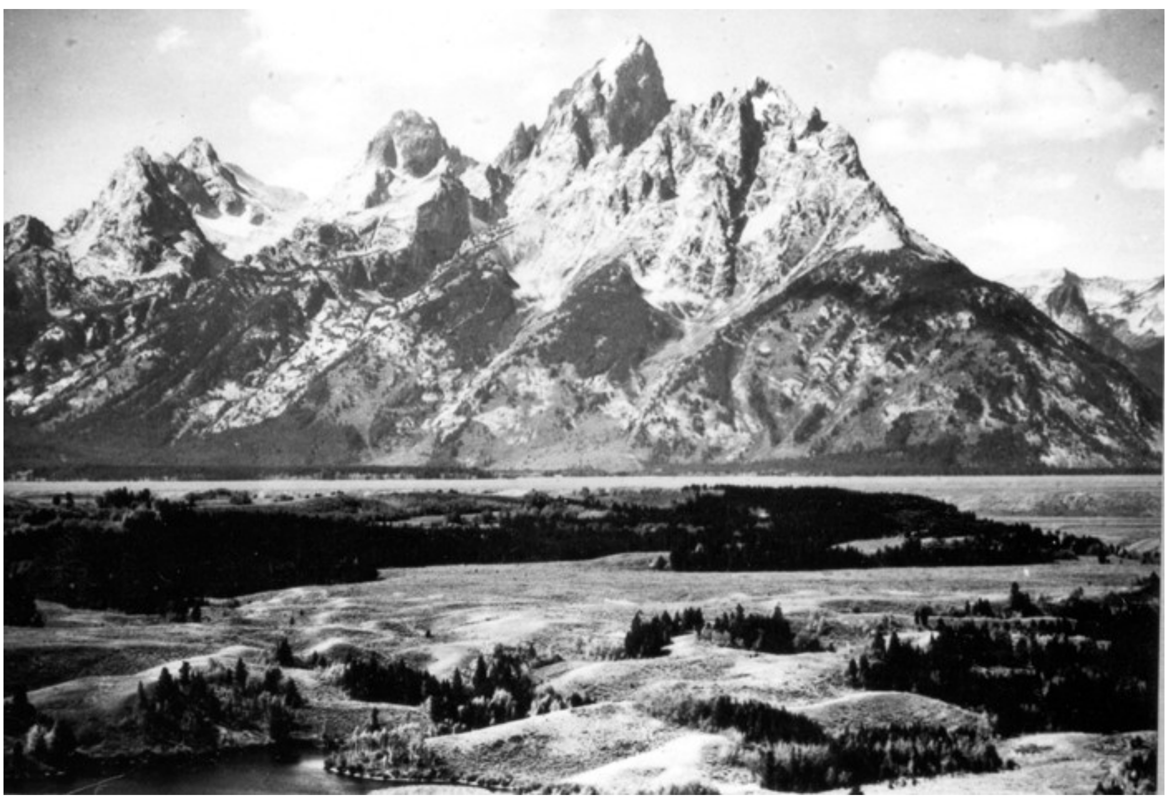
GEOSCIENCE INFORMATION SOCIETY

GEOSCIENCE INFORMATION SERVICES:

"Peak" Performances



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GEOSCIENCE INFORMATION SERVICES:

"Peak" Performances

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Janet E. Dombrowski

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TABLE OF CONTENTS

(Continued on next page)

TABLE OF CONTENTS *(cont.)*

PREFACE

The Geoscience Information Society (GSIS) was established in 1965 as an independent, nonprofit professional society. Members include librarians, information specialists, publishers, and scientists concerned with all aspects of geosciences information. Members are based in the United States, Canada, Australia, Denmark, India, Sweden, Taiwan, and the United Kingdom.

GSIS is a member society of the American Geological Institute and is an associated society of the Geological Society of America (GSA). The GSIS Annual meeting is held in conjunction with the annual GSA meeting, and the papers, posters, and forums presented are a part of the GSA program.

Oral presentations of the papers provided in this proceedings volume were given at the 2010 Annual Joint Meeting of the Geoscience Information Society and the Geological Society of America (GSA) held in Denver, Colorado October 31-November 3, 2010. The papers are arranged in the order they were presented and, where the entire paper was not available due to publishing conflicts, the abstract has been provided with the permission of the author.

This proceedings volume is divided into two parts as follows:

1. Oral papers presented at the GSA Technical Session 79: "Geoscience Information Services: 'Peak' Performances" and one poster presented at GSA by GSIS members.
2. Reports of the 2010 GSIS program sessions.

Thanks to all of the presenters who made this session a success and for their patience in awaiting publication of this proceedings. My particular thanks goes to our GSIS 2010 Chair, Jan Heagy, and our in-coming Chair and conference planner, Kay Johnson, for their support and timely assistance during session planning. Jody Bales Foote, 2009 Conference Convener, and Lisa Johnston, past Proceedings Editor, provided invaluable guidance in planning the session and editing the Proceedings.

Janet E. Dombrowski
GSIS Conference Convener 2010

Part 1: GSA Topical Session T79

Geoscience Information Services:
"Peak" Performances

Geoscience information providers apply their expertise to add value to information and deliver exceptional services for library users in complex and diverse roles, such as consultation, contract negotiation, metadata description, instruction, and website development.

Technical Session Convener

Janet E. Dombrowski
November 2, 2010
8:00 a.m. - 12:00 p.m.

STATE GEOLOGICAL SURVEY DEPLOYMENT OF THE NATIONAL GEOTHERMAL DATA SYSTEM

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Abstract — Addressing scientific solutions to the challenges of energy supply as well as landslides and earthquakes, minerals and mining, water supply and flooding, pollution and erosion, and not least, climate change, is dependent on geological data. Rich environmental data are extensive, but when they are available, they are often exceptionally difficult to discover, exist in different formats and via different services, with different access conditions.

A coalition of State Geological Surveys (via the Association of American State Geologists - AASG) is expanding and enhancing the National Geothermal Data System (NGDS) by creating a national, sustainable, distributed, interoperable network of data providers representing all 50 states that will develop, collect, serve, and maintain geothermal-relevant data that operates as an integral compliant component of NGDS. The data exchange mechanism is built on the Geoscience Information Network (GIN) protocols and standards.

Data are exposed from the State Geological Surveys through the NGDS, by digitizing at-risk legacy, geothermal-relevant data (paper records, samples, etc.), publishing existing digital data using standard web and data services, and through limited collection of new data in areas lacking critical information.

Goals are to enhance states' abilities to preserve and disseminate geothermal data; facilitate geothermal resource characterization and development efforts; expand the scope of data available to the geothermal community; foster new services and applications built by third-parties to take advantage of the system's capabilities and content; contribute materially to creation of a national geoinformatics system through implementation and deployment of NGDS; and increase operational support for geoinformatics infrastructure through a broader user base.

This material is based upon work supported by the U.S. Dept. of Energy, Geothermal Technologies Program under award DE-EE0002850, and the National Science Foundation under Grant No. 0753154.

MAPS, MAPS AND MORE MAPS:
THREE APPROACHES TO REACH THE MASSES

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Abstract — Online mapping applications and services have made promoting data collections easier than ever, affording opportunities to visualize and disperse map content to the masses. While paper libraries still exist, librarians and archivists are adopting measures to preserve content and make their collections widely accessible. Web mapping can enhance a collection by depicting: 1) news on maps, 2) visualizations on maps, and 3) interoperability via maps. The interoperability aspect is crucial as it allows the map services to be used in ways and with clients that the original authors may not have foreseen. Examples of these approaches include the use of a GeoRSS feed, Google Earth, and a Web Map Service.

DATA PRESERVATION AND MAINTENANCE OF THE OREGON GEOLOGIC DATA COMPILATION

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Abstract — As the use of Geographic Information Systems (GIS) became more widespread in the geologic community, the Oregon Department of Geology and Mineral Industries (DOGAMI) recognized the need to provide users with digital geologic information. DOGAMI embarked on a multi-year effort to capture and classify the "best available" geologic mapping of the state. GIS and a relational database were employed and provided the infrastructure for storage, processing, and portrayal of information collected from 345 published and unpublished maps, theses, and dissertations. The Oregon Geologic Data Compilation (OGDC) was the culmination of this effort. OGDC was also built in conjunction with the Oregon Geospatial Enterprise Office as part of the Geoscience Framework Theme for statewide spatial data as part of the National Spatial Data Infrastructure initiative. It has since been implemented as the state's geologic data standard.

DOGAMI is currently developing a methodology to update OGDC by adding more recent publications to maintain it as the "best available" source of geologic data for the state. New geologic mapping is continually being created, has been available since completion of the project, and needs to be incorporated into the data set to keep it current. Recent work includes a conversion of the spatial files and the tabular database into a file geodatabase, a standard file platform of ESRI software. Future iterations of OGDC will be developed and published in the geodatabase format, rather than as the two separate components of previous releases. This new methodology will help streamline updates in the future while preserving the existing legacy data in a more robust geodatabase technology.

GEOSCIENCE DATABASES: A COMPARATIVE ANALYSIS

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Abstract — Many bibliographic indexes are available for research in the geosciences, including general indexes such as *Academic Search* and *InfoTrac*; science databases, such as *Science Citation Index* and *Scopus*; and subject specific geosciences databases, such as *GeoBase*, *GeoRef*, *Meteorological and Geoastrophysical Abstracts*, *Oceanic Abstracts*, and *Water Resources Abstracts*. As library budgets are reduced by inflation and other cuts, libraries are increasingly looking at all possible savings, including canceling databases.

A comparison of six major geoscience and science databases, including *GeoBase*, *GeoRef*, *Meteorological and Geoastrophysical Abstracts*, *Oceanic Abstracts*, *Water Resources Abstracts*, and *Science Citation Index* reveals that each index contains unique content and search capabilities. Examining the coverage of these databases to identify the number and nature of unique and duplicate titles and assessing the needs of the local user population enables librarians and their users to make an informed decision regarding possible database cancellations. Based on the results of these comparisons, librarians will be able to hold informed discussions with their users regarding potential database cancellations.

INTRODUCTION

In this time of tight budgets, it is important to evaluate every expenditure, especially expensive purchases, such as indexes and databases. Among the criteria to consider are whether an index or database provides access to full-text content and the titles that are indexed. When analyzing content, one of the most important considerations is the extent of duplication between indexes in the same or similar subject areas. Six databases could be useful for research in the geosciences, including *GeoBase*, *GeoRef*, *Meteorological and Geoastrophysical Abstracts*, *Oceanic Abstracts, Science Citation Index*, and *Water Resources Abstracts*. The titles indexed in each of these databases were analyzed to determine the extent of duplication between them.

DESCRIPTION OF THE DATABASES

GeoBase is the online equivalent of *Geographical Abstracts*, which was once published by the University of East Anglia and then by GeoAbstracts until 1988, when it was acquired by Elsevier. The online database, which is available through Dialog, Ovid, and Engineering Village, covers resources indexed from 1980 to the present. It indexes journal articles and a few government publications in geology, oceanography, ecology, physical and human geography and international development. Based on information from the combined title lists and *Ulrich's Periodicals Directory* (R.R. Bowker), it indexes 2304 unique titles.

GeoRef is an index to books, articles in books and journals, maps, and United States, state, provincial and foreign government publications in all areas of the geological sciences, including the geological aspects of water and oceanography. It is available through ProQuest/CSA, EBSCO, STN, Dialog, Engineering Village, and GeoScience World. Published by the American Geological Institute, it indexes publications related to North America from 1666 to the present and other areas of the World from 1933 to the present. Based on the title list from the American Geological Institute, it indexes 19,693 unique titles.

Meteorological and Geoastrophysical Abstracts is an index to government publications, books, journal articles, and conference publications related to astrophysics, atmospheric science, meteorology, climatology, glaciology, hydrology, and physical oceanography that was once published by the American Meteorological Society, but is now published by ProQuest/CSA. It covers titles indexed from 1974 to the present. It is available through Dialog and ProQuest/CSA. Based on information from the ProQuest/CSA website and *Ulrich's*, it indexes 981 titles.

Oceanic Abstracts is the online equivalent of the print title of the same name. The online index, which covers publications from 1981 to the present, indexes journal articles, conference proceedings, and some government publications in biological, physical, and chemical oceanography as well as titles related to maritime transportation, navigation, and law. It is published by ProQuest/CSA and is available through ProQuest/CSA and Dialog. Based on information on the ProQuest/CSA website and *Ulrich's*, it indexes 696 titles.

Science Citation Index is an index to journals in a wide variety of scientific disciplines. It is published by Thomson-Reuters and is available on Dialog, STN, and Thomson-Reuters' ISI Web of Knowledge platform. Subscribers can acquire access to the database for varying time periods. On Dialog and STN, it covers titles from 1974 to the present. The basic (not the expanded) Science Citation Index indexes 3769 unique titles, including 274 titles in core geoscience subject areas (geology, physical geography, geosciences, geochemistry and geophysics, paleontology, and water resources).

Water Resources Abstracts is the online equivalent of the print index *Selected Water Resources Abstracts*, which was produced by the U.S. Geological Survey until 1994. Published by ProQuest/CSA, it indexes journal articles and a few U.S. and state water survey publications, including titles related to water law. The online database, which covers the time period from 1967 to the present, is available through ProQuest/CSA, Dialog, and STN. It indexes 1289 unique titles.

METHODOLOGY

Title lists for each index were obtained from the individual website for each database, or other sources as needed. The title list for *GeoRef* was supplied by GeoRef Information Services. The title list for *GeoBase* was compiled from three different title lists that were found on the Elsevier website (2006, 2009, and 2010) and a list of titles downloaded from *Ulrich's Periodicals Directory*. The lists were imported into Excel, sorted, and analyzed to identify duplicates; duplicates in individual indexes were eliminated.

The title lists for each database were combined with the lists for the other databases, then sorted and analyzed to identify duplicates. When duplicates were found, they were marked as such; the entry for one title was retained while the other was deleted. The number of duplicates was noted so that the percent of duplication could be calculated using this equation:

$$\%\,Duplication = \left(\frac{\#\,of\ Duplicate\ Titles}{\#\,of\ Titles\ in\ a\ Database}\right) X\ 100$$

RESULTS

GeoRef has the most duplication with the other indexes; *GeoRef* duplicates more than 50% of the titles in all indexes except *Science Citation Index*. Because of its size (19,693 titles) *GeoRef* also has the most unique content of the databases. A considerable amount of duplication also exists between these databases and *GeoBase*; over 34% of the titles in *Meteorological and Geoastrophysical Abstracts*, *Water Resources Abstracts*, and *Oceanic Abstracts* are also indexed by *GeoBase*. There is also a considerable amount of duplication between *Oceanic Abstracts* and *Water Resources Abstracts* (Table 1).

CONCLUSIONS

Duplication exists between each of these databases. While each index has unique subject content, the other indexes include titles on that topic that are not indexed by the subject database. For

Index	Titles	Percent Duplication					
		GeoBase	GeoRef	MGA	Oceanic	SCI	WRA
GeoBase	2,304	***	50.04%	14.50%	13.98%	24.26%	25.87%
GeoRef	19,693	5.85%	***	2.51%	1.91%	5.18%	3.48%
Meteorological & Geoastro-physical Abstracts (MGA)	981	34.05%	50.46%	***	18.86%	27.62%	31.60%
Oceanic Abstracts	696	46.26%	54.17%	26.58%	***	36.06%	40.66%
Science Citation Index (SCI)	3,769 [274]	14.83%	27.06%	7.19%	6.66%	***	10.80%
Water Resources Abstracts (WRA)	1,289	46.24%	53.22%	24.05%	21.96%	31.57%	***

Table 1. Percent of Title Duplication between Geoscience Databases

example, some meteorology titles indexed by *GeoRef* and *Science Citation Index* are not indexed by *Meteorological and Geoastrophysical Abstracts*. In particular, *GeoRef* indexes over 850 water-related titles, specifically state water resource agency publications, which are not indexed by *Water Resources Abstracts*. Information on specific topics might also be available in other indexes (e.g. biological oceanography in *Biological Abstracts*; law in legal indexes).

Based on this analysis, it is apparent that *GeoRef* is the core geoscience index, because of its broad coverage and unique content. As such, it is recommended for research related to geology and many areas of physical geography. Additional work needs to be done to compare the content of one or more of these indexes with that of other databases, such as *Biological Abstracts*, *Agricola*, and *PAIS International*. This might help identify additional indexes for cancellation.

ACKNOWLEDGEMENTS

The author would like to extend her appreciation to Sharon Tahirkheli, Director, Information Systems (GeoRef) for supplying the *GeoRef* title list.

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Elsevier, Inc., 2009. *GeoBase* 2009 Source List – Journals. New York: Elsevier Science: http://www.ei.org/userfiles/SourceLists/GEOBASE2009Journals.pdf (accessed February 25, 2011).

Elsevier, Inc., 2010. *GeoBase* Source List 2010. New York: Elsevier Science: http://www.ei.org/userfiles/SourceLists/GEOBASE%20JOURNAL%20LIST%202010_0505.pdf (accessed February 25, 2011).

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February 25, 2011).

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ProQuest/CSA, 2011. Serials Source List for *Oceanic Abstracts*. Ann Arbor, MI: ProQuest/CSA: http://www.csa.com/ids70/serials_source_list.php?db=oceanic-set-c (accessed February 25, 2011).

ProQuest/CSA, 2011. Serials Source List for *Water Resources Abstracts*. Ann Arbor, MI: ProQuest/CSA: http://www.csa.com/ids70/serials_source_list.php?db=water-resources-set-c (accessed February 25, 2011).

Thompson Reuters, 2011. *Science Citation Index* Journal Search. New York: Thompson Reuters: http://science.thomsonreuters.com/cgi-bin/jrnlst/jloptions.cgi?PC=K (accessed February 25, 2011).

EXPANDING ACCESS TO THE GEOSCIENCE LITERATURE: NEW DEVELOPMENTS WITH THE USGS PUBLICATIONS WAREHOUSE

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Abstract — The United States Geological Survey (USGS) has recently released an updated and enhanced version of their online publications system, the Publications Warehouse. In addition to numerous enhancements to the interface, the USGS is now including citations for literature authored by USGS staff in addition to publications published by the Survey. This new development will support future identification of relevant geoscience literature that may be in the public domain due to federal law regarding public access to federally funded research. These enhancements will impact future generations of researchers and will potentially increase the availability and use of federal research within the geoscience literature.

The presentation will focus on the recent enhancements as well as planned future developments to improve the durability of digital information and the long-term preservation of the geoscience literature using this and other tools within the United States Geological Survey.

OPEN ACCESS GEOLOGY: USING THE INSTITUTIONAL REPOSITORY TO HOST STATE GEOLOGICAL SURVEY PUBLICATIONS

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University of Minnesota

Abstract — The Minnesota Geological Survey (MGS) hosts information systems containing data sets that are valuable historic and scientific resources for the state. Several options are being pursued to curate, preserve, describe, and disseminate these data to broader audiences, including web services, national data archives, and institutional repositories. One of the challenges has been to find a means to make available scanned versions of geological survey publications. Geoscience research literature is increasingly published electronically and made digitally available for immediate online access. For state geological survey publications, a library-run institutional repository (IR) can be an excellent solution to host digitized and born-digital content. In the past few years, MGS has scanned all of its publications published since 1872 through a number of library and state preservation grants. The comprehensive project included over 40,000 pages of reports, guidebooks, and bulletins, and over 600 maps, along with GIS data files from recent decades. This talk will describe how the MGS content was archived in the university's institutional repository and the issues and challenges we faced such as format decisions, workflow issues, and modes of user access.

