

GRAD CABLE

The official newsletter of the Texas A&M University at Qatar Graduate Student Association



UPCOMING EVENTS/NEWS

NOV. 25

READING DAY
(NO CLASS, OFFICES OPEN)

DEC. 1

DEADLINE TO APPLY FOR
PHD TAMU - CHEN

DEC. 15

DEADLINE TO APPLY FOR
PHD TAMU - PETE

**CONGRATULATIONS TO THE
FOLLOWING GRADUATE
STUDENTS WHO RECENTLY
DEFENDED THEIR THESIS!**

MASTERS

MUHAMMAD DANYAL IMAM
YASIR IBRAHIM
FATHYA SALIH
ABDUL REHMAN
ABDULLAH SHAAT
ELIZABETH IJEOMA OBODE

Red Sprites: The Meteorological Phenomena You Need to Know About

by Midhat Zaidi

Disclaimer: This piece is in no way claiming to be a full-blown review but rather an introductory insight into a meteorological phenomenon.

We all know about thunderstorm formations and the basic science behind them. But it may come to your surprise that there is a whole community of light phenomena that occur far above a thunderstorm; phenomena that started receiving much attention recently.

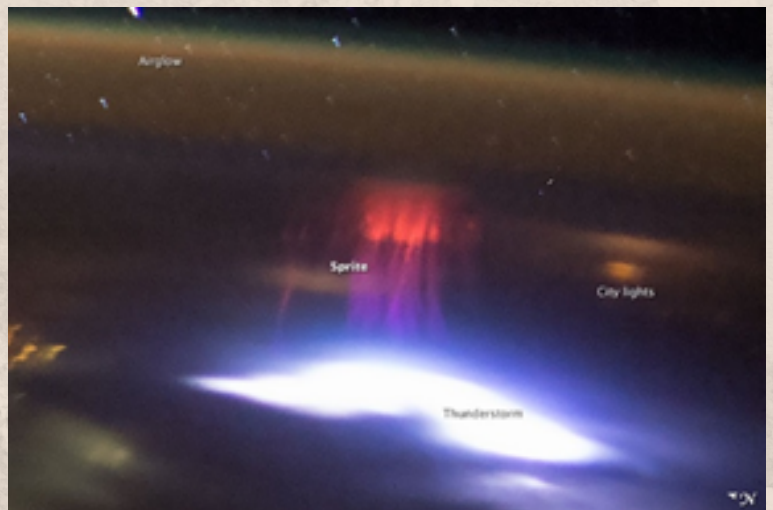
Sprites, named by a U of Alaska physics professor for their appearance and fleeting nature, are just one of the numerous optical phenomena that belong to a class of events called **Transient Luminous Events (TLE)**. They are short-lived red flashes of light that occur in the ionosphere, far above the first atmosphere and last for milliseconds. They occur in superfast spurts or clusters that move upwards, towards space and are much larger than lightning itself. 1-3



To the human-looking up, it would look like a reddish-orange display of fireworks that are gone within the blink of an eye. And whilst they may look small to us in size, they span 50km across.⁴ Imagine an electrical discharge spanning from TAMUQ to Al-Khor!

What is astounding is that visual reports of sprites date back to at least the 1880s, but it wasn't until 1989 when the first documentation of sprites occurred by a physicist who happened to catch one when testing a low light video camera. It is only recently that more work and observational reports, along with a lot of video footage and pictures have started emerging. Astronauts have even spotted them from the ISS (see image below). The reason for them being so unnoticed is that whenever they were reported, the scientific community dismissed them to be northern lights instead. ⁴⁻⁶

As for commoners like us, we simply didn't look up enough, especially during thunderstorms which is when sprites reveal themselves. I really don't blame us living in Qatar as we've hardly seen thunderstorms for over a year now. But within the rest of the world that host frequent lightning storms, it's a wonder that this weather phenomenon has gone unnoticed for decades.



Sprites are initiated by a rare but intense form of lightning known as positive lightning (when the cloud-to-ground lightning discharge has a positive charge), which is 10x stronger than negative (regular) lightning. Sprites appear at altitudes of ~80km high and through optical imaging, we know that sprites are in fact clusters of decameter-sized balls of ionisation! ^{3,7}

But how do they have this red colour when lightning has a white colour? When the ions from the discharge collide with molecules in the air, it excites nitrogen, hydrogen, and oxygen in the earth's atmosphere. For the case of red sprites, it is nitrogen in the atmosphere that receives this energy and gets excited, emitting energy in the form of mostly red (sometimes blue) glow depending on the altitude.^{1,2,7}

Red sprites can be categorised into three types based on appearance. Some are jellyfish-shaped that can be around 50 kilometers tall, whereas others are like vertical columns of red light and some that are carrot-shaped. ¹

Ok so we know what sprites are but let's say you have a great thunderstorm in front of you and you remembered this article and wondered if today was your lucky day to spot a sprite, how would you know to look for them? Luckily, red sprites are the easiest to spot. They can occur anytime during strong thunderstorms that exhibit intense lightning. To see a red sprite, you will need the following: 2,4,8,9

1. A strong powerful thunderstorm that's making a lot of lightning
2. A very dark (almost black), intensely clear sky with little to no light pollution, not even the bright moonlight (this can make it very hard to spot them otherwise)
3. Being at a very far distance from the storm so you can clearly see the sky above the storm cloud.
4. ~20 minutes to allow your eyes to adjust to the dark then watch closely as sprites can occur once every 200 lightning strokes and last only for 1/10th of a second
5. If you do plan to film them, you'll need several hours of footage and long exposure shots on red-sensitive recording equipment with you.

