vrq	B	58830.9081	14.415	0.07	cpt1m012-fa06
SN2019vrq	B	58832.4806	14.491	0.07	coj1m011-fa12
SN2019vrq	B	58832.4819	14.461	0.07	coj1m011-fa12
SN2019vrq	B	58833.8648	14.415	0.081	cpt1m013-fa14
SN2019vrq	B	58833.8662	14.418	0.087	cpt1m013-fa14
SN2019vrq	B	58835.5155	14.562	0.064	coj1m011-fa12
SN2019vrq	B	58835.5168	14.562	0.071	coj1m011-fa12
SN2019vrq	B	58836.9559	14.548	0.053	cpt1m010-fa16
SN2019vrq	B	58836.9572	14.549	0.06	cpt1m010-fa16
SN2019vrq	B	58838.4693	14.668	0.072	coj1m011-fa12
SN2019vrq	B	58838.4707	14.666	0.077	coj1m011-fa12
SN2019vrq	B	58839.8813	14.704	0.063	cpt1m012-fa06
SN2019vrq	B	58839.8827	14.709	0.061	cpt1m012-fa06
SN2019vrq	B	58841.8977	14.841	0.063	cpt1m013-fa14
SN2019vrq	B	58841.899	14.829	0.062	cpt1m013-fa14
SN2019vrq	B	58846.9293	15.338	0.066	cpt1m012-fa06
SN2019vrq	B	58846.9306	15.335	0.065	cpt1m012-fa06
SN2019vrq	B	58849.7886	15.649	0.057	cpt1m012-fa06
SN2019vrq	B	58849.79	15.653	0.066	cpt1m012-fa06
SN2019vrq	B	58852.488	15.995	0.058	coj1m011-fa12
SN2019vrq	B	58852.4894	15.982	0.07	coj1m011-fa12
SN2019vrq	B	58855.7976	16.289	0.061	cpt1m012-fa06
SN2019vrq	B	58855.799	16.27	0.068	cpt1m012-fa06
SN2019vrq	B	58859.092	16.606	0.062	lsc1m009-fa04
SN2019vrq	B	58859.0934	16.6	0.06	lsc1m009-fa04
SN2019vrq	B	58859.9065	16.642	0.053	cpt1m010-fa16
SN2019vrq	B	58859.9078	16.615	0.072	cpt1m010-fa16
SN2019vrq	B	58863.8226	16.928	0.066	cpt1m013-fa14
SN2019vrq	B	58863.8239	16.944	0.119	cpt1m013-fa14
SN2019vrq	B	58863.865	16.94	0.061	cpt1m012-fa06
SN2019vrq	B	58863.8664	16.958	0.061	cpt1m012-fa06
SN2019vrq	B	58869.1158	17.226	0.074	elp1m008-fa05
SN2019vrq	B	58869.1172	17.244	0.073	elp1m008-fa05
SN2019vrq	B	58875.8277	17.447	0.063	cpt1m013-fa14
SN2019vrq	B	58875.8291	17.452	0.061	cpt1m013-fa14
SN2019vrq	B	58881.0639	17.571	0.071	lsc1m004-fa03
SN2019vrq	B	58881.0653	17.584	0.073	lsc1m004-fa03
SN2019vrq	B	58884.7998	17.586	0.072	cpt1m010-fa16
SN2019vrq	B	58884.8024	17.566	0.07	cpt1m010-fa16
SN2019vrq	B	58890.0559	17.708	0.067	lsc1m004-fa03
SN2019vrq	B	58890.0585	17.68	0.064	lsc1m004-fa03
SN2019vrq	B	58896.4588	17.798	0.068	coj1m011-fa12
SN2019vrq	B	58896.4615	17.799	0.074	coj1m011-fa12
SN2019vrq	B	58898.027	17.762	0.05	lsc1m009-fa04
SN2019vrq	B	58898.0296	17.78	0.051	lsc1m009-fa04
SN2019vrq	B	58903.0198	17.87	0.077	lsc1m004-fa03
SN2019vrq	B	58903.0224	17.906	0.078	lsc1m004-fa03
SN2019vrq	B	58909.0629	17.943	0.063	lsc1m009-fa04
SN2019vrq	B	58909.0656	17.955	0.067	lsc1m009-fa04
SN2019vrq	B	58915.0369	18.024	0.074	lsc1m004-fa03
SN2019vrq	B	58915.0395	17.995	0.08	lsc1m004-fa03
SN2019vrq	B	58918.008	18.062	0.088	lsc1m004-fa03
SN2019vrq	B	58918.0107	17.821	0.071	lsc1m004-fa03
SN2019vrq	B	58924.3916	18.228	0.058	coj1m011-fa12
SN2019vrq	B	58924.3943	18.161	0.056	coj1m011-fa12
SN2019vrq	B	58925.761	18.167	0.06	cpt1m012-fa06
SN2019vrq	B	58925.7636	18.174	0.076	cpt1m012-fa06
SN2019vrq	B	58931.7417	18.264	0.057	cpt1m012-fa06
SN2019vrq	B	58931.7443	18.26	0.059	cpt1m012-fa06
SN2019vrq	V	58816.5839	16.547	0.038	coj1m011-fa12
SN2019vrq	V	58816.5852	16.544	0.037	coj1m011-fa12
SN2019vrq	V	58818.1714	15.92	0.034	elp1m008-fa05
SN2019vrq	V	58818.1727	15.923	0.036	elp1m008-fa05
SN2019vrq	V	58820.076	15.379	0.036	lsc1m004-fa03
SN2019vrq	V	58820.0774	15.384	0.034	lsc1m004-fa03
SN2019vrq	V	58821.4489	15.157	0.04	coj1m011-fa12

SN2019vrq	V	58821.4503	15.15	0.04	coj1m011-fa12
SN2019vrq	V	58822.9587	14.858	0.03	cpt1m013-fa14
SN2019vrq	V	58822.9601	14.863	0.034	cpt1m013-fa14
SN2019vrq	V	58823.8789	14.751	0.037	cpt1m012-fa06
SN2019vrq	V	58823.8799	14.745	0.036	cpt1m012-fa06
SN2019vrq	V	58824.9204	14.652	0.035	cpt1m013-fa14
SN2019vrq	V	58824.9214	14.648	0.036	cpt1m013-fa14
SN2019vrq	V	58826.035	14.597	0.035	lsc1m004-fa03
SN2019vrq	V	58826.036	14.586	0.032	lsc1m004-fa03
SN2019vrq	V	58827.6084	14.544	0.034	coj1m011-fa12
SN2019vrq	V	58827.6094	14.507	0.034	coj1m011-fa12
SN2019vrq	V	58828.8411	14.46	0.053	cpt1m012-fa06
SN2019vrq	V	58828.8761	14.427	0.035	cpt1m012-fa06
SN2019vrq	V	58828.8771	14.422	0.036	cpt1m012-fa06
SN2019vrq	V	58829.8862	14.404	0.035	cpt1m012-fa06
SN2019vrq	V	58829.8872	14.418	0.039	cpt1m012-fa06
SN2019vrq	V	58830.9096	14.419	0.039	cpt1m012-fa06
SN2019vrq	V	58832.4834	14.448	0.041	coj1m011-fa12
SN2019vrq	V	58832.4844	14.455	0.04	coj1m011-fa12
SN2019vrq	V	58833.8677	14.382	0.047	cpt1m013-fa14
SN2019vrq	V	58833.8687	14.402	0.039	cpt1m013-fa14
SN2019vrq	V	58835.5183	14.472	0.03	coj1m011-fa12
SN2019vrq	V	58835.5193	14.47	0.033	coj1m011-fa12
SN2019vrq	V	58836.9588	14.464	0.032	cpt1m010-fa16
SN2019vrq	V	58836.9598	14.462	0.031	cpt1m010-fa16
SN2019vrq	V	58838.4722	14.551	0.031	coj1m011-fa12
SN2019vrq	V	58838.4732	14.559	0.038	coj1m011-fa12
SN2019vrq	V	58839.8842	14.566	0.036	cpt1m012-fa06
SN2019vrq	V	58839.8852	14.558	0.033	cpt1m012-fa06
SN2019vrq	V	58841.9005	14.647	0.034	cpt1m013-fa14
SN2019vrq	V	58841.9015	14.65	0.032	cpt1m013-fa14
SN2019vrq	V	58846.9321	14.933	0.031	cpt1m012-fa06
SN2019vrq	V	58846.9331	14.935	0.032	cpt1m012-fa06
SN2019vrq	V	58849.7915	15.09	0.036	cpt1m012-fa06
SN2019vrq	V	58849.7925	15.096	0.04	cpt1m012-fa06
SN2019vrq	V	58852.4909	15.271	0.037	coj1m011-fa12
SN2019vrq	V	58852.4919	15.282	0.032	coj1m011-fa12
SN2019vrq	V	58855.8005	15.394	0.046	cpt1m012-fa06
SN2019vrq	V	58855.8015	15.392	0.048	cpt1m012-fa06
SN2019vrq	V	58859.0949	15.553	0.04	lsc1m009-fa04
SN2019vrq	V	58859.0959	15.564	0.046	lsc1m009-fa04
SN2019vrq	V	58859.9093	15.61	0.05	cpt1m010-fa16
SN2019vrq	V	58859.9104	15.597	0.035	cpt1m010-fa16
SN2019vrq	V	58863.8254	15.737	0.092	cpt1m013-fa14
SN2019vrq	V	58863.8264	15.813	0.062	cpt1m013-fa14
SN2019vrq	V	58863.8679	15.817	0.025	cpt1m012-fa06
SN2019vrq	V	58863.8689	15.801	0.032	cpt1m012-fa06
SN2019vrq	V	58869.1187	16.098	0.037	elp1m008-fa05
SN2019vrq	V	58869.1197	16.094	0.036	elp1m008-fa05
SN2019vrq	V	58875.8306	16.376	0.032	cpt1m013-fa14
SN2019vrq	V	58875.8316	16.367	0.03	cpt1m013-fa14
SN2019vrq	V	58881.0668	16.537	0.041	lsc1m004-fa03
SN2019vrq	V	58881.0678	16.52	0.04	lsc1m004-fa03
SN2019vrq	V	58884.8052	16.626	0.05	cpt1m010-fa16
SN2019vrq	V	58884.8069	16.622	0.035	cpt1m010-fa16
SN2019vrq	V	58890.0613	16.777	0.038	lsc1m004-fa03
SN2019vrq	V	58890.063	16.785	0.042	lsc1m004-fa03
SN2019vrq	V	58896.4643	16.964	0.038	coj1m011-fa12
SN2019vrq	V	58896.466	16.953	0.041	coj1m011-fa12
SN2019vrq	V	58898.0324	16.979	0.036	lsc1m009-fa04
SN2019vrq	V	58898.0341	16.966	0.039	lsc1m009-fa04
SN2019vrq	V	58903.0252	17.078	0.034	lsc1m004-fa03
SN2019vrq	V	58903.0269	17.087	0.036	lsc1m004-fa03
SN2019vrq	V	58909.0684	17.248	0.046	lsc1m009-fa04
SN2019vrq	V	58909.0701	17.226	0.05	lsc1m009-fa04
SN2019vrq	V	58915.0423	17.379	0.039	lsc1m004-fa03
SN2019vrq	V	58915.044	17.361	0.038	lsc1m004-fa03
SN2019vrq	V	58918.0135	17.438	0.05	lsc1m004-fa03

SN2019vrq	V	58918.0151	17.362	0.044	lsc1m004-fa03
SN2019vrq	V	58925.7664	17.625	0.062	cpt1m012-fa06
SN2019vrq	V	58925.7681	17.668	0.096	cpt1m012-fa06
SN2019vrq	V	58931.7471	17.75	0.047	cpt1m012-fa06
SN2019vrq	V	58931.7488	17.724	0.046	cpt1m012-fa06
SN2019vrq	g	58816.5868	16.607	0.05	coj1m011-fa12
SN2019vrq	g	58816.5885	16.61	0.052	coj1m011-fa12
SN2019vrq	g	58818.1742	15.987	0.046	elp1m008-fa05
SN2019vrq	g	58818.176	15.993	0.046	elp1m008-fa05
SN2019vrq	g	58820.0789	15.48	0.05	lsc1m004-fa03
SN2019vrq	g	58820.0806	15.48	0.049	lsc1m004-fa03
SN2019vrq	g	58821.4518	15.166	0.066	coj1m011-fa12
SN2019vrq	g	58821.4535	15.167	0.066	coj1m011-fa12
SN2019vrq	g	58822.9616	14.884	0.043	cpt1m013-fa14
SN2019vrq	g	58822.9633	14.876	0.044	cpt1m013-fa14
SN2019vrq	g	58823.8811	14.789	0.061	cpt1m012-fa06
SN2019vrq	g	58823.8824	14.782	0.056	cpt1m012-fa06
SN2019vrq	g	58824.9226	14.66	0.045	cpt1m013-fa14
SN2019vrq	g	58824.9239	14.673	0.044	cpt1m013-fa14
SN2019vrq	g	58826.0371	14.685	0.053	lsc1m004-fa03
SN2019vrq	g	58826.0385	14.691	0.052	lsc1m004-fa03
SN2019vrq	g	58827.6106	14.579	0.049	coj1m011-fa12
SN2019vrq	g	58828.8462	14.467	0.058	cpt1m012-fa06
SN2019vrq	g	58828.8475	14.473	0.056	cpt1m012-fa06
SN2019vrq	g	58828.8782	14.459	0.052	cpt1m012-fa06
SN2019vrq	g	58828.8796	14.463	0.045	cpt1m012-fa06
SN2019vrq	g	58829.8884	14.458	0.05	cpt1m012-fa06
SN2019vrq	g	58829.8897	14.446	0.052	cpt1m012-fa06
SN2019vrq	g	58832.4856	14.5	0.061	coj1m011-fa12
SN2019vrq	g	58832.487	14.499	0.06	coj1m011-fa12
SN2019vrq	g	58833.8698	14.483	0.063	cpt1m013-fa14
SN2019vrq	g	58833.8712	14.479	0.066	cpt1m013-fa14
SN2019vrq	g	58835.5205	14.6	0.052	coj1m011-fa12
SN2019vrq	g	58835.5219	14.597	0.051	coj1m011-fa12
SN2019vrq	g	58836.9609	14.572	0.047	cpt1m010-fa16
SN2019vrq	g	58836.9623	14.567	0.045	cpt1m010-fa16
SN2019vrq	g	58838.4744	14.684	0.056	coj1m011-fa12
SN2019vrq	g	58838.4757	14.677	0.049	coj1m011-fa12
SN2019vrq	g	58839.8863	14.671	0.056	cpt1m012-fa06
SN2019vrq	g	58839.8877	14.689	0.052	cpt1m012-fa06
SN2019vrq	g	58841.9027	14.784	0.041	cpt1m013-fa14
SN2019vrq	g	58841.904	14.782	0.04	cpt1m013-fa14
SN2019vrq	g	58846.9343	15.162	0.042	cpt1m012-fa06
SN2019vrq	g	58846.9357	15.154	0.043	cpt1m012-fa06
SN2019vrq	g	58849.7936	15.407	0.064	cpt1m012-fa06
SN2019vrq	g	58849.795	15.403	0.061	cpt1m012-fa06
SN2019vrq	g	58852.4931	15.678	0.047	coj1m011-fa12
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SN2019vrq	g	58855.8027	15.934	0.054	cpt1m012-fa06
SN2019vrq	g	58855.804	15.942	0.052	cpt1m012-fa06
SN2019vrq	g	58859.9115	16.278	0.055	cpt1m010-fa16
SN2019vrq	g	58859.9129	16.278	0.057	cpt1m010-fa16
SN2019vrq	g	58863.8276	16.533	0.1	cpt1m013-fa14
SN2019vrq	g	58863.8289	16.548	0.04	cpt1m013-fa14
SN2019vrq	g	58863.8701	16.545	0.04	cpt1m012-fa06
SN2019vrq	g	58863.8714	16.546	0.04	cpt1m012-fa06
SN2019vrq	g	58869.1209	16.847	0.051	elp1m008-fa05
SN2019vrq	g	58869.1222	16.845	0.047	elp1m008-fa05
SN2019vrq	g	58875.8328	17.08	0.042	cpt1m013-fa14
SN2019vrq	g	58875.8341	17.079	0.043	cpt1m013-fa14
SN2019vrq	g	58881.069	17.187	0.05	lsc1m004-fa03
SN2019vrq	g	58881.0703	17.208	0.051	lsc1m004-fa03
SN2019vrq	g	58884.8088	17.254	0.054	cpt1m010-fa16
SN2019vrq	g	58884.8114	17.239	0.061	cpt1m010-fa16
SN2019vrq	g	58890.0649	17.335	0.062	lsc1m004-fa03
SN2019vrq	g	58890.0675	17.333	0.067	lsc1m004-fa03
SN2019vrq	g	58896.4678	17.454	0.052	coj1m011-fa12
SN2019vrq	g	58896.4705	17.433	0.053	coj1m011-fa12

SN2019vrq	g	58902.8065	17.508	0.042	cpt1m013-fa14
SN2019vrq	g	58902.8091	17.497	0.043	cpt1m013-fa14
SN2019vrq	g	58908.4201	17.637	0.05	coj1m011-fa12
SN2019vrq	g	58908.4227	17.627	0.051	coj1m011-fa12
SN2019vrq	g	58918.0182	17.708	0.063	lsc1m004-fa03
SN2019vrq	g	58918.0208	17.664	0.08	lsc1m004-fa03
SN2019vrq	g	58925.7395	17.848	0.06	cpt1m012-fa06
SN2019vrq	g	58925.7421	17.844	0.054	cpt1m012-fa06
SN2019vrq	r	58816.5903	16.561	0.024	coj1m011-fa12
SN2019vrq	r	58816.5917	16.569	0.144	coj1m011-fa12
SN2019vrq	r	58818.1778	15.991	0.02	elp1m008-fa05
SN2019vrq	r	58818.1792	15.996	0.021	elp1m008-fa05
SN2019vrq	r	58820.0824	15.497	0.025	lsc1m004-fa03
SN2019vrq	r	58820.0838	15.495	0.02	lsc1m004-fa03
SN2019vrq	r	58821.4554	15.222	0.025	coj1m011-fa12
SN2019vrq	r	58821.4568	15.214	0.025	coj1m011-fa12
SN2019vrq	r	58822.9652	14.979	0.017	cpt1m013-fa14
SN2019vrq	r	58822.9665	14.975	0.018	cpt1m013-fa14
SN2019vrq	r	58823.884	14.878	0.024	cpt1m012-fa06
SN2019vrq	r	58823.885	14.876	0.023	cpt1m012-fa06
SN2019vrq	r	58824.9254	14.794	0.025	cpt1m013-fa14
SN2019vrq	r	58824.9264	14.783	0.026	cpt1m013-fa14
SN2019vrq	r	58826.04	14.725	0.026	lsc1m004-fa03
SN2019vrq	r	58826.041	14.731	0.028	lsc1m004-fa03
SN2019vrq	r	58827.6135	14.624	0.029	coj1m011-fa12
SN2019vrq	r	58827.6145	14.631	0.024	coj1m011-fa12
SN2019vrq	r	58828.8491	14.573	0.031	cpt1m012-fa06
SN2019vrq	r	58828.8501	14.566	0.033	cpt1m012-fa06
SN2019vrq	r	58828.8811	14.562	0.024	cpt1m012-fa06
SN2019vrq	r	58828.8821	14.559	0.023	cpt1m012-fa06
SN2019vrq	r	58829.8912	14.53	0.022	cpt1m012-fa06
SN2019vrq	r	58829.8922	14.54	0.023	cpt1m012-fa06
SN2019vrq	r	58830.9146	14.512	0.024	cpt1m012-fa06
SN2019vrq	r	58830.9156	14.466	0.026	cpt1m012-fa06
SN2019vrq	r	58832.4885	14.498	0.024	coj1m011-fa12
SN2019vrq	r	58832.4895	14.504	0.025	coj1m011-fa12
SN2019vrq	r	58833.8727	14.496	0.061	cpt1m013-fa14
SN2019vrq	r	58833.8737	14.486	0.026	cpt1m013-fa14
SN2019vrq	r	58835.5234	14.53	0.022	coj1m011-fa12
SN2019vrq	r	58835.5244	14.528	0.024	coj1m011-fa12
SN2019vrq	r	58836.9639	14.556	0.02	cpt1m010-fa16
SN2019vrq	r	58836.9649	14.555	0.019	cpt1m010-fa16
SN2019vrq	r	58838.4773	14.629	0.024	coj1m011-fa12
SN2019vrq	r	58838.4783	14.642	0.022	coj1m011-fa12
SN2019vrq	r	58839.8892	14.683	0.023	cpt1m012-fa06
SN2019vrq	r	58839.8902	14.679	0.021	cpt1m012-fa06
SN2019vrq	r	58841.9055	14.826	0.018	cpt1m013-fa14
SN2019vrq	r	58841.9065	14.809	0.015	cpt1m013-fa14
SN2019vrq	r	58846.9372	15.121	0.02	cpt1m012-fa06
SN2019vrq	r	58846.9382	15.114	0.02	cpt1m012-fa06
SN2019vrq	r	58849.7965	15.202	0.025	cpt1m012-fa06
SN2019vrq	r	58849.7975	15.208	0.026	cpt1m012-fa06
SN2019vrq	r	58852.496	15.281	0.027	coj1m011-fa12
SN2019vrq	r	58852.497	15.266	0.025	coj1m011-fa12
SN2019vrq	r	58855.8055	15.318	0.031	cpt1m012-fa06
SN2019vrq	r	58855.8065	15.307	0.034	cpt1m012-fa06
SN2019vrq	r	58859.0999	15.378	0.021	lsc1m009-fa04
SN2019vrq	r	58859.1009	15.378	0.023	lsc1m009-fa04
SN2019vrq	r	58859.9144	15.419	0.034	cpt1m010-fa16
SN2019vrq	r	58859.9154	15.426	0.044	cpt1m010-fa16
SN2019vrq	r	58863.8304	15.528	0.024	cpt1m013-fa14
SN2019vrq	r	58863.8314	15.551	0.079	cpt1m013-fa14
SN2019vrq	r	58863.8729	15.558	0.019	cpt1m012-fa06
SN2019vrq	r	58863.8739	15.559	0.021	cpt1m012-fa06
SN2019vrq	r	58875.8356	16.165	0.018	cpt1m013-fa14
SN2019vrq	r	58875.8366	16.181	0.019	cpt1m013-fa14
SN2019vrq	r	58881.0718	16.383	0.028	lsc1m004-fa03
SN2019vrq	r	58881.0728	16.364	0.03	lsc1m004-fa03

SN2019vrq	r	58884.8142	16.48	0.064	cpt1m010-fa16
SN2019vrq	r	58884.8159	16.471	0.028	cpt1m010-fa16
SN2019vrq	r	58890.0703	16.68	0.046	lsc1m004-fa03
SN2019vrq	r	58890.072	16.653	0.038	lsc1m004-fa03
SN2019vrq	r	58896.4733	16.864	0.02	coj1m011-fa12
SN2019vrq	r	58896.475	16.873	0.026	coj1m011-fa12
SN2019vrq	r	58902.8119	17.035	0.02	cpt1m013-fa14
SN2019vrq	r	58902.8136	17.053	0.018	cpt1m013-fa14
SN2019vrq	r	58908.4255	17.207	0.027	coj1m011-fa12
SN2019vrq	r	58908.4272	17.229	0.025	coj1m011-fa12
SN2019vrq	r	58918.0236	17.459	0.037	lsc1m004-fa03
SN2019vrq	r	58918.0253	17.51	0.032	lsc1m004-fa03
SN2019vrq	r	58925.7451	17.686	0.024	cpt1m012-fa06
SN2019vrq	r	58925.7468	17.703	0.024	cpt1m012-fa06
SN2019vrq	i	58816.5932	16.712	0.058	coj1m011-fa12
SN2019vrq	i	58816.5946	16.827	0.052	coj1m011-fa12
SN2019vrq	i	58818.1807	16.263	0.045	elp1m008-fa05
SN2019vrq	i	58818.182	16.263	0.047	elp1m008-fa05
SN2019vrq	i	58820.0853	15.764	0.044	lsc1m004-fa03
SN2019vrq	i	58820.0866	15.76	0.042	lsc1m004-fa03
SN2019vrq	i	58821.4583	15.466	0.044	coj1m011-fa12
SN2019vrq	i	58821.4597	15.479	0.044	coj1m011-fa12
SN2019vrq	i	58822.968	15.249	0.056	cpt1m013-fa14
SN2019vrq	i	58822.9693	15.273	0.055	cpt1m013-fa14
SN2019vrq	i	58823.8861	15.174	0.055	cpt1m012-fa06
SN2019vrq	i	58823.8871	15.137	0.054	cpt1m012-fa06
SN2019vrq	i	58824.9276	15.077	0.055	cpt1m013-fa14
SN2019vrq	i	58824.9286	15.083	0.056	cpt1m013-fa14
SN2019vrq	i	58826.0422	15.048	0.049	lsc1m004-fa03
SN2019vrq	i	58826.0432	15.053	0.05	lsc1m004-fa03
SN2019vrq	i	58827.6157	15.064	0.06	coj1m011-fa12
SN2019vrq	i	58827.6167	15.062	0.049	coj1m011-fa12
SN2019vrq	i	58828.8512	15.053	0.072	cpt1m012-fa06
SN2019vrq	i	58828.8833	15.048	0.046	cpt1m012-fa06
SN2019vrq	i	58828.8843	15.059	0.046	cpt1m012-fa06
SN2019vrq	i	58829.8938	15.062	0.054	cpt1m012-fa06
SN2019vrq	i	58829.8948	15.059	0.054	cpt1m012-fa06
SN2019vrq	i	58830.9168	15.11	0.051	cpt1m012-fa06
SN2019vrq	i	58830.9178	15.008	0.066	cpt1m012-fa06
SN2019vrq	i	58832.4907	15.138	0.044	coj1m011-fa12
SN2019vrq	i	58832.4917	15.141	0.044	coj1m011-fa12
SN2019vrq	i	58833.8749	15.178	0.081	cpt1m013-fa14
SN2019vrq	i	58833.8759	15.126	0.071	cpt1m013-fa14
SN2019vrq	i	58835.5255	15.244	0.047	coj1m011-fa12
SN2019vrq	i	58835.5265	15.244	0.047	coj1m011-fa12
SN2019vrq	i	58836.966	15.285	0.05	cpt1m010-fa16
SN2019vrq	i	58836.967	15.283	0.052	cpt1m010-fa16
SN2019vrq	i	58838.4794	15.372	0.046	coj1m011-fa12
SN2019vrq	i	58838.4804	15.363	0.046	coj1m011-fa12
SN2019vrq	i	58839.8914	15.414	0.05	cpt1m012-fa06
SN2019vrq	i	58839.8924	15.412	0.05	cpt1m012-fa06
SN2019vrq	i	58841.9077	15.557	0.044	cpt1m013-fa14
SN2019vrq	i	58841.9087	15.565	0.046	cpt1m013-fa14
SN2019vrq	i	58846.9394	15.832	0.05	cpt1m012-fa06
SN2019vrq	i	58846.9404	15.826	0.05	cpt1m012-fa06
SN2019vrq	i	58849.7987	15.828	0.053	cpt1m012-fa06
SN2019vrq	i	58849.7997	15.838	0.056	cpt1m012-fa06
SN2019vrq	i	58852.4982	15.784	0.048	coj1m011-fa12
SN2019vrq	i	58852.4992	15.792	0.044	coj1m011-fa12
SN2019vrq	i	58855.8077	15.712	0.072	cpt1m012-fa06
SN2019vrq	i	58855.8087	15.698	0.072	cpt1m012-fa06
SN2019vrq	i	58859.1021	15.689	0.065	lsc1m009-fa04
SN2019vrq	i	58859.1031	15.697	0.063	lsc1m009-fa04
SN2019vrq	i	58859.9166	15.694	0.05	cpt1m010-fa16
SN2019vrq	i	58859.9175	15.684	0.052	cpt1m010-fa16
SN2019vrq	i	58863.8326	15.736	0.047	cpt1m013-fa14
SN2019vrq	i	58863.8751	15.738	0.043	cpt1m012-fa06
SN2019vrq	i	58863.8761	15.727	0.044	cpt1m012-fa06

SN2019vrq	i	58875.8378	16.341	0.057	cpt1m013-fa14
SN2019vrq	i	58875.8388	16.346	0.057	cpt1m013-fa14
SN2019vrq	i	58881.074	16.591	0.05	lsc1m004-fa03
SN2019vrq	i	58881.075	16.597	0.051	lsc1m004-fa03
SN2019vrq	i	58884.8177	16.727	0.055	cpt1m010-fa16
SN2019vrq	i	58884.8194	16.713	0.057	cpt1m010-fa16
SN2019vrq	i	58890.0738	16.974	0.062	lsc1m004-fa03
SN2019vrq	i	58890.0755	16.951	0.057	lsc1m004-fa03
SN2019vrq	i	58896.4769	17.172	0.047	coj1m011-fa12
SN2019vrq	i	58896.4786	17.196	0.046	coj1m011-fa12
SN2019vrq	i	58902.8154	17.391	0.055	cpt1m013-fa14
SN2019vrq	i	58902.8171	17.408	0.056	cpt1m013-fa14
SN2019vrq	i	58908.4291	17.614	0.049	coj1m011-fa12
SN2019vrq	i	58908.4308	17.597	0.048	coj1m011-fa12
SN2019vrq	i	58918.0271	17.888	0.062	lsc1m004-fa03
SN2019vrq	i	58918.0288	17.913	0.061	lsc1m004-fa03
SN2019vrq	i	58925.7487	18.146	0.056	cpt1m012-fa06
SN2019vrq	i	58925.7505	18.163	0.083	cpt1m012-fa06

Table B.2: Las Cumbres 91T/99aa-like SNe photometry in standard systems.