INTRODUCTION

The Minnesota Geological Survey (MGS) was established in 1872 under the direction of Newton Horace Winchell (Figure 1). Winchell started teaching as the University of Minnesota's first professor of Geology and Mineralogy and subsequently the MGS became a permanent unit of the University of Minnesota's Geology and Geosciences Department when it was established in 1874.

Since 2007, the library has partnered with the MGS to scan and digitally preserve their complete publication record, including all final reports, published maps, and field guides. With the support of library technical service staff and key MGS metadata and GIS experts, we successfully completed the scanning and upload this summer and all MGS final publications are now available electronically online for public download in our institutional repository, the University of Minnesota Digital Conservancy (UDC) (Figure 2). This paper will describe this project in detail and focus on our approach, workflow, complications, and issues that led us toward successfully implementing a digital open access plan for the state survey's information systems. Finally, we will describe our next steps for archiving other MGS collections, such as Open File Reports, future born digital works, GIS files, and other data sets.

ARCHIVING PROCESS

The MGS project encountered a number of issues that resulted in the formulation of several policies throughout the process of archiving content in the university's institutional repository. The issues and challenges we faced included: the scanning proc-

Figure 1. The Minnesota Geological Survey (MGS) was established in 1872 by an act of the State Legislature directing the University of Minnesota to investigate the geology of Minnesota and make that information available to its citizens.

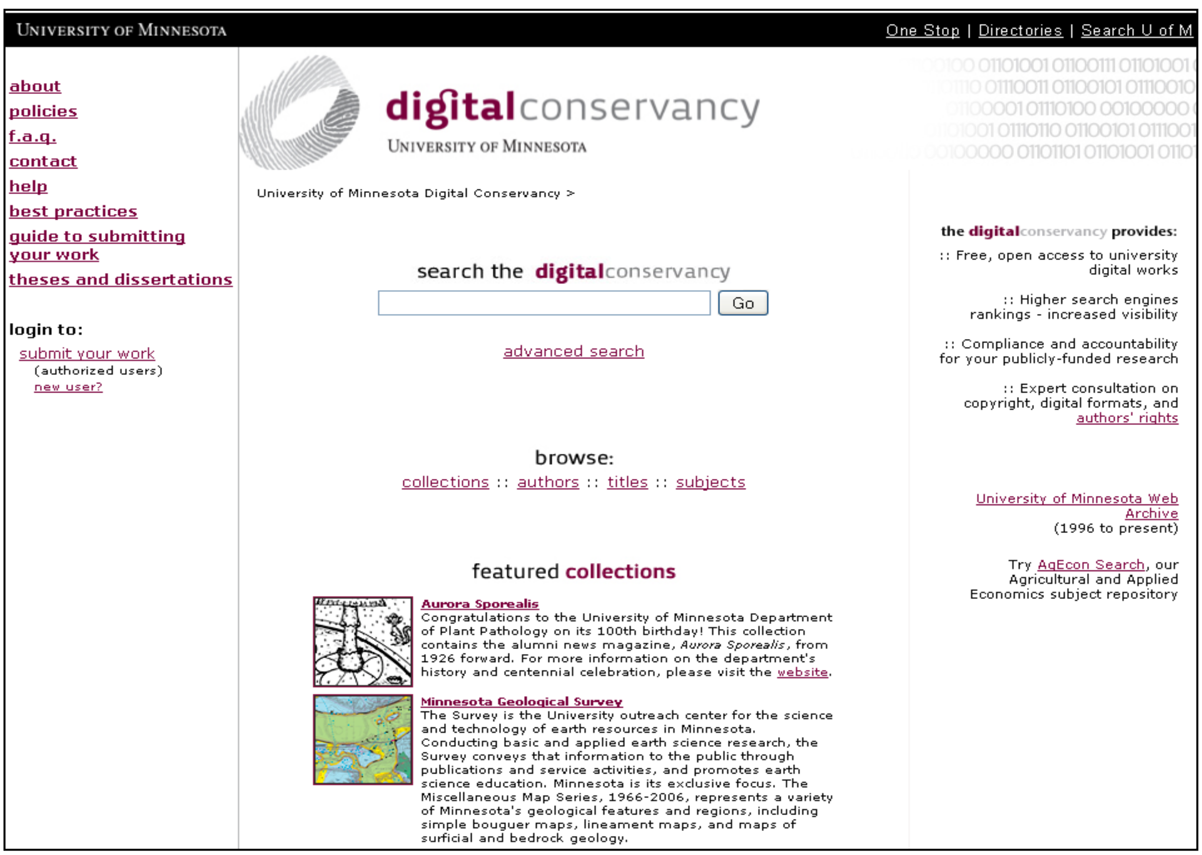


Figure 2. The University of Minnesota's institutional repository, dubbed the University Digital Conservancy (UDC), went online in 2007. Built on DSpace repository software, using a basic variation of Dublin core metadata schema, it allows for individual self-archiving capability, in open-access format. For a campus-based publisher, like the Minnesota Geological Survey, this presented an excellent solution to move toward electronic publishing.

ess, format decisions, workflow issues, born digital files, and modes of user access.

Scanning Process

Our library's in-house digital collections unit provided the scanning service for the monographic series and text-based map supplements. This was possibly with the support of an internal, library grant program. As a historic university-based collection, MGS publications were a priority for digitization and upload in the newly formed UDC. Once in the UDC, the text was indexed and made full-text searchable. The monographic series available in the UDC to date include:

- ANNUAL REPORTS
- BULLETINS
- EDUCATIONAL SERIES
- GEOLOGY OF MINNESOTA: A CENTENNIAL VOLUME
- GEOLOGY OF MINNESOTA—THE FINAL REPORT. Vols. 1-7 Folio
- GUIDEBOOK SERIES
- INFORMATION CIRCULARS
- MINNESOTA AT A GLANCE
- MISCELLANEOUS PUBLICATIONS
- NEWSLETTERS
- OPEN-FILE REPORTS (not complete)
- REPORTS OF INVESTIGATIONS
- SPECIAL PUBLICATION SERIES
- SUMMARY REPORTS

Simultaneously, a grant from the state provided support for MGS to scan around 600 maps for Minnesota Reflections, the state's digital library. The library augmented these maps in our collection with the original GIS and metadata files when available (mostly for post-1990 map publications). The map series held in the UDC are:

- AEROMAGNETIC MAP SERIES
- COUNTY ATLAS SERIES
- GEOLOGIC MAP INDEX
- GEOLOGIC MAP OF MINNESOTA [Scale 1:250,000]
- GEOLOGIC MAP SERIES
- MISCELLANEOUS MAP SERIES
- REGIONAL HYDROGEOLOGIC ASSESSMENTS
- STATE MAP SERIES

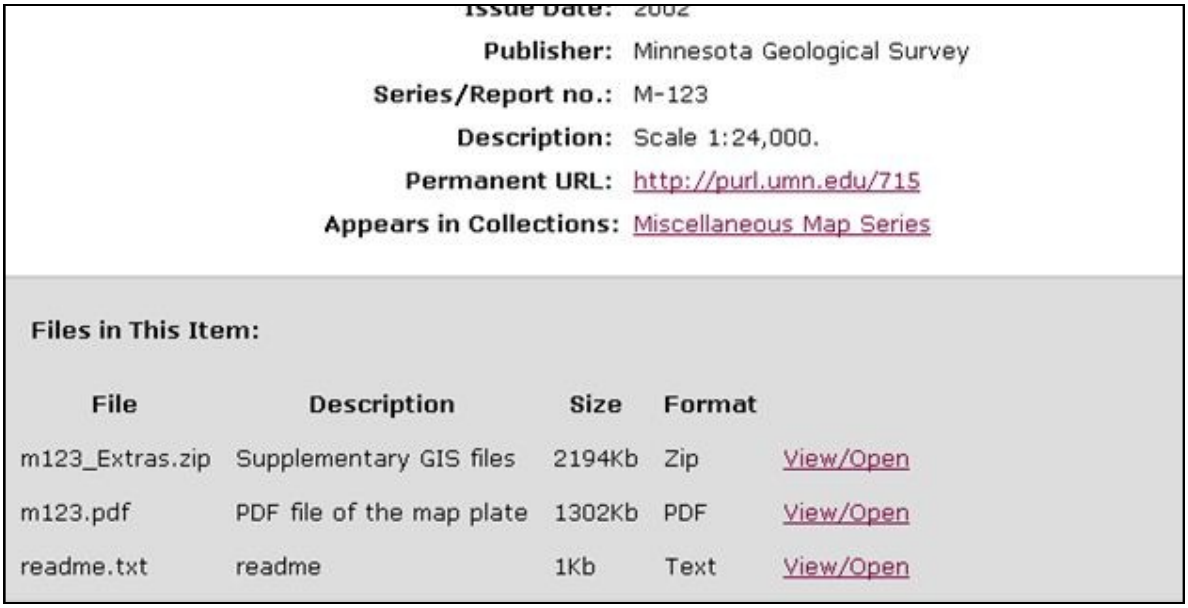
The MGS was enthusiastic about getting their content digitized, and they prepared the print copies from the Survey's library collection. Creating an up-to-date inventory of all MGS publications was not an easy process, and many publication lists had to be cleaned and double-checked by a student worker hired by the MGS. Most of our scanning metadata was generated from the MGS "publication order form" as it was the most up to date source for author, title, and related bibliographic information.

Format

MGS publications scanning resulted in over 40,000 pages of reports, guidebooks, and bulletins, and over 600 maps. The primary format was PDF with special treatment for the images in the reports, plates, and the maps, which were scanned at a higher resolution than the text-based pages. This process, essential for quality images and zoom capabilities, resulted in large PDF file sizes. For example, several of the bulletin issues were over 50MB in file size. Modern Internet connections are capable of downloading such a file quickly, however, some browser PDF preview functions, such as Firefox 6, do not function with files larger than about 25MB, resulting in a "Broken Link" error message. Therefore we decided to chunk larger files into smaller parts (Figure 3). Alternate formats, such as page flip views, are planned for the future.

Workflow Issues

In addition to the authors, we had the assistance of several people from the library and the MGS working on the uploading process. Uploading files into a digital archive is primarily a manual practice. Some of the work was batch loaded into the repository, but many of the series, such as the Miscellaneous Maps, had associated GIS files that required special treatment and had to be loaded one-by-one. Therefore, to avoid conflicting practices, we created a policy for uploading MGS publications



Issue Date: 2002
Publisher: Minnesota Geological Survey
Series/Report no.: M-123
Description: Scale 1:24,000.
Permanent URL: http://purl.umn.edu/715
Appears in Collections: Miscellaneous Map Series

Files in This Item:

File	Description	Size	Format	
m123_Extras.zip	Supplementary GIS files	2194Kb	Zip	View/Open
m123.pdf	PDF file of the map plate	1302Kb	PDF	View/Open
readme.txt	readme	1Kb	Text	View/Open

Figure 3. This screenshot illustrates the file structure used to upload MGS map publications with associated GIS files into the University Digital Conservancy.

into the UDC to streamline our workflow. Our policy followed that all MGS records in the UDC must:

- Be self contained (i.e. do not link to other web pages, or non-archived files)
- Include at least one file (i.e. citations or placeholders such as "Report 9 was skipped" were not included in the UDC to avoid "dead ends" for users. Rather, the map index was archived to preserve this type of information.)
- Contain files in preferred archival formats (files in open, standardized file formats)
- UDC records should not include any information that could change over time (ex. price info)

Preferred File Formats

The primary file format was PDF for the maps and text. However, special consideration was needed for the GIS files of the born-digital maps. Without an open, non-proprietary standard format available, the archiving process of the MGS GIS files included zipping them in their original ERSI ArcGIS formats (e.g. .e00). The zipped files provide a user-centered view of the record holding, rather than containing 20 or more files to choose from; each map record holds three objects:

- PDF of the map. This file format should meet the needs of most users and is maintainable for long-term preservation and migration.
- A zipped file containing the supplementary GIS files and FGDC metadata. The software used to zip the files was carefully chosen to not require additional software to run.
- A text "readme" file containing instructions on how to open and use the GIS files, software requirements, and other metadata of how the map was created. The MGS geologists, not librarians, contributed all of this information, including the GIS metadata.

Born Digital Publications

Going forward, the MGS will be publishing their born-digital maps and publications directly into the institutional repository. The library provided training sessions for MGS staff on how to upload the files into the UDC. Now Survey staff can take advantage of the publishing platform directly from their offices and within their existing workflows without relying on library staff. This practice has recently resulted in the publication of a new county atlas and the creation of two additional MGS digital collections: Geology of Minnesota Parks and Non-Series Publications.

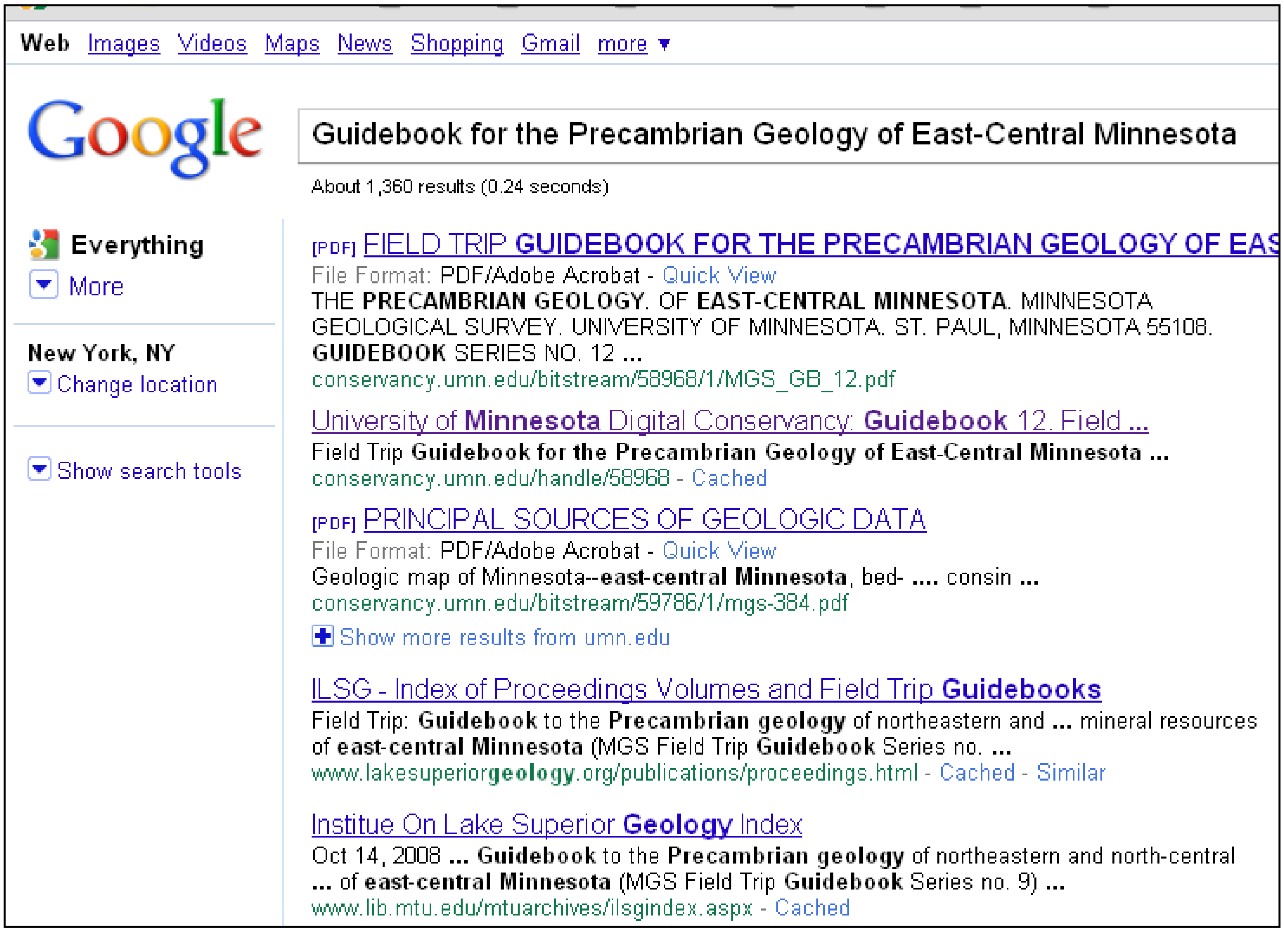


Figure 4. An example web search for a MGS publication yields the PDF and the UDC record for the digitized publication in the first two search results.

Access

Access to the digital MGS publications and maps is as easy as a web search (Figure 4). The UDC indexes the full-text of the documents and the maps include the scanned supplement documents and augmented metadata, such as keywords. The searchable MGS collection has been a valuable addition to the reference desk in the Science & Engineering Library at Minnesota. And the statistics for access to the digital files have topped the UDC download rates for all publications.

Of course, browsing is very important, and therefore, the library created a dump of the UDC archived collection and marked it up in HTML so the Survey can host links directly from their site along with a collection-specific keyword search box. This interface allows their website to be the primary website for public access to the MGS digital publications.

DATA: THE NEW SPECIAL COLLECTION

Next we have turned our preservation eye on the MGS data sets: the new special collection for libraries. The MGS hosts information systems containing data sets that are valuable historic and scientific resources for the state. Several options are being pursued to curate, preserve, describe, and disseminate these data to broader audiences, including web services, national data archives, and institutional repositories. To begin, we've archived three MGS datasets: Gravity and Aeromagnetic Data of Minnesota, the MGS's Rock Properties database, and the database of Karst Features of Minnesota (Figure 5).