Well I have equipped you now with the basic of red sprites so if you do ever see something like this, you'll know that you are not hallucinating 😊

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2. Machemer T. How to Spot Elusive 'Jellyfish Sprites' Dancing in the Sky During a Thunderstorm. *Smithsonian Magazine*. <https://www.smithsonianmag.com/smart-news/how-spot-elusive-jellyfish-sprites-thunderstorm-180975677/>. Published 2020.
3. Stenbaek-Nielsen HC. Observed emission rates in sprite streamer heads. *AGU Adv Earth Sp Sci*. 2007;34(11). doi:<https://doi.org/10.1029%2F2007GL029881>
4. Byrd D. What are lightning sprites? *EarthSky*. <https://earthsky.org/earth/definition-what-are-lightning-sprites>. Published 2020.
5. Toyne H. Meteorological Phenomena. *Nature*. 1886;33(245). doi:10.1038/033245d0
6. Franz RC, Nemzek RJ, Winckler JR. Television image of a large upward electrical discharge above a thunderstorm system. *Science* (80-). 1990;249(4964):48-51. doi:10.1126/science.249.4964.48
7. Fecht S. What Is A Red Sprite? Ghost? Alien? Carbonated beverage? *Popular Science*. <https://www.popsci.com/what-red-sprite/>. Published 2015.
8. Garriss JJ. RED SPRITES, ELVES, AND TROLLS: MAGIC IN THE SKIES HOW TO SEE A RED SPRITE. *Almanac*. <https://www.almanac.com/magic-skies-real-sprites-elves-and-trolls>. Published 2021.
9. Grønne J. First Danish "red sprites" caught from Silkeborg. *WaybackMachine*. https://web.archive.org/web/20120822234958/http://www.dmi.dk/dmi/foerste_danske_red_sprites_fanget_fra_silkeborg. Published 2012.

ADDITIONAL DEADLINES

MASTER'S - NON-THESIS

NOV. 12 - LAST DAY TO TAKE FINAL EXAMINATION

NOV. 19 - LAST DAY FOR ALL STUDENTS TO DROP COURSES WITH NO PENALTY (Q-DROP), 4:30PM. LAST DAY TO OFFICIALLY WITHDRAW FROM THE UNIVERSITY

DEC. 8 - LAST DAY TO APPLY FOR GRADUATION

MASTER'S - THESIS

NOV. 19 - LAST DAY FOR ALL STUDENTS TO DROP COURSES WITH NO PENALTY (Q-DROP), 4:30PM. LAST DAY TO OFFICIALLY WITHDRAW FROM THE UNIVERSITY

DEC. 8 - LAST DAY TO APPLY FOR GRADUATION

DOCTORAL

NOV. 19 - LAST DAY FOR ALL STUDENTS TO DROP COURSES WITH NO PENALTY (Q-DROP), 4:30PM. LAST DAY TO OFFICIALLY WITHDRAW FROM THE UNIVERSITY

DEC. 8 - LAST DAY TO APPLY FOR GRADUATION

Is Milena

by Daniela Q Fonseca

Qué te trajo a mí ? Respuesta dual. Simple como decir que todo, complejo explicar el todo.

Sumatoria de todos los eventos sucesivos temporales, lineales y no-lineales, que precedieron nuestra sincronía y desencadenaron nuestro aleatorio encuentro en un instante congelado en el tiempo de nuestro reloj cósmico. Cada experiencia, gen e involuntario reflejo •Ser• dirigieron mi mirada hacia la tuya... y se dejaron cautivar.

Por qué señalamos eternidad?

Por qué sobrevivimos en la esperanza?

La primera no existe y la segunda es transitoria •vida•.

La vida, condenada al inmanente, donde todos los eventos sucesivos se dirigen a un instante imposible de congelar, en el que finalmente es liberada •muerte•.

Transcendencia? Podemos transcender si así lo deseamos sentir.

Aún así seguimos pereciendo y sufriendo al despedirnos de los nuestros. Dolor inmenso que nos hace experimentar la levedad de nuestro ser. Sin embargo, nos recuperamos y continuamos en la hermosa condena con Esperanza de nuestro lado.

Íntima, cómplice, desconocida,

No sé por dónde andas, en qué secreto esperas.

Florece tu milagro, tú,

porque nos vamos pronto.

Y cuando llegue ese instante lo único que pido es sostener tu mano.

Pues mi anhelo más profundo •Esperanza• es que en el silencio, mi corazón y el tuyo permanezcan siempre juntos •transcendencia•



Translation:

What brought you to me? Dual response. Simple as saying everything, complex explaining everything.

Sum of all the successive temporal events, linear and non-linear, that preceded our synchrony and triggered our random encounter in an instant frozen in time of our cosmic clock. Each experience, gene and involuntary reflection • Being • directed my gaze to yours... and were captivated.

Why do we point to eternity?

Why do we survive in hope?

The first does not exist and the second is transitory • life •.

Life, condemned to the immanent, where all successive events lead to an instant impossible to freeze, in which it is finally liberated • death •.

Transcendence? We can transcend if we want to feel it.

Even so, we continue to perish and suffer when we say goodbye to our beloved ones.

Immense pain that makes us experience the lightness of our being.

However, we recovered and continued in the beautiful sentence with Hope on our side. Intimate, accomplice, unknown, I don't know where you are, what secret you are waiting for. Your miracle blooms, you, because we are leaving soon. And when that moment comes, all I ask is to hold your hand.

Well, my deepest desire • Hope • is that in silence, my heart and yours always remain together • transcendence •