SN	Filter	MJD	Magnitude	Magnitude Error
SN2014dl	B	56929.3814	16.458	0.057
SN2014dl	B	56929.3839	16.458	0.061
SN2014dl	B	56932.3744	16.287	0.06
SN2014dl	B	56932.3769	16.276	0.059
SN2014dl	B	56935.0704	16.255	0.048
SN2014dl	B	56937.0705	16.281	0.058
SN2014dl	B	56937.073	16.291	0.057
SN2014dl	B	56940.0746	16.413	0.049
SN2014dl	B	56940.0771	16.418	0.047
SN2014dl	B	56942.0803	16.527	0.055
SN2014dl	B	56942.0828	16.539	0.056
SN2014dl	B	56944.0773	16.645	0.049
SN2014dl	B	56946.0593	16.824	0.05
SN2014dl	B	56946.0618	16.839	0.047
SN2014dl	B	56948.0697	17.07	0.053
SN2014dl	B	56948.0722	17.067	0.054
SN2014dl	V	56929.3866	16.372	0.054
SN2014dl	V	56929.3882	16.367	0.054
SN2014dl	V	56932.3795	16.24	0.048
SN2014dl	V	56932.3811	16.237	0.043
SN2014dl	V	56935.0746	16.176	0.054
SN2014dl	V	56937.0773	16.16	0.049
SN2014dl	V	56940.0813	16.225	0.046
SN2014dl	V	56942.0855	16.27	0.044
SN2014dl	V	56942.0871	16.27	0.043
SN2014dl	V	56944.0825	16.323	0.043
SN2014dl	V	56944.084	16.343	0.044
SN2014dl	V	56946.0644	16.412	0.048
SN2014dl	V	56946.066	16.4	0.049
SN2014dl	V	56948.0749	16.588	0.046
SN2014dl	V	56948.0764	16.57	0.047
SN2014dl	V	56961.0542	17.293	0.055
SN2014dl	g	56929.3899	16.53	0.085
SN2014dl	g	56929.3924	16.537	0.084
SN2014dl	g	56932.3829	16.381	0.077
SN2014dl	g	56932.3854	16.379	0.076
SN2014dl	g	56935.0763	16.304	0.065
SN2014dl	g	56937.079	16.331	0.069
SN2014dl	g	56937.0815	16.332	0.071
SN2014dl	g	56940.0856	16.448	0.074
SN2014dl	g	56942.0888	16.483	0.079
SN2014dl	g	56942.0913	16.493	0.074
SN2014dl	g	56944.0858	16.576	0.07

SN2014dl	g	56944.0883	16.575	0.071
SN2014dl	g	56946.0678	16.701	0.07
SN2014dl	g	56946.0703	16.701	0.071
SN2014dl	g	56948.0782	16.883	0.071
SN2014dl	g	56948.0807	16.868	0.073
SN2014dl	r	56929.395	16.436	0.044
SN2014dl	r	56929.3966	16.442	0.043
SN2014dl	r	56932.388	16.297	0.041
SN2014dl	r	56932.3896	16.316	0.04
SN2014dl	r	56935.0814	16.217	0.037
SN2014dl	r	56935.083	16.23	0.048
SN2014dl	r	56937.0841	16.206	0.048
SN2014dl	r	56937.0857	16.221	0.045
SN2014dl	r	56940.0882	16.246	0.041
SN2014dl	r	56940.0898	16.24	0.043
SN2014dl	r	56942.0939	16.272	0.061
SN2014dl	r	56942.0955	16.285	0.04
SN2014dl	r	56944.0909	16.386	0.04
SN2014dl	r	56944.0925	16.385	0.039
SN2014dl	r	56946.0729	16.456	0.045
SN2014dl	r	56946.0745	16.474	0.045
SN2014dl	r	56948.0833	16.598	0.042
SN2014dl	r	56948.0849	16.598	0.043
SN2014dl	i	56929.3983	16.689	0.077
SN2014dl	i	56929.3999	16.725	0.076
SN2014dl	i	56932.3913	16.666	0.065
SN2014dl	i	56932.3929	16.669	0.064
SN2014dl	i	56935.0847	16.719	0.072
SN2014dl	i	56935.0863	16.726	0.073
SN2014dl	i	56937.0874	16.803	0.075
SN2014dl	i	56940.0915	16.753	0.07
SN2014dl	i	56940.0931	16.746	0.071
SN2014dl	i	56942.0972	16.78	0.068
SN2014dl	i	56942.0988	16.79	0.064
SN2014dl	i	56944.0942	16.888	0.066
SN2014dl	i	56944.0958	16.903	0.065
SN2014dl	i	56946.0762	17.066	0.073
SN2014dl	i	56946.0778	17.033	0.07
SN2014dl	i	56948.0866	17.144	0.067
SN2014dl	i	56948.0882	17.168	0.071
SN2014eg	B	56985.2071	15.886	0.039
SN2014eg	B	56985.21	15.836	0.039
SN2014eg	B	56985.228	15.847	0.04
SN2014eg	B	56985.2309	15.877	0.039
SN2014eg	B	56985.268	15.853	0.047
SN2014eg	B	56985.2709	15.906	0.041
SN2014eg	B	56985.2884	15.884	0.043
SN2014eg	B	56985.2913	15.879	0.039
SN2014eg	B	56988.0248	15.695	0.042
SN2014eg	B	56988.0277	15.699	0.042
SN2014eg	B	56988.0543	15.687	0.039
SN2014eg	B	56988.0572	15.713	0.039
SN2014eg	B	56988.1354	15.652	0.039
SN2014eg	B	56988.1355	15.688	0.039
SN2014eg	B	56988.1382	15.641	0.039
SN2014eg	B	56988.1384	15.692	0.039
SN2014eg	B	56988.162	15.633	0.039
SN2014eg	B	56988.1649	15.638	0.039
SN2014eg	B	56988.1844	15.699	0.039
SN2014eg	B	56988.1873	15.706	0.039
SN2014eg	B	56988.1912	15.61	0.04
SN2014eg	B	56988.1941	15.649	0.039
SN2014eg	B	56988.2146	15.694	0.039
SN2014eg	B	56988.272	15.692	0.039
SN2014eg	B	56988.2749	15.708	0.039
SN2014eg	B	56989.1655	15.8	0.039
SN2014eg	B	56989.1685	15.81	0.039
SN2014eg	B	56991.0969	15.659	0.046

SN2014eg	B	56991.0998	15.687	0.031
SN2014eg	B	56992.0304	15.676	0.043
SN2014eg	B	56992.054	15.681	0.047
SN2014eg	B	56992.0568	15.621	0.076
SN2014eg	B	56992.0919	15.594	0.039
SN2014eg	B	56992.0948	15.597	0.039
SN2014eg	B	56992.109	15.595	0.039
SN2014eg	B	56992.1119	15.602	0.039
SN2014eg	B	56992.1364	15.613	0.043
SN2014eg	B	56992.1393	15.62	0.043
SN2014eg	B	56992.1524	15.581	0.04
SN2014eg	B	56992.1553	15.587	0.04
SN2014eg	B	56993.1569	15.617	0.04
SN2014eg	B	56993.1597	15.627	0.04
SN2014eg	B	56994.1952	15.64	0.039
SN2014eg	B	56994.1981	15.63	0.039
SN2014eg	B	56995.1665	15.786	0.04
SN2014eg	B	56995.1695	15.792	0.04
SN2014eg	B	56995.1969	15.77	0.039
SN2014eg	B	56995.1998	15.762	0.039
SN2014eg	B	56999.1718	15.812	0.04
SN2014eg	B	56999.1746	15.807	0.039
SN2014eg	B	56999.2078	15.825	0.04
SN2014eg	B	57003.1719	16.142	0.039
SN2014eg	B	57003.1748	16.149	0.039
SN2014eg	B	57003.1982	16.156	0.039
SN2014eg	B	57003.2011	16.161	0.038
SN2014eg	B	57003.2412	16.226	0.039
SN2014eg	B	57003.2441	16.222	0.041
SN2014eg	B	57007.1976	16.636	0.039
SN2014eg	B	57007.2005	16.626	0.039
SN2014eg	B	57011.2253	17.134	0.043
SN2014eg	B	57011.2282	17.115	0.039
SN2014eg	B	57015.1918	17.55	0.04
SN2014eg	B	57015.1947	17.58	0.041
SN2014eg	B	57019.0528	18.109	0.049
SN2014eg	B	57019.0557	18.105	0.047
SN2014eg	B	57021.0776	18.01	0.043
SN2014eg	B	57021.0805	17.986	0.046
SN2014eg	B	57027.0372	18.466	0.069
SN2014eg	B	57027.0401	18.418	0.068
SN2014eg	B	57035.1019	18.569	0.044
SN2014eg	B	57035.1048	18.537	0.043
SN2014eg	B	57041.0599	18.842	0.061
SN2014eg	B	57041.0628	18.921	0.05
SN2014eg	B	57041.1012	18.621	0.047
SN2014eg	B	57041.104	18.617	0.048
SN2014eg	B	57042.1274	18.723	0.099
SN2014eg	B	57042.1302	18.804	0.049
SN2014eg	B	57049.0368	18.78	0.047
SN2014eg	B	57049.0397	18.834	0.048
SN2014eg	B	57055.045	18.804	0.061
SN2014eg	B	57055.0546	18.778	0.066
SN2014eg	B	57055.0575	18.781	0.071
SN2014eg	B	57062.0756	19.048	0.058
SN2014eg	B	57062.0784	19.098	0.059
SN2014eg	B	57069.0282	19.227	0.097
SN2014eg	B	57069.031	19.27	0.057
SN2014eg	B	57076.0269	19.249	0.096
SN2014eg	B	57076.0298	19.402	0.108
SN2014eg	B	57083.0207	19.184	0.084
SN2014eg	B	57083.0236	19.106	0.082
SN2014eg	B	57089.0161	19.312	0.11
SN2014eg	B	57089.0189	19.292	0.101
SN2014eg	B	57090.0011	19.418	0.198
SN2014eg	B	57090.0039	19.343	0.145
SN2014eg	B	57091.0009	19.485	0.125
SN2014eg	B	57091.0038	19.322	0.079

SN2014eg	B	57092.999	19.429	0.224
SN2014eg	B	57093.0019	19.521	0.163
SN2014eg	B	57284.3442	20.997	0.299
SN2014eg	V	56985.2134	15.696	0.059
SN2014eg	V	56985.2154	15.693	0.059
SN2014eg	V	56985.2339	15.725	0.057
SN2014eg	V	56985.2359	15.477	0.065
SN2014eg	V	56985.2739	15.743	0.059
SN2014eg	V	56985.2759	15.669	0.059
SN2014eg	V	56985.2943	15.637	0.056
SN2014eg	V	56985.2963	15.635	0.053
SN2014eg	V	56988.0308	15.487	0.058
SN2014eg	V	56988.0327	15.48	0.058
SN2014eg	V	56988.0602	15.482	0.059
SN2014eg	V	56988.0622	15.516	0.059
SN2014eg	V	56988.1412	15.505	0.058
SN2014eg	V	56988.1414	15.48	0.059
SN2014eg	V	56988.1432	15.519	0.058
SN2014eg	V	56988.1433	15.468	0.057
SN2014eg	V	56988.1679	15.513	0.054
SN2014eg	V	56988.1699	15.519	0.059
SN2014eg	V	56988.1903	15.487	0.058
SN2014eg	V	56988.1922	15.488	0.059
SN2014eg	V	56988.1971	15.507	0.059
SN2014eg	V	56988.1991	15.481	0.065
SN2014eg	V	56988.2177	15.671	0.054
SN2014eg	V	56988.2196	15.664	0.055
SN2014eg	V	56988.278	15.468	0.059
SN2014eg	V	56988.2799	15.474	0.054
SN2014eg	V	56989.1734	15.458	0.054
SN2014eg	V	56991.1028	15.38	0.055
SN2014eg	V	56991.1048	15.346	0.041
SN2014eg	V	56992.0334	15.368	0.061
SN2014eg	V	56992.0354	15.362	0.06
SN2014eg	V	56992.0598	15.362	0.05
SN2014eg	V	56992.0618	15.353	0.053
SN2014eg	V	56992.0978	15.36	0.043
SN2014eg	V	56992.0998	15.36	0.043
SN2014eg	V	56992.1149	15.371	0.054
SN2014eg	V	56992.1169	15.355	0.053
SN2014eg	V	56992.1423	15.363	0.054
SN2014eg	V	56992.1443	15.359	0.053
SN2014eg	V	56992.1583	15.368	0.048
SN2014eg	V	56992.1603	15.374	0.042
SN2014eg	V	56993.1628	15.381	0.057
SN2014eg	V	56993.1647	15.381	0.057
SN2014eg	V	56995.1725	15.397	0.05
SN2014eg	V	56995.1745	15.395	0.05
SN2014eg	V	56995.2028	15.513	0.049
SN2014eg	V	56995.2048	15.507	0.048
SN2014eg	V	56999.1777	15.426	0.042
SN2014eg	V	56999.1797	15.418	0.042
SN2014eg	V	56999.2108	15.405	0.049
SN2014eg	V	56999.2128	15.427	0.052
SN2014eg	V	57003.1778	15.626	0.048
SN2014eg	V	57003.1798	15.64	0.055
SN2014eg	V	57003.2041	15.623	0.04
SN2014eg	V	57003.2061	15.635	0.055
SN2014eg	V	57003.2471	15.653	0.052
SN2014eg	V	57003.2491	15.651	0.052
SN2014eg	V	57007.2035	15.918	0.053
SN2014eg	V	57007.2055	15.916	0.053
SN2014eg	V	57011.2312	16.134	0.054
SN2014eg	V	57011.2331	16.135	0.059
SN2014eg	V	57015.1978	16.351	0.051
SN2014eg	V	57015.1997	16.354	0.051
SN2014eg	V	57021.0835	16.644	0.042
SN2014eg	V	57021.0855	16.65	0.041

SN2014eg	V	57027.0431	17.06	0.054
SN2014eg	V	57027.0451	17.003	0.057
SN2014eg	V	57035.1078	17.415	0.052
SN2014eg	V	57035.1098	17.393	0.054
SN2014eg	V	57041.0658	17.568	0.055
SN2014eg	V	57041.0678	17.553	0.055
SN2014eg	V	57041.107	17.553	0.055
SN2014eg	V	57041.109	17.55	0.055
SN2014eg	V	57042.1332	17.554	0.055
SN2014eg	V	57042.1352	17.577	0.055
SN2014eg	V	57048.0355	17.674	0.058
SN2014eg	V	57049.0427	17.755	0.059
SN2014eg	V	57049.0447	17.736	0.057
SN2014eg	V	57055.0499	17.773	0.05
SN2014eg	V	57055.0519	17.845	0.049
SN2014eg	V	57055.0625	17.937	0.054
SN2014eg	V	57055.0645	17.872	0.059
SN2014eg	V	57062.0833	18.219	0.068
SN2014eg	V	57076.0347	18.564	0.071
SN2014eg	V	57083.0266	18.525	0.084
SN2014eg	V	57083.0285	18.368	0.085
SN2014eg	V	57089.0218	18.732	0.079
SN2014eg	V	57089.0237	18.745	0.079
SN2014eg	V	57090.0068	18.64	0.077
SN2014eg	V	57090.0087	18.676	0.077
SN2014eg	V	57091.0068	18.701	0.068
SN2014eg	V	57091.0089	18.72	0.068
SN2014eg	V	57093.0049	18.644	0.074
SN2014eg	V	57093.0068	18.66	0.074
SN2014eg	g	56985.238	15.939	0.081
SN2014eg	g	56985.2409	15.794	0.07
SN2014eg	g	56985.278	15.847	0.066
SN2014eg	g	56985.2809	15.843	0.065
SN2014eg	g	56985.2984	15.843	0.063
SN2014eg	g	56985.3013	15.846	0.063
SN2014eg	g	56988.0349	15.703	0.065
SN2014eg	g	56988.0643	15.686	0.059
SN2014eg	g	56988.0672	15.742	0.059
SN2014eg	g	56988.1454	15.684	0.065
SN2014eg	g	56988.1483	15.684	0.065
SN2014eg	g	56988.172	15.698	0.066
SN2014eg	g	56988.1749	15.7	0.067
SN2014eg	g	56988.1944	15.697	0.064
SN2014eg	g	56988.1973	15.703	0.065
SN2014eg	g	56988.2013	15.703	0.071
SN2014eg	g	56988.2041	15.689	0.068
SN2014eg	g	56988.2218	15.782	0.062
SN2014eg	g	56988.2246	15.78	0.062
SN2014eg	g	56988.2821	15.673	0.064
SN2014eg	g	56988.285	15.682	0.064
SN2014eg	g	56989.1784	15.622	0.06
SN2014eg	g	56991.1069	15.629	0.06
SN2014eg	g	56991.1098	15.631	0.059
SN2014eg	g	56992.0375	15.616	0.06
SN2014eg	g	56992.0404	15.625	0.062
SN2014eg	g	56992.0639	15.624	0.06
SN2014eg	g	56992.0668	15.621	0.06
SN2014eg	g	56992.1019	15.601	0.071
SN2014eg	g	56992.1048	15.607	0.07
SN2014eg	g	56992.1191	15.63	0.061
SN2014eg	g	56992.1219	15.64	0.061
SN2014eg	g	56992.1464	15.641	0.06
SN2014eg	g	56992.1494	15.634	0.061
SN2014eg	g	56992.1624	15.614	0.07
SN2014eg	g	56992.1653	15.612	0.067
SN2014eg	g	56993.1669	15.645	0.061
SN2014eg	g	56993.1698	15.637	0.061
SN2014eg	g	56995.1766	15.637	0.06

SN2014eg	g	56995.2069	15.767	0.06
SN2014eg	g	56995.2098	15.729	0.06
SN2014eg	g	56999.1818	15.737	0.061
SN2014eg	g	56999.1847	15.735	0.063
SN2014eg	g	56999.2149	15.733	0.061
SN2014eg	g	56999.2178	15.736	0.061
SN2014eg	g	57003.1819	15.952	0.061
SN2014eg	g	57003.2083	15.971	0.064
SN2014eg	g	57003.2112	15.964	0.06
SN2014eg	g	57003.2517	15.977	0.06
SN2014eg	g	57003.2545	15.977	0.059
SN2014eg	g	57007.2076	16.309	0.059
SN2014eg	g	57007.2105	16.312	0.06
SN2014eg	g	57011.2352	16.647	0.061
SN2014eg	g	57011.2381	16.631	0.06
SN2014eg	g	57015.2018	16.985	0.061
SN2014eg	g	57015.2047	17.005	0.061
SN2014eg	g	57019.0627	17.464	0.064
SN2014eg	g	57019.0656	17.447	0.062
SN2014eg	g	57021.0876	17.5	0.06
SN2014eg	g	57021.0905	17.489	0.059
SN2014eg	g	57027.0473	17.857	0.061
SN2014eg	g	57027.0502	17.916	0.063
SN2014eg	g	57035.1119	18.142	0.061
SN2014eg	g	57035.1148	18.133	0.061
SN2014eg	g	57041.0699	18.188	0.062
SN2014eg	g	57041.0728	18.191	0.062
SN2014eg	g	57041.1111	18.235	0.061
SN2014eg	g	57041.114	18.243	0.061
SN2014eg	g	57042.1373	18.291	0.063
SN2014eg	g	57042.1402	18.294	0.062
SN2014eg	g	57049.0468	18.388	0.061
SN2014eg	g	57049.0497	18.387	0.061
SN2014eg	g	57055.0667	18.466	0.062
SN2014eg	g	57055.0696	18.508	0.061
SN2014eg	g	57062.0854	18.613	0.071
SN2014eg	g	57062.0883	18.669	0.069
SN2014eg	g	57076.0368	18.9	0.073
SN2014eg	g	57076.0396	18.811	0.073
SN2014eg	g	57083.0306	18.902	0.08
SN2014eg	g	57083.0335	18.844	0.075
SN2014eg	g	57089.0257	18.96	0.076
SN2014eg	g	57089.0285	18.969	0.074
SN2014eg	g	57090.0256	18.96	0.069
SN2014eg	g	57090.0283	19.026	0.068
SN2014eg	g	57284.3729	20.58	0.119
SN2014eg	g	57284.3768	20.724	0.132
SN2014eg	g	57285.0479	20.289	0.261
SN2014eg	g	57672.5725	22.191	0.266
SN2014eg	r	56985.3043	15.735	0.038
SN2014eg	r	56985.3062	15.734	0.036
SN2014eg	r	56988.0702	15.596	0.029
SN2014eg	r	56988.0722	15.603	0.032
SN2014eg	r	56988.1457	15.578	0.048
SN2014eg	r	56988.1477	15.577	0.047
SN2014eg	r	56988.1513	15.56	0.045
SN2014eg	r	56988.1533	15.568	0.044
SN2014eg	r	56988.1779	15.572	0.044
SN2014eg	r	56988.1799	15.577	0.046
SN2014eg	r	56988.2003	15.647	0.045
SN2014eg	r	56988.2023	15.646	0.053
SN2014eg	r	56988.2072	15.569	0.044
SN2014eg	r	56988.2091	15.565	0.044
SN2014eg	r	56988.2277	15.529	0.032
SN2014eg	r	56988.2296	15.528	0.032
SN2014eg	r	56988.2879	15.567	0.042
SN2014eg	r	56988.2899	15.57	0.042
SN2014eg	r	56989.1814	15.472	0.031

SN2014eg	r	56989.1834	15.469	0.033
SN2014eg	r	56991.1128	15.421	0.028
SN2014eg	r	56991.1148	15.418	0.028
SN2014eg	r	56992.0434	15.374	0.029
SN2014eg	r	56992.0453	15.38	0.028
SN2014eg	r	56992.0698	15.38	0.033
SN2014eg	r	56992.0718	15.379	0.034
SN2014eg	r	56992.1078	15.39	0.05
SN2014eg	r	56992.1097	15.388	0.052
SN2014eg	r	56992.125	15.395	0.033
SN2014eg	r	56992.1269	15.398	0.032
SN2014eg	r	56992.1524	15.397	0.033
SN2014eg	r	56992.1544	15.401	0.032
SN2014eg	r	56992.1683	15.38	0.032
SN2014eg	r	56992.1703	15.392	0.051
SN2014eg	r	56993.1728	15.367	0.033
SN2014eg	r	56993.1747	15.369	0.038
SN2014eg	r	56995.1825	15.341	0.035
SN2014eg	r	56995.1846	15.346	0.033
SN2014eg	r	56995.2128	15.356	0.033
SN2014eg	r	56995.2148	15.358	0.032
SN2014eg	r	56999.1877	15.489	0.039
SN2014eg	r	56999.1897	15.47	0.044
SN2014eg	r	56999.2208	15.488	0.036
SN2014eg	r	56999.2228	15.484	0.041
SN2014eg	r	57003.2142	15.772	0.034
SN2014eg	r	57003.2161	15.788	0.033
SN2014eg	r	57003.2576	15.797	0.045
SN2014eg	r	57003.2595	15.807	0.039
SN2014eg	r	57007.2135	16.017	0.031
SN2014eg	r	57007.2155	16.02	0.032
SN2014eg	r	57011.2411	16.051	0.03
SN2014eg	r	57011.2431	16.055	0.032
SN2014eg	r	57015.2077	16.093	0.033
SN2014eg	r	57015.2097	16.091	0.031
SN2014eg	r	57019.0686	16.248	0.034
SN2014eg	r	57019.0706	16.242	0.034
SN2014eg	r	57021.0935	16.26	0.032
SN2014eg	r	57021.0954	16.254	0.033
SN2014eg	r	57027.0552	16.634	0.031
SN2014eg	r	57035.1178	17.084	0.034
SN2014eg	r	57035.1198	17.075	0.033
SN2014eg	r	57041.0775	17.223	0.033
SN2014eg	r	57041.117	17.298	0.034
SN2014eg	r	57041.119	17.296	0.033
SN2014eg	r	57042.1432	17.333	0.031
SN2014eg	r	57042.1452	17.324	0.032
SN2014eg	r	57049.0527	17.516	0.031
SN2014eg	r	57049.0547	17.564	0.032
SN2014eg	r	57055.0726	17.746	0.035
SN2014eg	r	57062.0913	17.966	0.053
SN2014eg	r	57062.0932	18.089	0.05
SN2014eg	r	57076.0426	18.422	0.054
SN2014eg	r	57076.0445	18.524	0.059
SN2014eg	r	57083.0364	18.547	0.049
SN2014eg	r	57083.0384	18.47	0.053
SN2014eg	r	57089.0314	18.629	0.055
SN2014eg	r	57089.0333	18.7	0.057
SN2014eg	r	57090.0313	18.792	0.051
SN2014eg	r	57090.0331	18.737	0.055
SN2014eg	r	57286.2073	21.083	0.271
SN2014eg	r	57286.2113	20.879	0.238
SN2014eg	i	56985.3083	15.92	0.047
SN2014eg	i	56985.3103	15.907	0.048
SN2014eg	i	56988.0743	15.84	0.041
SN2014eg	i	56988.0762	15.827	0.037
SN2014eg	i	56988.1498	15.865	0.061
SN2014eg	i	56988.1517	15.869	0.064

SN2014eg	i	56988.1554	15.838	0.065
SN2014eg	i	56988.1573	15.867	0.07
SN2014eg	i	56988.182	15.851	0.067
SN2014eg	i	56988.184	15.846	0.067
SN2014eg	i	56988.2044	15.848	0.065
SN2014eg	i	56988.2064	15.86	0.059
SN2014eg	i	56988.2113	15.853	0.068
SN2014eg	i	56988.2132	15.843	0.069
SN2014eg	i	56988.2317	15.811	0.058
SN2014eg	i	56988.2337	15.796	0.058
SN2014eg	i	56988.292	15.865	0.056
SN2014eg	i	56988.294	15.864	0.059
SN2014eg	i	56989.1856	15.777	0.059
SN2014eg	i	56989.1877	15.738	0.063
SN2014eg	i	56991.1168	15.81	0.041
SN2014eg	i	56991.1188	15.797	0.042
SN2014eg	i	56992.0474	15.799	0.044
SN2014eg	i	56992.0494	15.793	0.042
SN2014eg	i	56992.0739	15.808	0.058
SN2014eg	i	56992.0759	15.811	0.058
SN2014eg	i	56992.1118	15.811	0.06
SN2014eg	i	56992.1138	15.833	0.059
SN2014eg	i	56992.129	15.826	0.057
SN2014eg	i	56992.131	15.818	0.056
SN2014eg	i	56992.1565	15.839	0.058
SN2014eg	i	56992.1585	15.84	0.058
SN2014eg	i	56992.1724	15.818	0.058
SN2014eg	i	56992.1744	15.833	0.057
SN2014eg	i	56993.1768	15.832	0.059
SN2014eg	i	56993.1788	15.821	0.056
SN2014eg	i	56995.2169	15.83	0.058
SN2014eg	i	56995.2189	15.834	0.059
SN2014eg	i	56999.1918	16.013	0.058
SN2014eg	i	56999.2249	15.99	0.058
SN2014eg	i	56999.2269	16.027	0.054
SN2014eg	i	57003.2182	16.323	0.059
SN2014eg	i	57003.2616	16.348	0.059
SN2014eg	i	57003.2636	16.39	0.078
SN2014eg	i	57007.2176	16.489	0.058
SN2014eg	i	57007.2196	16.489	0.059
SN2014eg	i	57011.2452	16.344	0.039
SN2014eg	i	57011.2471	16.384	0.039
SN2014eg	i	57015.2118	16.262	0.059
SN2014eg	i	57015.2138	16.232	0.059
SN2014eg	i	57019.0726	16.26	0.059
SN2014eg	i	57019.0746	16.262	0.059
SN2014eg	i	57021.0975	16.258	0.058
SN2014eg	i	57021.0995	16.254	0.058
SN2014eg	i	57027.0574	16.569	0.043
SN2014eg	i	57027.0595	16.577	0.047
SN2014eg	i	57035.1219	17.097	0.056
SN2014eg	i	57035.1238	17.077	0.056
SN2014eg	i	57041.1211	17.307	0.045
SN2014eg	i	57041.1231	17.369	0.045
SN2014eg	i	57042.1473	17.391	0.045
SN2014eg	i	57042.1493	17.401	0.046
SN2014eg	i	57049.0579	17.67	0.059
SN2014eg	i	57049.0598	17.601	0.06
SN2014eg	i	57055.0767	17.887	0.06
SN2014eg	i	57055.0787	17.894	0.059
SN2014eg	i	57062.0953	18.216	0.076
SN2014eg	i	57062.0972	18.199	0.065
SN2014eg	i	57076.0466	18.737	0.088
SN2014eg	i	57076.0485	18.683	0.085
SN2014eg	i	57083.0404	18.769	0.099
SN2014eg	i	57083.0423	18.834	0.103
SN2014eg	i	57090.0351	19.028	0.101
SN2014eg	i	57090.037	19.043	0.102

SN2014eg	i	57286.2154	19.337	0.112
SN2014eg	i	57286.2193	20.078	0.194
SN2014eg	i	57292.2017	20.345	0.299
SN2014eg	i	57345.3164	20.425	0.255
PS15sv	B	57110.9532	16.775	0.087
PS15sv	B	57110.956	16.759	0.087
PS15sv	B	57114.2824	16.718	0.104
PS15sv	B	57114.2849	16.739	0.087
PS15sv	B	57118.2982	16.789	0.087
PS15sv	B	57118.3007	16.812	0.087
PS15sv	B	57119.2693	16.861	0.092
PS15sv	B	57119.2717	16.933	0.119
PS15sv	B	57123.1716	17.099	0.087
PS15sv	B	57123.1741	17.095	0.086
PS15sv	B	57127.6622	17.575	0.079
PS15sv	B	57127.6647	17.583	0.079
PS15sv	B	57131.2955	18.141	0.087
PS15sv	B	57131.2979	18.085	0.088
PS15sv	B	57135.3532	18.547	0.094
PS15sv	B	57135.3557	18.598	0.095
PS15sv	B	57139.0967	18.8	0.09
PS15sv	B	57139.0993	18.898	0.09
PS15sv	B	57139.6994	18.951	0.11
PS15sv	B	57139.7019	18.912	0.109
PS15sv	B	57153.18	19.955	0.312
PS15sv	B	57157.0802	19.862	0.106
PS15sv	B	57157.0827	19.917	0.103
PS15sv	B	57159.9336	19.694	0.2
PS15sv	B	57160.934	20.039	0.103
PS15sv	B	57160.9378	19.899	0.1
PS15sv	B	57161.0551	19.836	0.104
PS15sv	B	57161.0591	19.875	0.111
PS15sv	B	57161.0678	19.659	0.096
PS15sv	B	57161.0701	20.485	0.258
PS15sv	B	57161.0715	20.014	0.105
PS15sv	B	57161.074	19.935	0.177
PS15sv	B	57161.1308	19.995	0.103
PS15sv	B	57161.1344	19.911	0.1
PS15sv	B	57161.1622	19.829	0.097
PS15sv	B	57161.1659	19.958	0.101
PS15sv	B	57161.2252	19.855	0.098
PS15sv	B	57161.2289	19.786	0.096
PS15sv	B	57161.2567	19.957	0.101
PS15sv	B	57161.2603	19.849	0.099
PS15sv	B	57161.3133	19.848	0.1
PS15sv	B	57161.8431	19.916	0.133
PS15sv	B	57161.847	19.64	0.108
PS15sv	B	57161.9058	19.623	0.102
PS15sv	B	57161.9096	20.139	0.122
PS15sv	B	57161.9128	20.376	0.155
PS15sv	B	57161.9167	19.977	0.115
PS15sv	B	57166.9725	20.729	0.171
PS15sv	B	57167.4029	19.847	0.17
PS15sv	B	57167.4065	20.364	0.285
PS15sv	V	57110.9592	16.716	0.043
PS15sv	V	57110.9608	16.743	0.036
PS15sv	V	57114.2875	16.693	0.037
PS15sv	V	57114.2891	16.699	0.038
PS15sv	V	57118.3033	16.747	0.037
PS15sv	V	57118.3049	16.69	0.037
PS15sv	V	57119.2744	16.896	0.145
PS15sv	V	57123.1768	16.911	0.036
PS15sv	V	57123.1784	16.898	0.036
PS15sv	V	57127.6673	17.247	0.034
PS15sv	V	57127.6689	17.218	0.034
PS15sv	V	57131.3006	17.433	0.038
PS15sv	V	57131.3021	17.483	0.038
PS15sv	V	57135.3583	17.723	0.058

PS15sv	V	57135.3599	17.709	0.058
PS15sv	V	57139.1022	17.907	0.058
PS15sv	V	57139.1039	17.83	0.057
PS15sv	V	57139.7045	17.976	0.052
PS15sv	V	57139.706	17.992	0.067
PS15sv	V	57148.4981	18.2	0.049
PS15sv	V	57148.4996	18.397	0.049
PS15sv	V	57153.1826	18.608	0.101
PS15sv	V	57153.1842	18.522	0.102
PS15sv	V	57157.0854	18.82	0.047
PS15sv	V	57157.087	18.87	0.047
PS15sv	V	57159.9375	18.947	0.053
PS15sv	V	57159.9401	18.804	0.049
PS15sv	V	57160.9418	18.907	0.063
PS15sv	V	57160.9444	18.904	0.062
PS15sv	V	57161.0636	18.948	0.095
PS15sv	V	57161.0664	18.995	0.088
PS15sv	V	57161.0753	18.904	0.047
PS15sv	V	57161.0778	18.879	0.047
PS15sv	V	57161.0783	18.9	0.081
PS15sv	V	57161.0809	18.92	0.078
PS15sv	V	57161.1382	18.755	0.124
PS15sv	V	57161.1407	18.931	0.046
PS15sv	V	57161.1697	18.977	0.047
PS15sv	V	57161.1722	18.944	0.047
PS15sv	V	57161.2328	18.888	0.047
PS15sv	V	57161.2353	18.913	0.047
PS15sv	V	57161.2641	18.898	0.046
PS15sv	V	57161.2666	18.887	0.047
PS15sv	V	57161.3171	18.907	0.047
PS15sv	V	57161.3196	18.977	0.047
PS15sv	V	57161.851	18.906	0.06
PS15sv	V	57161.8538	18.987	0.066
PS15sv	V	57161.8821	18.979	0.067
PS15sv	V	57161.8849	19.331	0.093
PS15sv	V	57161.9205	19.056	0.063
PS15sv	V	57161.9232	18.88	0.049
PS15sv	V	57166.9831	19.161	0.057
PS15sv	V	57167.4103	19.119	0.054
PS15sv	V	57167.4128	19.157	0.057
PS15sv	V	57174.6599	19.628	0.278
PS15sv	g	57110.9626	16.851	0.047
PS15sv	g	57110.9651	16.838	0.047
PS15sv	g	57114.2908	16.794	0.048
PS15sv	g	57114.2933	16.762	0.048
PS15sv	g	57118.3066	16.843	0.047
PS15sv	g	57118.3091	16.828	0.047
PS15sv	g	57123.1801	17.072	0.048
PS15sv	g	57123.1826	17.073	0.048
PS15sv	g	57127.6706	17.427	0.047
PS15sv	g	57127.6731	17.443	0.047
PS15sv	g	57131.3039	17.796	0.048
PS15sv	g	57131.3064	17.79	0.048
PS15sv	g	57135.3616	18.166	0.046
PS15sv	g	57135.3641	18.136	0.047
PS15sv	g	57139.106	18.448	0.048
PS15sv	g	57139.1086	18.453	0.049
PS15sv	g	57139.7078	18.522	0.06
PS15sv	g	57139.7103	18.511	0.059
PS15sv	g	57148.5013	18.909	0.057
PS15sv	g	57148.5038	19.212	0.062
PS15sv	g	57153.1859	19.39	0.106
PS15sv	g	57153.1884	19.088	0.078
PS15sv	g	57157.0888	19.383	0.055
PS15sv	g	57157.0913	19.335	0.053
PS15sv	g	57159.9432	19.488	0.099
PS15sv	g	57159.9469	19.398	0.057
PS15sv	g	57160.9473	19.569	0.053