The datasets were archived in an open database format (.dbf) so that users may download a copy and run it on their favorite platform. Although archival, this access method is not the ideal, compared to a custom interactive web-interface to the data. However, our first goal was preservation

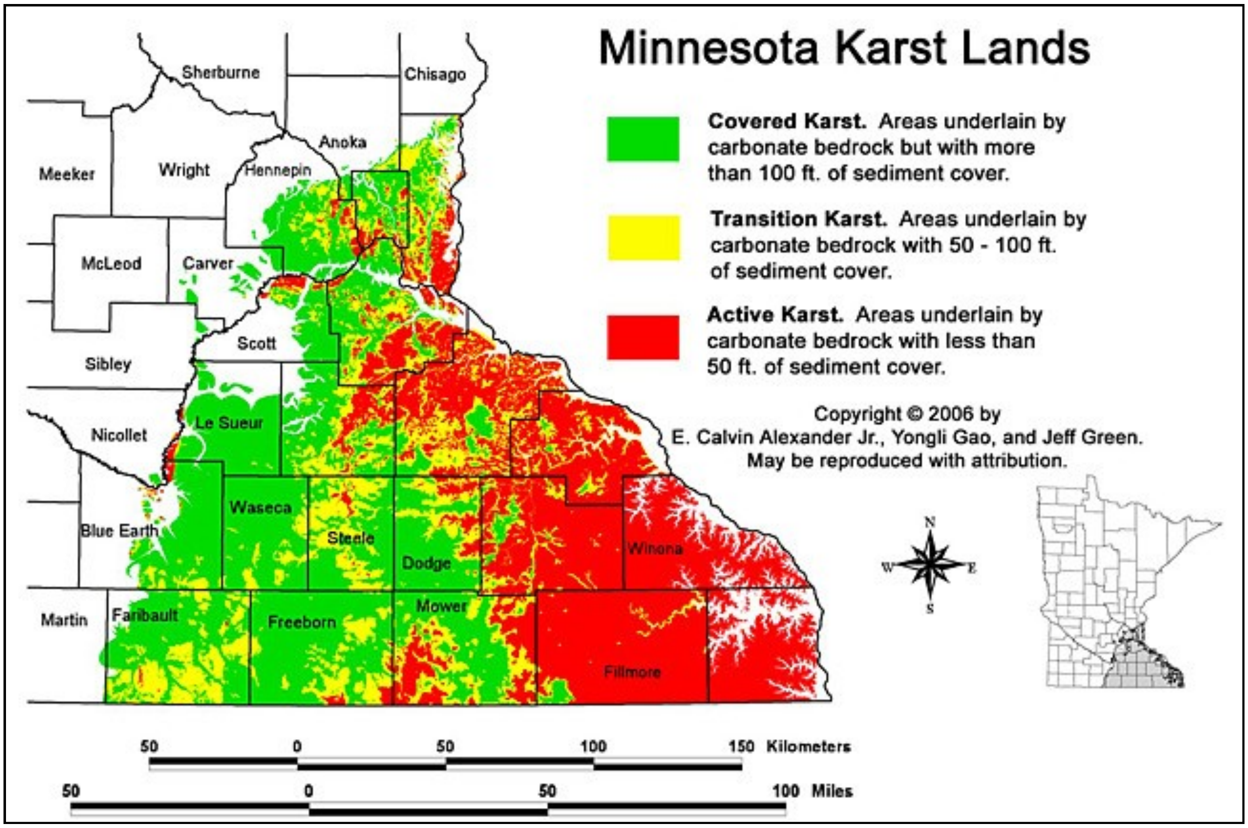


Figure 5. Created from the Karst database included in the MGS digital collection, this image represents the type of information that can be created from archival data sets. Image created by Calvin Alexander, University of Minnesota.

to ensure that an archival copy exists as we move to more usable platform. The library is changing the backend of our repository to a Fedora-based platform, where we hope to be able to better host a variety of data format types, and the MGS is building a custom GIS web service. Other datasets we plan to make available include:

- Geological observations
- Till texture and lithology
- Geochemical data
- Borehole geophysics index
- Water well data
- Geotechnical data
- Hydrogeological data

FUTURE NEXT STEPS

Now that we have everything scanned and archived, there are some important next steps to consider. As we mentioned above, the monographic content will be made available in alternate formats more suitable for web viewing. Aiding this effort is our plan to archive the MGS materials in the HathiTrust Digital Library as part of the University of Minnesota's participation in the Google Books Library Project. This will not only provide a page-flip view of the book, but will allow all libraries to harvest the content from OCLC's WorldCat to ingest into their library catalogs for direct access. Also, the UDC is an OAIster-compliant repository, thus the maps and data files can be pushed to WorldCat as well. Finally, with our GIS web services moving into place, federated repositories such as OneGeology.org and other Minnesota GIS services can link to our archived GIS files for interactive access to the data.

Another area for archival consideration is the Survey's physical data collections: samples that may be in need preservation, cataloging, and wider dissemination (Figure 6). There are many ways that the University Library can partner with the State Survey to succeed in this area. For example, the library was brought in to consult on the MGS's metadata and preservation plan for applying to the USGS's National Geological and Geophysical Data Preservation Program (NGGDPP). As a part

Figure 6. The physical specimen collection at the Minnesota Geological Survey has been cataloged with detailed metadata for in-house use. This database is a great candidate to move into the digital environment as an online searchable resource to provide broader dissemination.

of this proposal, the MGS's physical collections that we will work toward archiving and providing enhanced access include:

- Hand samples
- Thin sections
- Sediment samples
- Geochemical samples
- Cuttings
- Drill cores
- Fossils (collection managed by the University of Minnesota's Bell Museum)

Project files and orphan data sets are another potential area for archiving. But how do we begin to sift through all the file cabinets, both physically and, perhaps more daunting, the modern "file cabinets" of desktop computers and shared-server file directories. Progress has already been made here, with over 300 print field notebooks and other historical administrative files moved to the University Archives in the Library. In the short term the documents will receive descriptive records and be made more usable through finding aids. The future plan is to scan and add them to the digital archive as a UDC collection. For a future project, the library might work with the MGS on building a data management plan at the beginning of the project, to describe in detail how the supplementary information will be transitioned after the project is complete and to provide descriptive metadata, currently hidden from users in the ArcGIS files, more accessible as XML file formats.

Finally, the MGS has been scanning their historic photo collection in-house and there is an opportunity to archive these currently inaccessible files into the Library's new media repository, UMedia Archive. This Fedora-based repository holds university affiliate-created images and video with the goal of open access and digital perpetuity. This would not only give the MGS an excellent searchable database of their image archive but would expose their unique digitized collection to the world.

CONCLUSION

A partnership between a university library and a state geological survey is a great fit. The Library's dedication to long-term preservation and wide dissemination of information and the State Survey's open access publishing model and scientific expertise are necessary components of a robust digital library of geological information. Combined, they provide the public with accessible, quality information and data. The MGS publications project is a proof-of-concept for similar projects for managing data, GIS, and other media forms with the goal of preservation, access, and the widest possible dissemination of content.

Acknowledgements
Thanks to those who were responsible for successfully implementing the archiving process: Nicole Bretall, Philip Herold, Rich Lively, Beth Petsan, and Kadie Seitz.

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SUPPLEMENTARY MATERIALS IN GEOSCIENCE JOURNALS

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Abstract — The growing trend to include online supplementary materials in journals has provided opportunities for authors to add enhancements, such as data sets, color photos, or multimedia objects to their articles, which could not be included in printed journal pages. The addition of these supplementary materials has created new challenges for librarians, publishers, reviewers, and researchers in terms of access, peer review, citation, and data preservation.

To better understand the current status of supplementary materials in geoscience journals, this study focused on a small sample of high impact, peer-reviewed journals representing a range of geoscience publishers. We examined author guidelines and publisher policies for each journal to find information on size limits, format restrictions, peer review, citation, and archival practices. Also, we documented the publication frequency and different types of supplementary materials included in these geoscience journals. Finally, we investigated the ease of access, navigation, and linking options that publishers have provided for these materials. This talk will present our findings and recommendations for making supplementary materials easier for users to locate and access.

INTRODUCTION

The dramatic rise in the numbers of supplementary materials included in science journals has been the focus of several recent studies and surveys. Schaffer and Jackson (2004) looked at the use of supplementary materials in journals from a range of scientific disciplines, including astronomy, chemistry, mathematics, and physics. More recently, concerns about the rapid increase in supplementary materials and potential implications for authors, reviewers, and readers were raised by Marcus (2009) and Carpenter (2009). Both authors stressed the need for better guidelines and more consistency in the way these supplementary materials are handled. Schwarzman (2009) conducted a survey of publisher's practices concerning supplementary materials which generated additional interest in clarifying the role of supplementary materials and how publishers treat them. Recent efforts to develop recommended practices for incorporating supplementary materials into the publication process in a more consistent way are described by Carpenter (2010), Rosenthal and Reich (2010), and Laue (2010).

These studies sparked our interest in taking a closer look at the current status of supplementary materials in geoscience journals. We started by examining the Geological Society of America's (GSA) Data Repository and found that it provides a good example of the rising trend to include supplementary materials. Established in 1974, this repository holds information that supplements and expands on articles published in GSA journals. Steadily growing from one article with a supplement in 1974 to 296 articles with supplements in 2010, the GSA Data Repository clearly illustrates the dramatic rise in the use of supplementary materials in some key geoscience journals.

This study was undertaken to gain a better understanding of the potential implications of supplementary materials for libraries and researchers by investigating the following research questions:

- How widespread are supplementary materials across a range of geoscience journals?
- How do different publishers handle them?
- How accessible are supplementary materials for researchers?

RESEARCH METHODS

Our study sample consisted of 15 high-impact geoscience journals from 14 different publishers. These journals were selected from lists generated using Journal Citation Reports® (2009) for several geoscience categories (geology, geosciences multidisciplinary), which were sorted by Impact Factor (two year). We also reviewed quantitatively ranked lists of high impact geoscience journals generated using SciMago/Scopus (sorted by cites/year) and Eigenfactor (sorted by Eigenfactor number). Lastly, we consulted the Australian Research Council's (2010) qualitative *Ranked Journal List*. We selected a sample that represented different types of publications (such as letters and review journals) from a variety of geoscience disciplines and publishers. We were interested in looking at how supplementary data are dealt with in as wide a range of publications as possible. The sample was limited to journals currently available at the University of Idaho Library. For comparison purposes, we also included the journals *Nature* and *Science* in our study, resulting in a total of 17 journals from 16 different publishers (see Figure 1).

For each of the journals in the study, we compiled data on the number of articles with supplementary materials in each issue, as well as the total number of articles per issue. We compared the total number of articles with supplements to the total number of research articles for each year to calculate the percentage of articles with supplementary materials for each journal in the study. We were interested in determining when supplementary materials were first included in each journal and compiled the numbers of supplementary materials back to the first year that they were included. Figure 2 illustrates the wide variation in supplementary data inclusion for articles published in 2010 within the geoscience journals in our study.

Journal	**Publisher**
American Mineralogist	Mineralogical Society of America
Annual Review of Earth and Planetary Science Letters	Annual Reviews
Biogeosciences	European Geosciences Union
Bulletin of the Seismological Society of America	Seismological Society of America
Bulletin of Volcanology	Springer
Earth & Planetary Science Letters	Elsevier
Geological Magazine	Cambridge
Geology	Geological Society of America
Holocene	Sage
Journal of Geology	University of Chicago
Journal of Petrology	Oxford
Journal of Quaternary Science	Wiley
Journal of the Geological Society	Geological Society of London
Nature	Nature
Quaternary Research	Elsevier
Reviews of Geophysics	American Geophysical Union
Science	AAAS

Figure 1. Journals included in the study.

Journal	% of 2010 Articles with Supplementary Materials
Geology	77%
Journal of Geology	63%
Journal of Petrology	48%
Earth & Planetary Science Letters	45%
Geological Magazine	44%
Journal of the Geological Society	32%
Bulletin of Volcanology	25%
American Mineralogist	25%
Annual Review of Earth and Planetary Science	19%
Bulletin of the Seismological Society of America	19%
Quaternary Research	16%
Journal of Quaternary Science	12%
Biogeosciences	10%
Holocene	5%
Reviews of Geophysics	0%

Figure 2. Percentage of articles with supplementary material.

DISCUSSION

Analysis of Journal Trends

The rise of supplementary data has continued through the past decade.

Across the seventeen journals, results consistently show an upward trend in the presence of supplementary data (see Figure 3). Most journals examined had supplementary data for less than 50% of the articles. However, certain trend-setting publications, such as the multi-disciplinary journal *Science* and the GSA's *Geology,* show very high rates of supplementary data inclusion. This fact, coupled with the rising rates of most journals, suggests that the tide of supplementary data is only rising and has yet to plateau.

Very few journal archives include data from issues published prior to the past decade (2000-2010).

With few exceptions, supplementary data inclusion began during the past decade and is only beginning to appear widely. *Science*, which is currently at nearly 100% of research articles with supplements, began including these data in November 2000. We found no occurrences of supplementary data in the University of Chicago's *Journal of Geology* until May 2004 and now nearly two-thirds of the articles have supplementary data. Newer journals, such as *Biogeosciences* (EGU) started publishing during the past decade and have posted supplementary data with articles since their inception.

Most journals appear to maintain access to these data.

The continued presence of these data on publishers' websites indicates a trend towards maintaining access. In all cases, if the supplementary data were provided, there was no indication of removal or alteration of those data. data. Furthermore, as

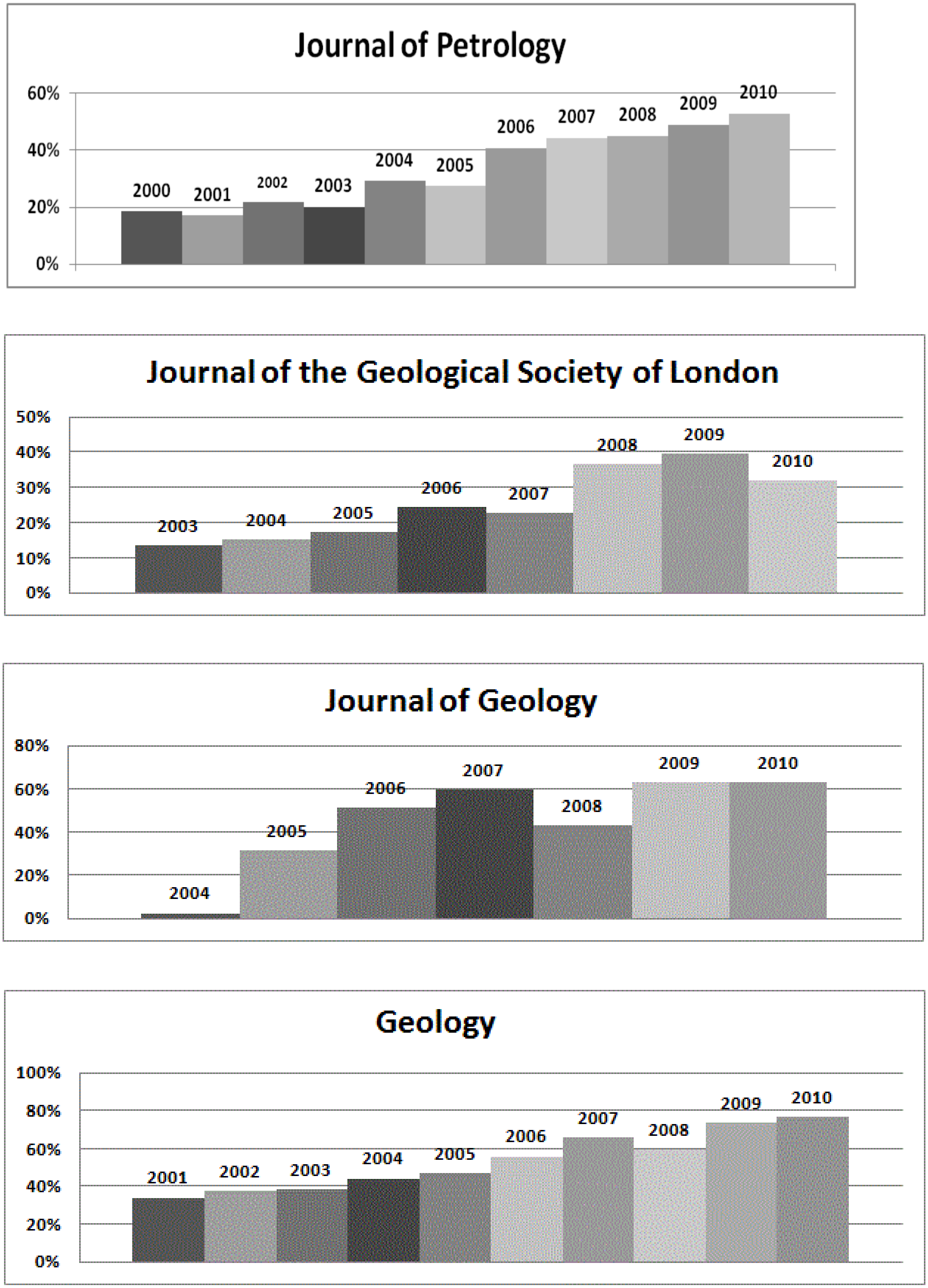

Figure 3. Example charts of journal trends. For each journal, the authors determined the percentage of articles that included supplementary data for each year over the past decade .

organizations such as LOCKSS and PORTICO begin to examine the supplementary data issue in greater detail, concerns about long-term preservation will be addressed (see Rosenthal and Reich, 2010).

Supplementary data are hosted locally on the publisher website itself, as opposed to linking to external websites.

While there is a growing trend towards disciplinary data repositories throughout the sciences, for article-specific supplementary data, the journal publishers host these data locally.

Analysis of Journal Policies

Most policies mention supplementary data.

Journal publishers have clearly recognized the need to establish policies and procedures governing the use of supplementary data. Very few journals fail to address it in some capacity, although the range of criteria provided is wide. *Science* has a long and considered policy, while *Geological Magazine* barely addresses how to treat or submit these data.

Very few policies address long-term archiving.

While virtually no mention of long-term archiving and preservation is made on publisher websites and in author instructions, publishers are evidently beginning to consider these issues. In most cases, there is an implication that data will be archived along with article text. However, data preservation of multimedia materials is more complicated than that of text, primarily due to format changes, emulation, and similar challenges. These factors will have to be considered as well. In most cases, the publishers do place some sort of limits on acceptable formats.

Very few policies address peer-review.

One of the most important considerations for inclusion of supplementary data is peer-review. Nearly all journals failed to mention peer-review explicitly. There were several who mentioned that data were required on submission of manuscripts, but in most cases, the expectation of peer-review was not clarified. A few journals explicitly said that data would be published as received. This is problematic given the close relationship of supplementary data to the otherwise reviewed article.

Nearly all publishers address the choice and characteristics of data files (type, size, nature), but do so largely for their own needs, not reader/user needs.

An interesting trend in journal publisher expectations is the description of acceptable formats, sizes, and characteristics of supplementary data. In only one case, Elsevier, was the size of a file described in the context of user needs (e.g. video files cannot be too large because they make downloads take too long). In most instances, requirements were described in clear simple standards: only PDFs, nothing more than 5 MB, or tables in an Excel-friendly format.

Recommendations

From this study, the authors have determined several recommendations for publishers of journals hosting supplementary data to improve access for users.

Discovery

- List data in the journal's table of contents and clearly describe and refer to data within the article.
- Supplementary data is an extension of the article, and as such, should be locally hosted.

Accessibility

- Provide direct links between article and supplementary materials (both ways).
- Third-party aggregators – e.g. EBSCO, ProQuest – do not currently deal with access to supplementary materials.

Usability

- Note any special applications or plug-ins needed.

Citability

- Provide a recommended citation as citation standards for supplementary data are developing and are not yet clearly established.

Implications for Librarians/Users

From the trends identified, we expect to continue to see the proliferation of this content. While decisions by authors to include supplementary data occurs on an article-level basis, most publishers appear to have decided to offer hosting capabilities and only need to agree on standards of practice. Until those standards are developed, however, users will likely continue to see wide variation in the way supplementary data are handled and presented.