PS15sv	g	57160.9511	19.483	0.054
PS15sv	g	57161.0692	19.713	0.097
PS15sv	g	57161.0731	19.53	0.085
PS15sv	g	57161.0805	19.503	0.055
PS15sv	g	57161.0837	19.539	0.101
PS15sv	g	57161.0842	19.444	0.054
PS15sv	g	57161.088	19.547	0.084
PS15sv	g	57161.1434	19.555	0.053
PS15sv	g	57161.1471	19.54	0.053
PS15sv	g	57161.1749	19.563	0.054
PS15sv	g	57161.1786	19.568	0.053
PS15sv	g	57161.238	19.459	0.053
PS15sv	g	57161.2416	19.526	0.053
PS15sv	g	57161.2693	19.63	0.055
PS15sv	g	57161.273	19.52	0.053
PS15sv	g	57161.3223	19.501	0.054
PS15sv	g	57161.8579	19.577	0.059
PS15sv	g	57161.8617	19.588	0.06
PS15sv	g	57161.8879	19.327	0.06
PS15sv	g	57161.8917	19.369	0.107
PS15sv	g	57161.9195	19.403	0.055
PS15sv	g	57161.9232	19.549	0.059
PS15sv	g	57161.9261	19.653	0.062
PS15sv	g	57161.9299	19.538	0.057
PS15sv	g	57166.986	19.577	0.058
PS15sv	g	57166.9898	19.679	0.058
PS15sv	g	57167.4154	19.64	0.059
PS15sv	g	57167.4191	19.643	0.103
PS15sv	r	57110.9686	16.848	0.04
PS15sv	r	57110.9702	16.849	0.04
PS15sv	r	57114.2959	16.768	0.04
PS15sv	r	57114.2975	16.742	0.04
PS15sv	r	57118.3121	16.779	0.041
PS15sv	r	57118.3138	16.77	0.046
PS15sv	r	57119.2828	16.773	0.044
PS15sv	r	57119.2844	16.768	0.041
PS15sv	r	57123.1853	16.953	0.04
PS15sv	r	57123.1869	16.961	0.04
PS15sv	r	57127.6773	17.28	0.041
PS15sv	r	57131.309	17.438	0.041
PS15sv	r	57131.3106	17.499	0.042
PS15sv	r	57135.3668	17.558	0.039
PS15sv	r	57135.3683	17.606	0.039
PS15sv	r	57139.1114	17.606	0.041
PS15sv	r	57139.113	17.606	0.042
PS15sv	r	57139.713	17.673	0.047
PS15sv	r	57139.7145	17.609	0.045
PS15sv	r	57148.5064	17.854	0.048
PS15sv	r	57148.508	17.855	0.044
PS15sv	r	57153.1911	18.154	0.064
PS15sv	r	57157.094	18.42	0.046
PS15sv	r	57157.0955	18.375	0.045
PS15sv	r	57159.951	18.462	0.046
PS15sv	r	57159.9536	18.367	0.047
PS15sv	r	57160.955	18.581	0.045
PS15sv	r	57160.9577	18.549	0.045
PS15sv	r	57161.077	18.596	0.065
PS15sv	r	57161.0796	18.548	0.061
PS15sv	r	57161.088	18.559	0.045
PS15sv	r	57161.0905	18.544	0.045
PS15sv	r	57161.0957	18.608	0.083
PS15sv	r	57161.1509	18.567	0.045
PS15sv	r	57161.1534	18.555	0.045
PS15sv	r	57161.1824	18.535	0.045
PS15sv	r	57161.1849	18.547	0.045
PS15sv	r	57161.2454	18.529	0.044
PS15sv	r	57161.2479	18.503	0.044
PS15sv	r	57161.2768	18.519	0.045

PS15sv	r	57161.2792	18.611	0.046
PS15sv	r	57161.3298	18.91	0.135
PS15sv	r	57161.3323	18.307	0.082
PS15sv	r	57161.8658	18.865	0.077
PS15sv	r	57161.8685	18.624	0.065
PS15sv	r	57161.8958	18.468	0.047
PS15sv	r	57161.8984	18.513	0.048
PS15sv	r	57161.9274	18.551	0.049
PS15sv	r	57161.9301	18.587	0.047
PS15sv	r	57161.9338	18.583	0.047
PS15sv	r	57161.9365	18.51	0.046
PS15sv	r	57166.9938	18.722	0.049
PS15sv	r	57166.9965	18.728	0.05
PS15sv	r	57167.4229	18.76	0.066
PS15sv	r	57167.4254	18.839	0.074
PS15sv	r	57174.675	19.119	0.165
PS15sv	i	57110.9722	17.152	0.131
PS15sv	i	57110.9738	17.105	0.131
PS15sv	i	57114.2992	17.225	0.13
PS15sv	i	57114.3008	17.225	0.131
PS15sv	i	57118.3165	17.21	0.14
PS15sv	i	57119.2861	17.236	0.165
PS15sv	i	57119.2876	17.249	0.174
PS15sv	i	57123.1886	17.58	0.131
PS15sv	i	57123.1902	17.597	0.131
PS15sv	i	57127.679	17.847	0.13
PS15sv	i	57127.6805	17.938	0.131
PS15sv	i	57131.3123	17.847	0.134
PS15sv	i	57131.3138	17.861	0.134
PS15sv	i	57135.3701	17.838	0.13
PS15sv	i	57135.3716	17.896	0.131
PS15sv	i	57139.1149	17.719	0.139
PS15sv	i	57139.7162	17.825	0.153
PS15sv	i	57139.7178	17.889	0.144
PS15sv	i	57148.5096	17.936	0.134
PS15sv	i	57148.5112	17.996	0.134
PS15sv	i	57153.1943	18.191	0.177
PS15sv	i	57153.1959	18.126	0.169
PS15sv	i	57157.0972	18.409	0.152
PS15sv	i	57157.0988	18.598	0.16
PS15sv	i	57159.9566	18.383	0.135
PS15sv	i	57160.9605	18.589	0.134
PS15sv	i	57161.0824	18.665	0.182
PS15sv	i	57161.0931	18.652	0.134
PS15sv	i	57161.0956	18.532	0.133
PS15sv	i	57161.156	18.65	0.134
PS15sv	i	57161.1585	18.754	0.135
PS15sv	i	57161.1876	18.554	0.133
PS15sv	i	57161.1901	18.66	0.134
PS15sv	i	57161.2505	18.616	0.134
PS15sv	i	57161.253	18.769	0.135
PS15sv	i	57161.2819	18.646	0.134
PS15sv	i	57161.2844	18.616	0.134
PS15sv	i	57161.3375	19.036	0.179
PS15sv	i	57161.8714	18.471	0.156
PS15sv	i	57161.9015	18.418	0.138
PS15sv	i	57161.933	18.833	0.14
PS15sv	i	57161.9396	18.599	0.136
PS15sv	i	57166.9995	18.889	0.139
PS15sv	i	57167.428	18.935	0.197
PS15sv	i	57167.4305	18.928	0.18
PS15sv	i	57174.6776	18.268	0.197
LSQ15aae	B	57104.4568	19.092	0.104
LSQ15aae	B	57104.4593	19.157	0.107
LSQ15aae	B	57108.6865	18.536	0.134
LSQ15aae	B	57108.689	18.648	0.1
LSQ15aae	B	57111.9743	18.253	0.062
LSQ15aae	B	57111.9768	18.212	0.064

LSQ15aae	B	57116.3395	18.073	0.06
LSQ15aae	B	57116.3813	18.172	0.061
LSQ15aae	B	57116.3839	18.022	0.06
LSQ15aae	B	57120.1225	18.217	0.061
LSQ15aae	B	57120.1252	18.297	0.061
LSQ15aae	B	57120.3014	18.427	0.066
LSQ15aae	B	57120.3039	18.287	0.067
LSQ15aae	B	57123.7026	18.398	0.062
LSQ15aae	B	57123.7051	18.462	0.062
LSQ15aae	B	57129.3357	18.843	0.063
LSQ15aae	B	57129.3382	18.898	0.062
LSQ15aae	B	57133.2769	19.48	0.124
LSQ15aae	B	57133.2794	19.337	0.122
LSQ15aae	B	57137.3088	19.67	0.073
LSQ15aae	B	57137.3113	19.772	0.169
LSQ15aae	B	57141.3475	20.133	0.083
LSQ15aae	B	57141.35	20.334	0.095
LSQ15aae	B	57148.5718	20.203	0.132
LSQ15aae	B	57148.5743	20.12	0.134
LSQ15aae	B	57150.1065	20.309	0.263
LSQ15aae	B	57162.9443	20.97	0.149
LSQ15aae	B	57162.948	21.411	0.164
LSQ15aae	B	57168.2774	21.741	0.222
LSQ15aae	B	57168.281	21.387	0.16
LSQ15aae	V	57104.4619	19.05	0.103
LSQ15aae	V	57104.4635	18.946	0.098
LSQ15aae	V	57108.6917	18.452	0.093
LSQ15aae	V	57108.6932	18.288	0.128
LSQ15aae	V	57111.9795	18.114	0.062
LSQ15aae	V	57111.9811	18.068	0.062
LSQ15aae	V	57116.3447	17.903	0.059
LSQ15aae	V	57116.3464	17.888	0.059
LSQ15aae	V	57116.3866	17.922	0.059
LSQ15aae	V	57116.3882	18.057	0.059
LSQ15aae	V	57120.1299	17.748	0.064
LSQ15aae	V	57120.3065	18.001	0.066
LSQ15aae	V	57120.3081	18.001	0.066
LSQ15aae	V	57123.7077	18.083	0.056
LSQ15aae	V	57123.7093	18.06	0.057
LSQ15aae	V	57129.3409	18.336	0.059
LSQ15aae	V	57129.3424	18.317	0.059
LSQ15aae	V	57133.2821	18.579	0.068
LSQ15aae	V	57133.2836	18.489	0.063
LSQ15aae	V	57137.3139	18.815	0.087
LSQ15aae	V	57137.3155	18.716	0.078
LSQ15aae	V	57141.3526	19.044	0.068
LSQ15aae	V	57141.3542	18.934	0.066
LSQ15aae	V	57148.5769	19.557	0.11
LSQ15aae	V	57148.5785	19.459	0.143
LSQ15aae	V	57150.1166	19.597	0.282
LSQ15aae	V	57154.5105	19.802	0.083
LSQ15aae	V	57154.513	19.61	0.081
LSQ15aae	V	57158.4339	20.063	0.172
LSQ15aae	V	57158.4364	20.197	0.117
LSQ15aae	V	57162.9522	20.046	0.1
LSQ15aae	V	57162.9549	20.326	0.117
LSQ15aae	V	57164.8586	20.033	0.115
LSQ15aae	V	57164.8614	20.138	0.15
LSQ15aae	V	57164.9002	20.362	0.123
LSQ15aae	V	57164.903	20.27	0.119
LSQ15aae	V	57166.877	20.036	0.108
LSQ15aae	V	57166.8797	20.117	0.126
LSQ15aae	V	57167.8841	20.235	0.134
LSQ15aae	V	57167.8867	20.128	0.144
LSQ15aae	V	57168.2848	20.207	0.102
LSQ15aae	V	57168.2873	19.956	0.089
LSQ15aae	V	57168.3799	20.011	0.088
LSQ15aae	V	57168.3824	20.178	0.098

LSQ15aae	g	57104.4652	19.193	0.079
LSQ15aae	g	57104.4677	19.211	0.081
LSQ15aae	g	57108.695	18.564	0.087
LSQ15aae	g	57111.9828	18.239	0.059
LSQ15aae	g	57111.9853	18.293	0.059
LSQ15aae	g	57116.3482	18.099	0.058
LSQ15aae	g	57116.3508	18.189	0.058
LSQ15aae	g	57116.3925	18.092	0.058
LSQ15aae	g	57120.1321	18.219	0.06
LSQ15aae	g	57120.1348	18.244	0.058
LSQ15aae	g	57120.3098	18.209	0.06
LSQ15aae	g	57120.3123	18.323	0.06
LSQ15aae	g	57123.711	18.381	0.059
LSQ15aae	g	57123.7135	18.375	0.059
LSQ15aae	g	57129.3442	18.751	0.058
LSQ15aae	g	57129.3467	18.733	0.058
LSQ15aae	g	57133.2854	19.075	0.078
LSQ15aae	g	57133.2878	19.027	0.065
LSQ15aae	g	57137.3172	19.32	0.083
LSQ15aae	g	57137.3196	19.277	0.061
LSQ15aae	g	57141.3559	19.783	0.064
LSQ15aae	g	57141.3584	19.614	0.063
LSQ15aae	g	57154.5157	20.589	0.083
LSQ15aae	g	57154.5193	20.422	0.081
LSQ15aae	g	57158.439	20.613	0.105
LSQ15aae	g	57158.4427	20.381	0.09
LSQ15aae	g	57162.9577	20.785	0.086
LSQ15aae	g	57162.9614	20.694	0.082
LSQ15aae	g	57164.906	20.857	0.095
LSQ15aae	g	57164.9099	20.985	0.114
LSQ15aae	g	57166.8826	20.832	0.115
LSQ15aae	g	57166.8864	20.96	0.127
LSQ15aae	g	57167.8895	20.931	0.112
LSQ15aae	g	57167.8932	20.938	0.225
LSQ15aae	g	57168.2899	20.582	0.08
LSQ15aae	g	57168.2936	20.84	0.088
LSQ15aae	g	57168.3851	20.939	0.093
LSQ15aae	g	57168.3887	20.8	0.085
LSQ15aae	r	57104.4704	18.913	0.1
LSQ15aae	r	57104.472	19.008	0.111
LSQ15aae	r	57108.7001	18.437	0.11
LSQ15aae	r	57108.7017	18.327	0.091
LSQ15aae	r	57111.988	18.113	0.055
LSQ15aae	r	57111.9896	18.024	0.059
LSQ15aae	r	57116.3537	17.841	0.054
LSQ15aae	r	57116.3553	17.781	0.054
LSQ15aae	r	57116.3955	18.013	0.055
LSQ15aae	r	57116.3971	17.971	0.056
LSQ15aae	r	57120.1375	17.85	0.056
LSQ15aae	r	57120.1393	17.807	0.056
LSQ15aae	r	57120.3149	17.877	0.059
LSQ15aae	r	57120.3165	18.053	0.06
LSQ15aae	r	57123.7161	17.927	0.055
LSQ15aae	r	57129.3493	18.278	0.056
LSQ15aae	r	57129.3509	18.278	0.056
LSQ15aae	r	57133.2905	18.407	0.058
LSQ15aae	r	57133.2921	18.462	0.059
LSQ15aae	r	57137.3223	18.555	0.059
LSQ15aae	r	57137.3239	18.525	0.073
LSQ15aae	r	57141.361	18.627	0.058
LSQ15aae	r	57141.3626	18.707	0.059
LSQ15aae	r	57148.5853	18.803	0.153
LSQ15aae	r	57148.5869	19.094	0.167
LSQ15aae	r	57154.5256	19.155	0.064
LSQ15aae	r	57158.4465	19.555	0.083
LSQ15aae	r	57158.4489	19.385	0.103
LSQ15aae	r	57162.9654	19.63	0.079
LSQ15aae	r	57162.9682	19.709	0.077

LSQ15aae	r	57164.8721	19.521	0.247
LSQ15aae	r	57164.9139	19.995	0.103
LSQ15aae	r	57164.9166	20.055	0.094
LSQ15aae	r	57166.8905	19.791	0.09
LSQ15aae	r	57166.8931	19.817	0.11
LSQ15aae	r	57167.8974	19.63	0.073
LSQ15aae	r	57167.9	19.777	0.082
LSQ15aae	r	57168.2973	19.753	0.075
LSQ15aae	r	57168.2998	19.824	0.077
LSQ15aae	r	57168.3925	19.899	0.089
LSQ15aae	r	57168.395	19.942	0.085
LSQ15aae	i	57104.4737	19.094	0.179
LSQ15aae	i	57104.4752	19.011	0.173
LSQ15aae	i	57108.7034	18.588	0.229
LSQ15aae	i	57108.705	18.265	0.135
LSQ15aae	i	57111.9914	18.18	0.092
LSQ15aae	i	57111.993	18.243	0.093
LSQ15aae	i	57116.3574	18.216	0.091
LSQ15aae	i	57116.4005	18.215	0.093
LSQ15aae	i	57120.3182	18.446	0.109
LSQ15aae	i	57120.3197	18.327	0.102
LSQ15aae	i	57123.7194	18.442	0.094
LSQ15aae	i	57123.7209	18.384	0.092
LSQ15aae	i	57129.3526	18.782	0.099
LSQ15aae	i	57129.3542	18.79	0.097
LSQ15aae	i	57133.2938	18.973	0.112
LSQ15aae	i	57133.2953	18.697	0.099
LSQ15aae	i	57137.3256	18.709	0.132
LSQ15aae	i	57137.3271	18.569	0.132
LSQ15aae	i	57141.3643	18.766	0.098
LSQ15aae	i	57141.3658	18.984	0.104
LSQ15aae	i	57148.5886	18.942	0.225
LSQ15aae	i	57148.5902	19.001	0.293
LSQ15aae	i	57154.5282	19.124	0.105
LSQ15aae	i	57154.5307	19.104	0.102
LSQ15aae	i	57158.4541	18.992	0.143
LSQ15aae	i	57162.9711	19.594	0.123
LSQ15aae	i	57164.9194	19.905	0.15
LSQ15aae	i	57166.8968	20.221	0.266
LSQ15aae	i	57167.9028	19.7	0.134
LSQ15aae	i	57168.3025	19.873	0.139
LSQ15aae	i	57168.3977	19.552	0.12
LSQ15aae	i	57168.4002	19.811	0.134
SN2016gcl	B	57641.2295	16.825	0.039
SN2016gcl	B	57641.2323	16.815	0.036
SN2016gcl	B	57645.4169	16.401	0.038
SN2016gcl	B	57645.4197	16.408	0.038
SN2016gcl	B	57650.5698	16.424	0.039
SN2016gcl	B	57650.5725	16.408	0.038
SN2016gcl	B	57652.2016	16.476	0.037
SN2016gcl	B	57652.2044	16.479	0.04
SN2016gcl	B	57656.1943	16.582	0.043
SN2016gcl	B	57656.1971	16.579	0.042
SN2016gcl	B	57660.1637	16.842	0.043
SN2016gcl	B	57660.1665	16.841	0.044
SN2016gcl	B	57664.3635	17.157	0.04
SN2016gcl	B	57664.3663	17.163	0.037
SN2016gcl	B	57665.368	17.273	0.04
SN2016gcl	B	57665.3708	17.281	0.034
SN2016gcl	B	57669.1243	17.687	0.038
SN2016gcl	B	57669.1271	17.655	0.04
SN2016gcl	B	57673.295	18.115	0.055
SN2016gcl	B	57673.2977	18.067	0.055
SN2016gcl	B	57675.1249	18.252	0.117
SN2016gcl	B	57675.1276	18.356	0.114
SN2016gcl	B	57681.0974	18.604	0.051
SN2016gcl	B	57681.1001	18.699	0.048
SN2016gcl	B	57682.085	18.615	0.052

SN2016gcl	B	57682.0878	18.606	0.054
SN2016gcl	B	57683.0631	18.852	0.059
SN2016gcl	B	57683.0659	18.91	0.058
SN2016gcl	B	57687.0532	18.911	0.06
SN2016gcl	B	57687.056	18.94	0.059
SN2016gcl	B	57687.0947	19.025	0.047
SN2016gcl	B	57687.0986	19.015	0.051
SN2016gcl	B	57693.2466	19.257	0.052
SN2016gcl	B	57693.2506	19.235	0.051
SN2016gcl	B	57699.2638	19.39	0.064
SN2016gcl	B	57699.2677	19.427	0.062
SN2016gcl	B	57700.2294	19.318	0.061
SN2016gcl	B	57700.2334	19.47	0.069
SN2016gcl	B	57706.1669	19.38	0.12
SN2016gcl	B	57706.1708	19.482	0.156
SN2016gcl	B	57712.2122	19.56	0.052
SN2016gcl	B	57712.2161	19.6	0.058
SN2016gcl	B	57719.2399	19.762	0.098
SN2016gcl	B	57730.2021	19.557	0.266
SN2016gcl	B	57732.178	20.009	0.158
SN2016gcl	B	57732.182	19.924	0.178
SN2016gcl	B	57738.0375	19.812	0.084
SN2016gcl	B	57738.0426	20.06	0.077
SN2016gcl	B	57738.1912	19.661	0.17
SN2016gcl	B	57748.1214	20.061	0.079
SN2016gcl	B	57748.1265	19.952	0.077
SN2016gcl	B	57758.0934	20.437	0.132
SN2016gcl	B	57758.0986	20.347	0.133
SN2016gcl	B	57759.0974	20.291	0.135
SN2016gcl	B	57759.1025	20.283	0.138
SN2016gcl	B	57770.0566	20.494	0.136
SN2016gcl	B	57778.0611	20.435	0.227
SN2016gcl	V	57641.2352	16.764	0.037
SN2016gcl	V	57641.2371	16.752	0.04
SN2016gcl	V	57645.4226	16.409	0.036
SN2016gcl	V	57645.4245	16.423	0.036
SN2016gcl	V	57650.5755	16.378	0.036
SN2016gcl	V	57650.5773	16.37	0.036
SN2016gcl	V	57652.2073	16.368	0.035
SN2016gcl	V	57652.2091	16.379	0.034
SN2016gcl	V	57656.2	16.353	0.037
SN2016gcl	V	57656.2018	16.366	0.037
SN2016gcl	V	57660.1694	16.599	0.028
SN2016gcl	V	57660.1712	16.631	0.032
SN2016gcl	V	57664.3693	16.881	0.034
SN2016gcl	V	57664.3712	16.862	0.033
SN2016gcl	V	57665.3737	16.926	0.034
SN2016gcl	V	57665.3756	16.927	0.032
SN2016gcl	V	57669.13	17.089	0.037
SN2016gcl	V	57669.1319	17.105	0.034
SN2016gcl	V	57673.3007	17.323	0.039
SN2016gcl	V	57673.3026	17.332	0.039
SN2016gcl	V	57675.1306	17.379	0.061
SN2016gcl	V	57675.1324	17.32	0.062
SN2016gcl	V	57680.1084	17.496	0.046
SN2016gcl	V	57680.1103	17.522	0.05
SN2016gcl	V	57681.1032	17.521	0.038
SN2016gcl	V	57681.105	17.545	0.042
SN2016gcl	V	57682.0907	17.594	0.034
SN2016gcl	V	57682.0925	17.634	0.032
SN2016gcl	V	57683.0688	17.644	0.032
SN2016gcl	V	57683.0707	17.644	0.03
SN2016gcl	V	57687.059	17.906	0.038
SN2016gcl	V	57687.0608	17.948	0.039
SN2016gcl	V	57687.1027	17.934	0.028
SN2016gcl	V	57687.1055	17.946	0.035
SN2016gcl	V	57693.2547	18.292	0.044
SN2016gcl	V	57693.2575	18.315	0.04

SN2016gcl	V	57699.2718	18.462	0.04
SN2016gcl	V	57699.2746	18.572	0.046
SN2016gcl	V	57700.2375	18.499	0.048
SN2016gcl	V	57700.2403	18.514	0.051
SN2016gcl	V	57706.1749	18.67	0.077
SN2016gcl	V	57706.1777	18.771	0.083
SN2016gcl	V	57712.2203	18.858	0.041
SN2016gcl	V	57712.223	18.881	0.042
SN2016gcl	V	57719.248	19.032	0.084
SN2016gcl	V	57728.1993	19.284	0.081
SN2016gcl	V	57728.2025	19.247	0.081
SN2016gcl	V	57732.1861	19.471	0.133
SN2016gcl	V	57732.1889	19.555	0.137
SN2016gcl	V	57738.0479	19.502	0.055
SN2016gcl	V	57738.0518	19.476	0.05
SN2016gcl	V	57738.1993	19.16	0.127
SN2016gcl	V	57738.2021	19.636	0.186
SN2016gcl	V	57748.1318	19.706	0.069
SN2016gcl	V	57748.1357	19.79	0.074
SN2016gcl	V	57758.1039	20.082	0.123
SN2016gcl	V	57758.108	19.9	0.115
SN2016gcl	V	57759.1078	19.976	0.126
SN2016gcl	V	57759.1118	19.937	0.136
SN2016gcl	V	57769.0548	20.065	0.127
SN2016gcl	V	57769.0832	20.001	0.115
SN2016gcl	V	57770.0619	20.069	0.086
SN2016gcl	V	57770.0658	20.051	0.09
SN2016gcl	V	57778.0666	20.134	0.158
SN2016gcl	V	57778.0705	20.062	0.143
SN2016gcl	g	57641.2391	16.898	0.048
SN2016gcl	g	57641.2419	16.908	0.05
SN2016gcl	g	57645.4266	16.506	0.052
SN2016gcl	g	57645.4294	16.499	0.052
SN2016gcl	g	57650.5793	16.505	0.051
SN2016gcl	g	57650.5821	16.486	0.052
SN2016gcl	g	57652.2112	16.501	0.049
SN2016gcl	g	57652.2139	16.516	0.048
SN2016gcl	g	57656.2039	16.595	0.046
SN2016gcl	g	57656.2066	16.605	0.046
SN2016gcl	g	57660.1732	16.794	0.044
SN2016gcl	g	57660.176	16.792	0.043
SN2016gcl	g	57664.3732	17.077	0.047
SN2016gcl	g	57664.3761	17.064	0.047
SN2016gcl	g	57665.3776	17.138	0.047
SN2016gcl	g	57665.3804	17.138	0.047
SN2016gcl	g	57669.1338	17.42	0.055
SN2016gcl	g	57669.1366	17.43	0.055
SN2016gcl	g	57673.3046	17.711	0.05
SN2016gcl	g	57673.3074	17.739	0.048
SN2016gcl	g	57675.1344	17.854	0.071
SN2016gcl	g	57675.1372	17.793	0.07
SN2016gcl	g	57681.1072	18.299	0.052
SN2016gcl	g	57681.11	18.292	0.051
SN2016gcl	g	57682.0947	18.332	0.052
SN2016gcl	g	57682.0974	18.333	0.048
SN2016gcl	g	57683.0727	18.427	0.055
SN2016gcl	g	57683.0755	18.4	0.053
SN2016gcl	g	57687.0628	18.694	0.052
SN2016gcl	g	57687.0656	18.646	0.051
SN2016gcl	g	57687.1085	18.684	0.055
SN2016gcl	g	57687.1124	18.696	0.055
SN2016gcl	g	57693.2605	18.993	0.055
SN2016gcl	g	57693.2645	18.957	0.051
SN2016gcl	g	57700.2433	19.091	0.061
SN2016gcl	g	57700.2473	19.2	0.11
SN2016gcl	g	57706.1807	19.394	0.109
SN2016gcl	g	57706.1847	19.246	0.104
SN2016gcl	g	57712.226	19.19	0.062

SN2016gcl	g	57712.23	19.309	0.056
SN2016gcl	g	57732.192	19.56	0.102
SN2016gcl	g	57732.1959	20.026	0.168
SN2016gcl	g	57738.056	19.803	0.054
SN2016gcl	g	57738.0611	19.815	0.055
SN2016gcl	g	57738.205	19.745	0.139
SN2016gcl	g	57738.209	19.9	0.163
SN2016gcl	g	57748.1399	20.057	0.068
SN2016gcl	g	57748.145	19.995	0.072
SN2016gcl	g	57758.1122	20.131	0.109
SN2016gcl	g	57758.1173	20.323	0.134
SN2016gcl	g	57759.116	20.101	0.104
SN2016gcl	g	57759.1211	20.174	0.12
SN2016gcl	g	57770.07	20.372	0.077
SN2016gcl	g	57770.0751	20.296	0.071
SN2016gcl	g	57778.0747	20.625	0.144
SN2016gcl	g	57778.0798	20.651	0.153
SN2016gcl	r	57641.2448	16.888	0.038
SN2016gcl	r	57641.2466	16.898	0.038
SN2016gcl	r	57645.4323	16.542	0.111
SN2016gcl	r	57645.4342	16.524	0.11
SN2016gcl	r	57650.585	16.392	0.039
SN2016gcl	r	57650.5869	16.424	0.038
SN2016gcl	r	57652.2169	16.414	0.037
SN2016gcl	r	57652.2187	16.401	0.04
SN2016gcl	r	57656.2096	16.478	0.039
SN2016gcl	r	57656.2114	16.502	0.04
SN2016gcl	r	57660.1789	16.73	0.039
SN2016gcl	r	57660.1808	16.701	0.038
SN2016gcl	r	57664.379	17.009	0.034
SN2016gcl	r	57664.3809	17.023	0.035
SN2016gcl	r	57665.3833	17.046	0.035
SN2016gcl	r	57665.3852	17.054	0.035
SN2016gcl	r	57669.1395	17.197	0.039
SN2016gcl	r	57669.1414	17.183	0.038
SN2016gcl	r	57673.3103	17.235	0.036
SN2016gcl	r	57673.3122	17.202	0.035
SN2016gcl	r	57675.1401	17.183	0.076
SN2016gcl	r	57675.1419	17.29	0.065
SN2016gcl	r	57681.113	17.243	0.07
SN2016gcl	r	57681.1149	17.266	0.046
SN2016gcl	r	57682.1004	17.305	0.038
SN2016gcl	r	57682.1022	17.288	0.04
SN2016gcl	r	57683.0784	17.355	0.035
SN2016gcl	r	57683.0802	17.344	0.035
SN2016gcl	r	57687.0686	17.59	0.04
SN2016gcl	r	57687.0704	17.64	0.039
SN2016gcl	r	57687.1165	17.559	0.038
SN2016gcl	r	57687.1193	17.549	0.04
SN2016gcl	r	57693.2686	17.937	0.037
SN2016gcl	r	57693.2714	17.889	0.038
SN2016gcl	r	57700.2514	18.253	0.055
SN2016gcl	r	57700.2542	18.277	0.082
SN2016gcl	r	57706.1888	18.385	0.061
SN2016gcl	r	57706.1915	18.544	0.069
SN2016gcl	r	57712.2341	18.592	0.113
SN2016gcl	r	57712.2369	18.59	0.114
SN2016gcl	r	57732.2001	19.271	0.125
SN2016gcl	r	57732.2028	19.006	0.125
SN2016gcl	r	57738.0663	19.344	0.047
SN2016gcl	r	57738.0703	19.393	0.049
SN2016gcl	r	57738.2131	19.4	0.101
SN2016gcl	r	57738.2159	19.122	0.105
SN2016gcl	r	57748.1502	19.562	0.061
SN2016gcl	r	57748.1542	19.715	0.068
SN2016gcl	r	57759.1264	19.884	0.124
SN2016gcl	r	57759.1304	19.882	0.122
SN2016gcl	r	57770.0804	20.125	0.089