Furthermore, there is often no access to these data outside of the original publisher's journal websites. This may be an instance of the publisher's added value over aggregating and discovery services. In other words, services such as EBSCO and ProQuest are not yet providing linking to supplementary data. A few publishers, like Elsevier and Wiley-Blackwell, are significant aggregators in their own right. For others, such as many scholarly societies, their publishing partners must provide and host this access. The trends in geoscience journals indicate that for all publishers, large and small alike, supplementary data are becoming frequent features.

Librarians and their host institutions need to ask questions about how well their needs fit these models and standards, especially in terms of open access repositories of journal pre- and post-prints. If librarians are to offer publications or scholarly communications support, awareness of these data and their characteristics are necessary, given the expanding role of supplemental data.

Without question, this growing trend requires librarians to be aware of, if not expert in, the presence and characteristics of these data. There are interesting questions for further study, such as: Why are these data increasingly common? Where do supplementary data fit into the process of information literacy education? What aspects must librarians educate users on – or do they simply anticipate expert-level use of these data? Should they insist on long-term preservation specifically for supplementary data by publishers as part of subscription agreements?

CONCLUSIONS

As the inclusion of supplementary data continues to rise, it is becoming clear that journal publishers are beginning to treat them with seriousness. This is appropriate, given that supplementary materials increasingly provide valuable enhancements to journal articles. The journals in our sample clearly demonstrated that the need to share more than just the written results of a study is becoming quite prevalent in the field of geosciences.

However, the challenges of standardization in the treatment of supplementary data are only beginning to be addressed. Fortunately, there are some strong examples by certain publishers of effective ways of treating supplementary data. One can only hope that publishers move quickly to establish these standards before too much more data are added to articles in an inconsistent manner that may make it difficult for users to access.

Supplementary data will continue to pose challenges for researchers as well as librarians. The biggest questions, such as accessibility, necessity of peer-review, and concerns about preservation and archiving, all need to be explored further. The growth of supplementary data in the geosciences does not appear to be slowing, but rather the opposite. It is incumbent on all parties—researchers, librarians, and publishers—to consider these issues carefully.

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AN ASSESSMENT OF IMAGE QUALITY IN GEOLOGY WORKS FROM THE *HathiTrust* DIGITAL LIBRARY

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Abstract — This study assesses the quality of both images and text in a sample from the 2,180 works on geology from the *HathiTrust* Digital Library (multi-institutional digital repository), an outgrowth of the Michigan Digitization Project and partnership with Google, Inc. A random sample of 180 works (consisting of 47,287 pages) was made and reveals many patterns and characteristics of the digital manifestations of these works. The good news is that of the total 47,287 pages that were reviewed, only 2.5% had scanning errors. The bad news, of the 180 works, 114 or 63% had at least one scanning error. It is important for librarians and readers to know the strengths and shortcomings of this repository in considering future decisions on both deaccessioning and remote storage of works from libraries.

INTRODUCTION

Partnering with libraries and publishers, Google, Inc. has created the World's largest digital collection and index of books and journals. The broad implications of how this digital collection may transform future access and use of the works it contains, and the subsequent future of libraries, has been the focus of several articles and opinion pieces of late (Dougherty, 2010; Jones, 2010; Nunberg, 2009; Darton, 2009). However, much of what has been written has also focused on the Google Books settlement with the Authors Guild and the Association of American Publishers (Proskine, 2006; Band, 2009; Okerson, 2009). A few articles have begun making assessments of image quality and the means of access used within the Google Books product (James, 2010; Duguid, 2007; Townsend, 2007). However, these articles have been very limited in scope or in the size of their samples. Studies by Duguid (2007) and Townsend (2007) have limited their assessments to a single work. James's found less than 1% of the pages in his sample had a significant error. However, the study had a relatively small sample of only 2,500 pages from 50 works.

The aim of this study is to assess the quality of both images and text in a sample from the 2,180 works on geology from the *HathiTrust* Digital Library (multi-institutional digital repository)—an outgrowth of the Michigan Digitization Project and partnership with Google, Inc. (HathiTrust n.d.). The *HathiTrust* has become a primary repository for much of the digitization being done by the Committee on Institutional Cooperation (CIC) and University of California system libraries for the Google Books Project. While this study specifically makes an assessment of the *HathiTrust* Digital Library, since much of the content is the same, many of the conclusions may, by extension, also be valid for portions of the Google Books Project.

METHODOLOGY

All records for works that are fully available within the *HathiTrust* Digital Library and indexed with the subject term "geology" from the University of Michigan Libraries' online catalog, "Mirlyn," were downloaded into EndNote. A total of 2,180 works met these criteria as of March 12, 2010. A random sample of 180 works was made from the total population of 2,180.

Data gathered from sample documents included:

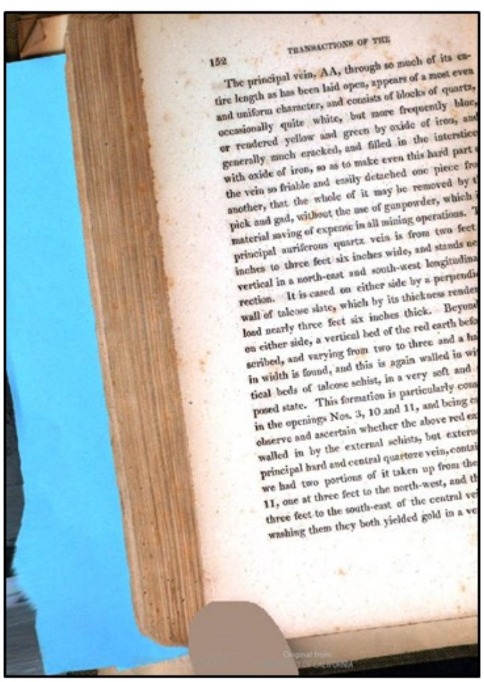
- title
- author

- library owning the source document

as well as study results:

- number of standard illustrations within the work
- number of standard illustrations with scanning errors
- number of large format illustrations (foldouts)
- number of large format illustrations with scanning errors
- number of pages of each work
- number of pages of text with scanning errors

A standard illustration was considered to be any image (i.e. woodcut, lithograph, and photograph) that was not a foldout or oversized illustration kept in a back pocket. A scanning error was determined by whether or not the illustration was capable of communicating the information it was intended to. Missing images were also considered an error. Most illustrations are degraded to some extent in the digitization process. For the purposes of this study they were judged using a pass or fail criteria: either they were adequate or they were not. Similar criteria for pages of text were also used: if the page was missing, unreadable, or missing words or information that made it unreadable, it was considered a scanning error.



152 TRANSACTIONS OF THE

The principal vein, AA, through so much of its en-
tire length as has been laid open, appears of a most even
and uniform character, and consists of blocks of quartz,
occasionally quite white, but more frequently blue,
or rendered yellow and green by oxide of iron, and
generally much cracked, and filled in the interstice
with oxide of iron, so as to make even this hard part
the vein so friable and easily detached one piece fro
another, that the whole of it may be removed by t
pick and gad, without the use of gunpowder, which
material saving of expense in all mining operations.
principal auriferous quartz vein is from two feet
inches to three feet six inches wide, and stands ne
vertical in a north-east and south-west longitudina
rection. It is cased on either side by a perpendic
wall of talcose slate, which by its thickness render
load nearly three feet six inches thick. Beyond
on either side, a vertical bed of the red earth befo
scribed, and varying from two to three and a ha
in width is found, and this is again walled in wi
tical beds of talcose schist, in a very soft and
posed state. This formation is particularly con
in the openings Nos. 3, 10 and 11, and being e
observe and ascertain whether the above red ea
walled in by the external schists, but extern
principal hard and central quartoze vein, contai
we had two portions of it taken up from the
11, one at three feet to the north-west, and th
three feet to the south-east of the central ve
washing them they both yielded gold in a ve

Figure 1. – Example of a text scanning error.

RESULTS

A total of 47,287 pages of text were evaluated. Of that, 865 pages, or 1.8% were missing or deemed to be text scanning errors. Of the 180 works in the sample, 34 works or 19% had at least one scanning error of text. One work, *An elementary treatise on mineralogy and geology, designed for the use of pupils*, originally published in 1822, was missing 566 pages. This accounted for 65% of all the text scanning errors. The remaining errors were mostly poor scans of pages (Figure 1).

A total of 8,098 standard images were contained with the 180 sample works. Of this total, 98 or 1.2% were missing or deemed to be scanning errors. Of the 180 works in the sample, 35 or 19% had at least one scanning error of a standard illustration. The work with the most errors, numbering thirteen, was *Ground-water hydrology, historical water use, and simulated ground-water flow in Cretaceous-age Coastal Plain aquifers near Charleston and Florence, South Carolina* (1996).

Automatic quality control processing of the page images may have resulted in images or parts of text being clipped out (Figure 2). However, this did not

Gneiss-Stufe. 13

müsste aber jedenfalls vor Ablagerung der ebenfalls palaeozoischen Kalkschiefer und carbonischen Grauwacken eingetreten sein, da diese abwechselnd theils auf Glimmerschiefer, theils auf dem Gneiss liegen, ohne selbst die geringsten Spuren einer Contactmetamorphose zu zeigen.

Der Gneiss wäre danach also altpalaeozoischer Granit, der sich von dem echten mesozoischen Granit sowohl durch seine Structur als auch durch die ungeheure Mächtigkeit seines Contacthofes erheblich unterschiede. Ich habe in diesem Gebiete nicht eine einzige Thatsache auffinden können, welche einer solchen Auffassung das Wort reden könnte, wohl aber viele, die dagegen sprechen. Ich will die vier hauptsächlichsten anführen.

1. Nirgends entsendet, wie schon erwähnt, der Gneiss Apophysen in sein Dach, eben so wenig treten im Glimmerschiefer Gneissgänge auf. Es fehlt also dieser wichtige Beweis für das jüngere Alter und die eruptive Natur des Gneisses ganz.

2. Die Grenze des Gneisses gegen den Glimmerschiefer fällt stets genau in die Richtung der Schichtung in letzterem, so dass die jüngeren oberen Lagen des Glimmerschiefers oder die Einlagerungen von Amphiboliten und Dolomiten nirgends direkt auf den Gneiss zu liegen kommen. Ebenso ist die Schichtung oder Bankung im Gneiss zu derjenigen im Glimmerschiefer parallel, so dass sich beide wie ältere und jüngere Theile eines concordanten Schichtensystemes verhalten und der Gneiss durchaus als der Untergrund erscheint, auf dem die Glimmerschiefer sich abgelagert haben.

3. Im Gneiss ist eine so stark ausgeprägte kataklastische Structur durchaus nicht zu beobachten, wie sie doch nothwendig entstanden sein müsste, wenn er durch Dynamometamorphose aus Granit hervorgegangen wäre.

4. Klastische Bestandtheile, wie sie in den sicher palaeozoischen Ablagerungen stets vorkommen, sind in den Glimmerschiefern nicht nachweisbar und waren deshalb wohl auch nie darin vorhanden.

Es fehlt also jeder Grund, um in ihnen einen palaeozoischen Contacthof zu sehen. Damit soll selbstverständlich keineswegs das Vorkommen lokaler Contacthöfe im Glimmerschiefer geleugnet werden, wie

Figure 2. – Example of a standard illustration scanning error (figure is missing).

seem to be a problem in the Google Books interface for these same works (as the images had already been reprocessed to correct these errors).

A total of 223 foldouts or large format illustrations were contained within the 180 sample physical works. Since all were missing from the digital version, or scanned incorrectly (Figure 3), all were counted as scanning errors. Obviously, there was a conscious decision by Google not to digitize foldout and large format illustrations (no doubt to increase the speed of scanning). Of the 180 works in the sample, 77 or 42% had at least one foldout or large format illustration. Thus for geology works, we can infer that not scanning the foldouts or large format illustrations results in scanning errors 42% of the time.

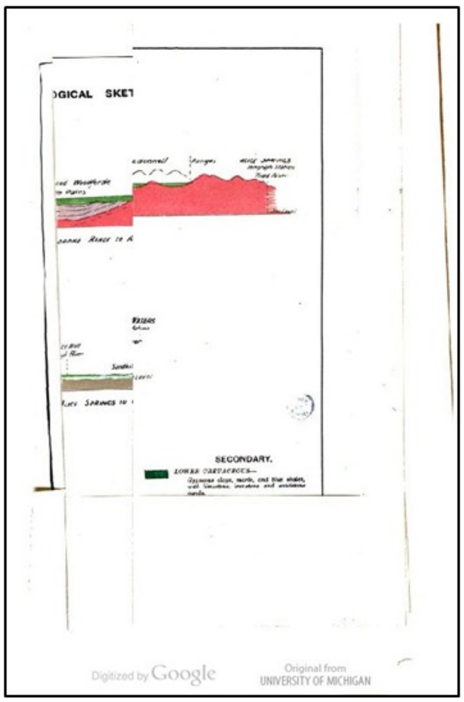


Figure 3. – Example of a foldout scanning error.

DISCUSSION

When the different types of errors are taken all together, within the sample of 180 works, there were a total of 1,186 scanning errors. Thus, of the 180 works, 114 or 63% had at least one scanning error. Google has classed errors into two forms: material and processing (York, 2010). Material errors are the result of deficiencies in the physical works (i.e. missing pages). Processing errors are those which result from the post-scan processing of the image. Of course there are also the human errors associated with the procedure of manually turning the page (hand in the picture). This study suggests a fourth type of error; "policy" error. In order to achieve the massive scale deemed necessary for the project to be successful, the scanning of larger format foldouts was originally neglected. This policy can result in a large number of errors, especially in the case of works from certain disciplines such as geology, since a large percentage of these works contain large foldout illustrations.

The policy of not scanning large format foldouts has implications for quality and completeness of the *HathiTrust* Digital Library and the Google Books product. The foldouts are of central importance for many works. Why would the original publisher go through the expense of compilation and printing them if they were not? In fact, for many works, foldouts are the central intellectual work--the text is ancillary to the map. For example, in Robert Bailey's *Ecoregions of the United States*, the original map was published in 1976 and the explanatory text to the map, *Description of the Ecoregions of the United States*, was not published until 1978 (Bailey, 1978). The central element of the work in this example is the map.

It should be pointed out that the post-processing of the images has continued to improve. When the images are reprocessed, many of the errors are corrected (York, 2010). Thus, the results of this paper are really just a "snapshot in time" of how the images appeared in the summer of 2010 when this research was conducted. Also, the policy of not scanning large foldouts may change if it already has not. This will eventually result in fewer percentages of scanning errors within the texts and illustrations. Given Google's mission, "to organize the World's information and make it universally accessible and useful," it is entirely appropriate that they should undertake such an ambitious endeavor of digitizing the World's printed books. While this study identified many of the shortcomings in image quality for works related to geology, it was found that the vast majority of page images have no scanning errors. The *HathiTrust* Digital Library and Google Books are providing easy access to many works that would otherwise be very difficult to utilize for many researchers. Perhaps more importantly, the *HathiTrust* Digital Library intends to provide long-term stewardship and digital access to works in the public domain and has demonstrated a commitment to quality control; once provided with the information about errors identified by this project they quickly corrected the majority of errors.

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GEOSPATIAL DATA PORTALS: LIBRARIANS ADD EXPERTISE IN THE DEVELOPMENT OF GIS METADATA CATALOGS

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Abstract — Searching a geospatial data catalog can be frustrating for many GIS data users. Geospatial data catalogs are built on records created to a specific metadata standard, such as ISO 19115. The search query is often limited to searching a few tags within the record, such as title, publisher, spatial extent, content theme, and content type. GIS personnel tend to create metadata records with little thought into how it will be discovered by others. On the other hand, library catalogs are developed for a broad spectrum of users with varying knowledge of the subject. Librarians can bring this expertise in creating user-friendly catalogs to the GIS profession.

In the development of NebraskaMAP, a statewide geospatial data sharing portal and web services network, the GIS Librarian from the University of Nebraska-Lincoln used knowledge of Boolean operators, Lucerne query syntax, and the understanding of geospatial metadata standards to improve the searching, retrieval, and display capabilities of this geospatial data portal's metadata catalog.

This paper describes the process of building a statewide geospatial data portal in Nebraska, and how the UNL Libraries contributed to the organization of the portal's metadata records. The portal uses ESRI's Geospatial Portal Extension software.

INTRODUCTION

Wording used to describe geospatial portals frequently includes terms such as gateway, discovery, and user-focused access to spatial data. For example, Maguire and Longley (2005, p.7) state, "Portals are web sites that act as a door or gateway to a collection of information resources." Tait (2005, p. 34) continues, "A geographic portal is a web site where the discovery of geographic content is a primary focus," and the ESRI GIS Dictionary (2006) states, a GIS portal is a "Web resource that provides access to a broad array of related resources and services." The question becomes how well are geospatial portals living up to this concept of *access* and *discovery* of spatial data? Not very well, according to Comber, et al. (2008, p. 287), "In the domain of spatial information semantics are poorly treated by metadata and data standards."

Geospatial portals, like libraries, build their catalogs based on metadata records. The records are stored in an online database that is accessed when a user enters a search query through the portal's client software interface. This software is built on World Wide Web technology utilizing a web browser to search and display query results. World Wide Web technology enables geospatial portals to become interactive sites where users search a metadata database for information about spatial data and services, as well as directly connect to these services for live mapping, geocoding, and routing. The technology also allows for the downloading of spatial data to be used in more robust desktop GIS applications such as ESRI's ArcMap or Google Earth.

Metadata, often described as "data about data," is the roadblock to intuitive, user-friendly searching of spatial data catalogs. Encoding within metadata records is standardized to help facilitate the searching of spatial data produced by different governmental agencies and commercial developers. The standard recommended for use in the United States for spatial data is the North American Profile (NAP), adopted in 2009 by the Federal Geographic Data Committee (FGDC) and based on International Standard (ISO) 11915, which was approved by the International Standards Committee in 2003. These standards dictate which fields in the record are searchable and what information is required in each field. Geospatial portal developers often use commercial software, such as ESRI's Geoportal Server Toolkit Extension, for managing the spatial data catalog. The ESRI product indexes the metadata database to allow for searching by three parameters: spatial, temporal, or thematic. The NAP standard dictates that elements within the metadata record describe spatial data in terms of content, quality, condition, and origin. However, no required element defines the purpose or use of the data, or allows for "free term" word searching. While technology has made spatial data available to a wide audience through the World Wide Web, discovery by non-specialized users is frustrating at best. Either the terminology the general populace uses does not access the desired records, or the retrieved data is inappropriate for their needs. Thus, geospatial portals, although intended to be one-stop shopping for everyone, are marginally successful, and often are accessed and used only by specialized GIS users who already know what they are looking for before they begin their search.

Librarians, whose profession is founded in the organization and access of information, can provide a broader perspective to the design of geospatial portals. Library online catalogs are built on the same technology as geospatial portals and librarians are experts in working with patrons who have varying degrees of experience in navigating their catalogs. Having a librarian involved in the development and management of a geospatial portal brings a unique perspective often over-looked in geoportal development. Librarians bring to the project their expertise in indexing and catalog development. They understand how coding within the metadata record defines search parameters, and determines retrieval and display of the results. This, in turn, has the capability of improving the functionality of the portal through the creation of "search savvy" metadata records. As members of the project team, librarians can use their influence to advocate for applying their expertise in the education of GIS metadata creators. This was the case in the devel-

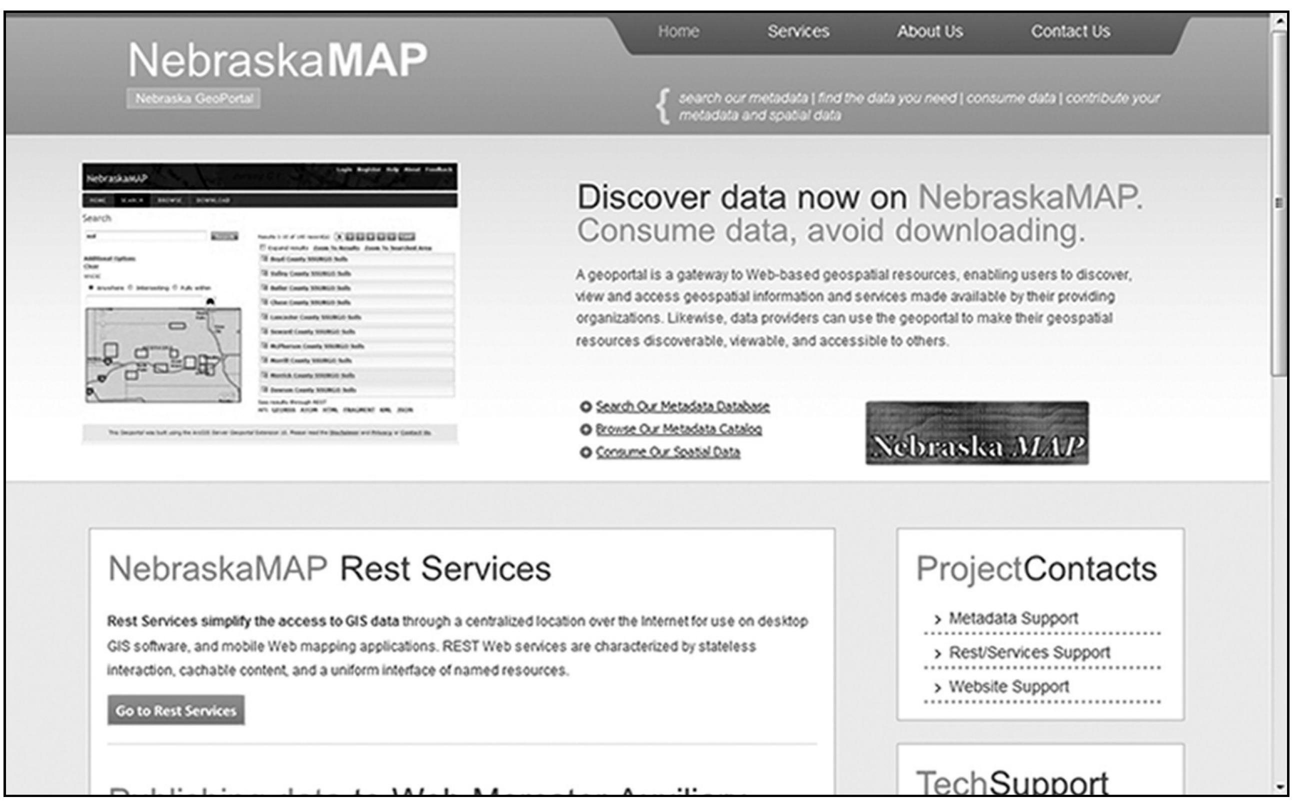

Figure 1. NebraskaMap is a gateway to Nebraska-related geospatial data and services from a wide range of state, local and federal agencies.

opment of NebraskaMap (http://nebraskamap.gov, Figure 1), which included a librarian from the University of Nebraska-Lincoln (UNL) on the development taskforce.

NEBRASKAMAP

NebraskaMap is a collaborative project initiated by the Nebraska GIS Council under the guidance of the Nebraska Information Technology Commission (NITC). The goal of the NebraskaMap project is to develop a geospatial portal to enable finding and providing online access to Nebraska-related geospatial data and services available from a wide range of state, local, and federal agencies.

In 2009, the NebraskaMap Partners Committee, an interagency taskforce, was formed to help advise and guide the portal's development and implementation. Members of the committee included: Nebraska GIS Council, Nebraska Office of the Chief Information Officer, City of Lincoln/Lancaster County, City of Omaha/Douglas County, Nebraska Department of Natural Resources, Nebraska Department of Health and Human Services, Nebraska Department of Roads, Nebraska Emergency Management Agency, Nebraska Game and Parks Commission, Sarpy County, University of Nebraska-Lincoln Libraries, University of Nebraska-Lincoln School of Natural Resources, UNL Center for Advanced Land Management Information Technologies (CALMIT)/NebraskaView, and the U.S. Geological Survey.

Two-year grant funding enabled the hiring of a project administrator, and for CALMIT and UNL to provide project management and technical leadership. Along with the NebraskaMap Partners Committee, these agencies were responsible for day-to-day management of the project implementation. The UNL librarian on the NebraskaMap Partners Committee was responsible for the metadata component of the portal.

THE LIBRARIAN'S GOALS

1. Enhance the "out-of-the-box" portal development software to improve data searching and results display.
2. Develop a customized standard for metadata entry (Nebraska FGDC).
3. Through a series of workshops, teach NebraskaMap Partners Committee members and other metadata contributors how to create metadata in the portal that is enhanced for user-friendly searching and is compliant with the Nebraska FGDC standard.

NebraskaMap is built on ESRI's Geospatial Server Toolkit Extension version 10. Without any customization, the out-of-the-box editing tool for the NAP standard requires the following fields to be populated:

General information – Provides information about the metadata. For example, the organization which created it, who to contact for more information, and the date it was created. These fields are automatically populated in the NebraskaMap portal based on information from the registered users' profiles.

Identification – Includes the title of the spatial dataset or service, an abstract, and the dataset language.

Citation date – Includes the time frame the spatial data was created or revised.

Dataset development phase – Describes the currency of the data.

Contact for resource – Includes who or which organization to contact about the spatial data. These fields are automatically populated from the registered users' profiles.

Data theme – Describes the spatial data using a controlled vocabulary, similar to Library of Congress Subject headings. The NebraskaMap metadata editing tool allows the metadata creator to choose from a pick list of 19 thematic categories. These categories were derived from the ISO 11915 standard.

Spatial domain – Describes the geographic location of the spatial data entered in latitudinal and longitudinal decimal degrees.

Metadata reference information – Names the standard used to create the metadata.

The out-of-the-box settings for searchable fields are title, abstract, and data theme. The default setting for the display of the results is "relevancy," with the ranking based on a ratio of characters in the matching term/terms to overall number of characters in the field.

Outcomes of Goal One – Searching and Display

The NebraskaMap Partners Committee's portal development taskforce began by exporting approximately 400 metadata records from the Nebraska's Department of Natural Resources spatial data repository. The taskforce's librarian used these records to demonstrate how the relevancy ranking worked, and how to enhance search skills by the use of Apache Lucerne query syntax and Boolean operators. To address the issues of discovery by non-specialized users, the librarian encouraged metadata creators in the group to include common descriptive terms in the metadata's abstract, as well as spell out initialisms used for agency names. For example, include "soil" or "soil survey" in the description of a SURRGO record, and spell out what it stands for (Soil Survey Geographic database).

Outcomes of Goal Two – Customized Metadata Editing Tool

The reasoning for developing a customized metadata editing tool instead of using the out-of-the box configuration was twofold. The first was to make it easy to contribute metadata directly into the portal's metadata database. Second, the librarian wanted to enhance searching and retrieval functionality.

Creating Metadata Made Easy

The ESRI portal software allows registered users to pick from a list of GIS metadata standards. Upon selection, the metadata editing tool activates and is similar in functionality to the editing tools included in desktop ESRI products, such as ArcCatalog. The portal editing tool includes a validation function that runs a software application developed by Peter Schweitzer, the U. S. Geological Survey's metadata guru. The application verifies compliance to the standard by parsing the created metadata against a template of the standard. If required fields are missing, or there are errors, the portal will not accept the metadata.

At this stage of the development, the Federal Geographic Data Committee (FGDC) was still recommending metadata creators use the Content Standard for Digital Geospatial Metadata (CSDGM), the predecessor to the NAP standard. The CSDGM has over 300 elements, and many in the GIS community consider it bulky and out-of-date. The librarian was very aware that many metadata creators found it exhausting to try to validate so many fields using any of ESRI's metadata editing tools.

With this in mind, the librarian encouraged the NebraskaMap Partners Committee portal taskforce to develop a customized metadata editing tool that required a minimal number of fields to validate, but would be interoperable with other geospatial portals that were still using the CSDGM on their sites. Knowing what would become the minimum required fields in the NAP standard, the librarian selected fields in the CSDGM that were similar. These then became the required fields in the customized Nebraska FGDC standard. The remaining CSDGM fields were available as optional fields. Thus, the metadata creator has the option to provide as complete a metadata recorded as needed, without being discouraged by validation problems. Knowing the NAP standard was on the verge of approval, the portal developers planned to offer both standards in their metadata editing tool, making sure that any added functionality would continue to be available in both options.

To simplify the validation process even further, the NebraskaMap Partners Committee portal taskforce wrote coding that filled in as many of the required fields as possible, either with information from the user's profile, or from a pull-down menu. For example, the ISO 11915 required thematic categories are listed in a pull-down menu from which the metadata creator selects the categories that best describe the spatial data. Fields for status and completeness are also created in this fashion. Fields that automatically populate are the same as in the NAP version of the standard, using information from the users' profiles. The required field for spatial domain automatically populates with the latitude and longitude bounding coordinates for Nebraska, a feature unique to the Nebraska FGDC standard. The editing tool (Figure 2) allows a

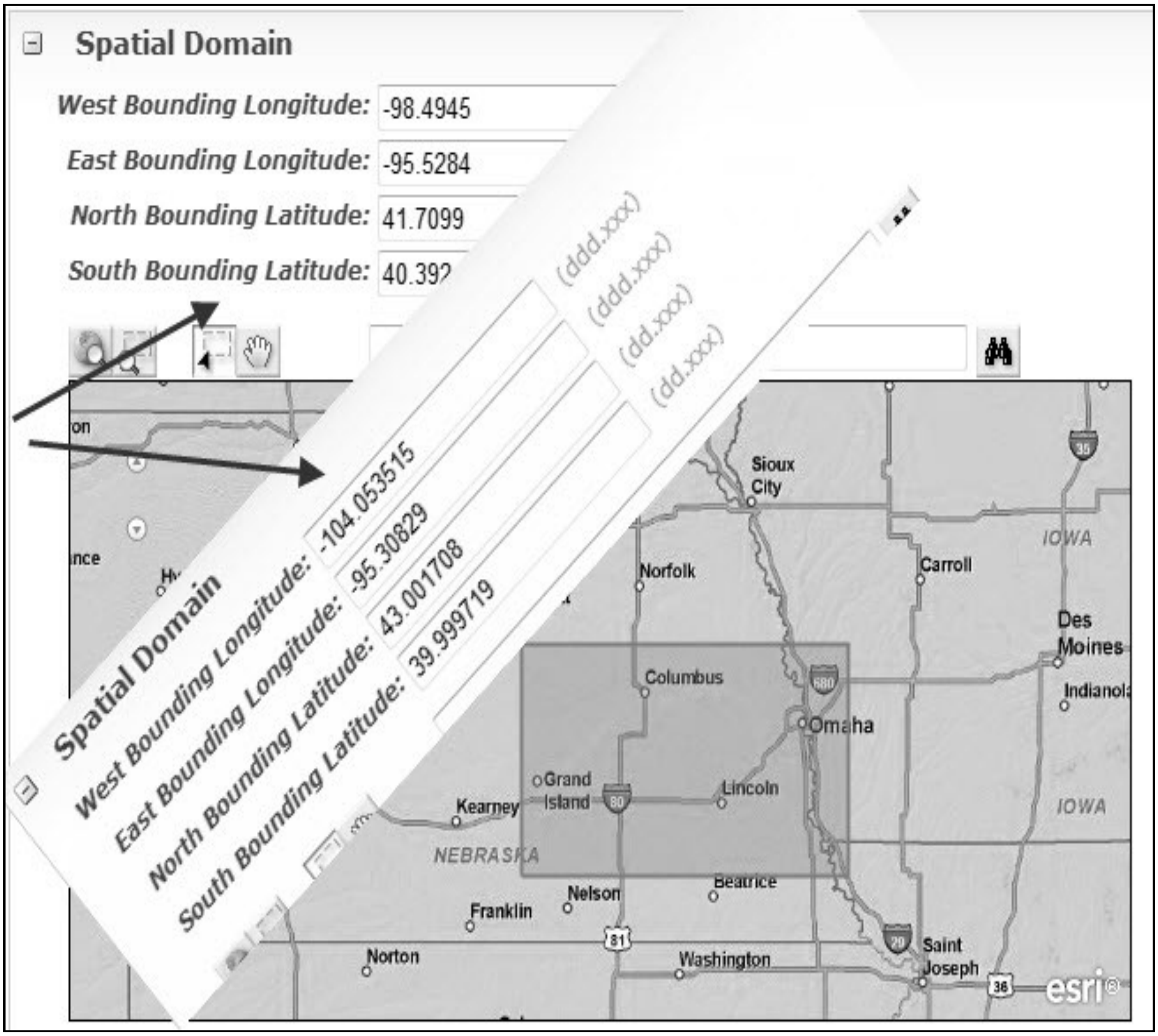

Figure 2. The NebraskaMap editing tool automatically populates with the latitude and longitude bounding coordinates as the metadata creator zooms in on the data's location.

metadata creator to zoom-in on a web mapping service, select the data's location, and the bounding coordinates will change accordingly.

Improving Discovery

The librarian wanted to enhance searching and retrieval properties of metadata created with the Nebraska FGDC standard. To improve discovery by non-specialized users, two new elements were added to the searchable fields of the customized standard.

Purpose, the "why" the spatial dataset was created, is the field in which the metadata creator describes how the spatial data may be used. Metadata creators are encouraged to give practical examples, such as, "centerline street data may be used by realtors for the development of a web mapping service showing homes for sale."

The purpose field from the metadata record for SSURGO soils is another example of how to give practical use information. Examples of information that can be queried from the database are: available water capacity, soil reaction, salinity, flooding, water table, and bedrock, building site development and engineering uses, cropland, woodland, rangeland, pastureland, and wildlife, and recreational development.

The second element is a "free-term" keyword option. This option allows for the expansion of descriptive terms beyond the 19 required by the ISO 11915 standard. For example, adding the terms "soil," "soil type," or even "dirt" to the searchable keyword field of the metadata record for the SURRGO database increases the likelihood that non-

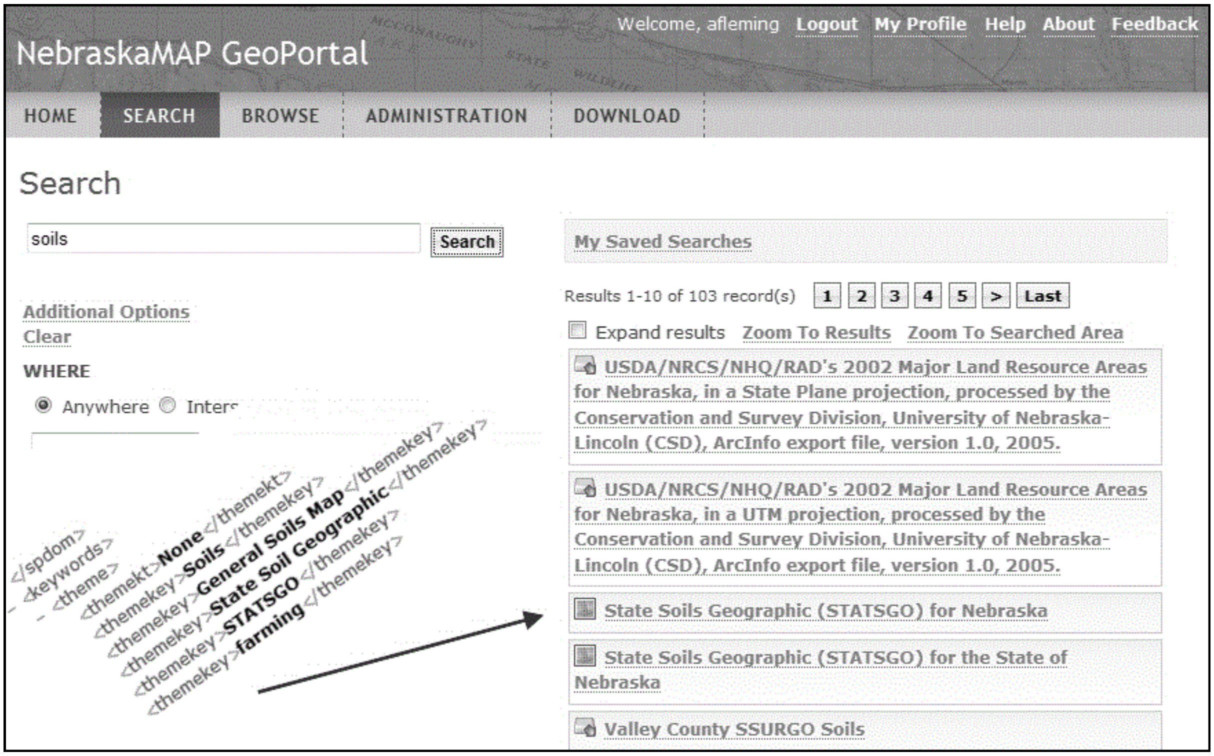

Figure 3. Free-term keywords create “search savvy” records.

specialized users would retrieve the record (Figure 3). On the other hand, retrieval by browsing records indexed under the controlled vocabulary heading of “agriculture and farming” is less likely by a non-specialized user, and would be too time consuming for efficient retrieval.

Outcomes of Goal Three – Metadata Workshops

As part of the two-year project, the portal development taskforce planned a series of training workshops using NebraskaMap. The project administrator, a representative from CALMIT, and the librarian developed and conducted the workshops. Each training session lasted roughly two hours with another hour set aside to assist attendees with introducing their metadata to the portal. Attendees were asked to provide assessments of the software, portal, and web. These sessions were held on July 28, July 30, August 3, and August 5 of 2010 on the UNL campus in Lincoln, Nebraska. Topics addressed included registering for the portal, editing metadata in ESRI’s ArcCatalog for the purpose of importing into the portal, the Nebraska FGDC standard, and searching for metadata. The last part of the training allowed time for attendees to import or create their own metadata.

To address the issues of discovery and improved search results by non-specialized users, the taskforce’s librarian introduced additional components to the traditional metadata training module. These included information on how metadata works, how to construct a search that will get the information wanted, and the importance of standards. Each field in the Nebraska FGDC standard was described and explained. The librarian constructed different search scenarios to demonstrate how relevancy ranking works, and then gave examples of how to construct the title, abstract, purpose, and keyword fields to improve discovery. In addition, the librarian gave attendees refresher tips on how to use Apache Lucerne query syntax and Boolean operators to improve search techniques. The goal of the training sessions was for attendees to have enough experience to be able to import a metadata record from ESRI’s ArcCatalog, or to create their own and submit the metadata for approval. To date, 77 additional metadata records have been added to the NebraskaMap metadata database by workshop attendees.