SN2016gcl	r	57770.0843	20.173	0.084
SN2016gcl	r	57778.0851	20.62	0.252
SN2016gcl	r	57778.0891	20.364	0.202
SN2016gcl	i	57641.2486	17.056	0.077
SN2016gcl	i	57641.2505	17.145	0.041
SN2016gcl	i	57645.4362	16.996	0.071
SN2016gcl	i	57645.4381	16.996	0.071
SN2016gcl	i	57650.5889	17.093	0.044
SN2016gcl	i	57650.5907	17.119	0.047
SN2016gcl	i	57652.2207	17.154	0.053
SN2016gcl	i	57652.2226	17.16	0.041
SN2016gcl	i	57656.2134	17.22	0.039
SN2016gcl	i	57656.2152	17.215	0.04
SN2016gcl	i	57660.1828	17.474	0.041
SN2016gcl	i	57660.1846	17.484	0.042
SN2016gcl	i	57664.3831	17.853	0.052
SN2016gcl	i	57664.3849	17.832	0.048
SN2016gcl	i	57665.3872	17.88	0.045
SN2016gcl	i	57665.3891	17.848	0.044
SN2016gcl	i	57669.1434	17.972	0.046
SN2016gcl	i	57669.1452	17.9	0.047
SN2016gcl	i	57673.3142	17.78	0.06
SN2016gcl	i	57673.3161	17.814	0.057
SN2016gcl	i	57675.1439	17.743	0.087
SN2016gcl	i	57675.1458	17.975	0.107
SN2016gcl	i	57681.1169	17.652	0.048
SN2016gcl	i	57681.1187	17.619	0.046
SN2016gcl	i	57682.1042	17.574	0.047
SN2016gcl	i	57682.1061	17.618	0.048
SN2016gcl	i	57683.0822	17.661	0.046
SN2016gcl	i	57683.0841	17.686	0.047
SN2016gcl	i	57687.0725	17.785	0.049
SN2016gcl	i	57687.0743	17.751	0.047
SN2016gcl	i	57687.1222	17.787	0.045
SN2016gcl	i	57687.125	17.767	0.042
SN2016gcl	i	57693.2743	18.151	0.047
SN2016gcl	i	57693.2771	18.183	0.044
SN2016gcl	i	57700.2572	18.545	0.064
SN2016gcl	i	57706.1945	18.961	0.131
SN2016gcl	i	57706.1973	18.973	0.133
SN2016gcl	i	57712.2398	19.103	0.083
SN2016gcl	i	57712.2426	19.026	0.081
SN2016gcl	i	57738.0744	20.191	0.141
SN2016gcl	i	57738.0784	20.11	0.115
SN2016gcl	i	57748.1583	20.615	0.244
SN2016gcl	i	57770.0924	20.728	0.233
SN2016hvl	B	57714.1934	15.98	0.067
SN2016hvl	B	57714.1952	15.987	0.067
SN2016hvl	B	57714.5831	16.058	0.092
SN2016hvl	B	57714.585	16.006	0.065
SN2016hvl	B	57715.573	16.069	0.059
SN2016hvl	B	57715.5749	16.078	0.056
SN2016hvl	B	57716.9338	16.148	0.062
SN2016hvl	B	57716.9357	16.16	0.063
SN2016hvl	B	57717.3003	16.175	0.068
SN2016hvl	B	57717.3179	16.192	0.057
SN2016hvl	B	57717.3198	16.207	0.059
SN2016hvl	B	57718.9536	16.308	0.064
SN2016hvl	B	57718.9556	16.318	0.064
SN2016hvl	B	57720.9292	16.51	0.066
SN2016hvl	B	57720.9311	16.508	0.065
SN2016hvl	B	57721.2816	16.548	0.061
SN2016hvl	B	57721.2834	16.544	0.06
SN2016hvl	B	57723.0733	16.741	0.065
SN2016hvl	B	57723.0751	16.738	0.065
SN2016hvl	B	57724.02	16.85	0.067
SN2016hvl	B	57724.0218	16.882	0.066
SN2016hvl	B	57725.0735	17.001	0.067

SN2016hvl	B	57725.0753	16.987	0.067
SN2016hvl	B	57726.159	17.126	0.072
SN2016hvl	B	57726.1609	17.132	0.068
SN2016hvl	B	57726.9013	17.218	0.06
SN2016hvl	B	57726.9031	17.198	0.06
SN2016hvl	B	57728.0722	17.326	0.068
SN2016hvl	B	57728.0741	17.334	0.067
SN2016hvl	B	57729.3333	17.438	0.051
SN2016hvl	B	57729.3351	17.43	0.055
SN2016hvl	B	57730.1444	17.491	0.055
SN2016hvl	B	57730.1471	17.568	0.058
SN2016hvl	B	57730.3322	17.489	0.059
SN2016hvl	B	57730.3341	17.516	0.055
SN2016hvl	B	57733.8833	17.88	0.08
SN2016hvl	B	57733.8861	17.881	0.081
SN2016hvl	B	57739.516	18.253	0.081
SN2016hvl	B	57739.5188	18.234	0.076
SN2016hvl	B	57742.8577	18.416	0.068
SN2016hvl	B	57742.8604	18.382	0.065
SN2016hvl	B	57745.2573	18.442	0.061
SN2016hvl	B	57745.2612	18.475	0.061
SN2016hvl	B	57746.2366	18.507	0.058
SN2016hvl	B	57746.2406	18.516	0.058
SN2016hvl	B	57746.299	18.495	0.061
SN2016hvl	B	57746.303	18.562	0.061
SN2016hvl	B	57746.8468	18.553	0.064
SN2016hvl	B	57746.8507	18.594	0.068
SN2016hvl	B	57747.2054	18.582	0.054
SN2016hvl	B	57747.2093	18.574	0.056
SN2016hvl	B	57747.2816	18.586	0.055
SN2016hvl	B	57753.1114	18.748	0.06
SN2016hvl	B	57753.1154	18.779	0.06
SN2016hvl	B	57757.8167	18.846	0.078
SN2016hvl	B	57757.8206	18.861	0.078
SN2016hvl	B	57757.9101	18.858	0.07
SN2016hvl	B	57757.9141	18.934	0.083
SN2016hvl	B	57759.8649	18.898	0.096
SN2016hvl	B	57759.8688	18.957	0.095
SN2016hvl	B	57760.8684	18.954	0.101
SN2016hvl	B	57760.8724	18.896	0.096
SN2016hvl	B	57761.8057	18.867	0.088
SN2016hvl	B	57761.8096	19.017	0.102
SN2016hvl	B	57769.8267	19.058	0.074
SN2016hvl	B	57769.8307	19.01	0.074
SN2016hvl	B	57770.6239	19.041	0.079
SN2016hvl	B	57770.6278	19.092	0.078
SN2016hvl	B	57778.785	19.195	0.097
SN2016hvl	B	57778.789	19.169	0.082
SN2016hvl	B	57784.7852	19.275	0.083
SN2016hvl	B	57784.7891	19.222	0.078
SN2016hvl	B	57789.8648	19.349	0.142
SN2016hvl	B	57789.8688	19.475	0.165
SN2016hvl	B	57795.8824	19.745	0.258
SN2016hvl	B	57795.8863	19.287	0.171
SN2016hvl	B	57802.5114	19.501	0.077
SN2016hvl	B	57802.5153	19.505	0.081
SN2016hvl	B	57808.2168	19.596	0.073
SN2016hvl	B	57808.2209	19.553	0.075
SN2016hvl	B	57808.5176	19.547	0.087
SN2016hvl	B	57808.5215	19.583	0.088
SN2016hvl	B	57813.8536	19.814	0.101
SN2016hvl	B	57813.8576	19.851	0.11
SN2016hvl	B	57814.7885	19.672	0.065
SN2016hvl	B	57814.7925	19.755	0.063
SN2016hvl	B	57815.786	19.7	0.079
SN2016hvl	B	57815.7899	19.815	0.086
SN2016hvl	B	57821.3904	19.806	0.284
SN2016hvl	B	57821.3944	19.819	0.253

SN2016hvl	B	57827.7893	19.957	0.089
SN2016hvl	B	57827.7932	19.973	0.091
SN2016hvl	B	57834.4302	20.126	0.107
SN2016hvl	B	57834.4353	20.054	0.154
SN2016hvl	B	57835.7887	20.199	0.092
SN2016hvl	B	57835.7939	20.136	0.091
SN2016hvl	B	57842.3721	19.969	0.257
SN2016hvl	B	57842.3772	20.159	0.197
SN2016hvl	B	57848.7272	20.328	0.195
SN2016hvl	V	57714.1973	15.466	0.057
SN2016hvl	V	57714.1991	15.471	0.054
SN2016hvl	V	57714.587	15.478	0.089
SN2016hvl	V	57714.5888	15.476	0.083
SN2016hvl	V	57715.5769	15.496	0.057
SN2016hvl	V	57715.5787	15.497	0.059
SN2016hvl	V	57716.9377	15.502	0.052
SN2016hvl	V	57716.9395	15.508	0.055
SN2016hvl	V	57717.3218	15.551	0.055
SN2016hvl	V	57717.3236	15.549	0.052
SN2016hvl	V	57718.9576	15.571	0.055
SN2016hvl	V	57718.9595	15.568	0.056
SN2016hvl	V	57720.9331	15.666	0.056
SN2016hvl	V	57720.935	15.662	0.053
SN2016hvl	V	57721.2854	15.672	0.08
SN2016hvl	V	57721.2872	15.668	0.08
SN2016hvl	V	57723.0772	15.805	0.051
SN2016hvl	V	57723.079	15.799	0.053
SN2016hvl	V	57724.0238	15.865	0.049
SN2016hvl	V	57724.0257	15.86	0.051
SN2016hvl	V	57725.0773	15.941	0.048
SN2016hvl	V	57725.0792	15.929	0.051
SN2016hvl	V	57726.1629	16.02	0.055
SN2016hvl	V	57726.1647	16.022	0.061
SN2016hvl	V	57726.9052	16.041	0.049
SN2016hvl	V	57726.907	16.037	0.05
SN2016hvl	V	57728.0761	16.081	0.078
SN2016hvl	V	57728.078	16.099	0.077
SN2016hvl	V	57729.3371	16.172	0.049
SN2016hvl	V	57729.339	16.16	0.049
SN2016hvl	V	57730.1503	16.223	0.055
SN2016hvl	V	57730.1521	16.226	0.051
SN2016hvl	V	57730.3361	16.222	0.054
SN2016hvl	V	57730.338	16.219	0.054
SN2016hvl	V	57733.889	16.38	0.055
SN2016hvl	V	57733.8909	16.408	0.056
SN2016hvl	V	57739.5217	16.643	0.058
SN2016hvl	V	57739.5236	16.694	0.065
SN2016hvl	V	57742.8634	16.841	0.056
SN2016hvl	V	57742.8653	16.853	0.049
SN2016hvl	V	57745.2653	16.983	0.077
SN2016hvl	V	57745.2681	16.987	0.077
SN2016hvl	V	57746.2446	17.041	0.055
SN2016hvl	V	57746.2474	17.052	0.059
SN2016hvl	V	57746.8548	17.061	0.048
SN2016hvl	V	57746.8576	17.069	0.05
SN2016hvl	V	57747.2134	17.1	0.05
SN2016hvl	V	57747.2162	17.098	0.048
SN2016hvl	V	57747.2882	17.093	0.056
SN2016hvl	V	57747.2914	17.088	0.052
SN2016hvl	V	57753.1195	17.389	0.051
SN2016hvl	V	57753.1222	17.379	0.057
SN2016hvl	V	57757.8247	17.537	0.058
SN2016hvl	V	57757.8275	17.538	0.058
SN2016hvl	V	57757.9188	17.525	0.057
SN2016hvl	V	57759.873	17.579	0.062
SN2016hvl	V	57759.8757	17.583	0.062
SN2016hvl	V	57760.8765	17.589	0.057
SN2016hvl	V	57760.8793	17.6	0.061

SN2016hvl	V	57761.8138	17.658	0.057
SN2016hvl	V	57761.8165	17.706	0.055
SN2016hvl	V	57769.8348	17.849	0.059
SN2016hvl	V	57769.8376	17.861	0.058
SN2016hvl	V	57770.6319	17.995	0.064
SN2016hvl	V	57770.6347	17.928	0.059
SN2016hvl	V	57778.793	18.074	0.058
SN2016hvl	V	57778.7958	18.068	0.061
SN2016hvl	V	57784.7932	18.286	0.061
SN2016hvl	V	57784.796	18.259	0.06
SN2016hvl	V	57789.8731	18.508	0.087
SN2016hvl	V	57789.8759	18.398	0.08
SN2016hvl	V	57795.8904	18.614	0.101
SN2016hvl	V	57795.8932	18.456	0.097
SN2016hvl	V	57802.5194	18.706	0.061
SN2016hvl	V	57802.5222	18.688	0.063
SN2016hvl	V	57808.225	18.835	0.062
SN2016hvl	V	57808.228	18.798	0.063
SN2016hvl	V	57808.5256	18.881	0.072
SN2016hvl	V	57808.5284	18.886	0.075
SN2016hvl	V	57813.8617	19.029	0.093
SN2016hvl	V	57813.8645	18.955	0.083
SN2016hvl	V	57814.7966	18.976	0.078
SN2016hvl	V	57814.7994	19.013	0.079
SN2016hvl	V	57815.794	18.999	0.06
SN2016hvl	V	57815.7968	19.007	0.06
SN2016hvl	V	57821.3985	19.119	0.148
SN2016hvl	V	57821.4012	19.241	0.157
SN2016hvl	V	57827.7974	19.284	0.067
SN2016hvl	V	57827.8002	19.172	0.067
SN2016hvl	V	57834.4406	19.323	0.081
SN2016hvl	V	57835.7991	19.403	0.07
SN2016hvl	V	57835.8031	19.507	0.078
SN2016hvl	V	57842.3824	19.444	0.096
SN2016hvl	V	57842.3863	19.648	0.108
SN2016hvl	V	57848.7376	19.697	0.164
SN2016hvl	V	57848.7415	19.389	0.168
SN2016hvl	g	57714.2012	15.803	0.07
SN2016hvl	g	57714.203	15.803	0.069
SN2016hvl	g	57714.5908	15.815	0.086
SN2016hvl	g	57714.5927	15.823	0.082
SN2016hvl	g	57715.5808	15.853	0.081
SN2016hvl	g	57715.5826	15.846	0.08
SN2016hvl	g	57716.9416	15.869	0.068
SN2016hvl	g	57716.9435	15.883	0.066
SN2016hvl	g	57717.3257	15.92	0.074
SN2016hvl	g	57717.3275	15.932	0.074
SN2016hvl	g	57718.9254	15.974	0.072
SN2016hvl	g	57718.9273	15.964	0.071
SN2016hvl	g	57718.9616	15.979	0.07
SN2016hvl	g	57718.9634	15.978	0.072
SN2016hvl	g	57720.9371	16.102	0.071
SN2016hvl	g	57720.9389	16.094	0.07
SN2016hvl	g	57721.2893	16.107	0.077
SN2016hvl	g	57721.2911	16.096	0.077
SN2016hvl	g	57723.0811	16.259	0.068
SN2016hvl	g	57723.0829	16.277	0.066
SN2016hvl	g	57724.0278	16.362	0.066
SN2016hvl	g	57724.0296	16.356	0.066
SN2016hvl	g	57725.0813	16.448	0.067
SN2016hvl	g	57725.0831	16.452	0.068
SN2016hvl	g	57726.1667	16.556	0.074
SN2016hvl	g	57726.1686	16.542	0.079
SN2016hvl	g	57726.9091	16.593	0.068
SN2016hvl	g	57726.9109	16.608	0.07
SN2016hvl	g	57728.08	16.688	0.077
SN2016hvl	g	57728.0819	16.691	0.077
SN2016hvl	g	57729.341	16.752	0.081

SN2016hvl	g	57729.3428	16.734	0.081
SN2016hvl	g	57730.1542	16.82	0.083
SN2016hvl	g	57730.1569	16.802	0.082
SN2016hvl	g	57730.34	16.826	0.081
SN2016hvl	g	57730.3418	16.818	0.081
SN2016hvl	g	57733.8929	17.096	0.076
SN2016hvl	g	57733.8957	17.108	0.078
SN2016hvl	g	57739.5256	17.498	0.083
SN2016hvl	g	57739.5284	17.394	0.084
SN2016hvl	g	57742.8673	17.676	0.069
SN2016hvl	g	57742.8701	17.689	0.068
SN2016hvl	g	57745.271	17.82	0.078
SN2016hvl	g	57745.2749	17.815	0.077
SN2016hvl	g	57746.2504	17.853	0.072
SN2016hvl	g	57746.2543	17.853	0.072
SN2016hvl	g	57746.8606	17.902	0.068
SN2016hvl	g	57746.8645	17.898	0.068
SN2016hvl	g	57747.2191	17.878	0.077
SN2016hvl	g	57747.2231	17.881	0.077
SN2016hvl	g	57753.1252	18.113	0.073
SN2016hvl	g	57753.1291	18.119	0.072
SN2016hvl	g	57757.8305	18.267	0.068
SN2016hvl	g	57757.8344	18.228	0.071
SN2016hvl	g	57757.9229	18.247	0.071
SN2016hvl	g	57759.8787	18.324	0.076
SN2016hvl	g	57759.8827	18.298	0.103
SN2016hvl	g	57760.8823	18.227	0.075
SN2016hvl	g	57760.8863	18.359	0.073
SN2016hvl	g	57761.8195	18.38	0.079
SN2016hvl	g	57761.8235	18.367	0.08
SN2016hvl	g	57769.8406	18.514	0.064
SN2016hvl	g	57769.8445	18.49	0.061
SN2016hvl	g	57770.6377	18.504	0.086
SN2016hvl	g	57770.6416	18.494	0.085
SN2016hvl	g	57778.7988	18.655	0.068
SN2016hvl	g	57778.8028	18.644	0.07
SN2016hvl	g	57784.799	18.751	0.071
SN2016hvl	g	57784.803	18.713	0.066
SN2016hvl	g	57789.8789	18.8	0.091
SN2016hvl	g	57789.8829	18.862	0.099
SN2016hvl	g	57795.8962	18.817	0.1
SN2016hvl	g	57795.9002	18.964	0.116
SN2016hvl	g	57802.5252	19.048	0.083
SN2016hvl	g	57802.5291	19.023	0.083
SN2016hvl	g	57808.5314	19.177	0.083
SN2016hvl	g	57808.5353	19.175	0.085
SN2016hvl	g	57813.8675	19.212	0.077
SN2016hvl	g	57813.8714	19.181	0.081
SN2016hvl	g	57814.8024	19.238	0.078
SN2016hvl	g	57814.8063	19.224	0.078
SN2016hvl	g	57815.7998	19.23	0.072
SN2016hvl	g	57815.8038	19.249	0.072
SN2016hvl	g	57821.4042	19.325	0.141
SN2016hvl	g	57821.4082	19.437	0.133
SN2016hvl	g	57827.8032	19.366	0.081
SN2016hvl	g	57827.8071	19.521	0.081
SN2016hvl	g	57835.8072	19.509	0.076
SN2016hvl	g	57835.8124	19.575	0.076
SN2016hvl	g	57842.3905	19.57	0.094
SN2016hvl	g	57842.3956	19.714	0.101
SN2016hvl	g	57848.7457	20.075	0.181
SN2016hvl	r	57714.205	15.362	0.062
SN2016hvl	r	57714.5947	15.347	0.072
SN2016hvl	r	57714.5965	15.346	0.072
SN2016hvl	r	57715.5847	15.389	0.061
SN2016hvl	r	57715.5865	15.396	0.061
SN2016hvl	r	57716.9455	15.426	0.059
SN2016hvl	r	57716.9474	15.424	0.059

SN2016hvl	r	57717.3295	15.432	0.073
SN2016hvl	r	57717.3314	15.44	0.073
SN2016hvl	r	57718.9293	15.52	0.059
SN2016hvl	r	57718.9312	15.514	0.059
SN2016hvl	r	57718.9655	15.507	0.059
SN2016hvl	r	57718.9675	15.515	0.059
SN2016hvl	r	57720.9409	15.633	0.06
SN2016hvl	r	57720.9428	15.642	0.06
SN2016hvl	r	57721.2931	15.656	0.073
SN2016hvl	r	57721.295	15.659	0.074
SN2016hvl	r	57723.085	15.773	0.059
SN2016hvl	r	57723.0868	15.756	0.059
SN2016hvl	r	57724.0317	15.821	0.056
SN2016hvl	r	57724.0335	15.833	0.059
SN2016hvl	r	57725.0851	15.867	0.058
SN2016hvl	r	57725.087	15.864	0.059
SN2016hvl	r	57726.1706	15.889	0.073
SN2016hvl	r	57726.1724	15.898	0.074
SN2016hvl	r	57726.9129	15.925	0.06
SN2016hvl	r	57726.9148	15.915	0.06
SN2016hvl	r	57728.0839	15.937	0.074
SN2016hvl	r	57728.0858	15.936	0.073
SN2016hvl	r	57729.3448	15.987	0.061
SN2016hvl	r	57729.3467	15.988	0.062
SN2016hvl	r	57730.1599	16.005	0.061
SN2016hvl	r	57730.1617	16.009	0.062
SN2016hvl	r	57730.3438	16.002	0.059
SN2016hvl	r	57730.3457	16.009	0.061
SN2016hvl	r	57733.8987	16.108	0.061
SN2016hvl	r	57733.9005	16.091	0.061
SN2016hvl	r	57739.5313	16.287	0.062
SN2016hvl	r	57739.5331	16.27	0.062
SN2016hvl	r	57742.8731	16.416	0.063
SN2016hvl	r	57742.8749	16.413	0.06
SN2016hvl	r	57745.279	16.567	0.073
SN2016hvl	r	57745.2818	16.559	0.073
SN2016hvl	r	57746.2584	16.602	0.072
SN2016hvl	r	57746.2612	16.598	0.073
SN2016hvl	r	57746.8687	16.674	0.059
SN2016hvl	r	57746.8715	16.657	0.059
SN2016hvl	r	57747.2272	16.677	0.074
SN2016hvl	r	57747.23	16.681	0.073
SN2016hvl	r	57747.2959	16.703	0.06
SN2016hvl	r	57753.1332	17.01	0.073
SN2016hvl	r	57753.136	17.013	0.072
SN2016hvl	r	57757.8386	17.232	0.06
SN2016hvl	r	57757.8414	17.242	0.059
SN2016hvl	r	57760.8904	17.366	0.059
SN2016hvl	r	57760.8932	17.357	0.063
SN2016hvl	r	57761.8276	17.421	0.063
SN2016hvl	r	57761.8304	17.39	0.061
SN2016hvl	r	57769.8487	17.68	0.059
SN2016hvl	r	57769.8514	17.667	0.058
SN2016hvl	r	57770.6457	17.697	0.073
SN2016hvl	r	57770.6485	17.679	0.066
SN2016hvl	r	57778.8069	17.942	0.061
SN2016hvl	r	57778.8096	17.975	0.059
SN2016hvl	r	57784.8071	18.124	0.063
SN2016hvl	r	57784.8099	18.138	0.063
SN2016hvl	r	57789.8871	18.237	0.072
SN2016hvl	r	57789.8899	18.299	0.075
SN2016hvl	r	57795.9043	18.468	0.084
SN2016hvl	r	57795.9071	18.394	0.085
SN2016hvl	r	57802.5332	18.717	0.067
SN2016hvl	r	57802.536	18.684	0.068
SN2016hvl	r	57808.5394	18.909	0.075
SN2016hvl	r	57808.5422	18.812	0.07
SN2016hvl	r	57813.8755	18.995	0.093

SN2016hvl	r	57813.8783	19.038	0.129
SN2016hvl	r	57814.8105	19.055	0.075
SN2016hvl	r	57814.8132	19.09	0.075
SN2016hvl	r	57815.8079	19.049	0.075
SN2016hvl	r	57815.8107	19.018	0.075
SN2016hvl	r	57821.4122	19.194	0.132
SN2016hvl	r	57821.415	19.126	0.124
SN2016hvl	r	57827.8112	19.449	0.077
SN2016hvl	r	57827.814	19.441	0.077
SN2016hvl	r	57835.8176	19.678	0.079
SN2016hvl	r	57835.8216	19.566	0.077
SN2016hvl	r	57842.4008	19.622	0.115
SN2016hvl	r	57842.4048	19.735	0.118
SN2016hvl	i	57714.5985	15.725	0.105
SN2016hvl	i	57714.601	15.707	0.121
SN2016hvl	i	57715.5885	15.762	0.083
SN2016hvl	i	57715.5911	15.845	0.083
SN2016hvl	i	57716.9494	15.798	0.089
SN2016hvl	i	57716.952	15.788	0.087
SN2016hvl	i	57717.3334	15.826	0.084
SN2016hvl	i	57717.3359	15.806	0.103
SN2016hvl	i	57718.9332	15.896	0.083
SN2016hvl	i	57718.9358	15.897	0.089
SN2016hvl	i	57718.9695	15.899	0.083
SN2016hvl	i	57718.972	15.9	0.082
SN2016hvl	i	57720.9448	16.017	0.081
SN2016hvl	i	57720.9474	16.017	0.082
SN2016hvl	i	57721.2969	16.01	0.103
SN2016hvl	i	57721.2995	16.019	0.103
SN2016hvl	i	57723.0888	16.103	0.087
SN2016hvl	i	57723.0914	16.123	0.087
SN2016hvl	i	57724.0355	16.152	0.083
SN2016hvl	i	57724.0381	16.136	0.082
SN2016hvl	i	57725.089	16.164	0.081
SN2016hvl	i	57725.0916	16.155	0.081
SN2016hvl	i	57726.1744	16.137	0.103
SN2016hvl	i	57726.177	16.121	0.103
SN2016hvl	i	57726.9168	16.142	0.085
SN2016hvl	i	57726.9194	16.15	0.087
SN2016hvl	i	57728.0878	16.112	0.105
SN2016hvl	i	57728.0903	16.123	0.103
SN2016hvl	i	57729.3486	16.139	0.083
SN2016hvl	i	57729.3512	16.132	0.087
SN2016hvl	i	57730.1637	16.14	0.079
SN2016hvl	i	57730.1665	16.14	0.081
SN2016hvl	i	57730.3477	16.137	0.086
SN2016hvl	i	57730.3502	16.127	0.085
SN2016hvl	i	57733.9026	16.178	0.083
SN2016hvl	i	57733.9054	16.153	0.084
SN2016hvl	i	57739.5351	16.234	0.093
SN2016hvl	i	57739.5379	16.252	0.086
SN2016hvl	i	57742.877	16.335	0.084
SN2016hvl	i	57742.8797	16.319	0.087
SN2016hvl	i	57745.2848	16.428	0.101
SN2016hvl	i	57745.2876	16.434	0.101
SN2016hvl	i	57746.2643	16.507	0.085
SN2016hvl	i	57746.2671	16.475	0.101
SN2016hvl	i	57746.8744	16.522	0.086
SN2016hvl	i	57746.8772	16.542	0.084
SN2016hvl	i	57747.2329	16.5	0.153
SN2016hvl	i	57747.2357	16.548	0.107
SN2016hvl	i	57753.1389	16.655	0.52
SN2016hvl	i	57753.1417	16.905	0.102
SN2016hvl	i	57757.8443	17.192	0.084
SN2016hvl	i	57757.8471	17.196	0.087
SN2016hvl	i	57760.8961	17.276	0.085
SN2016hvl	i	57760.8989	17.309	0.083
SN2016hvl	i	57761.8333	17.374	0.089

SN2016hvl	i	57761.8361	17.395	0.088
SN2016hvl	i	57769.8544	17.715	0.088
SN2016hvl	i	57770.6515	17.714	0.091
SN2016hvl	i	57770.6542	17.738	0.106
SN2016hvl	i	57778.8126	18.034	0.085
SN2016hvl	i	57778.8154	18.016	0.086
SN2016hvl	i	57784.8128	18.298	0.088
SN2016hvl	i	57784.8156	18.271	0.088
SN2016hvl	i	57789.8929	18.474	0.12
SN2016hvl	i	57789.8957	18.404	0.109
SN2016hvl	i	57795.91	18.572	0.11
SN2016hvl	i	57795.9128	18.668	0.123
SN2016hvl	i	57802.5389	18.821	0.104
SN2016hvl	i	57802.5417	18.781	0.113
SN2016hvl	i	57808.5451	19.174	0.119
SN2016hvl	i	57808.5479	19.234	0.122
SN2016hvl	i	57813.8812	19.176	0.142
SN2016hvl	i	57813.884	19.09	0.125
SN2016hvl	i	57815.8136	19.293	0.109
SN2016hvl	i	57815.8164	19.244	0.132
SN2016hvl	i	57821.418	19.474	0.182
SN2016hvl	i	57821.4207	19.347	0.149
SN2016hvl	i	57827.8169	19.563	0.111
SN2016hvl	i	57827.8197	19.654	0.111
SN2016hvl	i	57835.8257	19.615	0.13
SN2016hvl	i	57835.8297	19.961	0.161
SN2016hvl	i	57842.4089	19.653	0.175
SN2016hvl	i	57842.4128	20.004	0.217
SN2017awz	B	57804.2453	16.118	0.05
SN2017awz	B	57804.2471	16.102	0.049
SN2017awz	B	57807.548	15.852	0.046
SN2017awz	B	57807.5498	15.942	0.062
SN2017awz	B	57810.1321	15.758	0.046
SN2017awz	B	57810.134	15.733	0.044
SN2017awz	B	57813.8935	15.713	0.043
SN2017awz	B	57813.8953	15.715	0.047
SN2017awz	B	57814.5288	15.772	0.046
SN2017awz	B	57814.5306	15.763	0.047
SN2017awz	B	57814.9581	15.744	0.047
SN2017awz	B	57814.96	15.743	0.05
SN2017awz	B	57815.9151	15.752	0.049
SN2017awz	B	57815.9169	15.749	0.049
SN2017awz	B	57818.2459	15.794	0.054
SN2017awz	B	57818.2478	15.864	0.051
SN2017awz	B	57820.9652	15.948	0.048
SN2017awz	B	57820.9671	15.959	0.043
SN2017awz	B	57824.8683	16.34	0.073
SN2017awz	B	57824.8702	16.344	0.065
SN2017awz	B	57826.102	16.473	0.047
SN2017awz	B	57826.1039	16.46	0.046
SN2017awz	B	57829.1279	16.869	0.05
SN2017awz	B	57829.1297	16.834	0.049
SN2017awz	B	57833.2009	17.308	0.053
SN2017awz	B	57833.2027	17.306	0.055
SN2017awz	B	57838.8614	17.905	0.055
SN2017awz	B	57838.8632	17.888	0.057
SN2017awz	B	57838.875	17.82	0.058
SN2017awz	B	57838.8769	17.796	0.056
SN2017awz	B	57842.8284	18.067	0.054
SN2017awz	B	57842.8302	18.164	0.06
SN2017awz	B	57846.8034	18.353	0.068
SN2017awz	B	57846.8052	18.316	0.064
SN2017awz	B	57852.1119	18.561	0.182
SN2017awz	B	57852.1138	18.783	0.179
SN2017awz	B	57853.8255	18.515	0.123
SN2017awz	B	57853.8274	18.536	0.122
SN2017awz	B	57858.0154	18.652	0.07
SN2017awz	B	57858.0173	18.633	0.068

SN2017awz	B	57858.0221	18.502	0.091
SN2017awz	B	57864.0097	18.783	0.088
SN2017awz	B	57864.0115	18.602	0.076
SN2017awz	B	57870.2795	18.916	0.098
SN2017awz	B	57870.2823	18.87	0.11
SN2017awz	B	57882.769	18.955	0.128
SN2017awz	B	57882.7718	18.904	0.112
SN2017awz	B	57894.3866	19.262	0.091
SN2017awz	B	57894.3894	18.988	0.076
SN2017awz	B	57901.712	19.17	0.075
SN2017awz	B	57901.7148	19.434	0.093
SN2017awz	B	57909.712	19.317	0.165
SN2017awz	B	57909.7149	18.876	0.114
SN2017awz	B	57918.1888	19.591	0.168
SN2017awz	B	57918.1916	19.704	0.111
SN2017awz	B	57918.6959	19.394	0.113
SN2017awz	B	57918.6987	19.716	0.111
SN2017awz	B	57924.7047	19.242	0.098
SN2017awz	B	57945.1268	19.816	0.27
SN2017awz	B	57945.1297	20.053	0.289
SN2017awz	V	57804.2491	16.183	0.059
SN2017awz	V	57804.2506	16.113	0.031
SN2017awz	V	57807.5518	15.837	0.034
SN2017awz	V	57807.5533	15.843	0.03
SN2017awz	V	57810.136	15.716	0.032
SN2017awz	V	57810.1376	15.714	0.03
SN2017awz	V	57813.8974	15.634	0.034
SN2017awz	V	57813.8989	15.632	0.031
SN2017awz	V	57814.5326	15.659	0.031
SN2017awz	V	57814.5342	15.68	0.034
SN2017awz	V	57814.962	15.612	0.034
SN2017awz	V	57814.9635	15.629	0.03
SN2017awz	V	57815.919	15.6	0.03
SN2017awz	V	57815.9205	15.611	0.03
SN2017awz	V	57818.2498	15.672	0.042
SN2017awz	V	57818.2514	15.644	0.042
SN2017awz	V	57820.9691	15.694	0.034
SN2017awz	V	57820.9706	15.67	0.033
SN2017awz	V	57824.8722	15.936	0.037
SN2017awz	V	57824.8737	15.922	0.035
SN2017awz	V	57825.8646	16.068	0.111
SN2017awz	V	57826.1059	16.006	0.058
SN2017awz	V	57826.1074	15.999	0.054
SN2017awz	V	57829.1317	16.19	0.035
SN2017awz	V	57829.1332	16.198	0.035
SN2017awz	V	57833.2048	16.47	0.034
SN2017awz	V	57833.2063	16.46	0.036
SN2017awz	V	57838.8789	16.743	0.036
SN2017awz	V	57838.8804	16.718	0.034
SN2017awz	V	57842.8323	16.907	0.038
SN2017awz	V	57842.8338	16.9	0.035
SN2017awz	V	57846.8073	17.171	0.04
SN2017awz	V	57846.8088	17.211	0.075
SN2017awz	V	57852.1158	17.31	0.096
SN2017awz	V	57853.8295	17.381	0.051
SN2017awz	V	57853.831	17.471	0.064
SN2017awz	V	57858.0193	17.656	0.044
SN2017awz	V	57858.0208	17.675	0.044
SN2017awz	V	57858.0259	17.779	0.145
SN2017awz	V	57858.0274	17.802	0.087
SN2017awz	V	57864.0135	17.835	0.045
SN2017awz	V	57864.015	17.767	0.046
SN2017awz	V	57870.2852	18.127	0.074
SN2017awz	V	57870.2871	17.944	0.054
SN2017awz	V	57882.7748	18.436	0.069
SN2017awz	V	57882.7766	18.255	0.07
SN2017awz	V	57894.3923	18.751	0.163
SN2017awz	V	57901.7178	18.652	0.063

SN2017awz	V	57901.7196	18.682	0.063
SN2017awz	V	57909.7179	19.11	0.17
SN2017awz	V	57909.7198	18.665	0.125
SN2017awz	V	57918.1827	19.093	0.109
SN2017awz	V	57918.7017	19.361	0.058
SN2017awz	V	57918.7036	19.283	0.098
SN2017awz	V	57924.7146	19.374	0.113
SN2017awz	V	57924.7174	19.337	0.098
SN2017awz	V	57935.131	19.158	0.163
SN2017awz	V	57945.1327	19.27	0.164
SN2017awz	V	57945.1346	19.784	0.232
SN2017awz	g	57804.2523	16.103	0.057
SN2017awz	g	57804.2542	16.116	0.052
SN2017awz	g	57807.555	15.867	0.055
SN2017awz	g	57807.5569	15.891	0.073
SN2017awz	g	57810.1393	15.752	0.061
SN2017awz	g	57810.1412	15.759	0.065
SN2017awz	g	57813.9006	15.716	0.054
SN2017awz	g	57813.9025	15.699	0.039
SN2017awz	g	57814.5359	15.757	0.066
SN2017awz	g	57814.5377	15.748	0.063
SN2017awz	g	57814.9653	15.692	0.044
SN2017awz	g	57814.9671	15.729	0.048
SN2017awz	g	57815.9222	15.723	0.065
SN2017awz	g	57815.9241	15.71	0.044
SN2017awz	g	57818.2532	15.769	0.041
SN2017awz	g	57818.255	15.784	0.041
SN2017awz	g	57820.9724	15.853	0.061
SN2017awz	g	57820.9743	15.856	0.062
SN2017awz	g	57824.8754	16.116	0.062
SN2017awz	g	57824.8773	16.121	0.063
SN2017awz	g	57826.109	16.212	0.064
SN2017awz	g	57826.1109	16.236	0.047
SN2017awz	g	57829.135	16.485	0.051
SN2017awz	g	57829.1368	16.467	0.048
SN2017awz	g	57833.208	16.881	0.057
SN2017awz	g	57833.2098	16.868	0.05
SN2017awz	g	57838.8822	17.336	0.063
SN2017awz	g	57838.884	17.32	0.048
SN2017awz	g	57842.8356	17.593	0.057
SN2017awz	g	57842.8374	17.659	0.062
SN2017awz	g	57846.8105	17.899	0.052
SN2017awz	g	57846.8124	17.861	0.062
SN2017awz	g	57852.119	18.066	0.105
SN2017awz	g	57852.1208	17.97	0.095
SN2017awz	g	57853.8327	18.161	0.091
SN2017awz	g	57853.8346	18.161	0.097
SN2017awz	g	57858.0224	18.168	0.059
SN2017awz	g	57858.0243	18.21	0.054
SN2017awz	g	57858.0291	18.337	0.096
SN2017awz	g	57858.031	17.989	0.292
SN2017awz	g	57864.0167	18.313	0.059
SN2017awz	g	57864.0186	18.455	0.057
SN2017awz	g	57870.2892	18.548	0.055
SN2017awz	g	57870.292	18.518	0.062
SN2017awz	g	57882.7787	18.629	0.088
SN2017awz	g	57882.7815	18.753	0.101
SN2017awz	g	57894.3962	18.914	0.091
SN2017awz	g	57901.7217	18.92	0.076
SN2017awz	g	57901.7245	18.978	0.08
SN2017awz	g	57909.7219	19.109	0.11
SN2017awz	g	57909.7247	19.067	0.118
SN2017awz	g	57918.1947	19.812	0.131
SN2017awz	g	57918.7056	19.172	0.063
SN2017awz	g	57918.7084	19.093	0.071
SN2017awz	g	57924.6966	19.278	0.145
SN2017awz	g	57935.1341	19.57	0.145
SN2017awz	g	57935.1382	19.553	0.134

SN2017awz	r	57804.2562	16.349	0.068
SN2017awz	r	57804.2577	16.271	0.045
SN2017awz	r	57807.5589	15.941	0.034
SN2017awz	r	57807.5604	15.933	0.034
SN2017awz	r	57810.1432	15.78	0.026
SN2017awz	r	57810.1447	15.762	0.029
SN2017awz	r	57813.9045	15.659	0.027
SN2017awz	r	57813.906	15.663	0.028
SN2017awz	r	57814.5397	15.635	0.03
SN2017awz	r	57814.5412	15.645	0.029
SN2017awz	r	57814.9692	15.649	0.033
SN2017awz	r	57814.9707	15.644	0.034
SN2017awz	r	57815.9261	15.672	0.027
SN2017awz	r	57815.9276	15.647	0.026
SN2017awz	r	57818.2571	15.667	0.032
SN2017awz	r	57818.2586	15.665	0.03
SN2017awz	r	57820.9764	15.788	0.028
SN2017awz	r	57820.9779	15.79	0.028
SN2017awz	r	57824.8794	16.06	0.054
SN2017awz	r	57824.8809	16.061	0.049
SN2017awz	r	57826.1129	16.131	0.068
SN2017awz	r	57826.1144	16.173	0.063
SN2017awz	r	57829.1388	16.344	0.031
SN2017awz	r	57829.1403	16.342	0.033
SN2017awz	r	57833.2118	16.376	0.032
SN2017awz	r	57833.2133	16.4	0.03
SN2017awz	r	57838.886	16.463	0.029
SN2017awz	r	57838.8876	16.436	0.029
SN2017awz	r	57842.8396	16.563	0.029
SN2017awz	r	57842.8411	16.579	0.029
SN2017awz	r	57846.8144	16.805	0.033
SN2017awz	r	57846.8159	16.796	0.03
SN2017awz	r	57852.1228	17.197	0.057
SN2017awz	r	57852.1243	17.043	0.055
SN2017awz	r	57853.8366	17.194	0.039
SN2017awz	r	57853.8381	17.21	0.041
SN2017awz	r	57858.0263	17.369	0.035
SN2017awz	r	57858.0278	17.324	0.038
SN2017awz	r	57858.033	17.456	0.068
SN2017awz	r	57858.0345	17.577	0.115
SN2017awz	r	57864.0206	17.719	0.038
SN2017awz	r	57864.0221	17.636	0.062
SN2017awz	r	57870.295	17.797	0.048
SN2017awz	r	57870.2968	17.775	0.044
SN2017awz	r	57882.7845	18.388	0.053
SN2017awz	r	57882.7863	18.314	0.039
SN2017awz	r	57901.7275	18.895	0.051
SN2017awz	r	57901.7293	18.879	0.062
SN2017awz	r	57909.7278	19.029	0.119
SN2017awz	r	57909.7297	19.125	0.131
SN2017awz	r	57918.7114	19.331	0.093
SN2017awz	r	57918.7132	19.499	0.115
SN2017awz	r	57924.7089	19.194	0.116
SN2017awz	r	57924.7116	19.333	0.107
SN2017awz	i	57804.2593	16.6	0.072
SN2017awz	i	57804.2608	16.618	0.063
SN2017awz	i	57807.5621	16.222	0.039
SN2017awz	i	57807.5636	16.298	0.057
SN2017awz	i	57810.1464	16.157	0.035
SN2017awz	i	57810.148	16.187	0.065
SN2017awz	i	57813.9077	16.139	0.039
SN2017awz	i	57813.9092	16.198	0.039
SN2017awz	i	57814.5429	16.191	0.039
SN2017awz	i	57814.5444	16.198	0.039
SN2017awz	i	57814.9723	16.226	0.054
SN2017awz	i	57814.9738	16.198	0.04
SN2017awz	i	57815.9293	16.276	0.073
SN2017awz	i	57815.9308	16.253	0.062

SN2017awz	i	57818.2603	16.249	0.038
SN2017awz	i	57818.2618	16.281	0.039
SN2017awz	i	57820.9796	16.381	0.043
SN2017awz	i	57820.9811	16.401	0.043
SN2017awz	i	57824.8826	16.683	0.065
SN2017awz	i	57824.8841	16.784	0.076
SN2017awz	i	57826.1161	16.84	0.04
SN2017awz	i	57826.1176	16.855	0.042
SN2017awz	i	57829.142	16.931	0.067
SN2017awz	i	57829.1435	16.865	0.043
SN2017awz	i	57833.215	16.676	0.045
SN2017awz	i	57833.2165	16.728	0.045
SN2017awz	i	57838.8893	16.625	0.038
SN2017awz	i	57838.8908	16.625	0.037
SN2017awz	i	57842.8428	16.688	0.041
SN2017awz	i	57842.8444	16.676	0.04
SN2017awz	i	57846.8177	16.837	0.041
SN2017awz	i	57846.8192	16.838	0.043
SN2017awz	i	57852.126	17.18	0.072
SN2017awz	i	57852.1275	17.182	0.079
SN2017awz	i	57853.8398	17.232	0.05
SN2017awz	i	57853.8413	17.212	0.05
SN2017awz	i	57858.0295	17.474	0.061
SN2017awz	i	57858.031	17.489	0.049
SN2017awz	i	57858.0361	17.514	0.047
SN2017awz	i	57858.0376	17.384	0.066
SN2017awz	i	57864.0237	17.777	0.057
SN2017awz	i	57864.0252	17.749	0.064
SN2017awz	i	57870.2989	18.115	0.079
SN2017awz	i	57870.3008	18.114	0.08
SN2017awz	i	57882.7884	18.803	0.101
SN2017awz	i	57882.7902	18.618	0.101
SN2017awz	i	57894.4058	18.607	0.191
SN2017awz	i	57894.4076	18.899	0.169
SN2017awz	i	57901.7313	19.082	0.12
SN2017awz	i	57901.7332	18.853	0.12
SN2017awz	i	57909.7317	19.365	0.215
SN2017awz	i	57909.7336	19.354	0.204
SN2017awz	i	57918.1848	19.573	0.267
SN2017awz	i	57918.1867	19.194	0.181
SN2017awz	i	57924.7205	19.752	0.213
SN2017awz	i	57924.7233	19.682	0.2
SN2017dfb	B	57869.2045	16.307	0.07
SN2017dfb	B	57869.2072	16.282	0.071
SN2017dfb	B	57872.0385	16.259	0.08
SN2017dfb	B	57872.0413	16.269	0.061
SN2017dfb	B	57875.1427	16.382	0.07
SN2017dfb	B	57875.1454	16.366	0.058
SN2017dfb	B	57878.2572	16.484	0.05
SN2017dfb	B	57878.26	16.479	0.054
SN2017dfb	B	57880.866	16.684	0.057
SN2017dfb	B	57880.8688	16.681	0.059
SN2017dfb	B	57885.6764	17.276	0.079
SN2017dfb	B	57885.6792	17.329	0.078
SN2017dfb	B	57888.9427	17.695	0.062
SN2017dfb	B	57888.9455	17.675	0.076
SN2017dfb	B	57889.6426	17.761	0.059
SN2017dfb	B	57889.6454	17.83	0.059
SN2017dfb	B	57895.6427	18.494	0.065
SN2017dfb	B	57895.6455	18.537	0.069
SN2017dfb	B	57901.8092	18.976	0.08
SN2017dfb	B	57901.812	19.084	0.081
SN2017dfb	B	57902.601	19.101	0.092
SN2017dfb	B	57902.6038	19.002	0.085
SN2017dfb	B	57908.2157	19.303	0.104
SN2017dfb	B	57908.2185	19.36	0.117
SN2017dfb	B	57914.055	19.822	0.15
SN2017dfb	B	57914.0578	19.299	0.147

SN2017dfb	B	57919.8126	19.747	0.132
SN2017dfb	B	57919.8154	19.879	0.154
SN2017dfb	B	57926.4908	19.666	0.12
SN2017dfb	B	57926.4936	19.804	0.134
SN2017dfb	B	57932.1601	19.779	0.104
SN2017dfb	B	57932.1629	19.707	0.096
SN2017dfb	B	57937.8302	20.209	0.292
SN2017dfb	B	57937.8329	19.875	0.223
SN2017dfb	B	57944.243	19.733	0.23
SN2017dfb	B	57944.2458	19.852	0.276
SN2017dfb	B	57951.0421	20.491	0.193
SN2017dfb	B	57951.0449	20.251	0.152
SN2017dfb	B	57957.4481	20.149	0.177
SN2017dfb	B	57957.451	20.031	0.157
SN2017dfb	B	57959.3503	20.28	0.237
SN2017dfb	V	57869.2102	16.155	0.071
SN2017dfb	V	57869.212	16.133	0.071
SN2017dfb	V	57872.0442	16.099	0.075
SN2017dfb	V	57872.0461	16.087	0.074
SN2017dfb	V	57875.1484	16.15	0.055
SN2017dfb	V	57875.1502	16.152	0.053
SN2017dfb	V	57878.2629	16.117	0.049
SN2017dfb	V	57878.2648	16.117	0.049
SN2017dfb	V	57880.8718	16.26	0.047
SN2017dfb	V	57880.8737	16.254	0.047
SN2017dfb	V	57885.6821	16.688	0.059
SN2017dfb	V	57885.684	16.789	0.059
SN2017dfb	V	57889.6483	16.866	0.049
SN2017dfb	V	57889.6502	16.917	0.047
SN2017dfb	V	57895.6484	17.244	0.047
SN2017dfb	V	57895.6503	17.248	0.05
SN2017dfb	V	57901.815	17.578	0.056
SN2017dfb	V	57901.8169	17.604	0.053
SN2017dfb	V	57902.6067	17.665	0.054
SN2017dfb	V	57902.6085	17.663	0.051
SN2017dfb	V	57908.2215	18.015	0.066
SN2017dfb	V	57908.2234	17.994	0.067
SN2017dfb	V	57914.0412	18.268	0.072
SN2017dfb	V	57914.0431	18.299	0.077
SN2017dfb	V	57919.8028	18.315	0.063
SN2017dfb	V	57919.8047	18.33	0.063
SN2017dfb	V	57926.4829	18.548	0.074
SN2017dfb	V	57926.4848	18.635	0.079
SN2017dfb	V	57932.1659	18.697	0.072
SN2017dfb	V	57932.1678	18.813	0.072
SN2017dfb	V	57937.8359	18.919	0.144
SN2017dfb	V	57937.8378	18.535	0.109
SN2017dfb	V	57944.2488	19.576	0.256
SN2017dfb	V	57944.2507	18.979	0.145
SN2017dfb	V	57951.0478	19.458	0.128
SN2017dfb	V	57951.0497	20.138	0.252
SN2017dfb	V	57957.4539	19.396	0.139
SN2017dfb	V	57957.4558	19.12	0.12
SN2017dfb	V	57959.3533	19.265	0.128
SN2017dfb	V	57959.3552	19.259	0.124
SN2017dfb	g	57869.214	16.288	0.07
SN2017dfb	g	57869.2168	16.278	0.074
SN2017dfb	g	57872.0482	16.261	0.067
SN2017dfb	g	57872.051	16.257	0.072
SN2017dfb	g	57875.1523	16.322	0.058
SN2017dfb	g	57875.155	16.333	0.06
SN2017dfb	g	57878.2668	16.37	0.053
SN2017dfb	g	57878.2696	16.358	0.036
SN2017dfb	g	57880.8758	16.529	0.039
SN2017dfb	g	57880.8786	16.547	0.049
SN2017dfb	g	57885.686	16.899	0.054
SN2017dfb	g	57885.6888	16.896	0.075
SN2017dfb	g	57889.6522	17.298	0.05

SN2017dfb	g	57889.655	17.328	0.049
SN2017dfb	g	57895.6524	17.935	0.059
SN2017dfb	g	57895.6551	17.929	0.047
SN2017dfb	g	57901.819	18.435	0.051
SN2017dfb	g	57901.8217	18.356	0.049
SN2017dfb	g	57902.6109	18.501	0.057
SN2017dfb	g	57902.6137	18.678	0.055
SN2017dfb	g	57908.2255	19.168	0.097
SN2017dfb	g	57908.2283	18.923	0.083
SN2017dfb	g	57914.0452	19.04	0.095
SN2017dfb	g	57914.048	18.971	0.079
SN2017dfb	g	57919.8068	19.083	0.065
SN2017dfb	g	57919.8096	19.246	0.064
SN2017dfb	g	57926.5004	19.122	0.066
SN2017dfb	g	57926.5032	19.148	0.074
SN2017dfb	g	57932.1699	19.424	0.072
SN2017dfb	g	57932.1727	19.507	0.072
SN2017dfb	g	57937.8399	19.423	0.129
SN2017dfb	g	57937.8426	19.243	0.106
SN2017dfb	g	57944.2528	19.411	0.13
SN2017dfb	g	57944.2557	19.433	0.129
SN2017dfb	g	57951.0518	19.952	0.1
SN2017dfb	g	57951.0546	19.728	0.088
SN2017dfb	g	57957.4579	19.589	0.083
SN2017dfb	g	57957.4607	19.678	0.1
SN2017dfb	g	57959.3572	19.689	0.101
SN2017dfb	g	57959.3601	19.754	0.105
SN2017dfb	r	57869.2198	16.178	0.053
SN2017dfb	r	57869.2216	16.193	0.053
SN2017dfb	r	57872.0539	16.113	0.049
SN2017dfb	r	57872.0558	16.128	0.05
SN2017dfb	r	57875.158	16.099	0.054
SN2017dfb	r	57875.1598	16.074	0.053
SN2017dfb	r	57878.2725	16.136	0.045
SN2017dfb	r	57878.2744	16.143	0.055
SN2017dfb	r	57880.8816	16.324	0.061
SN2017dfb	r	57880.8835	16.348	0.073
SN2017dfb	r	57885.6918	16.595	0.09
SN2017dfb	r	57885.6936	16.722	0.285
SN2017dfb	r	57889.6579	16.711	0.058
SN2017dfb	r	57889.6598	16.735	0.052
SN2017dfb	r	57895.6581	16.802	0.062
SN2017dfb	r	57895.6599	16.815	0.066
SN2017dfb	r	57901.8247	17.097	0.062
SN2017dfb	r	57901.8266	17.087	0.059
SN2017dfb	r	57902.6166	17.144	0.067
SN2017dfb	r	57902.6185	17.182	0.072
SN2017dfb	r	57908.2312	17.533	0.061
SN2017dfb	r	57908.2331	17.546	0.059
SN2017dfb	r	57914.0609	17.753	0.073
SN2017dfb	r	57914.0627	17.753	0.07
SN2017dfb	r	57919.7989	17.912	0.063
SN2017dfb	r	57919.8008	17.864	0.063
SN2017dfb	r	57926.4966	18.222	0.09
SN2017dfb	r	57926.4984	18.127	0.084
SN2017dfb	r	57932.1756	18.285	0.07
SN2017dfb	r	57932.1775	18.181	0.067
SN2017dfb	r	57937.8456	18.495	0.098
SN2017dfb	r	57937.8475	18.593	0.104
SN2017dfb	r	57944.2587	18.463	0.09
SN2017dfb	r	57944.2606	18.947	0.13
SN2017dfb	r	57951.0576	18.917	0.093
SN2017dfb	r	57951.0595	18.971	0.098
SN2017dfb	r	57957.4637	18.91	0.109
SN2017dfb	r	57957.4656	18.903	0.118
SN2017dfb	r	57959.363	18.982	0.119
SN2017dfb	r	57959.3649	19.103	0.149
SN2017dfb	i	57869.2236	16.595	0.123

SN2017dfb	i	57869.2254	16.61	0.124
SN2017dfb	i	57872.0578	16.644	0.124
SN2017dfb	i	57872.0597	16.636	0.124
SN2017dfb	i	57875.1618	16.656	0.124
SN2017dfb	i	57875.1636	16.631	0.123
SN2017dfb	i	57878.2764	16.72	0.128
SN2017dfb	i	57878.2782	16.772	0.122
SN2017dfb	i	57880.8855	16.854	0.114
SN2017dfb	i	57880.8874	17.17	0.156
SN2017dfb	i	57889.6618	17.131	0.133
SN2017dfb	i	57889.6636	17.187	0.112
SN2017dfb	i	57895.6619	16.958	0.137
SN2017dfb	i	57895.6638	16.945	0.134
SN2017dfb	i	57901.8286	17.143	0.133
SN2017dfb	i	57901.8305	17.137	0.111
SN2017dfb	i	57902.6205	17.192	0.131
SN2017dfb	i	57902.6224	17.206	0.137
SN2017dfb	i	57908.2352	17.737	0.127
SN2017dfb	i	57908.237	17.737	0.126
SN2017dfb	i	57914.051	18.073	0.13
SN2017dfb	i	57914.0529	18.015	0.133
SN2017dfb	i	57919.8185	18.476	0.132
SN2017dfb	i	57919.8204	18.129	0.13
SN2017dfb	i	57926.4869	18.591	0.161
SN2017dfb	i	57926.4887	18.515	0.16
SN2017dfb	i	57932.1796	18.889	0.146
SN2017dfb	i	57932.1814	18.499	0.148
SN2017dfb	i	57937.8495	19.25	0.236
SN2017dfb	i	57937.8514	18.733	0.18
SN2017dfb	i	57944.2627	19.645	0.3
SN2017dfb	i	57944.2646	19.667	0.32
SN2017dfb	i	57951.0615	19.851	0.303
SN2017dfb	i	57957.4676	19.645	0.279
SN2017dfb	i	57957.4695	19.674	0.266
SN2017glx	B	58002.2954	15.059	0.045
SN2017glx	B	58002.2982	15.038	0.042
SN2017glx	B	58004.2365	14.844	0.053
SN2017glx	B	58004.2393	14.841	0.039
SN2017glx	B	58005.2384	14.789	0.049
SN2017glx	B	58005.2412	14.789	0.048
SN2017glx	B	58008.2431	14.743	0.048
SN2017glx	B	58008.2459	14.743	0.053
SN2017glx	B	58009.2261	14.739	0.049
SN2017glx	B	58009.2289	14.744	0.051
SN2017glx	B	58009.2677	14.753	0.049
SN2017glx	B	58009.2706	14.756	0.05
SN2017glx	B	58033.2207	16.626	0.049
SN2017glx	B	58033.2236	16.65	0.051
SN2017glx	B	58039.2157	17.142	0.038
SN2017glx	B	58039.2187	17.137	0.038
SN2017glx	B	58045.2054	17.493	0.042
SN2017glx	B	58045.2083	17.463	0.041
SN2017glx	B	58046.1914	17.857	0.071
SN2017glx	B	58048.1463	17.58	0.04
SN2017glx	B	58048.1491	17.572	0.039
SN2017glx	B	58050.1843	17.608	0.041
SN2017glx	B	58050.1872	17.617	0.042
SN2017glx	B	58051.179	17.669	0.042
SN2017glx	B	58051.1818	17.649	0.04
SN2017glx	B	58055.1173	17.766	0.049
SN2017glx	B	58055.1201	17.791	0.045
SN2017glx	B	58059.0791	17.825	0.053
SN2017glx	B	58059.0819	17.832	0.053
SN2017glx	B	58076.075	17.985	0.05
SN2017glx	B	58076.0778	17.972	0.05
SN2017glx	B	58087.0364	18.078	0.066
SN2017glx	B	58087.0392	18.116	0.066
SN2017glx	B	58099.0418	18.271	0.059

SN2017glx	B	58099.0446	18.349	0.054
SN2017glx	V	58002.3012	14.729	0.097
SN2017glx	V	58002.3031	14.739	0.094
SN2017glx	V	58004.2423	14.635	0.059
SN2017glx	V	58004.2443	14.62	0.061
SN2017glx	V	58005.2443	14.573	0.103
SN2017glx	V	58005.2462	14.573	0.104
SN2017glx	V	58008.2489	14.503	0.107
SN2017glx	V	58008.2508	14.5	0.105
SN2017glx	V	58009.2319	14.501	0.107
SN2017glx	V	58009.2338	14.494	0.103
SN2017glx	V	58009.2736	14.491	0.103
SN2017glx	V	58009.2755	14.474	0.106
SN2017glx	V	58033.2265	15.628	0.102
SN2017glx	V	58033.2284	15.481	0.098
SN2017glx	V	58039.2217	15.778	0.058
SN2017glx	V	58039.2236	15.957	0.126
SN2017glx	V	58046.1973	16.156	0.139
SN2017glx	V	58048.1529	16.329	0.063
SN2017glx	V	58048.1548	16.315	0.059
SN2017glx	V	58050.1916	16.366	0.068
SN2017glx	V	58050.1935	16.422	0.066
SN2017glx	V	58051.1848	16.47	0.057
SN2017glx	V	58051.1867	16.465	0.058
SN2017glx	V	58055.1231	16.365	0.07
SN2017glx	V	58055.125	16.532	0.06
SN2017glx	V	58059.0849	16.7	0.125
SN2017glx	V	58059.0868	16.674	0.114
SN2017glx	V	58076.0808	17.133	0.071
SN2017glx	V	58076.0827	17.193	0.072
SN2017glx	V	58087.0422	17.412	0.064
SN2017glx	V	58087.0441	17.398	0.071
SN2017glx	V	58099.0475	17.71	0.07
SN2017glx	V	58099.0494	17.651	0.069
SN2017glx	g	58002.3052	14.963	0.063
SN2017glx	g	58002.308	14.953	0.066
SN2017glx	g	58004.2464	14.792	0.054
SN2017glx	g	58004.2492	14.779	0.054
SN2017glx	g	58005.2483	14.737	0.053
SN2017glx	g	58005.2511	14.733	0.052
SN2017glx	g	58008.253	14.676	0.055
SN2017glx	g	58008.2558	14.671	0.055
SN2017glx	g	58009.236	14.688	0.055
SN2017glx	g	58009.2388	14.683	0.057
SN2017glx	g	58009.2776	14.682	0.056
SN2017glx	g	58009.2804	14.691	0.055
SN2017glx	g	58033.2305	16.028	0.059
SN2017glx	g	58033.2334	16.027	0.059
SN2017glx	g	58039.2258	16.628	0.059
SN2017glx	g	58039.2286	16.578	0.058
SN2017glx	g	58048.1569	17.197	0.064
SN2017glx	g	58048.1597	17.035	0.057
SN2017glx	g	58050.1981	17.152	0.059
SN2017glx	g	58050.2009	17.083	0.058
SN2017glx	g	58051.1888	17.107	0.056
SN2017glx	g	58051.1916	17.139	0.057
SN2017glx	g	58055.127	17.286	0.057
SN2017glx	g	58055.1299	17.189	0.054
SN2017glx	g	58059.0889	17.342	0.058
SN2017glx	g	58059.0917	17.287	0.058
SN2017glx	g	58076.0848	17.886	0.07
SN2017glx	g	58076.0876	17.614	0.06
SN2017glx	g	58087.0462	17.971	0.091
SN2017glx	g	58087.049	17.913	0.078
SN2017glx	g	58099.0515	17.95	0.063
SN2017glx	g	58099.0543	17.963	0.065
SN2017glx	r	58002.311	15.003	0.051
SN2017glx	r	58002.313	15.009	0.048

SN2017glx	r	58004.2522	14.846	0.048
SN2017glx	r	58004.2541	14.867	0.05
SN2017glx	r	58005.2541	14.809	0.049
SN2017glx	r	58005.256	14.792	0.049
SN2017glx	r	58008.2588	14.678	0.051
SN2017glx	r	58008.2608	14.672	0.049
SN2017glx	r	58009.2418	14.667	0.052
SN2017glx	r	58009.2437	14.66	0.051
SN2017glx	r	58009.2834	14.661	0.052
SN2017glx	r	58009.2854	14.649	0.051
SN2017glx	r	58033.2364	15.375	0.047
SN2017glx	r	58033.2383	15.398	0.048
SN2017glx	r	58039.2316	15.567	0.049
SN2017glx	r	58039.2335	15.57	0.049
SN2017glx	r	58048.1628	16.09	0.048
SN2017glx	r	58048.1647	16.083	0.048
SN2017glx	r	58050.2061	16.259	0.049
SN2017glx	r	58050.208	16.174	0.05
SN2017glx	r	58051.1946	16.254	0.049
SN2017glx	r	58051.1964	16.223	0.049
SN2017glx	r	58055.1328	16.451	0.05
SN2017glx	r	58055.1347	16.399	0.05
SN2017glx	r	58059.0947	16.558	0.049
SN2017glx	r	58059.0966	16.608	0.05
SN2017glx	r	58076.0905	16.989	0.056
SN2017glx	r	58076.0924	17.028	0.055
SN2017glx	r	58087.0519	17.442	0.062
SN2017glx	r	58087.0538	17.465	0.06
SN2017glx	r	58099.0573	17.641	0.117
SN2017glx	r	58099.0592	17.477	0.14
SN2017glx	i	58002.315	15.221	0.074
SN2017glx	i	58002.317	15.226	0.075
SN2017glx	i	58004.2562	15.113	0.074
SN2017glx	i	58004.2582	15.139	0.074
SN2017glx	i	58005.2581	15.107	0.072
SN2017glx	i	58005.26	15.1	0.073
SN2017glx	i	58008.2628	15.13	0.073
SN2017glx	i	58008.2647	15.112	0.073
SN2017glx	i	58009.2458	15.127	0.074
SN2017glx	i	58009.2477	15.135	0.076
SN2017glx	i	58009.2874	15.144	0.075
SN2017glx	i	58009.2893	15.137	0.075
SN2017glx	i	58033.2404	15.671	0.072
SN2017glx	i	58033.2424	15.648	0.073
SN2017glx	i	58039.2356	15.653	0.075
SN2017glx	i	58039.2375	15.652	0.081
SN2017glx	i	58051.1985	16.278	0.073
SN2017glx	i	58055.1368	16.546	0.076
SN2017glx	i	58055.1386	16.554	0.074
SN2017glx	i	58059.0986	16.684	0.075
SN2017glx	i	58059.1005	16.796	0.077
SN2017glx	i	58076.0944	17.319	0.087
SN2017glx	i	58076.0963	17.417	0.091
SN2017glx	i	58087.0558	17.601	0.095
SN2017glx	i	58087.0577	17.867	0.104
SN2017hng	B	58053.2438	17.882	0.053
SN2017hng	B	58053.2472	17.851	0.053
SN2017hng	B	58057.3302	17.416	0.053
SN2017hng	B	58057.3336	17.412	0.052
SN2017hng	B	58060.8856	17.04	0.105
SN2017hng	B	58067.0143	17.325	0.053
SN2017hng	B	58067.0171	17.333	0.053
SN2017hng	B	58080.1875	18.391	0.055
SN2017hng	B	58080.1903	18.394	0.055
SN2017hng	B	58083.9058	18.657	0.057
SN2017hng	B	58083.9086	18.705	0.057
SN2017hng	B	58088.9752	19.05	0.078
SN2017hng	B	58088.978	19.576	0.301