CONCLUSION

Librarians are experienced in the development of online library catalogs. This experience brings a unique perspective to the development of spatial data catalogs. Librarians provide expertise in three areas. First is their understanding of how coding within the metadata records effects the display and retrieval of query results. Second, their knowledge of Apache Lucerne query syntax and Boolean operators improve searching skills. Third, their familiarity with cataloging standards for library resources, such as Anglo-American Cataloging Rules (AACR2), leads to the understanding of geospatial metadata standards. Incorporating a librarian's perspective during the development of a geospatial portal increases the functionality of the metadata catalog, and thus, increases the chances of discovery of spatial data by both experienced and novice users.

WHAT'S NEXT?

The NebraskaMap Partners Committee continues to support the portal on a volunteer basis, with hopes of permanent funding from the State of Nebraska during the next budget cycle. The UNL Libraries continue to participate in the project through the teaching of workshops on metadata, customizing the portal's metadata editing tools, and monitoring contributed metadata.

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CHARACTERISTICS OF GEOSCIENCE LIBRARIES AND ASSOCIATED TECHNOLOGY/USER-DRIVEN LIBRARY STRATEGIES: A SURVEY

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Abstract — A 2009 survey of geoscience librarians provides qualitative information on librarians' roles as specialists, library collections, and the physical library's space and function within the organization. The libraries represented in the survey vary across mission, size, user population, and budget. Respondents' perceptions of their libraries can help gauge the impact of technology and user expectations on decisions to manage library resources. Geoscience libraries, like most libraries, have experienced economic adversity and critical review of their value to the hosting organization. This is very much the case for many libraries in the current period of severe economic downturn in the United States. However, in this case user behaviors and technological applications in the information industry have developed to the point where it is feasible for libraries and their organizations to see library services in different ways and respond accordingly. Web-based information tools, virtual environments, electronic publishing, digital archives, and resource sharing capabilities provide viable options to the traditional library and encourage changes in the nature of the geoscience library.

INTRODUCTION

At the annual meeting of the Geoscience Information Society (GSIS), held in conjunction with the 2009 Geological Society of America Annual Meeting, one of the topics of discussion was the economic downturn and the funding climate for libraries. There was worry that reports of downsizing, consolidations, loss of space, and changing professional roles indicated a trend of diminishing access to specialized geoscience resources.

A survey was formulated to develop simple baseline data on the status of geoscience libraries with respect to librarians' titles, collections, and space, and the perceived impact of changes. Survey results are presented here. The results and respondents' comments provide a basis for discussing trends and the options available for geoscience libraries to manage change.

METHODOLOGY

Statistical data on libraries, including collection size, number of staff, square footage, seating, etc., is already aggregated by professional organizations such as the Association for College and Research Libraries (ACRL) and the National Center for Education Statistics (NCES). Numerical data are important for determining overall trends and changes in the information industry. However, numerical data don't tell a complete story. Quantifiable changes (changing collection size, etc.) will have different impacts depending on the library site. Some changes are not scalable and would hit a small library much harder than a large library. Libraries may also experience shifts in subject focus, collection maintenance, program support, service philosophy, or user population which necessitate a change in how they do business, causing numbers to rise or fall anomalously without sufficient context.

This brief survey aimed to gather respondents' qualitative assessments of their libraries' resources and, indirectly, institutional support. The survey was designed in a simple way to address how institutions are supporting their geoscience information resources. To do this, the survey questions focused on subjects that are significant resource commitments on the part of the home institution—the concept of a "geoscience library" and specialist librarian, collections, and physical space.

A 10-question survey (see Appendix) was developed using the web-based SurveyMonkey™. The survey link was sent out in late 2009 to Geonet, the GSIS listserv, with a request to forward the link to other geoscience librarians. The initial intent of the survey was to gather data on geoscience libraries in the U.S., but no international restrictions were applied. Most of the responses were collected within 30 days of the survey's distribution.

Respondents represented a range from large multidisciplinary libraries to small specialized libraries, and included libraries from academic institutions, government agencies, professional societies, and corporations. SurveyMonkey™ (2010) includes analytical tools that were used to cross-compare selected responses. Due to the nature of the survey questions, responses were not always standardized. To minimize error, responses were checked against the respondent's comments as well as the official website of the responding library and/or institution to clarify facts or provide sufficient context to analyze the data in a consistent manner.

RESULTS

Institutions & Subject Focus

There were 67 respondents representing 66 institutions. Of these responses, the majority (56) were from U.S. institutions and ten were from international institutions. Academic libraries comprised the majority of responders at 52 (79%), eight of which were international. The remainder were research/professional society libraries (7), corporate libraries (3), and government agency libraries (4).

Respondents' libraries were categorized by subject specialization and responses were checked for accuracy against institutional website and/or institutional mission statement. For the purposes of this survey:

- "Geosciences" include the physical sciences of the earth, water, and atmosphere, as well as planetary geology.
- "Science and Technology" (ST) includes the traditional *physical* sciences such as physics, mathematics, chemistry, astronomy, and engineering disciplines based in the physical sciences.

<u>Type of Library by Subject</u>
Thirty (45%) respondents' libraries were designated as geoscience libraries and 25 (26%) as ST libraries with geoscience resources (Figure 1). The remainder were designated as general or multi-use libraries that included geoscience resources within their main collections, for example, the main library at a general university.

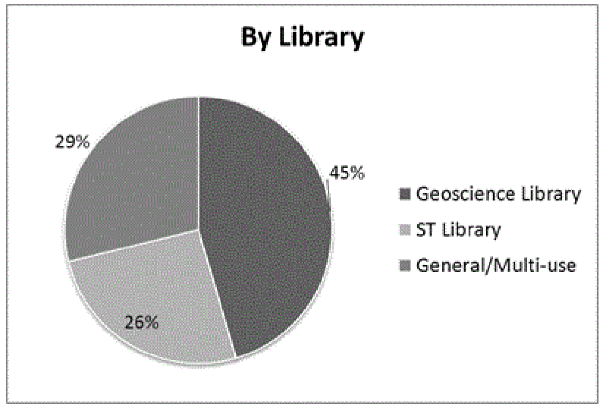

Figure 1. Respondents by type of library.

<u>Staff Titles</u>
Staff titles are an indication of the organization's commitment from a resources standpoint. Job duties are often flexible and not always apparent to outsiders. Titles are a more formal designation that reflects the organization's support for a subject-specialist librarian. Geoscience librarians comprise 45% of respondents (Figure 2). There was almost complete (but not total) overlap with those respondents in geoscience libraries (Figure 1).

Conversely, over half (55%) of the respondents were not designated as geoscience librarians. A

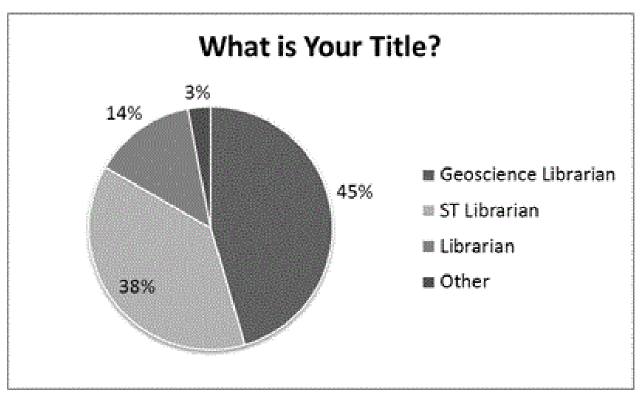

Figure 2. Respondents' staff titles.

significant number (38%) were ST librarians whose responsibilities include geoscience subjects. The remainder were general librarians or other staff with geoscience responsibilities.

Subject Responsibilities

This is a more specific, and possibly a more accurate, reflection of the institution's priorities in how their librarians' expertise and effort is allocated. Despite job title, advanced degree, or experience, if a librarian is responsible for managing multiple distinct subjects in addition to geosciences their support for any one of those subjects is going to be challenged if not outright limited.

Figure 3 shows a breakdown of subject responsibilities. "Geoscience" and "ST" are defined above. The "Other" category covers all other disciplines, including biological and life sciences, social sciences, and arts and humanities.

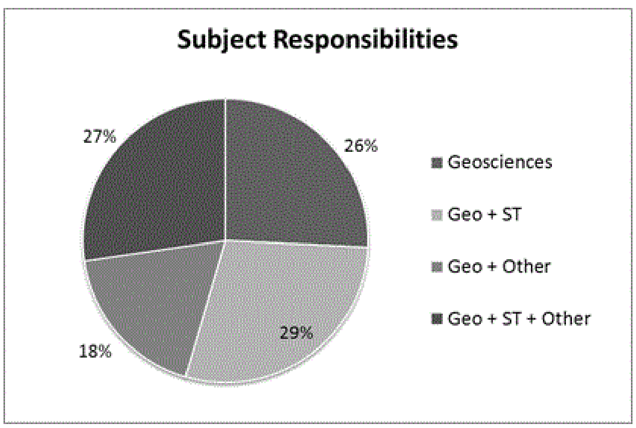

Figure 3. Responsibilities categorized by type of subject.

Even though 45% of respondents are geoscience librarians (from Figure 2), only 26% of respondents are responsible solely for geoscience subjects. Almost 30% of respondents have one or more ST subject responsibilities in addition to geosciences. Eighteen percent of respondents have responsibility for the geosciences plus one or more other subjects. Survey responses on these other subjects ranged from earth-related subjects, such as agriculture and ecology, to distinctly separate subjects, including nursing, psychology, and economics. Some respondents listed up to a half dozen separate other subjects as their responsibility. A considerable 27% of respondents listed geosciences plus one or more ST subjects PLUS one or more other subjects as their responsibility—a wide range to spread subject expertise.

Of note: Geospatial sciences such as GIS, cartography, and geography are included in 'Other,' rather than in Geosciences or ST. This categorization is certainly not universal and in this case is ascribed to the nature of this survey. Geoscience libraries often integrate geospatial and geographical data into their collections; there can be considerable overlap with an institution's other map resources, for example. However, the target population for the survey was specifically those librarians responsible for geoscience collections. No attempt was made to widen the survey responses by contacting geospatial librarian groups. As a comparison, geospatial and geography disciplines separated out from the other category are illustrated in Figure 4.

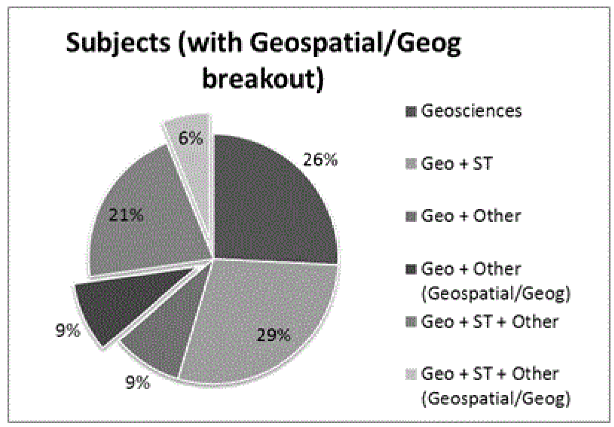

Figure 4. Subject responsibilities, as in Figure 3, with geospatial/geographic subjects separated.

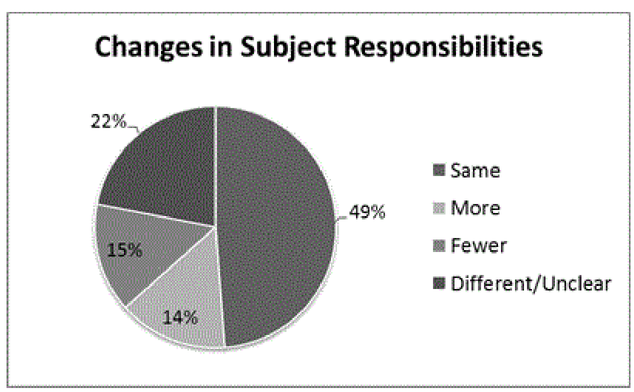

Figure 5. Changes in respondents' subject responsibilities.

Regarding changes in their subject responsibilities, about half of the respondents indicated that their responsibilities were about the same (Figure 5). This was initially interpreted to mean that the librarians were not assigned additional subject responsibilities, but after reviewing survey comments it could also represent librarians hired to fill a restructured position that included additional subject responsibilities from, for example, eliminated or vacant staff positions.

Collections

Collections represent a major commitment of resources, whether in digital or print format. Given the proliferation of electronic publications, demands on institutional resources, and changing user expectations, the choices geoscience librarians make for their collections have been a running topic of discussion.

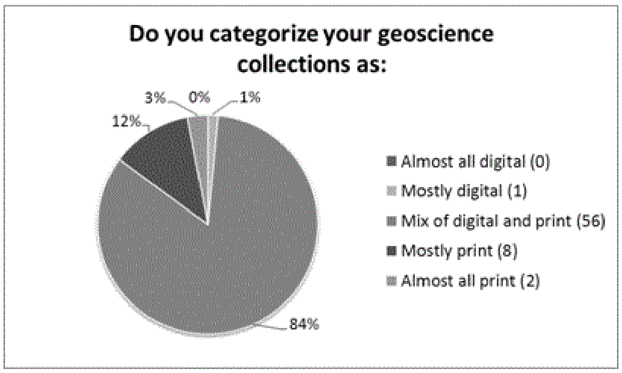

Figure 6. Categorization of geoscience collections from as print and/or digital.

Print vs. Digital Collections

Not surprisingly, a large majority of respondents categorized their collections as a mix of print and digital resources (Figure 6). Digital formats are increasingly popular but many core geoscience resources are not available digitally, not affordable locally, or not suitable (as e-formats) for the library's purposes. Few libraries were categorized as the extremes of either almost all print or almost all digital.

Changes in Print Collections

All respondents answered this survey question. Weeding, expanding, consolidating, or making use of storage tend to be interrelated—for example, if your library is moving materials to storage, it may have been driven by a loss of space or a major acquisition, and it makes good sense to weed storage-bound materials beforehand. Respondents were asked to choose all responses that apply to a change in print collections over the past five years.

About half of the libraries responding (34) reported a steady state in terms of the size of their print collections over the past five years (Figure 7). Given the multiple response options, respondents could indicate whether this was a static or dynamic condition; eight of these libraries reported achieving steady state by significant weeding, acquisitions, and/or transfer to storage.

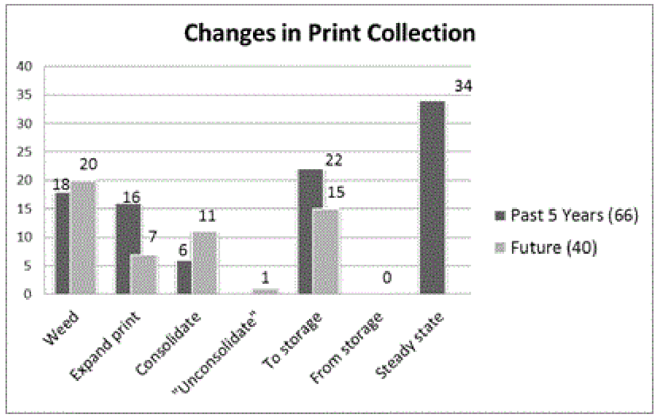

Figure 7. Changes in the print collections (past 5 years) compared with anticipated changes in the future.

Sixteen respondents reported expanding their print collections significantly over the past five years. Of these, 13 also weeded and/or made significant use of storage. About a third (22) of respondents reported moving a significant amount of print materials to storage over the past five years. Of these, five libraries reported significant expansions of their print collections due to acquisitions, indicating that space was a factor in moving items to storage.

It's not clear what the driving factors in the use of storage were for the other respondents, but in the accompanying comments, 26 respondents indicated that availability of e-publications (journals, back runs, e-books, government publications) was a factor in the status of their print collections; nine respondents reported a loss of available space; and 16 reported policy/budget changes (discarding duplicates, acquisitions changes, managing less-used items, etc.). Storage was a one-way activity; no respondent reported transferring materials back out of storage.

Many respondents' libraries are already part of a general or shared library facility (see Figure 1). Among the others, of the six libraries reporting consolidation of their resources with another library, five reported significant weeding and/or removal of print materials to storage for a net reduction of on-site print materials. Consolidation represents a change in the character of these libraries, but whether that change is neutral, positive, or negative must be determined by those on site. While loss of access to print materials or relocation to a less convenient site can be a problem for users, consolidation can also involve long-delayed weeding projects, a calculated response to changing user needs, or expanded access to resources.

Future Plans for the Print Collections

There were 40 responses to the survey question asking about future plans for print collections. Figure 7 shows a comparison of responses between past changes in the print collections and expectations for the future. ("Steady state" was not a survey response option for this question so a comparison is not available here.) It's worth noting that fewer respondents expect to expand their print collections significantly in the future and more anticipate consolidation.

Physical Space

Space is another major resource commitment on the part of the institution. Whether a library has a stand-alone facility or shares space within a building, there is often concern that the library may lose space to others' offices, labs, or classrooms.

Changes in Physical Space

All respondents answered this question. Forty (about 60%) reported maintaining a steady state (Figure 8). "Lost space" and "run out of space"

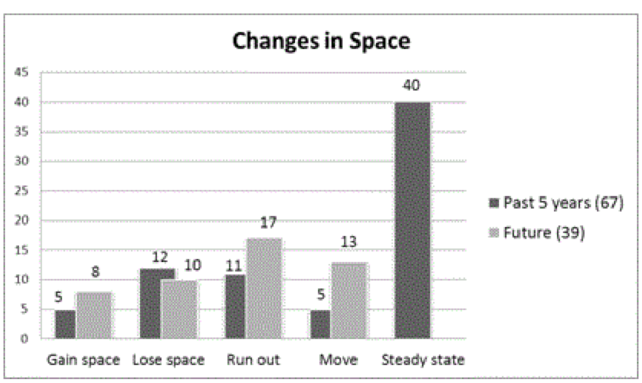

Figure 8. Changes in space (past 5 years) compared with anticipated changes in the future.

were closely correlated—those that lost space tended to have run out of space as well. Libraries that moved their facilities were slightly more likely to lose space.

Future Plans for Space

There were 39 responses to the survey question asking about future plans for library space. Figure 8 shows a comparison of responses between past changes in space availability and expectations for the future. ("Steady state" was not a survey response option for this question, so a comparison is not available here.) Of these, 17 respondents anticipated running out of space, and ten expected to lose space. Thirteen respondents expected to be moving their facilities or their comments indicated that they were in the planning stages to do so. This number is comparable with those libraries that planned to consolidate (Figure 7).

General Comments

Thirty-eight respondents contributed final comments. Responses were assigned the following categories:

- E-publications. Most of these comments concerned adding e-content to the collections; some respondents referred to licensing issues and subscription cancellations.
- Cancelling or no longer acquiring print titles.
- Changes in how the library is doing business. Many comments referred to space use, and specifically the space needs of collections vs. study space and making room for other functions (lab space, offices, etc.).
- Staffing, specifically the lack of staff to support library services.
- Outreach and technology. Comments concerned activities to reach users through web-based applications such as social networking and providing expanded access to technology.
- Renovation/space. Respondents referred to renovations completed, in progress, or planned, and new space becoming available.