SN2017hng	B	58092.0446	19.458	0.079
SN2017hng	B	58092.0474	19.433	0.084
SN2017hng	B	58094.2426	19.605	0.081
SN2017hng	B	58094.2454	19.416	0.072
SN2017hng	B	58099.2186	19.893	0.095
SN2017hng	B	58099.2214	19.852	0.09
SN2017hng	B	58103.889	19.864	0.084
SN2017hng	B	58103.8918	19.993	0.092
SN2017hng	B	58107.8913	20.079	0.106
SN2017hng	B	58107.8941	19.99	0.103
SN2017hng	B	58115.1177	20.232	0.12
SN2017hng	B	58115.1206	20.335	0.127
SN2017hng	B	58119.1198	20.607	0.14
SN2017hng	B	58119.1226	20.002	0.098
SN2017hng	B	58120.8976	20.005	0.112
SN2017hng	B	58120.9004	20.622	0.188
SN2017hng	B	58125.1287	20.494	0.126
SN2017hng	B	58125.1315	20.572	0.151
SN2017hng	B	58131.7843	20.063	0.104
SN2017hng	B	58131.7871	20.596	0.16
SN2017hng	B	58136.0801	20.502	0.13
SN2017hng	B	58136.0841	20.471	0.127
SN2017hng	B	58142.1908	20.831	0.176
SN2017hng	B	58142.1948	20.525	0.138
SN2017hng	B	58144.0906	20.645	0.177
SN2017hng	B	58144.0946	20.569	0.167
SN2017hng	B	58150.0976	20.766	0.165
SN2017hng	B	58159.1035	20.841	0.181
SN2017hng	B	58159.1075	21.047	0.236
SN2017hng	B	58168.778	21.101	0.249
SN2017hng	B	58168.782	21.085	0.226
SN2017hng	B	58188.4136	21.296	0.25
SN2017hng	B	58188.4176	20.976	0.188
SN2017hng	V	58053.2508	17.728	0.072
SN2017hng	V	58053.2536	17.716	0.081
SN2017hng	V	58057.3372	17.25	0.056
SN2017hng	V	58057.34	17.255	0.046
SN2017hng	V	58067.0201	17.182	0.043
SN2017hng	V	58067.022	17.119	0.047
SN2017hng	V	58070.5096	17.348	0.053
SN2017hng	V	58070.5115	17.288	0.045
SN2017hng	V	58080.1933	17.71	0.047
SN2017hng	V	58080.1952	17.717	0.066
SN2017hng	V	58083.9116	17.87	0.055
SN2017hng	V	58083.9135	17.961	0.05
SN2017hng	V	58088.981	18.053	0.109
SN2017hng	V	58088.9829	18.288	0.12
SN2017hng	V	58092.0504	18.354	0.081
SN2017hng	V	58092.0523	18.451	0.086
SN2017hng	V	58094.2484	18.381	0.087
SN2017hng	V	58094.2503	18.921	0.155
SN2017hng	V	58099.2244	18.652	0.072
SN2017hng	V	58099.2263	18.626	0.06
SN2017hng	V	58103.8948	18.933	0.063
SN2017hng	V	58103.8967	18.8	0.069
SN2017hng	V	58107.8971	19.087	0.122
SN2017hng	V	58107.899	19.191	0.268
SN2017hng	V	58113.4652	19.31	0.163
SN2017hng	V	58113.4671	19.537	0.208
SN2017hng	V	58115.1235	18.86	0.19
SN2017hng	V	58115.1254	19.065	0.157
SN2017hng	V	58119.1255	19.026	0.139
SN2017hng	V	58119.1274	19.145	0.143
SN2017hng	V	58120.9034	19.37	0.182
SN2017hng	V	58125.1345	19.273	0.146
SN2017hng	V	58125.1364	19.393	0.142
SN2017hng	V	58131.7901	19.477	0.121
SN2017hng	V	58131.792	19.653	0.123

SN2017hng	V	58136.0882	19.343	0.176
SN2017hng	V	58136.0911	19.509	0.178
SN2017hng	V	58142.1989	19.859	0.248
SN2017hng	V	58142.2017	19.619	0.151
SN2017hng	V	58144.0987	19.43	0.176
SN2017hng	V	58144.1015	19.283	0.169
SN2017hng	V	58150.1058	20.515	0.385
SN2017hng	V	58150.1086	19.765	0.276
SN2017hng	V	58159.1116	20.309	0.334
SN2017hng	V	58168.7861	20.433	0.223
SN2017hng	V	58168.7889	20.215	0.173
SN2017hng	V	58179.4415	19.745	0.297
SN2017hng	V	58188.4217	20.252	0.248
SN2017hng	V	58188.4245	20.3	0.248
SN2017hng	g	58053.2566	17.857	0.064
SN2017hng	g	58053.2594	17.852	0.053
SN2017hng	g	58057.343	17.418	0.047
SN2017hng	g	58057.3459	17.408	0.043
SN2017hng	g	58060.8984	17.384	0.255
SN2017hng	g	58067.024	17.286	0.039
SN2017hng	g	58067.0268	17.309	0.04
SN2017hng	g	58070.5136	17.515	0.051
SN2017hng	g	58070.5164	17.5	0.05
SN2017hng	g	58075.0475	17.706	0.198
SN2017hng	g	58080.1972	18.113	0.052
SN2017hng	g	58080.2001	18.1	0.079
SN2017hng	g	58083.9156	18.358	0.047
SN2017hng	g	58083.9184	18.33	0.055
SN2017hng	g	58088.985	18.702	0.122
SN2017hng	g	58088.9878	18.63	0.098
SN2017hng	g	58092.0544	18.948	0.073
SN2017hng	g	58092.0572	19.008	0.085
SN2017hng	g	58094.2523	19.165	0.086
SN2017hng	g	58094.2552	19.239	0.086
SN2017hng	g	58099.2284	19.236	0.058
SN2017hng	g	58099.2312	19.263	0.059
SN2017hng	g	58103.8988	19.37	0.061
SN2017hng	g	58103.9016	19.444	0.07
SN2017hng	g	58107.901	19.496	0.069
SN2017hng	g	58107.9038	19.538	0.076
SN2017hng	g	58113.4692	19.639	0.12
SN2017hng	g	58113.472	19.751	0.129
SN2017hng	g	58115.1275	19.619	0.098
SN2017hng	g	58115.1303	19.61	0.112
SN2017hng	g	58119.1295	19.851	0.169
SN2017hng	g	58119.1323	19.681	0.151
SN2017hng	g	58120.9073	19.759	0.223
SN2017hng	g	58125.1384	19.834	0.061
SN2017hng	g	58131.7941	19.828	0.093
SN2017hng	g	58131.7969	19.873	0.099
SN2017hng	g	58136.0941	19.823	0.117
SN2017hng	g	58136.098	19.848	0.117
SN2017hng	g	58142.2047	19.846	0.111
SN2017hng	g	58142.2087	19.886	0.115
SN2017hng	g	58144.1045	19.786	0.124
SN2017hng	g	58144.1085	19.775	0.177
SN2017hng	g	58150.1116	19.926	0.2
SN2017hng	g	58150.1156	20.027	0.153
SN2017hng	g	58159.1174	19.883	0.181
SN2017hng	g	58159.1214	19.979	0.217
SN2017hng	g	58168.7919	20.268	0.106
SN2017hng	g	58168.7959	20.253	0.097
SN2017hng	g	58179.4445	19.677	0.241
SN2017hng	g	58188.4275	20.233	0.15
SN2017hng	g	58188.4315	20.169	0.136
SN2017hng	r	58053.2624	17.862	0.051
SN2017hng	r	58053.2653	17.845	0.051
SN2017hng	r	58057.3488	17.408	0.049

SN2017hng	r	58057.3517	17.408	0.049
SN2017hng	r	58060.9042	17.212	0.097
SN2017hng	r	58060.907	17.241	0.069
SN2017hng	r	58067.0298	17.17	0.047
SN2017hng	r	58067.0317	17.203	0.047
SN2017hng	r	58070.5194	17.25	0.048
SN2017hng	r	58070.5213	17.334	0.045
SN2017hng	r	58075.0524	18.126	0.082
SN2017hng	r	58080.203	17.856	0.05
SN2017hng	r	58080.2049	17.862	0.05
SN2017hng	r	58083.9214	17.895	0.048
SN2017hng	r	58083.9232	17.838	0.051
SN2017hng	r	58088.9908	18.003	0.063
SN2017hng	r	58088.9927	18.09	0.061
SN2017hng	r	58092.0602	18.061	0.063
SN2017hng	r	58092.062	18.034	0.059
SN2017hng	r	58094.2581	18.079	0.05
SN2017hng	r	58094.26	18.054	0.052
SN2017hng	r	58099.2341	18.221	0.055
SN2017hng	r	58099.236	18.195	0.061
SN2017hng	r	58103.9045	18.557	0.061
SN2017hng	r	58103.9064	18.509	0.063
SN2017hng	r	58107.9068	18.721	0.058
SN2017hng	r	58107.9087	18.787	0.061
SN2017hng	r	58113.4749	18.959	0.081
SN2017hng	r	58113.4768	18.953	0.07
SN2017hng	r	58115.1333	18.942	0.067
SN2017hng	r	58115.1352	18.965	0.064
SN2017hng	r	58119.1353	18.992	0.073
SN2017hng	r	58119.1372	18.971	0.07
SN2017hng	r	58120.9131	19.286	0.079
SN2017hng	r	58120.915	19.172	0.075
SN2017hng	r	58125.1442	19.303	0.085
SN2017hng	r	58125.1461	19.293	0.081
SN2017hng	r	58131.7998	19.441	0.091
SN2017hng	r	58131.8017	19.363	0.083
SN2017hng	r	58136.1021	19.565	0.1
SN2017hng	r	58136.105	19.504	0.095
SN2017hng	r	58142.2128	19.615	0.127
SN2017hng	r	58144.1126	19.587	0.096
SN2017hng	r	58144.1154	19.636	0.091
SN2017hng	r	58150.1197	19.682	0.106
SN2017hng	r	58150.1226	19.923	0.126
SN2017hng	r	58159.1256	20.321	0.184
SN2017hng	r	58159.1284	20.254	0.142
SN2017hng	r	58168.8	20.21	0.151
SN2017hng	r	58168.8028	20.454	0.233
SN2017hng	r	58188.4356	20.491	0.222
SN2017hng	r	58188.4384	20.628	0.244
SN2017hng	i	58053.2682	18.033	0.049
SN2017hng	i	58053.2711	18.055	0.049
SN2017hng	i	58057.3546	17.646	0.049
SN2017hng	i	58057.3575	17.66	0.049
SN2017hng	i	58067.0338	17.757	0.049
SN2017hng	i	58067.0356	17.698	0.05
SN2017hng	i	58070.5233	17.926	0.081
SN2017hng	i	58070.5252	17.728	0.217
SN2017hng	i	58075.0544	18.053	0.062
SN2017hng	i	58075.0563	17.783	0.061
SN2017hng	i	58080.207	18.391	0.056
SN2017hng	i	58080.2088	18.356	0.056
SN2017hng	i	58083.9253	18.32	0.053
SN2017hng	i	58083.9272	18.351	0.052
SN2017hng	i	58088.9947	18.122	0.06
SN2017hng	i	58088.9966	18.235	0.066
SN2017hng	i	58092.0641	18.154	0.057
SN2017hng	i	58092.066	18.355	0.073
SN2017hng	i	58094.2621	18.184	0.05

SN2017hng	i	58094.2639	18.176	0.051
SN2017hng	i	58099.238	18.295	0.056
SN2017hng	i	58099.2399	18.262	0.053
SN2017hng	i	58103.9084	18.557	0.059
SN2017hng	i	58103.9103	18.555	0.056
SN2017hng	i	58107.9107	18.779	0.056
SN2017hng	i	58107.9126	18.776	0.057
SN2017hng	i	58115.1372	19.187	0.065
SN2017hng	i	58115.1391	19.035	0.061
SN2017hng	i	58119.1392	19.538	0.081
SN2017hng	i	58119.1411	19.222	0.071
SN2017hng	i	58120.917	19.194	0.069
SN2017hng	i	58120.9189	19.155	0.066
SN2017hng	i	58125.1481	19.461	0.072
SN2017hng	i	58125.15	19.536	0.073
SN2017hng	i	58131.8038	19.681	0.1
SN2017hng	i	58131.8057	19.625	0.126
SN2017hng	i	58136.1079	19.805	0.078
SN2017hng	i	58136.1107	19.697	0.072
SN2017hng	i	58144.1185	19.934	0.113
SN2017hng	i	58144.1213	19.372	0.081
SN2017hng	i	58150.1255	20.301	0.111
SN2017hng	i	58150.1284	20.143	0.099
SN2017hng	i	58159.1314	20.087	0.096
SN2017hng	i	58159.1342	20.258	0.112
SN2017hng	i	58168.8058	20.594	0.294
SN2017hng	i	58168.8086	20.725	0.227
SN2017hng	i	58177.7838	20.39	0.14
SN2017hng	i	58177.7866	20.975	0.195
SN2017hng	i	58188.4414	20.699	0.159
SN2017hng	i	58188.4442	21.035	0.239
SN2018apo	g	58217.3441	15.626	0.065
SN2018apo	g	58217.3453	15.618	0.064
SN2018apo	g	58220.0569	15.481	0.057
SN2018apo	g	58220.0581	15.476	0.056
SN2018apo	g	58223.1201	15.499	0.064
SN2018apo	g	58223.1213	15.499	0.06
SN2018apo	g	58226.6393	15.518	0.067
SN2018apo	g	58226.6405	15.521	0.066
SN2018apo	g	58229.5699	15.578	0.073
SN2018apo	g	58229.5711	15.572	0.07
SN2018apo	g	58232.3526	15.718	0.062
SN2018apo	g	58232.3538	15.701	0.061
SN2018apo	g	58235.3813	15.896	0.064
SN2018apo	g	58235.3825	15.931	0.081
SN2018apo	g	58238.5768	16.142	0.075
SN2018apo	g	58238.578	16.138	0.074
SN2018apo	g	58238.7261	16.154	0.056
SN2018apo	g	58238.7272	16.118	0.057
SN2018apo	g	58242.7457	16.46	0.056
SN2018apo	g	58242.7469	16.443	0.055
SN2018apo	g	58245.4759	16.683	0.066
SN2018apo	g	58245.4771	16.704	0.067
SN2018apo	g	58249.1116	17.046	0.057
SN2018apo	g	58249.1127	17.037	0.057
SN2018apo	g	58250.7764	17.164	0.059
SN2018apo	g	58250.7776	17.157	0.061
SN2018apo	g	58253.5366	17.343	0.063
SN2018apo	g	58253.5378	17.371	0.062
SN2018apo	g	58258.3475	17.581	0.069
SN2018apo	g	58258.3487	17.611	0.068
SN2018apo	g	58263.9917	17.844	0.066
SN2018apo	g	58263.9929	17.867	0.066
SN2018apo	g	58270.0247	18.065	0.064
SN2018apo	g	58270.0259	18.122	0.061
SN2018apo	g	58272.098	18.039	0.066
SN2018apo	g	58272.0991	18.073	0.066
SN2018apo	g	58275.7556	18.16	0.062

SN2018apo	g	58275.7568	18.125	0.065
SN2018apo	g	58279.8129	18.199	0.069
SN2018apo	g	58279.8141	18.168	0.066
SN2018apo	g	58285.9497	18.211	0.07
SN2018apo	g	58285.9509	18.279	0.071
SN2018apo	g	58289.9898	18.461	0.076
SN2018apo	g	58289.991	18.362	0.072
SN2018apo	g	58291.6931	18.378	0.066
SN2018apo	g	58291.695	18.453	0.061
SN2018apo	g	58297.0937	18.485	0.078
SN2018apo	g	58297.0956	18.461	0.083
SN2018apo	g	58303.7764	18.647	0.062
SN2018apo	g	58303.7783	18.594	0.06
SN2018apo	g	58310.4065	18.673	0.062
SN2018apo	g	58310.4084	18.723	0.062
SN2018apo	g	58316.4101	18.776	0.061
SN2018apo	g	58316.412	18.798	0.061
SN2018apo	g	58322.4448	18.863	0.076
SN2018apo	g	58322.4467	18.835	0.075
SN2018apo	g	58331.028	18.944	0.065
SN2018apo	g	58331.032	18.951	0.062
SN2018apo	g	58341.7519	19.107	0.064
SN2018apo	g	58341.7559	19.153	0.066
SN2018apo	g	58349.9844	19.187	0.074
SN2018apo	g	58349.9883	19.309	0.08
SN2018apo	r	58217.3466	15.55	0.048
SN2018apo	r	58217.3478	15.543	0.05
SN2018apo	r	58220.0595	15.412	0.053
SN2018apo	r	58220.0606	15.414	0.053
SN2018apo	r	58223.1227	15.314	0.051
SN2018apo	r	58223.1239	15.32	0.053
SN2018apo	r	58226.6418	15.309	0.066
SN2018apo	r	58226.643	15.326	0.162
SN2018apo	r	58229.5725	15.342	0.053
SN2018apo	r	58232.3552	15.52	0.051
SN2018apo	r	58232.3563	15.51	0.056
SN2018apo	r	58235.3839	15.748	0.068
SN2018apo	r	58235.3851	15.771	0.059
SN2018apo	r	58238.5793	15.95	0.059
SN2018apo	r	58238.5805	15.929	0.047
SN2018apo	r	58238.7286	15.954	0.059
SN2018apo	r	58238.7298	15.951	0.051
SN2018apo	r	58242.7482	16.01	0.049
SN2018apo	r	58242.7494	16.006	0.051
SN2018apo	r	58245.4785	16.046	0.06
SN2018apo	r	58245.4797	16.041	0.061
SN2018apo	r	58249.1153	16.2	0.122
SN2018apo	r	58250.779	16.139	0.061
SN2018apo	r	58250.7801	16.15	0.061
SN2018apo	r	58253.5392	16.258	0.054
SN2018apo	r	58253.5404	16.281	0.056
SN2018apo	r	58258.35	16.484	0.058
SN2018apo	r	58258.3512	16.511	0.054
SN2018apo	r	58263.9942	16.839	0.059
SN2018apo	r	58263.9954	16.849	0.055
SN2018apo	r	58270.0272	17.11	0.054
SN2018apo	r	58270.0284	17.108	0.058
SN2018apo	r	58272.1005	17.222	0.057
SN2018apo	r	58272.1017	17.202	0.056
SN2018apo	r	58275.7581	17.327	0.055
SN2018apo	r	58275.7593	17.352	0.055
SN2018apo	r	58279.8154	17.446	0.059
SN2018apo	r	58279.8166	17.48	0.059
SN2018apo	r	58285.9522	17.665	0.056
SN2018apo	r	58285.9534	17.656	0.054
SN2018apo	r	58289.9924	17.765	0.059
SN2018apo	r	58289.9936	17.833	0.059
SN2018apo	r	58291.697	17.855	0.062

SN2018apo	r	58291.6986	17.845	0.059
SN2018apo	r	58297.0976	18.013	0.065
SN2018apo	r	58297.0991	18.02	0.063
SN2018apo	r	58303.7804	18.197	0.061
SN2018apo	r	58303.7819	18.186	0.059
SN2018apo	r	58310.4104	18.436	0.059
SN2018apo	r	58310.412	18.438	0.058
SN2018apo	r	58316.414	18.58	0.059
SN2018apo	r	58316.4156	18.672	0.058
SN2018apo	r	58322.4488	18.821	0.07
SN2018apo	r	58322.4503	18.712	0.064
SN2018apo	r	58331.0361	19.012	0.061
SN2018apo	r	58331.039	19.024	0.059
SN2018apo	r	58341.76	19.381	0.077
SN2018apo	r	58341.7628	19.318	0.076
SN2018apo	r	58349.9924	19.564	0.111
SN2018apo	r	58349.9953	19.591	0.118
SN2018apo	i	58217.3492	15.728	0.067
SN2018apo	i	58217.3504	15.714	0.072
SN2018apo	i	58220.062	15.671	0.073
SN2018apo	i	58220.0632	15.659	0.072
SN2018apo	i	58223.1252	15.693	0.072
SN2018apo	i	58223.1264	15.694	0.071
SN2018apo	i	58226.6444	15.92	0.123
SN2018apo	i	58226.6456	15.655	0.1
SN2018apo	i	58229.5751	15.837	0.08
SN2018apo	i	58229.5763	15.832	0.077
SN2018apo	i	58232.3577	16.03	0.081
SN2018apo	i	58232.3589	16.049	0.078
SN2018apo	i	58235.3865	16.248	0.079
SN2018apo	i	58235.3877	16.304	0.082
SN2018apo	i	58238.5818	16.352	0.083
SN2018apo	i	58238.7311	16.39	0.075
SN2018apo	i	58238.7323	16.418	0.077
SN2018apo	i	58242.7508	16.323	0.075
SN2018apo	i	58242.752	16.323	0.075
SN2018apo	i	58245.481	16.263	0.073
SN2018apo	i	58245.4822	16.226	0.081
SN2018apo	i	58250.7815	16.174	0.086
SN2018apo	i	58250.7827	16.167	0.092
SN2018apo	i	58253.5418	16.232	0.079
SN2018apo	i	58253.5429	16.251	0.077
SN2018apo	i	58258.3526	16.393	0.078
SN2018apo	i	58258.3538	16.44	0.079
SN2018apo	i	58263.9968	16.784	0.081
SN2018apo	i	58263.998	16.789	0.081
SN2018apo	i	58270.0298	17.1	0.073
SN2018apo	i	58270.031	17.151	0.079
SN2018apo	i	58272.103	17.227	0.076
SN2018apo	i	58272.1042	17.218	0.078
SN2018apo	i	58275.7607	17.317	0.08
SN2018apo	i	58275.7619	17.318	0.081
SN2018apo	i	58279.8179	17.539	0.081
SN2018apo	i	58279.8191	17.524	0.082
SN2018apo	i	58285.9548	17.776	0.081
SN2018apo	i	58285.956	17.778	0.077
SN2018apo	i	58289.9949	17.936	0.083
SN2018apo	i	58289.9961	17.952	0.086
SN2018apo	i	58291.7003	18.025	0.09
SN2018apo	i	58291.7018	18.013	0.087
SN2018apo	i	58297.1008	18.229	0.089
SN2018apo	i	58297.1024	18.247	0.096
SN2018apo	i	58303.7836	18.481	0.091
SN2018apo	i	58303.7851	18.427	0.09
SN2018apo	i	58310.4136	18.677	0.092
SN2018apo	i	58310.4152	18.624	0.087
SN2018apo	i	58316.4173	18.664	0.102
SN2018apo	i	58316.4188	18.803	0.095

SN2018apo	i	58322.452	19.174	0.119
SN2018apo	i	58322.4535	19.062	0.115
SN2018apo	i	58331.0419	19.408	0.096
SN2018apo	i	58331.0447	19.352	0.094
SN2018apo	i	58341.7658	19.52	0.122
SN2018apo	i	58341.7686	19.597	0.122
SN2018apo	i	58349.9982	20.188	0.277
SN2018apo	i	58350.001	19.664	0.179
SN2018bie	B	58251.9169	17.517	0.062
SN2018bie	B	58251.9197	17.54	0.061
SN2018bie	B	58256.0976	16.566	0.062
SN2018bie	B	58256.1004	16.573	0.059
SN2018bie	B	58260.0108	16.131	0.061
SN2018bie	B	58260.0137	16.119	0.062
SN2018bie	B	58265.115	15.926	0.061
SN2018bie	B	58265.1178	15.901	0.061
SN2018bie	B	58271.0102	16.112	0.06
SN2018bie	B	58271.013	16.107	0.061
SN2018bie	B	58274.8192	16.359	0.061
SN2018bie	B	58274.822	16.38	0.061
SN2018bie	B	58280.7708	16.978	0.062
SN2018bie	B	58280.7736	16.984	0.061
SN2018bie	B	58288.0768	17.803	0.06
SN2018bie	B	58288.0796	17.816	0.061
SN2018bie	B	58292.4031	18.179	0.061
SN2018bie	B	58292.4059	18.159	0.06
SN2018bie	B	58296.0142	18.388	0.063
SN2018bie	B	58296.017	18.358	0.062
SN2018bie	B	58302.3888	18.758	0.059
SN2018bie	B	58302.3916	18.754	0.062
SN2018bie	B	58308.7571	18.983	0.061
SN2018bie	B	58308.7599	18.959	0.061
SN2018bie	B	58312.9553	19.043	0.064
SN2018bie	B	58312.9581	19.043	0.063
SN2018bie	B	58319.7052	19.269	0.179
SN2018bie	B	58319.708	19.127	0.078
SN2018bie	B	58321.3674	19.261	0.08
SN2018bie	B	58321.3703	19.247	0.08
SN2018bie	B	58322.7022	19.353	0.086
SN2018bie	B	58322.705	19.124	0.077
SN2018bie	B	58322.7139	19.278	0.068
SN2018bie	B	58322.7167	19.059	0.063
SN2018bie	B	58323.358	19.254	0.077
SN2018bie	B	58323.3581	19.244	0.071
SN2018bie	B	58323.3608	19.28	0.077
SN2018bie	B	58323.3609	19.192	0.071
SN2018bie	B	58324.9686	19.319	0.083
SN2018bie	B	58342.976	19.559	0.256
SN2018bie	B	58342.9788	19.17	0.274
SN2018bie	V	58251.9227	17.458	0.068
SN2018bie	V	58251.9246	17.43	0.07
SN2018bie	V	58256.1034	16.554	0.068
SN2018bie	V	58256.1053	16.553	0.069
SN2018bie	V	58260.0166	16.125	0.073
SN2018bie	V	58260.0185	16.121	0.073
SN2018bie	V	58265.1208	15.854	0.074
SN2018bie	V	58265.1227	15.877	0.075
SN2018bie	V	58271.016	15.966	0.076
SN2018bie	V	58271.0178	15.983	0.074
SN2018bie	V	58274.825	16.118	0.077
SN2018bie	V	58274.8269	16.13	0.078
SN2018bie	V	58280.7765	16.49	0.058
SN2018bie	V	58280.7784	16.476	0.071
SN2018bie	V	58288.0826	16.903	0.073
SN2018bie	V	58288.0845	16.931	0.074
SN2018bie	V	58292.4089	17.139	0.065
SN2018bie	V	58292.4108	17.134	0.065
SN2018bie	V	58296.0199	17.266	0.076

SN2018bie	V	58296.0218	17.251	0.074
SN2018bie	V	58302.3946	17.644	0.073
SN2018bie	V	58302.3965	17.643	0.07
SN2018bie	V	58308.7629	17.866	0.075
SN2018bie	V	58308.7648	17.9	0.074
SN2018bie	V	58312.9611	18.041	0.073
SN2018bie	V	58312.963	18.049	0.072
SN2018bie	V	58319.711	18.062	0.085
SN2018bie	V	58319.7129	17.977	0.091
SN2018bie	V	58321.3732	18.288	0.075
SN2018bie	V	58321.3751	18.237	0.071
SN2018bie	V	58322.7079	18.193	0.081
SN2018bie	V	58322.7098	18.284	0.093
SN2018bie	V	58322.7196	18.256	0.08
SN2018bie	V	58322.7215	18.296	0.078
SN2018bie	V	58323.3638	18.269	0.077
SN2018bie	V	58323.3638	18.332	0.072
SN2018bie	V	58323.3657	18.324	0.075
SN2018bie	V	58323.3657	18.312	0.074
SN2018bie	V	58324.9716	18.3	0.079
SN2018bie	V	58324.9735	18.264	0.081
SN2018bie	V	58342.9817	18.94	0.146
SN2018bie	V	58342.9836	18.85	0.111
SN2018bie	g	58251.9267	17.535	0.059
SN2018bie	g	58251.9295	17.528	0.059
SN2018bie	g	58256.1073	16.613	0.055
SN2018bie	g	58256.1101	16.606	0.055
SN2018bie	g	58260.0206	16.154	0.067
SN2018bie	g	58260.0234	16.136	0.061
SN2018bie	g	58265.1276	15.983	0.062
SN2018bie	g	58271.0199	16.086	0.06
SN2018bie	g	58271.0227	16.086	0.06
SN2018bie	g	58274.829	16.295	0.055
SN2018bie	g	58274.8318	16.29	0.06
SN2018bie	g	58280.7805	16.766	0.056
SN2018bie	g	58280.7833	16.766	0.055
SN2018bie	g	58288.0866	17.375	0.062
SN2018bie	g	58288.0894	17.394	0.059
SN2018bie	g	58292.4128	17.73	0.06
SN2018bie	g	58292.4157	17.725	0.07
SN2018bie	g	58296.0239	17.957	0.059
SN2018bie	g	58296.0267	17.95	0.063
SN2018bie	g	58302.3986	18.418	0.073
SN2018bie	g	58302.4014	18.371	0.069
SN2018bie	g	58308.7668	18.522	0.057
SN2018bie	g	58308.7697	18.542	0.057
SN2018bie	g	58312.965	18.648	0.063
SN2018bie	g	58312.9678	18.635	0.065
SN2018bie	g	58321.3772	18.811	0.073
SN2018bie	g	58321.38	18.823	0.074
SN2018bie	g	58322.7119	18.696	0.062
SN2018bie	g	58322.7147	18.823	0.088
SN2018bie	g	58322.7236	18.782	0.076
SN2018bie	g	58322.7264	18.859	0.082
SN2018bie	g	58323.3677	18.838	0.068
SN2018bie	g	58323.3678	18.896	0.075
SN2018bie	g	58323.3705	18.898	0.07
SN2018bie	g	58323.3706	18.847	0.073
SN2018bie	g	58324.9756	18.838	0.091
SN2018bie	g	58324.9785	18.859	0.076
SN2018bie	g	58342.9857	19.036	0.086
SN2018bie	g	58342.9885	18.984	0.11
SN2018bie	r	58251.9325	17.531	0.047
SN2018bie	r	58251.9344	17.519	0.045
SN2018bie	r	58256.1131	16.641	0.038
SN2018bie	r	58256.115	16.655	0.032
SN2018bie	r	58260.0264	16.179	0.061
SN2018bie	r	58260.0283	16.174	0.058

SN2018bie	r	58265.1305	15.948	0.044
SN2018bie	r	58265.1324	15.989	0.028
SN2018bie	r	58271.0257	16.023	0.044
SN2018bie	r	58271.0276	16.017	0.044
SN2018bie	r	58274.8348	16.217	0.049
SN2018bie	r	58274.8366	16.217	0.059
SN2018bie	r	58280.7863	16.595	0.038
SN2018bie	r	58280.7882	16.586	0.039
SN2018bie	r	58288.0924	16.736	0.043
SN2018bie	r	58288.0943	16.712	0.045
SN2018bie	r	58292.4186	16.813	0.034
SN2018bie	r	58292.4205	16.803	0.037
SN2018bie	r	58296.0297	16.887	0.048
SN2018bie	r	58296.0316	16.896	0.069
SN2018bie	r	58302.4044	17.226	0.043
SN2018bie	r	58302.4062	17.209	0.04
SN2018bie	r	58308.7726	17.556	0.059
SN2018bie	r	58308.7745	17.573	0.044
SN2018bie	r	58312.9708	17.732	0.048
SN2018bie	r	58312.9727	17.742	0.058
SN2018bie	r	58319.7226	18.06	0.11
SN2018bie	r	58321.383	18.08	0.044
SN2018bie	r	58321.3849	18.042	0.038
SN2018bie	r	58322.7176	18.022	0.052
SN2018bie	r	58322.7195	18.046	0.052
SN2018bie	r	58322.7294	18.06	0.052
SN2018bie	r	58322.7313	18.055	0.047
SN2018bie	r	58323.3735	18.052	0.045
SN2018bie	r	58323.3736	18.13	0.047
SN2018bie	r	58323.3754	18.076	0.044
SN2018bie	r	58323.3754	18.099	0.045
SN2018bie	r	58324.9815	18.134	0.059
SN2018bie	r	58324.9834	18.214	0.059
SN2018bie	r	58342.9914	18.704	0.156
SN2018bie	r	58342.9933	18.821	0.129
SN2018bie	i	58251.9364	17.682	0.078
SN2018bie	i	58251.9383	17.653	0.08
SN2018bie	i	58256.117	16.833	0.074
SN2018bie	i	58256.1189	16.82	0.074
SN2018bie	i	58260.0303	16.478	0.078
SN2018bie	i	58260.0322	16.455	0.078
SN2018bie	i	58265.1345	16.419	0.07
SN2018bie	i	58265.1364	16.447	0.067
SN2018bie	i	58271.0296	16.624	0.077
SN2018bie	i	58271.0315	16.634	0.079
SN2018bie	i	58274.8387	16.849	0.075
SN2018bie	i	58274.8406	16.835	0.079
SN2018bie	i	58280.7902	17.183	0.075
SN2018bie	i	58280.7921	17.149	0.075
SN2018bie	i	58288.0963	17.138	0.065
SN2018bie	i	58288.0982	17.117	0.065
SN2018bie	i	58292.4226	17.024	0.059
SN2018bie	i	58292.4245	17.029	0.058
SN2018bie	i	58296.0336	17.049	0.078
SN2018bie	i	58296.0355	17.033	0.079
SN2018bie	i	58302.4083	17.237	0.076
SN2018bie	i	58302.4102	17.238	0.077
SN2018bie	i	58308.7766	17.63	0.079
SN2018bie	i	58308.7784	17.643	0.077
SN2018bie	i	58312.9766	17.647	0.168
SN2018bie	i	58321.3869	18.36	0.15
SN2018bie	i	58321.3888	18.255	0.146
SN2018bie	i	58322.7216	18.143	0.09
SN2018bie	i	58322.7234	18.158	0.086
SN2018bie	i	58322.7333	18.314	0.091
SN2018bie	i	58322.7352	18.335	0.095
SN2018bie	i	58323.3774	18.277	0.078
SN2018bie	i	58323.3775	18.314	0.079

SN2018bie	i	58323.3793	18.273	0.081
SN2018bie	i	58323.3794	18.279	0.076
SN2018bie	i	58324.9854	18.649	0.728
SN2018bie	i	58324.9873	18.328	0.086
SN2018bie	i	58342.9954	18.632	0.228
SN2018bie	i	58342.9973	18.748	0.293
SN2018cnw	B	58287.3777	17.737	0.037
SN2018cnw	B	58287.3828	17.738	0.037
SN2018cnw	B	58289.3175	16.93	0.036
SN2018cnw	B	58289.3194	16.922	0.036
SN2018cnw	B	58290.3308	16.638	0.036
SN2018cnw	B	58290.3327	16.636	0.037
SN2018cnw	B	58292.3135	16.248	0.034
SN2018cnw	B	58292.3154	16.247	0.034
SN2018cnw	B	58293.1652	16.13	0.037
SN2018cnw	B	58293.167	16.119	0.037
SN2018cnw	B	58294.2417	15.991	0.036
SN2018cnw	B	58294.307	15.991	0.037
SN2018cnw	B	58294.3089	15.996	0.035
SN2018cnw	B	58295.3243	15.9	0.036
SN2018cnw	B	58295.3262	15.889	0.036
SN2018cnw	B	58296.2056	15.836	0.038
SN2018cnw	B	58296.2075	15.776	0.038
SN2018cnw	B	58296.3897	15.816	0.035
SN2018cnw	B	58296.3916	15.815	0.035
SN2018cnw	B	58299.2713	15.736	0.034
SN2018cnw	B	58299.2732	15.74	0.031
SN2018cnw	B	58301.3897	15.725	0.13
SN2018cnw	B	58301.3916	15.74	0.037
SN2018cnw	B	58306.1656	15.822	0.037
SN2018cnw	B	58306.1671	15.837	0.036
SN2018cnw	B	58307.1967	15.856	0.036
SN2018cnw	B	58307.1982	15.863	0.036
SN2018cnw	B	58318.1833	16.719	0.036
SN2018cnw	B	58318.1848	16.73	0.037
SN2018cnw	B	58322.1317	17.165	0.037
SN2018cnw	B	58322.1332	17.15	0.037
SN2018cnw	B	58323.2011	17.271	0.044
SN2018cnw	B	58323.2026	17.332	0.039
SN2018cnw	B	58323.215	17.315	0.044
SN2018cnw	B	58323.2165	17.301	0.038
SN2018cnw	B	58335.2115	18.234	0.037
SN2018cnw	B	58335.2143	18.279	0.037
SN2018cnw	B	58351.1845	18.691	0.039
SN2018cnw	B	58351.1873	18.757	0.041
SN2018cnw	B	58375.0814	18.977	0.051
SN2018cnw	B	58375.0853	18.987	0.045
SN2018cnw	B	58385.0722	19.184	0.076
SN2018cnw	B	58385.0762	19.238	0.071
SN2018cnw	B	58399.0601	19.538	0.075
SN2018cnw	B	58399.0641	19.409	0.054
SN2018cnw	B	58428.0412	19.919	0.145
SN2018cnw	B	58428.0452	19.958	0.098
SN2018cnw	V	58287.3881	17.59	0.037
SN2018cnw	V	58287.3914	17.586	0.036
SN2018cnw	V	58289.3214	16.823	0.037
SN2018cnw	V	58289.323	16.834	0.035
SN2018cnw	V	58290.3348	16.547	0.034
SN2018cnw	V	58290.3363	16.536	0.034
SN2018cnw	V	58292.3175	16.17	0.034
SN2018cnw	V	58292.319	16.163	0.032
SN2018cnw	V	58293.1706	16.031	0.04
SN2018cnw	V	58294.3109	15.917	0.03
SN2018cnw	V	58294.3125	15.935	0.029
SN2018cnw	V	58296.3936	15.765	0.034
SN2018cnw	V	58296.3951	15.768	0.033
SN2018cnw	V	58298.2317	15.699	0.181
SN2018cnw	V	58298.2332	15.694	0.046

SN2018cnw	V	58299.2753	15.655	0.033
SN2018cnw	V	58299.2768	15.636	0.031
SN2018cnw	V	58301.3936	15.602	0.097
SN2018cnw	V	58301.3951	15.634	0.086
SN2018cnw	V	58307.1999	15.653	0.053
SN2018cnw	V	58307.2011	15.641	0.035
SN2018cnw	V	58323.2043	16.462	0.035
SN2018cnw	V	58323.2055	16.456	0.032
SN2018cnw	V	58323.2182	16.453	0.032
SN2018cnw	V	58323.2194	16.46	0.033
SN2018cnw	V	58335.2173	17.12	0.035
SN2018cnw	V	58335.2192	17.112	0.039
SN2018cnw	V	58351.1903	17.801	0.047
SN2018cnw	V	58351.1922	17.864	0.045
SN2018cnw	V	58375.0895	18.471	0.047
SN2018cnw	V	58375.0913	18.461	0.047
SN2018cnw	V	58385.0803	18.789	0.076
SN2018cnw	V	58385.0821	18.833	0.073
SN2018cnw	V	58399.0682	19.13	0.051
SN2018cnw	V	58399.071	19.121	0.052
SN2018cnw	V	58428.0493	19.683	0.086
SN2018cnw	V	58428.0521	19.744	0.081
SN2018cnw	g	58287.3948	17.675	0.039
SN2018cnw	g	58287.3981	17.675	0.033
SN2018cnw	g	58289.3247	16.887	0.032
SN2018cnw	g	58289.3266	16.891	0.031
SN2018cnw	g	58290.338	16.605	0.031
SN2018cnw	g	58290.3399	16.613	0.031
SN2018cnw	g	58292.3207	16.238	0.033
SN2018cnw	g	58292.3226	16.222	0.031
SN2018cnw	g	58293.1723	16.112	0.032
SN2018cnw	g	58293.1742	16.109	0.033
SN2018cnw	g	58294.3142	15.966	0.032
SN2018cnw	g	58294.3161	15.978	0.035
SN2018cnw	g	58295.3315	15.899	0.037
SN2018cnw	g	58295.3334	15.889	0.034
SN2018cnw	g	58296.2128	15.812	0.035
SN2018cnw	g	58296.2146	15.847	0.037
SN2018cnw	g	58296.3969	15.829	0.034
SN2018cnw	g	58296.3988	15.83	0.034
SN2018cnw	g	58298.235	15.765	0.117
SN2018cnw	g	58299.2785	15.718	0.032
SN2018cnw	g	58299.2804	15.71	0.034
SN2018cnw	g	58301.3969	15.697	0.167
SN2018cnw	g	58301.3988	15.652	0.082
SN2018cnw	g	58307.2024	15.793	0.031
SN2018cnw	g	58307.204	15.791	0.03
SN2018cnw	g	58318.1891	16.461	0.032
SN2018cnw	g	58318.1906	16.46	0.032
SN2018cnw	g	58322.1388	16.768	0.036
SN2018cnw	g	58322.1404	16.786	0.036
SN2018cnw	g	58323.2069	16.889	0.039
SN2018cnw	g	58323.2208	16.872	0.034
SN2018cnw	g	58323.2223	16.886	0.039
SN2018cnw	g	58335.2212	17.826	0.037
SN2018cnw	g	58335.224	17.814	0.037
SN2018cnw	g	58351.1942	18.393	0.042
SN2018cnw	g	58351.197	18.329	0.043
SN2018cnw	g	58375.0934	18.728	0.036
SN2018cnw	g	58375.0973	18.717	0.034
SN2018cnw	g	58385.0842	18.956	0.05
SN2018cnw	g	58385.0881	18.856	0.046
SN2018cnw	g	58399.0746	19.107	0.035
SN2018cnw	g	58399.0785	19.098	0.036
SN2018cnw	r	58287.4015	17.663	0.03
SN2018cnw	r	58287.4048	17.666	0.03
SN2018cnw	r	58289.3286	16.933	0.031
SN2018cnw	r	58290.3419	16.676	0.032

SN2018cnw	r	58290.3435	16.682	0.032
SN2018cnw	r	58292.3246	16.309	0.03
SN2018cnw	r	58292.3262	16.313	0.029
SN2018cnw	r	58293.1778	16.207	0.034
SN2018cnw	r	58294.3181	16.064	0.03
SN2018cnw	r	58294.3197	16.054	0.03
SN2018cnw	r	58295.3354	15.987	0.03
SN2018cnw	r	58295.337	15.949	0.046
SN2018cnw	r	58296.2167	15.905	0.039
SN2018cnw	r	58296.2182	15.93	0.035
SN2018cnw	r	58296.4008	15.918	0.032
SN2018cnw	r	58296.4024	15.914	0.032
SN2018cnw	r	58299.2825	15.763	0.028
SN2018cnw	r	58301.4008	15.607	0.24
SN2018cnw	r	58301.4024	15.778	0.55
SN2018cnw	r	58307.2057	15.763	0.034
SN2018cnw	r	58307.2069	15.769	0.033
SN2018cnw	r	58318.1923	16.448	0.031
SN2018cnw	r	58323.224	16.475	0.032
SN2018cnw	r	58323.2252	16.479	0.031
SN2018cnw	r	58335.227	16.76	0.031
SN2018cnw	r	58335.2289	16.758	0.031
SN2018cnw	r	58351.2	17.535	0.034
SN2018cnw	r	58351.2019	17.517	0.034
SN2018cnw	r	58375.1014	18.292	0.033
SN2018cnw	r	58375.1033	18.34	0.034
SN2018cnw	r	58385.0922	18.569	0.047
SN2018cnw	r	58385.0941	18.635	0.047
SN2018cnw	r	58399.0826	19.032	0.035
SN2018cnw	r	58399.0854	19.033	0.039
SN2018cnw	i	58287.4082	18.02	0.036
SN2018cnw	i	58287.4115	17.986	0.034
SN2018cnw	i	58289.3319	17.248	0.036
SN2018cnw	i	58289.3334	17.217	0.036
SN2018cnw	i	58290.3452	16.989	0.035
SN2018cnw	i	58290.3467	16.981	0.036
SN2018cnw	i	58292.3279	16.613	0.037
SN2018cnw	i	58292.3294	16.634	0.036
SN2018cnw	i	58293.1795	16.546	0.034
SN2018cnw	i	58293.181	16.558	0.036
SN2018cnw	i	58294.2455	16.435	0.034
SN2018cnw	i	58294.247	16.438	0.035
SN2018cnw	i	58294.3214	16.422	0.036
SN2018cnw	i	58294.3229	16.437	0.036
SN2018cnw	i	58295.3386	16.407	0.034
SN2018cnw	i	58295.3402	16.401	0.034
SN2018cnw	i	58296.2199	16.421	0.038
SN2018cnw	i	58296.2215	16.388	0.039
SN2018cnw	i	58296.404	16.377	0.038
SN2018cnw	i	58296.4056	16.397	0.036
SN2018cnw	i	58301.404	16.276	0.523
SN2018cnw	i	58301.4056	16.348	0.043
SN2018cnw	i	58307.2082	16.545	0.039
SN2018cnw	i	58307.2094	16.512	0.039
SN2018cnw	i	58318.1948	17.216	0.037
SN2018cnw	i	58318.196	17.21	0.037
SN2018cnw	i	58322.1446	17.137	0.039
SN2018cnw	i	58323.2266	17.096	0.046
SN2018cnw	i	58323.2278	17.088	0.044
SN2018cnw	i	58335.2309	16.957	0.034
SN2018cnw	i	58335.2328	16.956	0.035
SN2018cnw	i	58351.2039	17.862	0.044
SN2018cnw	i	58351.2058	17.88	0.043
SN2018cnw	i	58375.1053	18.832	0.052
SN2018cnw	i	58375.1072	18.841	0.053
SN2018cnw	i	58385.0961	19.142	0.075
SN2018cnw	i	58385.098	19.204	0.08
SN2018cnw	i	58399.0884	19.536	0.077

SN2018cnw	i	58399.0912	19.511	0.071
SN2019dks	B	58586.7504	18.527	0.058
SN2019dks	B	58586.753	18.549	0.067
SN2019dks	B	58588.4588	18.176	0.061
SN2019dks	B	58588.4614	18.146	0.059
SN2019dks	B	58591.8142	17.604	0.056
SN2019dks	B	58592.8773	17.567	0.057
SN2019dks	B	58592.8799	17.545	0.057
SN2019dks	B	58594.3721	17.516	0.057
SN2019dks	B	58594.3748	17.531	0.134
SN2019dks	B	58595.5615	17.483	0.084
SN2019dks	B	58595.5641	17.489	0.057
SN2019dks	B	58598.144	17.367	0.057
SN2019dks	B	58598.1467	17.467	0.06
SN2019dks	B	58600.5462	17.48	0.056
SN2019dks	B	58600.5488	17.48	0.056
SN2019dks	B	58600.5735	17.455	0.045
SN2019dks	B	58600.5762	17.475	0.041
SN2019dks	B	58602.5359	17.541	0.056
SN2019dks	B	58602.5385	17.56	0.056
SN2019dks	B	58607.4855	17.843	0.056
SN2019dks	B	58607.4882	17.841	0.056
SN2019dks	B	58611.1418	18.019	0.611
SN2019dks	B	58611.1444	18.04	0.058
SN2019dks	B	58614.8751	18.493	0.057
SN2019dks	B	58614.8778	18.464	0.057
SN2019dks	B	58626.9647	19.769	0.058
SN2019dks	B	58626.9673	19.823	0.059
SN2019dks	B	58633.4135	20.206	0.062
SN2019dks	B	58633.4161	20.183	0.06
SN2019dks	B	58639.3963	20.55	0.083
SN2019dks	B	58639.399	20.474	0.08
SN2019dks	B	58648.0083	20.712	0.219
SN2019dks	B	58648.011	20.76	0.086
SN2019dks	B	58654.6926	20.975	0.103
SN2019dks	B	58654.6952	20.917	0.081
SN2019dks	B	58660.3928	20.916	0.102
SN2019dks	B	58660.3954	21.115	0.128
SN2019dks	B	58660.6964	20.724	0.203
SN2019dks	B	58667.3963	21.008	0.116
SN2019dks	B	58667.4012	21.203	0.073
SN2019dks	B	58674.9636	21.104	0.145
SN2019dks	B	58683.3511	21.362	0.184
SN2019dks	B	58683.3561	21.465	0.174
SN2019dks	V	58586.7558	18.613	0.071
SN2019dks	V	58588.4659	18.045	0.067
SN2019dks	V	58591.8196	17.615	0.046
SN2019dks	V	58591.8213	17.718	0.046
SN2019dks	V	58592.8827	17.523	0.052
SN2019dks	V	58592.8844	17.543	0.053
SN2019dks	V	58594.3776	17.544	0.037
SN2019dks	V	58594.3793	17.52	0.048
SN2019dks	V	58595.5669	17.472	0.047
SN2019dks	V	58595.5686	17.483	0.052
SN2019dks	V	58598.1512	17.374	0.063
SN2019dks	V	58600.5516	17.451	0.039
SN2019dks	V	58600.5533	17.439	0.04
SN2019dks	V	58600.579	17.438	0.039
SN2019dks	V	58600.5807	17.456	0.039
SN2019dks	V	58602.5413	17.489	0.048
SN2019dks	V	58602.543	17.501	0.048
SN2019dks	V	58607.491	17.715	0.048
SN2019dks	V	58607.4927	17.711	0.048
SN2019dks	V	58611.1472	17.902	0.049
SN2019dks	V	58611.1489	17.851	0.049
SN2019dks	V	58614.8805	18.098	0.051
SN2019dks	V	58614.8822	18.097	0.051
SN2019dks	V	58626.9701	18.746	0.04

SN2019dks	V	58626.9718	18.76	0.053
SN2019dks	V	58633.4189	19.077	0.042
SN2019dks	V	58633.4206	19.138	0.047
SN2019dks	V	58639.4018	19.521	0.055
SN2019dks	V	58639.4035	19.481	0.054
SN2019dks	V	58648.0137	19.7	0.125
SN2019dks	V	58648.0154	19.675	0.119
SN2019dks	V	58654.698	19.88	0.057
SN2019dks	V	58654.6997	19.899	0.059
SN2019dks	V	58660.3982	20.178	0.077
SN2019dks	V	58660.3999	20.177	0.086
SN2019dks	V	58660.6992	20.155	0.152
SN2019dks	V	58660.7008	19.975	0.125
SN2019dks	V	58667.4063	20.342	0.062
SN2019dks	V	58667.4101	20.24	0.059
SN2019dks	V	58674.9726	20.19	0.08
SN2019dks	V	58683.3612	20.871	0.128
SN2019dks	V	58683.365	20.745	0.11
SN2019dks	g	58586.7593	18.556	0.052
SN2019dks	g	58586.762	18.566	0.057
SN2019dks	g	58588.4678	18.099	0.066
SN2019dks	g	58588.4704	18.195	0.057
SN2019dks	g	58591.8231	17.763	0.051
SN2019dks	g	58591.8258	17.69	0.051
SN2019dks	g	58592.8862	17.575	0.051
SN2019dks	g	58592.8888	17.505	0.052
SN2019dks	g	58594.3811	17.554	0.057
SN2019dks	g	58594.3838	17.53	0.056
SN2019dks	g	58595.5705	17.483	0.07
SN2019dks	g	58598.153	17.509	0.079
SN2019dks	g	58598.1556	17.441	0.055
SN2019dks	g	58600.5552	17.496	0.061
SN2019dks	g	58600.5578	17.5	0.06
SN2019dks	g	58600.5826	17.489	0.059
SN2019dks	g	58600.5852	17.476	0.06
SN2019dks	g	58602.5449	17.546	0.056
SN2019dks	g	58602.5475	17.55	0.056
SN2019dks	g	58607.4945	17.788	0.056
SN2019dks	g	58607.4972	17.773	0.056
SN2019dks	g	58611.1508	17.989	0.052
SN2019dks	g	58611.1534	17.997	0.052
SN2019dks	g	58614.8841	18.311	0.052
SN2019dks	g	58614.8867	18.282	0.051
SN2019dks	g	58621.1525	19.115	0.249
SN2019dks	g	58626.9737	19.329	0.051
SN2019dks	g	58626.9763	19.3	0.051
SN2019dks	g	58633.4225	19.801	0.063
SN2019dks	g	58633.4251	19.791	0.058
SN2019dks	g	58639.4054	20.03	0.065
SN2019dks	g	58639.408	20.086	0.058
SN2019dks	g	58648.0173	20.416	0.153
SN2019dks	g	58648.0199	20.293	0.072
SN2019dks	g	58654.7016	20.519	0.056
SN2019dks	g	58654.7042	20.402	0.055
SN2019dks	g	58660.4017	20.557	0.079
SN2019dks	g	58660.4044	20.582	0.08
SN2019dks	g	58660.7027	20.682	0.109
SN2019dks	g	58660.7053	20.512	0.09
SN2019dks	g	58667.4141	20.729	0.061
SN2019dks	g	58667.419	20.702	0.061
SN2019dks	g	58674.9765	20.756	0.078
SN2019dks	g	58674.9814	20.564	0.08
SN2019dks	g	58683.3689	21.121	0.093
SN2019dks	g	58683.3738	21.065	0.088
SN2019dks	r	58586.7648	18.626	0.046
SN2019dks	r	58586.7664	18.68	0.044
SN2019dks	r	58588.4732	18.311	0.037
SN2019dks	r	58588.4749	18.307	0.036

SN2019dks	r	58591.8285	17.757	0.035
SN2019dks	r	58591.8302	17.767	0.035
SN2019dks	r	58592.8916	17.745	0.039
SN2019dks	r	58592.8934	17.78	0.035
SN2019dks	r	58594.3866	17.635	0.035
SN2019dks	r	58594.3883	17.62	0.035
SN2019dks	r	58595.5759	17.511	0.048
SN2019dks	r	58595.5776	17.559	0.04
SN2019dks	r	58598.1584	17.492	0.039
SN2019dks	r	58600.5606	17.518	0.042
SN2019dks	r	58600.5623	17.513	0.039
SN2019dks	r	58600.588	17.496	0.04
SN2019dks	r	58600.5897	17.487	0.04
SN2019dks	r	58602.5503	17.663	0.089
SN2019dks	r	58602.552	17.549	0.034
SN2019dks	r	58607.5	17.788	0.034
SN2019dks	r	58607.5017	17.777	0.034
SN2019dks	r	58611.1562	18.028	0.034
SN2019dks	r	58611.1579	18.012	0.034
SN2019dks	r	58614.8895	18.261	0.034
SN2019dks	r	58614.8912	18.276	0.035
SN2019dks	r	58621.157	18.469	0.208
SN2019dks	r	58626.9791	18.464	0.036
SN2019dks	r	58626.9808	18.476	0.036
SN2019dks	r	58633.4279	18.68	0.036
SN2019dks	r	58633.4297	18.697	0.036
SN2019dks	r	58639.4108	19.008	0.036
SN2019dks	r	58639.4125	19.036	0.038
SN2019dks	r	58648.0227	19.218	0.046
SN2019dks	r	58648.0244	19.385	0.05
SN2019dks	r	58654.707	19.631	0.038
SN2019dks	r	58654.7087	19.687	0.039
SN2019dks	r	58660.4072	19.78	0.056
SN2019dks	r	58660.4089	19.716	0.056
SN2019dks	r	58660.7081	19.885	0.089
SN2019dks	r	58660.7098	19.808	0.077
SN2019dks	r	58667.4241	20.098	0.043
SN2019dks	r	58667.4279	19.97	0.042
SN2019dks	r	58674.9866	20.002	0.079
SN2019dks	r	58674.9903	20.63	0.202
SN2019dks	r	58683.379	20.576	0.088
SN2019dks	r	58683.3827	20.546	0.09
SN2019dks	i	58586.7683	18.923	0.055
SN2019dks	i	58586.77	18.825	0.055
SN2019dks	i	58588.4768	18.458	0.055
SN2019dks	i	58588.4785	18.449	0.054
SN2019dks	i	58591.8321	18.126	0.051
SN2019dks	i	58591.8338	18.034	0.052
SN2019dks	i	58592.8952	17.948	0.053
SN2019dks	i	58592.8969	17.959	0.053
SN2019dks	i	58594.3902	17.998	0.051
SN2019dks	i	58594.3919	18.029	0.055
SN2019dks	i	58595.5795	18.05	0.053
SN2019dks	i	58595.5812	17.948	0.056
SN2019dks	i	58600.5659	18.162	0.055
SN2019dks	i	58602.5539	18.194	0.051
SN2019dks	i	58602.5556	18.215	0.053
SN2019dks	i	58607.5036	18.429	0.051
SN2019dks	i	58607.5053	18.385	0.054
SN2019dks	i	58611.1597	18.748	0.052
SN2019dks	i	58611.1614	18.822	0.052
SN2019dks	i	58614.8931	19.083	0.056
SN2019dks	i	58614.8948	19.063	0.056
SN2019dks	i	58626.9826	18.842	0.054
SN2019dks	i	58626.9843	18.832	0.051
SN2019dks	i	58633.4315	18.826	0.056
SN2019dks	i	58633.4332	18.864	0.055
SN2019dks	i	58639.4144	19.146	0.067

SN2019dks	i	58639.416	19.182	0.055
SN2019dks	i	58648.0262	19.69	0.093
SN2019dks	i	58648.0279	19.644	0.086
SN2019dks	i	58654.7105	19.965	0.075
SN2019dks	i	58654.7122	20.401	0.094
SN2019dks	i	58660.4108	20.249	0.157
SN2019dks	i	58660.4125	20.144	0.142
SN2019dks	i	58660.7117	20.305	0.183
SN2019dks	i	58660.7134	20.141	0.175
SN2019dks	i	58667.4318	20.494	0.152
SN2019dks	i	58667.4356	20.246	0.152
SN2019dks	i	58674.9943	20.872	0.163
SN2019dks	i	58683.3867	21.373	0.299
SN2019dks	i	58683.3905	21.284	0.267
SN2019gwa	B	58645.4817	18.066	0.052
SN2019gwa	B	58645.4843	18.077	0.052
SN2019gwa	B	58648.8249	17.83	0.078
SN2019gwa	B	58648.8275	17.861	0.083
SN2019gwa	B	58652.5519	17.902	0.052
SN2019gwa	B	58652.5545	17.942	0.058
SN2019gwa	B	58657.0524	18.014	0.052
SN2019gwa	B	58657.0551	18.019	0.051
SN2019gwa	B	58660.5516	18.232	0.048
SN2019gwa	B	58660.5542	18.237	0.047
SN2019gwa	B	58665.0932	18.639	0.054
SN2019gwa	B	58665.0958	18.645	0.052
SN2019gwa	B	58665.1437	18.659	0.055
SN2019gwa	B	58665.1463	18.672	0.055
SN2019gwa	B	58669.0177	19.131	0.059
SN2019gwa	B	58669.0203	19.122	0.06
SN2019gwa	B	58675.8198	19.98	0.156
SN2019gwa	B	58675.8225	19.949	0.091
SN2019gwa	B	58679.7149	20.18	0.13
SN2019gwa	B	58679.7176	20.497	0.161
SN2019gwa	V	58645.4871	17.975	0.048
SN2019gwa	V	58645.4888	17.973	0.048
SN2019gwa	V	58648.8303	17.729	0.072
SN2019gwa	V	58648.832	17.717	0.072
SN2019gwa	V	58652.5573	17.743	0.057
SN2019gwa	V	58652.559	17.852	0.051
SN2019gwa	V	58657.0579	17.725	0.043
SN2019gwa	V	58657.0596	17.745	0.045
SN2019gwa	V	58660.557	17.852	0.043
SN2019gwa	V	58660.5587	17.88	0.045
SN2019gwa	V	58665.0986	18.08	0.048
SN2019gwa	V	58665.1004	18.084	0.048
SN2019gwa	V	58665.1491	18.087	0.051
SN2019gwa	V	58665.1508	18.093	0.051
SN2019gwa	V	58669.0231	18.347	0.052
SN2019gwa	V	58669.0248	18.343	0.051
SN2019gwa	V	58675.8252	18.774	0.059
SN2019gwa	V	58675.8269	18.72	0.058
SN2019gwa	V	58679.7204	18.727	0.059
SN2019gwa	V	58679.722	18.939	0.06
SN2019vrq	B	58816.5803	16.577	0.068
SN2019vrq	B	58816.582	16.567	0.068
SN2019vrq	B	58818.1678	15.988	0.058
SN2019vrq	B	58818.1695	15.979	0.074
SN2019vrq	B	58820.0725	15.468	0.068
SN2019vrq	B	58820.0742	15.471	0.068
SN2019vrq	B	58821.4454	15.121	0.061
SN2019vrq	B	58821.4471	15.117	0.063
SN2019vrq	B	58822.9552	14.829	0.075
SN2019vrq	B	58822.9569	14.819	0.075
SN2019vrq	B	58823.8761	14.723	0.071
SN2019vrq	B	58823.8774	14.711	0.071
SN2019vrq	B	58824.9176	14.612	0.079
SN2019vrq	B	58824.9189	14.609	0.073