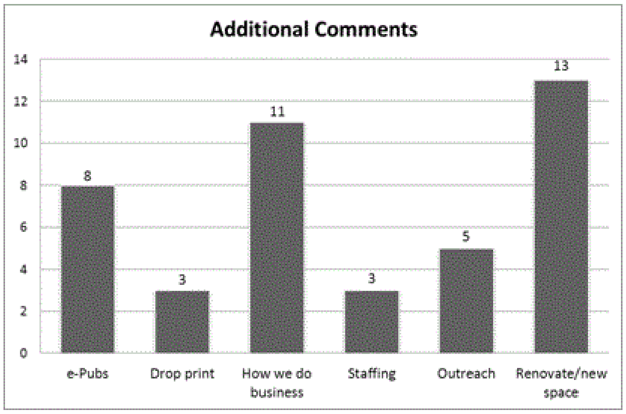

Figure 9. General survey comments grouped by theme.

DISCUSSION

Survey Results

There are several themes that can be identified from the responses (Figure 9). At many institutions the geosciences are still supported as a specialized subject, either through a stand-alone library or through subject-specialist staff in a larger science/technology library. [Bell (2009) predicts a poor future for special branch libraries in the face of institutional cutbacks; Pinfield (2001) argues in favor of the subject librarian system that, "because of its user focus, is a flexible one, which is able to respond and expectations."]

Other institutions find their needs or budgets best met by treating the geosciences as one of multiple subjects supported by a single librarian or a subject team. Position titles for these librarians varied. Multidisciplinary ties are common, particularly ties with other ST subjects. Many librarians manage a range of subjects in addition to their professional expertise as librarians. Managing increased subject and other responsibilities seems to be part of a long-term trend where budgets, multi-tasking, and technology converge (Miller, 2000). Meier (2010) indicates that job titles for ST librarians seem to be reflecting "the responsibilities of multiple traditional librarian jobs." In a long-term study, Osorio (1999) identified a decades-long trend of an increased number of responsibilities for ST librarians.

Most respondents view their libraries as being in equilibrium in terms of print collections and space, and their collections are a mix of print and digital resources at this point. Most respondents expect to have more e-resources, smaller print collections, and less space in the future. [Results were similar in a 2007 survey on what GSIS members thought the geoscience library would be like in 2017 (Scott, 2008).] These conclusions are not particularly surprising—it's like having a map that confirms that you are headed where you suspected — but it's a good idea to have the confirmation all the same.

Strategies for Change

In the past, before widespread use of technology, libraries had a limited range of responses to change—there were no alternatives to print other than microforms, a loss of space meant a loss of access to either collections or public seating, and most users were limited to items available locally. The information industry has changed, of course, and many of the ideas, applications, and strategies to meet user demands for information have been technologically possible for years. [Pruett (1986) and Miller (2000) describe library practices and the adoption of electronic resources at different stages in the process.]

However, it has taken time for these changes to become part of our *practical* information landscape. Librarians needed to acquire the experience and/or mindset necessary to apply technology-based strategies successfully. Libraries needed librarians with the technological skills and examples of others' successful innovations before pursuing new approaches. Those who wanted to collaborate and network needed others at a similar technological level to partner with. Publishers needed to be on board with rich, useable e-content—from metadata downloads to e-publications, digital archives, and open access collections. Technological applications and user expectations have developed to the point where it is not only possible, but feasible, for libraries to see information services in very different ways and respond quickly to change, and for more libraries to take advantage of these applications—think social bookmarking, RSS feeds, mashups, Webinars, blogs, YouTube training videos, Google Scholar linking, QR codes, geocaching…

User behaviors are grounded in an expanding familiarity with computers and, increasingly, with powerful personal technology devices. ("Is there an app for that?") Users have the expectation of ease and instant access to content. Users are more ready to accept something different from the traditional library built almost exclusively around print collections. At the same time, users have come to value the physical space of the library as a place to congregate, study, socialize, do research, or relax while having instant and easy access to technology and data (Gerke and Maness, 2010). Scott's survey respondents predicted that "the library as place will be more important than it is today" (Scott, 2008); in 2010, we're seeing that prediction come true.

Our institutions' expectations have also been altered by the alternatives to traditional library services and their adoption by ST library peers. Institutions see possibilities and examples from other sites that were not available or were too risky (bleeding edge) in the past. The possibilities themselves are neither inherently beneficial nor detrimental; what works for one institution's library and user population will not necessarily work for another. However, the possibilities allow libraries more flexibility in developing strategies for the future to meet user needs and manage resources, and to position themselves advantageously within their institutions.

ACKNOWLEDGEMENTS

I would like to thank all of the survey respondents, who generously donated their information and their comments, some very detailed, on the status of their libraries.

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APPENDIX

Survey Questions

1. What is the name of your library and institution/ organization?

2. What is your title?

3. What subjects (earth science and any others) are you responsible for supporting?

4. Do you categorize your earth science collection as:

- Almost all digital
- Mostly digital
- Mix of digital and print
- Mostly print
- Almost all print

5. In the past 5 years, has your earth science “print” collection (select all that apply):

- Been weeded significantly
- Expanded with the addition of significant print materials
- Consolidated with other library collections
- Been “unconsolidated” (separated out from other library collections)
- Moved significant amounts to remote storage
- Transferred significant amounts from remote storage
- Maintained a (mostly) steady state

6. Details on your response to Question 5? [Opportunity to add comments]

7. Are there plans to do any of the following in the future (select all that apply):

- Weed significantly
- Expand with the addition of significant print materials
- Consolidate with other library collections
- “Unconsolidate” (separate out from other library collections)
- Move significant amounts to remote storage
- Transfer significant amounts from remote storage

8. In the past 5 years, has your library (select all that apply):

- Gained physical space
- Lost physical space
- Run out of physical space
- Moved to a different space and/or a different building
- Remained at a (mostly) steady state

9. Are there plans (or do you expect) to do any of the following in the future (select all that apply):

- Gain physical space
- Lose physical space
- Run out of physical space
- Move to a different space and/or a different building

10. Any comments you’d like to share?

USGS LIBRARY TRAINING AND OUTREACH: FINDING AND USING SCIENTIFIC LITERATURE AND DATA

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Abstract — Scientists utilize interdisciplinary information sources from varied science and geographic areas. The U.S. Geological Survey (USGS) Library provides access and training for these continually developed sources. These internal training sessions and external outreach activities are presented by USGS librarians to enhance dissemination of information to USGS scientists, the geoscience community, and other librarians within the Rocky Mountains.

For the past two years, the USGS Library has provided internal USGS monthly training sessions online (national) and in person (local) on topics such as navigating USGS Library and USGS science area websites, access and use personal bibliographic software, electronic full-text documents, grey literature, geospatial data resources, USGS software, and USGS raw data. Currently, USGS librarians are developing nine training modules that will be available online to USGS employees. My presentation will provide an overview of current USGS library training sessions and outreach activities and address future collaborations within the geoscience and library communities.

E-SCIENCE AT THE UNIVERSITY OF MASSACHUSETTS

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Abstract — In 2008, an ad hoc committee of science librarians from the five campuses of the University of Massachusetts met to discuss the challenges of e-science and prepare the Libraries for their role in e-science initiatives. In order to effectively collaborate with and earn the trust of researchers generating data sets, librarians must be aware of trends in scientific research fields and be familiar with the methodologies used in different disciplines. The committee decided to plan a series of events to inform and prepare science librarians to engage research faculty as a first step toward active participation in e-science projects. An initial effort was to establish our own set of Principles Fundamental to the Role of the University of Massachusetts Research Libraries in e-Science, modeled on the principles presented by the ARL Joint Task Force of Library Support for e-Science in its Report, "Agenda for Developing e-Science in Research Libraries" (Joint Task Force on Library Support for E-Science, Association of Research Libraries, 2007). As we began work on these projects, it quickly became apparent that even on the Ad Hoc Committee only a handful of librarians had formal science education or experience. Since then, the Libraries have organized three annual events to increase our awareness and knowledge base: a cross-campus Symposium each spring on e-Science, designed to open a dialog between research faculty and librarians to identify and establish fruitful collaborations; a Professional Development Day, focusing on bench research of a single discipline or lab; and "Science Boot Camp for Librarians," a low-cost, regional professional development program designed as a casual but intensive immersion event into selected scientific subjects. Finally, we are identifying collaborative, data-intensive research projects already underway on and among our campuses.

INTRODUCTION

In the fall of 2008, science librarians from the five campuses of the University of Massachusetts (UMass) system met as an *ad hoc* committee to discuss the Commonwealth of Massachusetts' Life Science Initiative, a multi-million dollar undertaking designed to enable research partnerships between University researchers and the private sector. Two schemes emerged from that meeting. The first, concerning the sharing of electronic resources among the five campuses to facilitate the collaboration described in the Initiative, is ongoing but beset with problems, owing to licensing costs based on FTEs and the disparity in size among the campuses. The second scheme, how to deal with the expected large datasets resulting from the activities sponsored by the Initiative, has fared much better.

In the past few years, librarians have been hearing about the "data deluge"—the rising wave of data resulting from collaborative research using more powerful, networked computing, called e-science or cyberinfrastructure. This has given rise to the fear that this data, poorly stored and managed, will be lost to future researchers. The UMass librarians understood that the Life Science Initiative would likely generate a data flood, and determined to see what, if any, steps could be taken to prepare for it. The committee realized that educating librarians about e-science would have to be a primary goal, and to that end, developed three annual professional development events.

e-SCIENCE SYMPOSIA

Beginning with 2009, the committee has planned an annual e-science symposium. The day-long meetings, hosted by the Lamar Soutter Library at the University of Massachusetts Medical School, are were an opportunity for librarians from the New England region to learn about e-science, information resources available, and how they might support their own institutions and work with their colleagues at other institutions to develop programs to support data-driven research. The 2009 Symposium featured talks on bioinformatics databases and the Stem Cell Registry as examples of current e-science projects, and a breakout session in which small groups of attendees addressed questions about data at their own institutions and the parts libraries and librarians could play in e-science projects. The results of those discussions helped guide subsequent e-science events. The second symposium, held in 2010, focused more closely on the roles of libraries and librarians in the research enterprise. In 2011, the theme was the management and fate of research data. Since 2010, poster sessions illustrating library e-science initiatives have been a part of the symposia.

PROFESSIONAL DEVELOPMENT DAYS

The committee has designed Professional Development Days (PDD) to expose librarians to bench science in a single lab or discipline. The focus has been on new or emerging areas of research. The first PDD was held at the Center for Stem Cell Biology and Regenerative Medicine at the University of Massachusetts Medical School (UMMS) in 2009. The talks included an overview of the International Stem Cell Registry at UMMS, intellectual property issues and patents, and bioethical considerations of stem cell research. After lunch, the sixty participants toured laboratories and ended with a discussion of the roles and opportunities for librarians. "Nanotechnology in the Health and Applied Sciences: Implications for Librarians and Researchers" (also known as "Nanoday"), the second PDD, was held at the University of Massachusetts Amherst in 2010. The talks covered nanotechnology as related to cancer research and health topics, and were followed by lab tours, a talk on intellectual property and a presentation by MIT librarians Katherine McNeill, Anne Graham, and Amy Stout, titled "Data Curation 101." The third PDD, in March of 2011, was titled "Scientific Data Management: Pulling the Pieces Together." Jian Qin, from the School of Information Studies at Syracuse University, gave a half-day presentation, followed by practical analysis of the prospects for developing a data duration program at each librarian's institution.

SCIENCE BOOT CAMP 2009

As the committee planned the Professional Development Days and the Symposia, it quickly became clear that only a small fraction of the committee had any formal background in science. This is typical of the larger science librarian community; researchers have reported that the proportion of science librarians with undergraduate or graduate science degrees has remained around 30 percent for the past twenty-five years (Liu and Wei, 1993; Mount, 1985; Ortega and Brown, 2005; Winston, 2001). [This figure is nearly double when only physical science librarians are considered (Hooper-Lane, 1999; Ortega and Brown, 2005).] Furthermore, all members of the committee struggled to keep current with developments in the traditional science disciplines, and, while they were aware of emerging new fields of research, were not at all familiar with the scope of these new areas, and felt a sense of urgency to learn more quickly. In order to create a bond of trust and effectively engage with the research community, the committee understood that librarians would need to have some understanding of the nature of a research discipline, as well as vocabulary and a context for the science. From this insight, the idea for Science Boot Camp for Librarians was born, and a Boot Camp Planning Committee was formed.

Planning

From the beginning, the Planning Committee faced the challenges of geography, limited funding and lack of time to plan. Given these constraints, Boot Camp was initially conceived as a workshop-type event for the UMass science librarians, using researchers from the UMass campuses, to be held on a UMass campus after classes ended for the 2009 spring semester. Librarians from other institutions in the region expressed interest, however, and Boot Camp quickly grew from an in-service training to a regional event.

The three topics for Boot Camp were chosen by the larger group, based on data intensive research conducted on their own campuses. The committee decided that each topic would be covered in a half-day session, and would consist of an overview, followed by a closer look at a specific project. Professors, researchers, and graduate students from two UMass campuses and Harvard University agreed to speak. The committee asked them to address their talks to educated non-specialists. After the final presentation, the committee planned an open discussion with all participants involving next steps in e-science at our institutions.

The Planning Committee chose June 24-26, 2009, as the dates of the Camp, sent descriptions of the event to the conference services offices on each of the five UMass campuses, and asked for quotes to host it. UMass Dartmouth was chosen as the venue. The Conferencing and Events Services Office at Dartmouth provided dormitory lodging, catering (two breakfasts, two lunches, one dinner, and three snack breaks), and registration. The library at Dartmouth was well-suited to Boot Camp. There was a large, open space for the talks, computers available in the nearby Learning Commons, and an area with tables that served for meals and snacks. A member of the committee from each of the campuses agreed to provide promotional items—such as pens and sticky notes—for the conference packets.

The Planning Committee felt that the proposed intensive, two-and-a-half-day event would be deadly without some light entertainment and distractions. Riffing on a stereotype, the committee decided on a "Nonsensible Shoe Contest" for the first evening's activities. Dinner at a local harbor restaurant was planned for the second evening. One especially creative member of the committee designed and produced merit badges for each of the three topics, which were given in exchange for the camper's evaluation sheet for each session. (see Figure 1.)

Figure 1. Merit badges for 2009 Boot Camp. L-R, GIS, Bioinformatics, Nanotechnology. Designed and produced by Sally Gore, Lamar Soutter Library, University of Massachusetts Medical School.

Funding

The UMass Amherst and the UMass Medical School Library Directors pledged $5,000 to fund the Camp. In addition, the National Network of Libraries of Medicine-New England Region (NNLM-NER) provided $1,200 and the Boston Library Consortium gave the Camp $800. With $7,000 in hand, and an estimated 60 potential campers, the committee was able to set the registration fee at $200. This covered food and lodging for two-and-a-half days, as well as all conference materials.

Many of the tools used for planning the camp were either free or were resources already present and available at the UMass campuses. A wiki served as a planning document, many meetings were conducted via conference call (organized with a free online scheduling and polling service), and publicity was accomplished using listserves. The Boot Camp "website" was constructed via UMass Amherst's LibGuides subscription. The site (http://guides.library.umass.edu/bootcamp) provided information on the topics to be covered, the instructors, the schedule, some preparatory reading, directions to the UMass Dartmouth campus, and a link to the registration site.

Results

The first Science Boot Camp for Librarians was very successful. The evaluations were consistently favorable, and almost all participants said they would attend another Boot Camp. The registration was considered to be very reasonable, and the topics important and timely. The camaraderie of colleagues was deemed especially valuable. One camper commented that he would have liked to have more people from his institution attend. On the negative side, some participants said that two very technical topics were a lot to absorb in one day, and others wished for hands-on activities. Respondents considered the chosen subjects to be relevant (89%) and valuable (65%) and rated the content of each subject session similarly well (80% and 65% respectively). Although some participants felt that a one- or two-day event would be better, most favored the three-day format. Given that this event was an experiment, and was conceived, planned, and executed in less than seven months, the Planning Committee was very pleased with the results. At the final session, where all participants met for discussion, there was overwhelming support for a second Boot Camp. The discussion was also rich with ideas for future projects for regional science librarians.

SCIENCE BOOT CAMP 2010

Following the enthusiastic response to the first Boot Camp, the UMass science librarians proposed a second. Structured much the same as the first, the second Boot Camp was held June 9-11, 2010, at the University of Massachusetts Lowell. Sixty-three registered campers participated, mostly from the New England-New York region. Word of the 2009 Camp had spread and campers from as far away as Utah and New Mexico registered; one camper even travelled from Alberta, Canada. Genetics, climate change, and remote sensing were the topics for the second camp. The instructors represented four of the five University of Massachusetts campuses. This time we asked the instructors to provide us with any preparative material they thought would be useful to the campers and posted links to it on the Boot Camp website. The diversions were similar to the first camp and included a lobster and clam dinner. Since the sing-along was so popular at the first camp, registrants were encouraged to bring musical instruments. For this camp, the especially creative member of the Planning Committee produced another set of merit badges for the new topics, and copies of the *Camp Songs of the Science Boot Camp for Librarians*, containing titles such as “Little Data Sets” (sung to the tune of “Little Boxes” by Malvina Reynolds) and “High Tech” (sung to the tune of “High Hopes” by J. van Heusen and S. Cahn). As with the first Boot Camp, evaluations were positive, but once again, participants asked for hands-on work with the topics.

After the 2010 Camp, the organizers received requests from other institutions to participate in the planning of future Boot Camps. After some consideration, the group agreed that librarians from outside the University of Massachusetts system—but in the New England region—would be permitted to join the planning group if their institutions contributed $1,000 to that year’s camp, just as each of the University of Massachusetts campuses do. For the 2011 Boot Camp, three new institutions—Tufts University (Medford, Massachusetts), Worcester Polytechnic Institute (Massachusetts) and the University of Connecticut (Storrs)—joined. Besides additional funding, this move brings to the group new planners with new ideas, a wider choice of venues, and a larger number of potential instructors.

In 2011, the Science Boot Camp for Librarians will be held at Worcester Polytechnic Institute. The registration costs remain unchanged since the first camp.

SCIENCE BOOT CAMP FOR LIBRARIANS AS A MODEL

The planners feel that the camp can serve as a model for similar low-budget, “home-grown” events which can provide learning opportunities in any research area, not only science. Here we offer some suggestions for others who would like to stage their own Boot Camp.

- A community of regional institutions is essential. While one institution could produce a Boot Camp, much of the value comes from working with people from different institutions and institutional “cultures.” In addition, a consortium of some sort creates a larger pool of researchers to draw on for speakers. Planning and execution is easier with a regional group, which also provides a natural audience for the camp.
- Institutional support is vital. Each of the five library directors contributed funds to the camp, permitted librarians to spend time planning it, and provided administrative support such as signing authorizations for venue reservations and expenditures.
- Use what is at hand. LibGuides, blogs, wikis, dormitories, researchers, local

attractions, and the talent in the planning group all helped to keep the cost low. Each campus contributed some promotional items such as pens or sticky notes for "swag."