SN2019vrq	B	58826.0321	14.64	0.047
SN2019vrq	B	58826.0335	14.64	0.068
SN2019vrq	B	58827.6056	14.495	0.059
SN2019vrq	B	58827.6069	14.493	0.076
SN2019vrq	B	58828.8382	14.405	0.059
SN2019vrq	B	58828.8396	14.397	0.077
SN2019vrq	B	58828.8732	14.389	0.063
SN2019vrq	B	58828.8745	14.403	0.068
SN2019vrq	B	58829.8834	14.382	0.071
SN2019vrq	B	58829.8847	14.386	0.062
SN2019vrq	B	58830.9067	14.415	0.075
SN2019vrq	B	58830.9081	14.399	0.073
SN2019vrq	B	58832.4806	14.474	0.073
SN2019vrq	B	58832.4819	14.444	0.073
SN2019vrq	B	58833.8648	14.398	0.083
SN2019vrq	B	58833.8662	14.401	0.089
SN2019vrq	B	58835.5155	14.544	0.067
SN2019vrq	B	58835.5168	14.544	0.074
SN2019vrq	B	58836.9559	14.531	0.057
SN2019vrq	B	58836.9572	14.533	0.063
SN2019vrq	B	58838.4693	14.653	0.075
SN2019vrq	B	58838.4707	14.651	0.08
SN2019vrq	B	58839.8813	14.689	0.066
SN2019vrq	B	58839.8827	14.694	0.064
SN2019vrq	B	58841.8977	14.828	0.066
SN2019vrq	B	58841.899	14.816	0.065
SN2019vrq	B	58846.9293	15.32	0.07
SN2019vrq	B	58846.9306	15.317	0.068
SN2019vrq	B	58849.7886	15.63	0.06
SN2019vrq	B	58849.79	15.634	0.069
SN2019vrq	B	58852.488	15.976	0.061
SN2019vrq	B	58852.4894	15.963	0.073
SN2019vrq	B	58855.7976	16.268	0.064
SN2019vrq	B	58855.799	16.249	0.071
SN2019vrq	B	58859.092	16.583	0.065
SN2019vrq	B	58859.0934	16.577	0.063
SN2019vrq	B	58859.9065	16.619	0.057
SN2019vrq	B	58859.9078	16.592	0.074
SN2019vrq	B	58863.8226	16.903	0.069
SN2019vrq	B	58863.8239	16.919	0.121
SN2019vrq	B	58863.865	16.915	0.064
SN2019vrq	B	58863.8664	16.933	0.064
SN2019vrq	B	58869.1158	17.206	0.077
SN2019vrq	B	58869.1172	17.224	0.076
SN2019vrq	B	58875.8277	17.431	0.066
SN2019vrq	B	58875.8291	17.436	0.064
SN2019vrq	B	58881.0639	17.552	0.074
SN2019vrq	B	58881.0653	17.565	0.076
SN2019vrq	B	58884.7998	17.567	0.075
SN2019vrq	B	58884.8024	17.546	0.073
SN2019vrq	B	58890.0559	17.688	0.07
SN2019vrq	B	58890.0585	17.66	0.067
SN2019vrq	B	58896.4588	17.775	0.071
SN2019vrq	B	58896.4615	17.776	0.077
SN2019vrq	B	58898.027	17.738	0.055
SN2019vrq	B	58898.0296	17.756	0.055
SN2019vrq	B	58903.0198	17.844	0.08
SN2019vrq	B	58903.0224	17.88	0.081
SN2019vrq	B	58909.0629	17.918	0.066
SN2019vrq	B	58909.0656	17.93	0.07
SN2019vrq	B	58915.0369	17.999	0.077
SN2019vrq	B	58915.0395	17.97	0.082
SN2019vrq	B	58918.008	18.038	0.089
SN2019vrq	B	58918.0107	17.797	0.074
SN2019vrq	B	58924.3916	18.204	0.061
SN2019vrq	B	58924.3943	18.137	0.059
SN2019vrq	B	58925.761	18.143	0.063
SN2019vrq	B	58925.7636	18.15	0.079

SN2019vrq	B	58931.7417	18.24	0.06
SN2019vrq	B	58931.7443	18.236	0.062
SN2019vrq	V	58816.5839	16.522	0.043
SN2019vrq	V	58816.5852	16.519	0.042
SN2019vrq	V	58818.1714	15.893	0.039
SN2019vrq	V	58818.1727	15.896	0.041
SN2019vrq	V	58820.076	15.35	0.04
SN2019vrq	V	58820.0774	15.355	0.04
SN2019vrq	V	58821.4489	15.133	0.045
SN2019vrq	V	58821.4503	15.126	0.045
SN2019vrq	V	58822.9587	14.83	0.035
SN2019vrq	V	58822.9601	14.835	0.039
SN2019vrq	V	58823.8789	14.722	0.042
SN2019vrq	V	58823.8799	14.716	0.041
SN2019vrq	V	58824.9204	14.622	0.04
SN2019vrq	V	58824.9214	14.618	0.041
SN2019vrq	V	58826.035	14.567	0.04
SN2019vrq	V	58826.036	14.556	0.038
SN2019vrq	V	58827.6084	14.521	0.039
SN2019vrq	V	58827.6094	14.484	0.039
SN2019vrq	V	58828.8411	14.436	0.057
SN2019vrq	V	58828.8761	14.403	0.04
SN2019vrq	V	58828.8771	14.398	0.041
SN2019vrq	V	58829.8862	14.382	0.04
SN2019vrq	V	58829.8872	14.396	0.044
SN2019vrq	V	58830.9096	14.402	0.044
SN2019vrq	V	58832.4834	14.434	0.046
SN2019vrq	V	58832.4844	14.441	0.045
SN2019vrq	V	58833.8677	14.365	0.051
SN2019vrq	V	58833.8687	14.385	0.044
SN2019vrq	V	58835.5183	14.464	0.036
SN2019vrq	V	58835.5193	14.461	0.039
SN2019vrq	V	58836.9588	14.456	0.038
SN2019vrq	V	58836.9598	14.454	0.037
SN2019vrq	V	58838.4722	14.55	0.037
SN2019vrq	V	58838.4732	14.558	0.043
SN2019vrq	V	58839.8842	14.565	0.041
SN2019vrq	V	58839.8852	14.558	0.039
SN2019vrq	V	58841.9005	14.645	0.039
SN2019vrq	V	58841.9015	14.648	0.038
SN2019vrq	V	58846.9321	14.929	0.037
SN2019vrq	V	58846.9331	14.931	0.038
SN2019vrq	V	58849.7915	15.09	0.041
SN2019vrq	V	58849.7925	15.096	0.045
SN2019vrq	V	58852.4909	15.28	0.042
SN2019vrq	V	58852.4919	15.291	0.038
SN2019vrq	V	58855.8005	15.406	0.05
SN2019vrq	V	58855.8015	15.404	0.052
SN2019vrq	V	58859.0949	15.568	0.045
SN2019vrq	V	58859.0959	15.579	0.05
SN2019vrq	V	58859.9093	15.625	0.054
SN2019vrq	V	58859.9104	15.611	0.04
SN2019vrq	V	58863.8254	15.754	0.093
SN2019vrq	V	58863.8264	15.83	0.065
SN2019vrq	V	58863.8679	15.834	0.032
SN2019vrq	V	58863.8689	15.818	0.038
SN2019vrq	V	58869.1187	16.127	0.042
SN2019vrq	V	58869.1197	16.123	0.041
SN2019vrq	V	58875.8306	16.403	0.038
SN2019vrq	V	58875.8316	16.394	0.036
SN2019vrq	V	58881.0668	16.56	0.046
SN2019vrq	V	58881.0678	16.543	0.046
SN2019vrq	V	58884.8052	16.65	0.054
SN2019vrq	V	58884.8069	16.646	0.04
SN2019vrq	V	58890.0613	16.8	0.043
SN2019vrq	V	58890.063	16.808	0.047
SN2019vrq	V	58896.4643	16.987	0.043
SN2019vrq	V	58896.466	16.975	0.046

SN2019vrq	V	58898.0324	17.001	0.041
SN2019vrq	V	58898.0341	16.987	0.044
SN2019vrq	V	58903.0252	17.095	0.039
SN2019vrq	V	58903.0269	17.104	0.041
SN2019vrq	V	58909.0684	17.263	0.05
SN2019vrq	V	58909.0701	17.241	0.054
SN2019vrq	V	58915.0423	17.384	0.044
SN2019vrq	V	58915.044	17.366	0.043
SN2019vrq	V	58918.0135	17.443	0.054
SN2019vrq	V	58918.0151	17.367	0.048
SN2019vrq	V	58925.7664	17.633	0.065
SN2019vrq	V	58925.7681	17.676	0.098
SN2019vrq	V	58931.7471	17.758	0.051
SN2019vrq	V	58931.7488	17.732	0.05
SN2019vrq	g	58816.5868	16.604	0.054
SN2019vrq	g	58816.5885	16.607	0.056
SN2019vrq	g	58818.1742	15.984	0.05
SN2019vrq	g	58818.176	15.99	0.05
SN2019vrq	g	58820.0789	15.479	0.054
SN2019vrq	g	58820.0806	15.479	0.053
SN2019vrq	g	58821.4518	15.168	0.069
SN2019vrq	g	58821.4535	15.169	0.069
SN2019vrq	g	58822.9616	14.886	0.047
SN2019vrq	g	58822.9633	14.879	0.048
SN2019vrq	g	58823.8811	14.791	0.064
SN2019vrq	g	58823.8824	14.784	0.059
SN2019vrq	g	58824.9226	14.665	0.049
SN2019vrq	g	58824.9239	14.677	0.048
SN2019vrq	g	58826.0371	14.689	0.057
SN2019vrq	g	58826.0385	14.695	0.056
SN2019vrq	g	58827.6106	14.582	0.053
SN2019vrq	g	58828.8462	14.47	0.061
SN2019vrq	g	58828.8475	14.476	0.06
SN2019vrq	g	58828.8782	14.462	0.056
SN2019vrq	g	58828.8796	14.466	0.049
SN2019vrq	g	58829.8884	14.461	0.054
SN2019vrq	g	58829.8897	14.451	0.056
SN2019vrq	g	58832.4856	14.507	0.064
SN2019vrq	g	58832.487	14.506	0.063
SN2019vrq	g	58833.8698	14.492	0.066
SN2019vrq	g	58833.8712	14.488	0.069
SN2019vrq	g	58835.5205	14.607	0.056
SN2019vrq	g	58835.5219	14.604	0.055
SN2019vrq	g	58836.9609	14.577	0.051
SN2019vrq	g	58836.9623	14.572	0.049
SN2019vrq	g	58838.4744	14.686	0.059
SN2019vrq	g	58838.4757	14.679	0.053
SN2019vrq	g	58839.8863	14.669	0.059
SN2019vrq	g	58839.8877	14.687	0.056
SN2019vrq	g	58841.9027	14.777	0.046
SN2019vrq	g	58841.904	14.776	0.045
SN2019vrq	g	58846.9343	15.141	0.047
SN2019vrq	g	58846.9357	15.134	0.047
SN2019vrq	g	58849.7936	15.377	0.067
SN2019vrq	g	58849.795	15.373	0.064
SN2019vrq	g	58852.4931	15.641	0.051
SN2019vrq	g	58852.4945	15.632	0.051
SN2019vrq	g	58855.8027	15.891	0.057
SN2019vrq	g	58855.804	15.898	0.056
SN2019vrq	g	58859.9115	16.232	0.059
SN2019vrq	g	58859.9129	16.232	0.06
SN2019vrq	g	58863.8276	16.488	0.103
SN2019vrq	g	58863.8289	16.503	0.045
SN2019vrq	g	58863.8701	16.5	0.045
SN2019vrq	g	58863.8714	16.501	0.045
SN2019vrq	g	58869.1209	16.799	0.055
SN2019vrq	g	58869.1222	16.797	0.051
SN2019vrq	g	58875.8328	17.035	0.047

SN2019vrq	g	58875.8341	17.034	0.047
SN2019vrq	g	58881.069	17.145	0.054
SN2019vrq	g	58881.0703	17.166	0.055
SN2019vrq	g	58884.8088	17.214	0.058
SN2019vrq	g	58884.8114	17.199	0.064
SN2019vrq	g	58890.0649	17.299	0.065
SN2019vrq	g	58890.0675	17.297	0.07
SN2019vrq	g	58896.4678	17.423	0.056
SN2019vrq	g	58896.4705	17.402	0.057
SN2019vrq	g	58902.8065	17.483	0.047
SN2019vrq	g	58902.8091	17.472	0.047
SN2019vrq	g	58908.4201	17.613	0.054
SN2019vrq	g	58908.4227	17.603	0.055
SN2019vrq	g	58918.0182	17.687	0.066
SN2019vrq	g	58918.0208	17.643	0.082
SN2019vrq	g	58925.7395	17.83	0.063
SN2019vrq	g	58925.7421	17.826	0.058
SN2019vrq	r	58816.5903	16.573	0.031
SN2019vrq	r	58816.5917	16.581	0.145
SN2019vrq	r	58818.1778	16.001	0.029
SN2019vrq	r	58818.1792	16.006	0.029
SN2019vrq	r	58820.0824	15.506	0.032
SN2019vrq	r	58820.0838	15.504	0.029
SN2019vrq	r	58821.4554	15.231	0.032
SN2019vrq	r	58821.4568	15.223	0.032
SN2019vrq	r	58822.9652	14.989	0.026
SN2019vrq	r	58822.9665	14.985	0.027
SN2019vrq	r	58823.884	14.888	0.031
SN2019vrq	r	58823.885	14.886	0.03
SN2019vrq	r	58824.9254	14.805	0.032
SN2019vrq	r	58824.9264	14.794	0.033
SN2019vrq	r	58826.04	14.738	0.032
SN2019vrq	r	58826.041	14.744	0.035
SN2019vrq	r	58827.6135	14.643	0.035
SN2019vrq	r	58827.6145	14.65	0.031
SN2019vrq	r	58828.8491	14.595	0.037
SN2019vrq	r	58828.8501	14.588	0.039
SN2019vrq	r	58828.8811	14.584	0.031
SN2019vrq	r	58828.8821	14.581	0.03
SN2019vrq	r	58829.8912	14.554	0.03
SN2019vrq	r	58829.8922	14.564	0.03
SN2019vrq	r	58830.9146	14.537	0.031
SN2019vrq	r	58830.9156	14.491	0.033
SN2019vrq	r	58832.4885	14.523	0.031
SN2019vrq	r	58832.4895	14.529	0.032
SN2019vrq	r	58833.8727	14.52	0.064
SN2019vrq	r	58833.8737	14.51	0.033
SN2019vrq	r	58835.5234	14.553	0.03
SN2019vrq	r	58835.5244	14.551	0.031
SN2019vrq	r	58836.9639	14.581	0.028
SN2019vrq	r	58836.9649	14.58	0.028
SN2019vrq	r	58838.4773	14.657	0.031
SN2019vrq	r	58838.4783	14.671	0.03
SN2019vrq	r	58839.8892	14.715	0.03
SN2019vrq	r	58839.8902	14.711	0.029
SN2019vrq	r	58841.9055	14.87	0.027
SN2019vrq	r	58841.9065	14.853	0.025
SN2019vrq	r	58846.9372	15.179	0.029
SN2019vrq	r	58846.9382	15.172	0.028
SN2019vrq	r	58849.7965	15.262	0.032
SN2019vrq	r	58849.7975	15.268	0.033
SN2019vrq	r	58852.496	15.334	0.034
SN2019vrq	r	58852.497	15.318	0.032
SN2019vrq	r	58855.8055	15.361	0.037
SN2019vrq	r	58855.8065	15.35	0.039
SN2019vrq	r	58859.0999	15.412	0.029
SN2019vrq	r	58859.1009	15.412	0.03
SN2019vrq	r	58859.9144	15.452	0.039

SN2019vrq	r	58859.9154	15.459	0.048
SN2019vrq	r	58863.8304	15.558	0.032
SN2019vrq	r	58863.8314	15.581	0.081
SN2019vrq	r	58863.8729	15.588	0.028
SN2019vrq	r	58863.8739	15.589	0.029
SN2019vrq	r	58875.8356	16.218	0.027
SN2019vrq	r	58875.8366	16.234	0.028
SN2019vrq	r	58881.0718	16.444	0.034
SN2019vrq	r	58881.0728	16.425	0.036
SN2019vrq	r	58884.8142	16.547	0.067
SN2019vrq	r	58884.8159	16.538	0.034
SN2019vrq	r	58890.0703	16.754	0.05
SN2019vrq	r	58890.072	16.727	0.043
SN2019vrq	r	58896.4733	16.941	0.028
SN2019vrq	r	58896.475	16.95	0.033
SN2019vrq	r	58902.8119	17.111	0.028
SN2019vrq	r	58902.8136	17.129	0.027
SN2019vrq	r	58908.4255	17.283	0.034
SN2019vrq	r	58908.4272	17.305	0.032
SN2019vrq	r	58918.0236	17.535	0.042
SN2019vrq	r	58918.0253	17.586	0.038
SN2019vrq	r	58925.7451	17.762	0.032
SN2019vrq	r	58925.7468	17.779	0.031
SN2019vrq	i	58816.5932	16.718	0.061
SN2019vrq	i	58816.5946	16.833	0.056
SN2019vrq	i	58818.1807	16.27	0.049
SN2019vrq	i	58818.182	16.27	0.051
SN2019vrq	i	58820.0853	15.769	0.048
SN2019vrq	i	58820.0866	15.766	0.047
SN2019vrq	i	58821.4583	15.469	0.048
SN2019vrq	i	58821.4597	15.482	0.048
SN2019vrq	i	58822.968	15.25	0.06
SN2019vrq	i	58822.9693	15.274	0.059
SN2019vrq	i	58823.8861	15.175	0.059
SN2019vrq	i	58823.8871	15.138	0.058
SN2019vrq	i	58824.9276	15.078	0.059
SN2019vrq	i	58824.9286	15.084	0.059
SN2019vrq	i	58826.0422	15.048	0.053
SN2019vrq	i	58826.0432	15.053	0.054
SN2019vrq	i	58827.6157	15.062	0.063
SN2019vrq	i	58827.6167	15.06	0.053
SN2019vrq	i	58828.8512	15.05	0.075
SN2019vrq	i	58828.8833	15.045	0.05
SN2019vrq	i	58828.8843	15.056	0.05
SN2019vrq	i	58829.8938	15.059	0.058
SN2019vrq	i	58829.8948	15.056	0.058
SN2019vrq	i	58830.9168	15.108	0.055
SN2019vrq	i	58830.9178	15.005	0.069
SN2019vrq	i	58832.4907	15.134	0.048
SN2019vrq	i	58832.4917	15.137	0.048
SN2019vrq	i	58833.8749	15.174	0.083
SN2019vrq	i	58833.8759	15.122	0.074
SN2019vrq	i	58835.5255	15.241	0.051
SN2019vrq	i	58835.5265	15.241	0.051
SN2019vrq	i	58836.966	15.283	0.054
SN2019vrq	i	58836.967	15.281	0.055
SN2019vrq	i	58838.4794	15.369	0.05
SN2019vrq	i	58838.4804	15.36	0.05
SN2019vrq	i	58839.8914	15.409	0.054
SN2019vrq	i	58839.8924	15.407	0.054
SN2019vrq	i	58841.9077	15.55	0.048
SN2019vrq	i	58841.9087	15.558	0.05
SN2019vrq	i	58846.9394	15.829	0.054
SN2019vrq	i	58846.9404	15.823	0.054
SN2019vrq	i	58849.7987	15.824	0.057
SN2019vrq	i	58849.7997	15.834	0.06
SN2019vrq	i	58852.4982	15.777	0.052
SN2019vrq	i	58852.4992	15.785	0.048

SN2019vrq	i	58855.8077	15.701	0.075
SN2019vrq	i	58855.8087	15.686	0.075
SN2019vrq	i	58859.1021	15.675	0.068
SN2019vrq	i	58859.1031	15.683	0.066
SN2019vrq	i	58859.9166	15.679	0.054
SN2019vrq	i	58859.9175	15.669	0.056
SN2019vrq	i	58863.8326	15.722	0.051
SN2019vrq	i	58863.8751	15.724	0.047
SN2019vrq	i	58863.8761	15.713	0.048
SN2019vrq	i	58875.8378	16.33	0.06
SN2019vrq	i	58875.8388	16.335	0.06
SN2019vrq	i	58881.074	16.583	0.054
SN2019vrq	i	58881.075	16.589	0.055
SN2019vrq	i	58884.8177	16.721	0.059
SN2019vrq	i	58884.8194	16.707	0.06
SN2019vrq	i	58890.0738	16.97	0.065
SN2019vrq	i	58890.0755	16.947	0.06
SN2019vrq	i	58896.4769	17.171	0.051
SN2019vrq	i	58896.4786	17.195	0.05
SN2019vrq	i	58902.8154	17.393	0.059
SN2019vrq	i	58902.8171	17.41	0.06
SN2019vrq	i	58908.4291	17.616	0.053
SN2019vrq	i	58908.4308	17.599	0.052
SN2019vrq	i	58918.0271	17.891	0.065
SN2019vrq	i	58918.0288	17.915	0.064
SN2019vrq	i	58925.7487	18.148	0.059
SN2019vrq	i	58925.7505	18.165	0.085

Table B.3: Las Cumbres 91T/99aa-like SNe photometry in UR bands.

SN	Filter	MJD	Magnitude	Magnitude Error	Site, Telescope and Instrument
SN2018cnw	U	58287.365	17.436	0.074	elp1m008-fl05
SN2018cnw	U	58287.3712	17.447	0.061	elp1m008-fl05
SN2018cnw	U	58289.3094	16.48	0.08	elp1m008-fl05
SN2018cnw	U	58289.3134	16.479	0.058	elp1m008-fl05
SN2018cnw	U	58290.3227	16.137	0.085	elp1m008-fl05
SN2018cnw	U	58290.3267	16.145	0.086	elp1m008-fl05
SN2018cnw	U	58292.3054	15.707	0.073	elp1m008-fl05
SN2018cnw	U	58292.3094	15.706	0.083	elp1m008-fl05
SN2018cnw	U	58293.157	15.588	0.111	elp1m008-fl05
SN2018cnw	U	58293.161	15.642	0.059	elp1m008-fl05
SN2018cnw	U	58294.2365	15.485	0.086	elp1m008-fl05
SN2018cnw	U	58294.2989	15.468	0.057	elp1m008-fl05
SN2018cnw	U	58294.3029	15.468	0.115	elp1m008-fl05
SN2018cnw	U	58295.3162	15.397	0.098	elp1m008-fl05
SN2018cnw	U	58295.3202	15.386	0.1	elp1m008-fl05
SN2018cnw	U	58296.1975	15.26	0.14	elp1m008-fl05
SN2018cnw	U	58296.2014	15.357	0.065	elp1m008-fl05
SN2018cnw	U	58296.3816	15.353	0.131	elp1m008-fl05
SN2018cnw	U	58296.3856	15.319	0.154	elp1m008-fl05
SN2018cnw	U	58299.2633	15.324	0.085	elp1m008-fl05
SN2018cnw	U	58299.2672	15.314	0.13	elp1m008-fl05
SN2018cnw	U	58301.3856	15.395	0.142	elp1m008-fl05
SN2018cnw	U	58306.1598	15.587	0.059	elp1m008-fl05
SN2018cnw	U	58306.1626	15.596	0.059	elp1m008-fl05
SN2018cnw	U	58307.1909	15.646	0.058	elp1m008-fl05
SN2018cnw	U	58307.1937	15.653	0.058	elp1m008-fl05
SN2018cnw	U	58318.1775	16.667	0.058	elp1m008-fl05
SN2018cnw	U	58318.1803	16.723	0.061	elp1m008-fl05
SN2018cnw	U	58322.1258	17.135	0.126	elp1m008-fl05
SN2018cnw	U	58322.1287	17.036	0.064	elp1m008-fl05
SN2018cnw	U	58323.2092	17.253	0.073	elp1m008-fl05
SN2018cnw	U	58323.212	17.212	0.068	elp1m008-fl05
SN2018cnw	U	58335.2034	18.225	0.097	elp1m008-fl05
SN2018cnw	U	58335.2074	18.255	0.102	elp1m008-fl05

SN2018cnw	U	58351.1764	18.714	0.146	elp1m008-fl05
SN2018cnw	U	58351.1804	18.75	0.162	elp1m008-fl05
SN2019dks	U	58586.7426	18.077	0.063	cpt1m010-fa16
SN2019dks	U	58586.7464	18.042	0.063	cpt1m010-fa16
SN2019dks	U	58588.451	17.669	0.079	coj1m003-fa11
SN2019dks	U	58588.4548	17.653	0.078	coj1m003-fa11
SN2019dks	U	58591.8064	17.499	1.003	cpt1m010-fa16
SN2019dks	U	58591.8102	17.134	0.061	cpt1m010-fa16
SN2019dks	U	58592.8696	17.061	0.061	cpt1m010-fa16
SN2019dks	U	58592.8733	17.492	0.894	cpt1m010-fa16
SN2019dks	U	58594.3644	17.002	0.09	coj1m003-fa11
SN2019dks	U	58594.3682	16.924	0.079	coj1m003-fa11
SN2019dks	U	58595.5575	16.904	0.062	coj1m011-fa12
SN2019dks	U	58598.1401	17.02	0.061	lsc1m005-fa15
SN2019dks	U	58600.5384	17.165	0.061	coj1m011-fa12
SN2019dks	U	58600.5422	17.18	0.068	coj1m011-fa12
SN2019dks	U	58600.5658	17.173	0.068	coj1m003-fa11
SN2019dks	U	58600.5696	17.136	0.071	coj1m003-fa11
SN2019dks	U	58602.5281	17.34	0.061	coj1m011-fa12
SN2019dks	U	58602.5319	17.334	0.061	coj1m011-fa12
SN2019dks	U	58607.4778	17.762	0.068	coj1m011-fa12
SN2019dks	U	58607.4816	17.818	0.062	coj1m011-fa12
SN2019dks	U	58611.1341	18.214	0.809	lsc1m005-fa15
SN2019dks	U	58611.1379	18.227	0.07	lsc1m005-fa15
SN2019dks	U	58614.8674	18.756	0.067	cpt1m010-fa16
SN2019dks	U	58614.8712	18.798	0.066	cpt1m010-fa16
SN2019gwa	R	58645.4907	17.985	0.027	coj1m011-fa12
SN2019gwa	R	58645.4924	17.995	0.027	coj1m011-fa12
SN2019gwa	R	58648.8339	17.759	0.066	cpt1m013-fa14
SN2019gwa	R	58648.8356	17.77	0.068	cpt1m013-fa14
SN2019gwa	R	58652.5609	17.737	0.044	coj1m003-fa11
SN2019gwa	R	58652.5626	17.7	0.043	coj1m003-fa11
SN2019gwa	R	58657.0614	17.657	0.021	lsc1m005-fa15
SN2019gwa	R	58657.0631	17.645	0.026	lsc1m005-fa15
SN2019gwa	R	58660.5605	17.842	0.021	coj1m011-fa12
SN2019gwa	R	58660.5622	17.817	0.022	coj1m011-fa12
SN2019gwa	R	58665.1023	18.11	0.029	lsc1m005-fa15
SN2019gwa	R	58665.1042	18.132	0.026	lsc1m005-fa15
SN2019gwa	R	58665.1527	18.116	0.027	elp1m008-fa05
SN2019gwa	R	58665.1544	18.116	0.028	elp1m008-fa05
SN2019gwa	R	58669.0266	18.298	0.028	lsc1m005-fa15
SN2019gwa	R	58669.0283	18.294	0.027	lsc1m005-fa15
SN2019gwa	R	58675.8288	18.388	0.075	cpt1m010-fa16
SN2019gwa	R	58675.8305	18.415	0.077	cpt1m010-fa16
SN2019gwa	R	58679.7239	18.498	0.033	cpt1m012-fa06
SN2019gwa	R	58679.7256	18.648	0.072	cpt1m012-fa06
SN2019vrq	U	58816.5748	16.293	0.227	coj1m011-fa12
SN2019vrq	U	58816.5775	16.285	0.23	coj1m011-fa12
SN2019vrq	U	58818.1624	15.72	0.244	elp1m008-fa05
SN2019vrq	U	58818.165	15.716	0.249	elp1m008-fa05
SN2019vrq	U	58820.0671	15.028	0.225	lsc1m004-fa03
SN2019vrq	U	58820.0697	15.022	0.22	lsc1m004-fa03
SN2019vrq	U	58821.4399	14.636	0.231	coj1m011-fa12
SN2019vrq	U	58821.4426	14.627	0.075	coj1m011-fa12
SN2019vrq	U	58822.9485	14.335	0.027	cpt1m013-fa14
SN2019vrq	U	58822.9498	14.34	0.021	cpt1m013-fa14
SN2019vrq	U	58822.9524	14.334	0.022	cpt1m013-fa14
SN2019vrq	U	58823.8725	14.222	0.235	cpt1m012-fa06
SN2019vrq	U	58823.8742	14.215	0.074	cpt1m012-fa06
SN2019vrq	U	58824.9139	14.102	0.026	cpt1m013-fa14
SN2019vrq	U	58824.9156	14.115	0.023	cpt1m013-fa14
SN2019vrq	U	58826.0286	14.048	0.038	lsc1m004-fa03
SN2019vrq	U	58826.0303	14.081	0.027	lsc1m004-fa03
SN2019vrq	U	58827.602	14.012	0.146	coj1m011-fa12
SN2019vrq	U	58827.6037	14.015	0.144	coj1m011-fa12
SN2019vrq	U	58828.8347	13.889	0.052	cpt1m012-fa06
SN2019vrq	U	58828.8364	13.897	0.049	cpt1m012-fa06
SN2019vrq	U	58828.8696	13.943	0.078	cpt1m012-fa06

SN2019vrq	U	58828.8713	13.938	0.237	cpt1m012-fa06
SN2019vrq	U	58829.8798	13.946	0.038	cpt1m012-fa06
SN2019vrq	U	58829.8815	13.919	0.039	cpt1m012-fa06
SN2019vrq	U	58830.9032	13.931	0.369	cpt1m012-fa06
SN2019vrq	U	58830.9048	13.999	0.075	cpt1m012-fa06
SN2019vrq	U	58832.477	14.066	0.076	coj1m011-fa12
SN2019vrq	U	58832.4787	14.079	0.075	coj1m011-fa12
SN2019vrq	U	58833.8613	14.15	0.076	cpt1m013-fa14
SN2019vrq	U	58835.5119	14.243	0.08	coj1m011-fa12
SN2019vrq	U	58835.5136	14.264	0.07	coj1m011-fa12
SN2019vrq	U	58836.9523	14.332	0.032	cpt1m010-fa16
SN2019vrq	U	58836.954	14.332	0.032	cpt1m010-fa16
SN2019vrq	U	58838.4658	14.463	0.05	coj1m011-fa12
SN2019vrq	U	58838.4675	14.47	0.052	coj1m011-fa12
SN2019vrq	U	58839.8777	14.546	0.236	cpt1m012-fa06
SN2019vrq	U	58841.8941	14.72	0.356	cpt1m013-fa14
SN2019vrq	U	58841.8958	14.736	0.359	cpt1m013-fa14
SN2019vrq	U	58843.8227	14.971	0.029	cpt1m012-fa06
SN2019vrq	U	58846.9257	15.356	0.366	cpt1m012-fa06
SN2019vrq	U	58846.9274	15.364	0.364	cpt1m012-fa06
SN2019vrq	U	58849.785	15.75	0.247	cpt1m012-fa06
SN2019vrq	U	58849.7867	15.789	0.245	cpt1m012-fa06
SN2019vrq	U	58852.4844	16.178	0.081	coj1m011-fa12
SN2019vrq	U	58852.4861	16.127	0.067	coj1m011-fa12
SN2019vrq	U	58855.7941	16.517	0.041	cpt1m012-fa06
SN2019vrq	U	58855.7958	16.524	0.078	cpt1m012-fa06
SN2019vrq	U	58859.9029	16.955	0.381	cpt1m010-fa16
SN2019vrq	U	58859.9046	16.852	0.37	cpt1m010-fa16
SN2019vrq	U	58863.819	17.13	0.421	cpt1m013-fa14
SN2019vrq	U	58863.8207	17.225	0.419	cpt1m013-fa14
SN2019vrq	U	58863.8615	17.238	0.423	cpt1m012-fa06
SN2019vrq	U	58863.8632	17.222	0.418	cpt1m012-fa06
SN2019vrq	U	58869.114	17.601	0.491	elp1m008-fa05
SN2019vrq	U	58871.066	17.537	0.478	elp1m006-fa07
SN2019vrq	U	58871.0677	17.55	0.478	elp1m006-fa07
SN2019vrq	U	58875.8242	17.618	0.495	cpt1m013-fa14
SN2019vrq	U	58875.8259	17.693	0.51	cpt1m013-fa14
SN2019vrq	U	58881.0603	18.062	0.278	lsc1m004-fa03
SN2019vrq	U	58881.062	17.818	0.557	lsc1m004-fa03
SN2019vrq	U	58898.0161	18.119	0.073	lsc1m009-fa04
SN2019vrq	U	58909.0552	18.33	0.08	lsc1m009-fa04
SN2019vrq	U	58909.059	18.227	0.075	lsc1m009-fa04
SN2019vrq	U	58915.0291	18.169	0.193	lsc1m004-fa03
SN2019vrq	U	58915.0329	18.066	0.17	lsc1m004-fa03
SN2019vrq	U	58924.3839	18.67	0.152	coj1m011-fa12
SN2019vrq	U	58924.3877	18.614	0.117	coj1m011-fa12
SN2019vrq	U	58925.757	18.681	0.094	cpt1m012-fa06
SN2019vrq	U	58931.7377	18.72	0.162	cpt1m012-fa06