- Integrate fun into the camp. Merit badges and camp songs made the project seem much less like work, both for organizers and attendees. Every member of the group revealed a previously unknown gift for organization and leadership, music, visual arts, or humor. In the same way, it is important to find researchers who are engaging speakers.

It's not clear to us yet how scalable Boot Camp is. It seems that camaraderie and community would decrease as the number of participants increases. On the other hand, costs might be further reduced with a larger group. So far, no camp has attracted more than 63 participants. Even this number makes hands-on learning difficult to manage.

ACKNOWLEDGMENTS

I would like to thank the librarians of the New England e-science group for their hard work, companionship, and enjoyable company, and I look forward to working with them all on future projects. For more information on our e-science activities, see the *eScience Portal for New England Librarians* (http://esciencelibrary.umassmed.edu/).

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QUICK AND EASY MAP MASHUPS [1]

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Abstract — Map mashups are an increasingly popular way of visually expressing spatial features and are a quick and simple way of presenting cartographic information without investing in a more powerful, expensive, and formal GIS. Through map mashups there is the ability to create a map that conveys pertinent and relevant information or data. The value of these mashups lies in the functionality and ability to meet specific requirements at the point of need. They can be created instantly, are particularly suited to using extant data, and provide a visual overview of one or more areas of interest. They can be either informally or scholarly based. Map Builder, Wayfaring, and Google My Maps are explored for their functionalities.

INTRODUCTION

Map mashups are increasingly popular for visually expressing spatial features and integrating them with visual or other information. They are quick and simple to create without investing in a more powerful and formal geographic information system (GIS) approach. Mashups:

- Convey pertinent and relevant information or data.
- Meet unique information needs.
- Use extant data.
- Provide a visual overview of area of interest.
- Create new relationships through synthesis.

Map mashups integrate data from two or more different sources to create a unique visual compilation, in this instance, geographical and textual information. The University of Georgia (UGA) Department of Geology thesis and dissertation research field sites were chosen for this mashup project because the data is unique and this mashup is potentially beneficial to the Department.

EXPLORING THE APPLICATIONS

Map mashup applications were explored to determine the utility each offered. Specifically considered:

- Is the application fee-based or free?
- Is a sign-in required?
- Are online tutorials available?
- Can locations be pinpointed by latitude and longitude?
- Are the necessary geographical, geopolitical, and topological features available?
- Is the range of visuals and pointers suitable?

Google My Maps, Wayfaring, and Map Builder were eventually selected. Other map mashup applications exist, but the three chosen most closely matched the specifications of the project and had the benefit of some longevity. In addition to functionality, we chose these three map mashup applications for the following affordances:

- Google My Maps was selected for its ubiquity.

[1] This paper was presented at session T17. Geologic Maps, Digital Geologic Maps, and Derivatives from Geologic and Geophysical Maps (Posters) on Monday, November 1, 2010. The poster may be downloaded from the GSA conference website: http://gsa.confex.com/gsa/viewHandout.cgi?uploadid=483.

- Map Builder for its stunning array of location icons (see Figure 1).
- Wayfaring for it's clean but high-featured interface.

These three applications are easily available and free of charge—an additional benefit.

Figure 1. "Stunning array of location icons" in Map Builder.

THE PROJECT

The project needed to be of academic interest, preferably focusing on a liaison department of one or both of the authors. This investigation was undertaken with the intent of sharing its findings. To this end, several subjects were considered. Some topics had already been done (e.g. historical sites in Georgia), others were too nebulous or difficult to define without extensive research (e.g. folk life fairs), or lacked current stability (e.g. organic farms in Georgia).

The basic question asked was, "where have UGA Geology Students conducted their field work to support their theses and dissertations?" Two strands of inquiry were explored: how far flung are the field sites and how densely spaced are the field sites. In terms of the spatial range of program interests, a visual archive of the locations of study would be a useful tool. The UGA Department of Geology graduate student field sites met these criteria:

- Data were readily available.
- Data were stable in that they incremented predictably.
- Site could be easily updated.
- Interest to the UGA research community.

Potential users of this project include the UGA Department of Geology and other Geology departments worldwide, as well as prospective students, current students, and alumni.

METHODOLOGY

The authors subscribed to each map mashup application, sharing user names and passwords. The UGA Department of Geology theses and dissertations from 1964 to the present, as listed on the departmental website (http://www.gly.uga.edu), were transferred to a Microsoft (MS) Excel spreadsheet so the data could be sorted into fields for systematic treatment. The fields were: Author, Title, Year, Academic Level, Country of Research, Location 1, Location 2, and Location 3. The necessity of listing multiple locations arose from the reality that field samples often came from more than one field site, and the purpose of the research was to compare the samples. Several issues surfaced as the MS Excel spreadsheet was built.

Some of the theses and dissertations were done on sites from non-terrestrial locations (e.g. Mars). Others did not specify exact locations for terrestrial samples (e.g. *Gold in placer and saprolite deposits*) or oceanic field sites (e.g. *A diatom abundance stratigraphy and dispersed ash tephrochronology for the South Atlantic sector of the Southern Ocean*). Other locations required access to the individual thesis or dissertation to determine the field site with precision (e.g. *Derivation of sediment from weathering of a humid sub-tropical to temperate climate – Georgia*). With such spoilers identified, the project continued apace for those theses and dissertations with field sites that could be readily identified for point plotting.

To compare different affordances of the selected map mashup sites, the data for about 150 theses and dissertations were entered into Google My Maps. Inputting the data involved deciding where to place the markers and determining which locations were not suitable for point plotting. In total, 301 locations were plotted in Google My Maps, 19 locations in Map Builder, and 93 locations in Wayfaring. At this point, a large enough sample had been input to proceed with an analysis of the efficacies of the three applications used.

The Google My Maps interface (Figure 2) did not allow for all sites to be displayed on one screen. Nonetheless, Google Maps proved to be the most versatile and robust for our project. It allowed us to navigate across the globe in a straightforward manner, to correct misplaced points quickly, differentiate academic level by color, and label with pertinent information. Google My Maps also allowed us to choose a pointer specifically tailored to our information, in this case a pushpin in red (MS) or yellow (PhD).

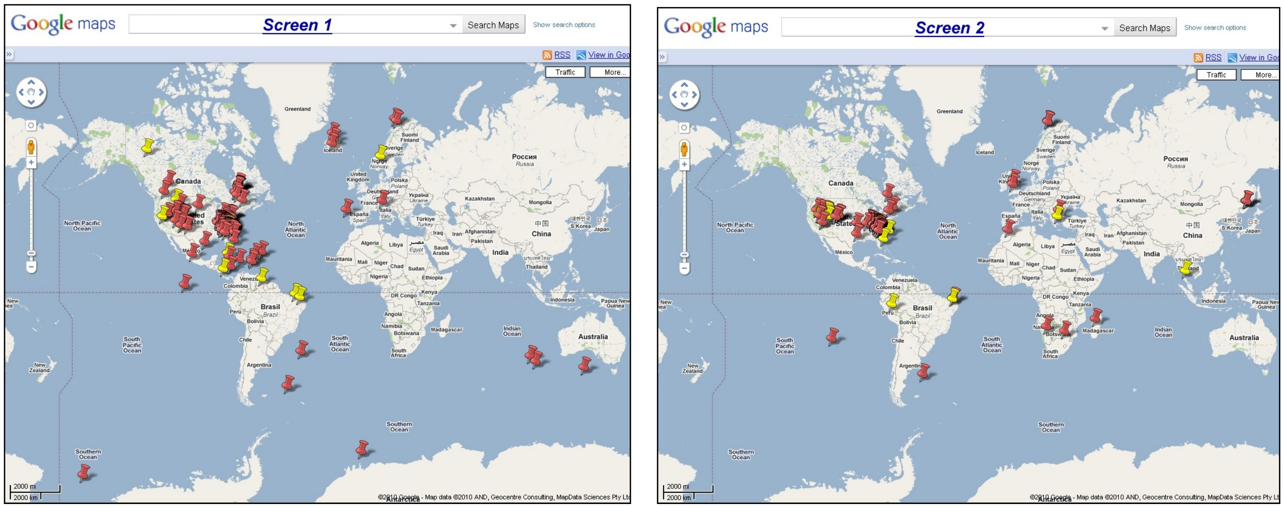

Figure 2. Google My Maps interface (http://maps.google.com/).

Map Builder (Figure 3) offers a large palette of pointer choice (color and size), but we discovered that locations are not easily plotted nor readily edited as compared to Google My Maps.

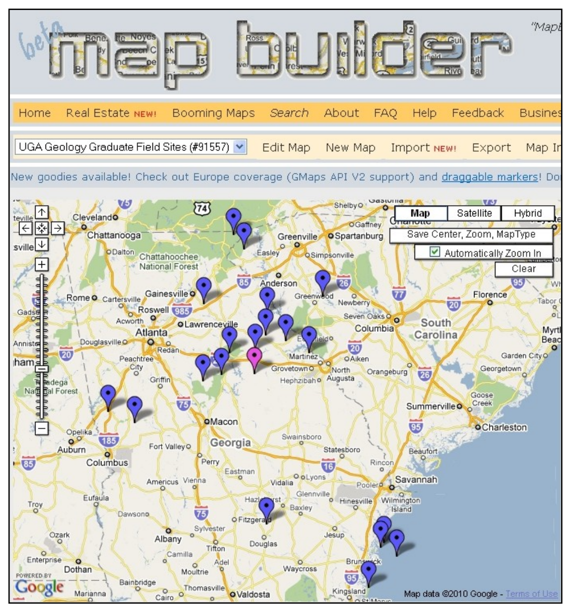

Figure 3. Map Builder interface (http://www.mapbuilder.net/).

Figure 4. Wayfaring interface (http://www.wayfaring.com/).

Wayfaring (Figure 4) did not offer a choice of pointer types, which led us to change how we presented the descriptive information. While Wayfaring allowed us to plot our locations easily, it did not permit relocating a point. This application is designed to be used more as a route-planning function.

FINDINGS & OUTCOMES

For the most part the learning curve for each application was gentle. Google My Maps, Map Builder, and Wayfaring are relatively simple to use. A quick review of the tutorials for each was sufficient to generate an almost instantaneous desire to begin plotting the data.

There were different affordances among the applications. Google My Maps proved to be the most versatile and robust for our project. It allowed us to navigate across the globe in a straightforward manner, to correct misplaced points quickly, differentiate academic level by color, and label with pertinent information. Google My Maps also allowed a choice of pointer specifically tailored to the data information, in this case pushpins in red (MS) or yellow (PhD).

Map Builder provided a large palette of pointer choice (color and size). Misplaced data points were a little more problematic to resolve. Often the easiest manner of correction was to delete and resituate the point.

Wayfaring did not offer a choice as to pointer type, which led to a revised version of presenting the descriptive information. While Wayfaring allowed for plotting the locations easily, relocating a point was somewhat involved. Examples of Wayfaring map mashups indicated that this application is designed to be used more as a route-planning application and our experience supports that conclusion.

The project turned out to be much bigger than anticipated. With approximately 438 field/sample sites to be interpreted and plotted, time became an issue. Consequently, only a subset of the total number of thesis and dissertation field/sample sites was plotted. In Google My Maps, we included those from 1964-2000. In Wayfaring, only sites west of Mississippi River and the outlying global areas were included. In Map Builder, we only included sites from 1964-1970. Proceeding in this fashion allowed for enough data input for us to make a comparison among the three applications.

In the meantime, some issues arose that required a realignment of project specifications. Translating 3-D points onto a 2-D surface reflects the ongoing challenge and dissatisfaction with surficial representations. Another question was, "This field site is *exactly*, where?" We also came across authors whose field/sample sites were widely dispersed, e.g. Georgia (U.S.) and Greece. Should those theses and dissertations be represented by more than one point on the map? Would doing so have the effect of visually inflating the number of theses and dissertations overall? Then there is the quadrangle on Mars …

A concomitant issue was that latitude and longitude would allow more precise plotting of locations, but none of the field sites were mere points. The question remains of how to represent an area as a point. Google My Maps, Wayfaring, and Map Builder do not allow user defined areal dimensions as GIS applications would.

Another consideration, anticipated from the project's beginning, was the concern that having the thesis or dissertation in hand would lend increased specificity to site location whereas title alone may not. Ultimately the question is whether or not plotting the exact location is crucial, since this map mashup is not intended to provide such specific geographic information that obtaining and perusing the actual thesis or dissertation would be unnecessary. On the other hand, some exactitude would greatly enhance a researcher's decision to obtain a given thesis or dissertation. Not least, the authors had to consider the time and effort it would take to pinpoint each and every terrestrial field site by examining each thesis and dissertation. In moving the project forward, it transpired that the authors may have sacrificed precision in favor of simply plotting the points as carefully as possible based on the titles.

CONCLUSIONS

A sample of the project was completed for presentation at the Geological Society of America 2010 Annual Meeting in Denver, Colorado. In the future, the authors intend to firm up the data fields, expand the plan of action to incorporate more specific plotting where it is crucial for research purposes, and finalize a choice of map mashup application to finish plotting the remaining theses and dissertations. This project needs to move to completion in order to meet the original plan of sharing the results with the UGA Department of Geology.

It was a distinct benefit that intensive and rigorous planning preceded implementation. This rigor saved time, overlap, and duplication of effort. This planning also provided clear guidelines as to the ultimate trajectory of this effort. Certainly the process of planning and learning the technology has been eye-opening.

The three applications used in this project were a sample of the options available. It is recommended that planning and implementing of this type of project include an examination of the ease of learning and ease of use of available applications. The ‘sharability’ of map mashup applications is another important consideration. Perhaps most crucial is matching the available data to the functionality of the application. Are there sufficient tag colors or shapes to accommodate the kinds of data intended for input? Is a coordinate system important to the overall accuracy of the data? Does the application allow for scaling in order to manipulate perspective? Is it necessary to have vector polygon data, or are points sufficient for indicating location data?

It seems unnecessary to emphasize that robust planning will result in a better organized project, and a well-organized project encounters fewer unanticipated obstacles. Although serendipity is a comforting fallback and fortuitous discoveries cannot be discounted, flying by the seat of one's pants is not a recommended modus operandi. The smoother the journey to the final outcome, the sooner project members and others can enjoy the fruits of their labor.

PART 2:

GEOSCIENCE INFORMATION SOCIETY MEETING
SUPPLEMENTAL MATERIALS

2010 Annual Meeting, Denver, Colorado
October 31 - November 3, 2010

GEOSCIENCE INFORMATION SOCIETY
SCHEDULE OF EVENTS

Note: GSIS Committees met separately as arranged by committee chairs

Saturday, October 30

9:15 a.m. – 3:45 p.m.	Geosciences Librarianship 101	Auraria Library
6:00 p.m. – 9:00 p.m.	GSIS Executive Board Meeting	HyattCCC, Capitol Ballroom 1

Sunday, October 31

9:30 a.m. – 12:30 p.m.	GSIS Business Meeting	HyattCCC, Capitol Ballroom 1

Monday, November 1

12:30 p.m. – 2:00 p.m.	GSIS Luncheon	HyattCCC, Capitol Ballroom 3
2:00 p.m. – 5:00 p.m.	GSIS Professional Issues Round Table	HyattCCC, Centennial Ballroom A

Tuesday, November 2

8:00 a.m. – 12:00 noon	Technical Session	Colorado Convention Center, Room 708
6:00 p.m. – 9:00 p.m.	GSIS Reception, Awards, and Silent Auction	HyattCCC, Mineral Hall A

Wednesday, November 3

9:30 a.m. – 12 noon	GSIS Field Trip	Denver Museum of Nature and Science

GEOSCIENCE INFORMATION SOCIETY
2010 ANNUAL BUSINESS MEETING MINUTES

SUNDAY OCTOBER, 31 2010, 9:30 AM -12:30 PM

DENVER, CO

Respectfully submitted by Elaine Adams, Secretary

The meeting was called to order at 9:35am by Jan Heagy, President.

I. Introduction of Executive Board

Heagy introduced the incoming and outgoing association officers:

Vice-President, President Elect 2010 (Kay Johnson)

Vice-President, President Elect 2011 (Lisa Johnston)

Secretary 2010 (Elaine Adams)

Secretary Elect 2011 (Cynthia Prosser)

Treasurer (Angelique Jenks-Brown)

Immediate Past President (Rusty Kimball)

Newsletter Editor (Janet Dombrowski)

Publications Manager (Ellie Clement)

II. Welcome and general introductions (All)

After welcoming remarks by Heagy, members in attendance introduced themselves.

III. Approvals

The 2010 Business Meeting agenda was approved without change. The minutes of the 2009 Business Meeting were approved without change

IV. Reports

GSIS General: How many people had the kind of year they anticipated in January? The majority of members had changes in plans, adaptations and adjustments to new conditions, and the acquisition of new responsibilities. Heagy noted that even with all the workplace changes, there are lots of opportunities to participate in GSIS and urged members to participate in any way you can. The organization had lots of empty committee chair positions this year. Heagy encouraged members to indicate committee assignment interest on the signup sheets at each table noting that involvement is the best way to network and get full benefits from our organization.

Treasurer's report: Jenks-Brown was unable to attend the conference to give her report, but her report appears in the GSIS Newsletter.

Archives: Anne Huber was also not able to be here, but noted that her report was published in the last GSIS Newsletter.

Exhibits: Committee members Donna Dirlam and April Love will be putting up the GSIS booth. Please sign up for booth time during tonight's reception in the Exhibit Hall. We have volunteers from the local area to cover the booth during GSIS events.

Membership: Heagy noted that there was no Committee Chair this year and thanked the Secretary for helping out with membership issues.

Best Paper Award: Carol La Russa announced the award winner: Linda R. Musser for her paper ―Progress in Citation of Geoscience Data, which appeared in the GSIS Proceedings, v. 39, 2010, p.55-58.

Best Reference Work: Heagy will be presenting the award on behalf of the Committee at reception. The Mary B. Ansari Best Reference Work Award for 2010 goes to S. Ross Taylor and Scott McLennan for Planetary Crusts: Their Composition, Origin and Evolution. Cambridge University Press, 2009.

Distinguished Service Award: Sharon Tahirkheli

2010 GSIS BUSINESS MEETING MINUTES, CONT.

will present the award on behalf of Committee Chair Patricia Yocum. The 2010 Mary B. Ansari Distinguished Service Award goes to Julie Hallmark, Professor Emeritus, University of Texas.

Award Certificates: Jim O'Donnell noted that he still needs signatures on some certificates. He will be contacting the appropriate parties.

Guidebooks: Lura Joseph will be presenting the award on behalf of the subcommittee. This year's winner is Southworth, Scott; Brezinski, D. K.; Orndorff, R.C.; Repetski, J.E.; and Denenny, D.M. Geology of the Chesapeake and Ohio Canal National Historical Park and Potomac River corridor, District of Columbia, Maryland, West Virginia, and Virginia U.S. Geological Survey Professional Paper 1691, 2008. Joseph also reported on ideas the Guidebooks Committee developed for making more of a presence on the GSIS website, e.g. links for finding guidebooks, links to criteria for the award and how to nominate. This topic will be further discussed under New Business.

Information Resources: There was no Committee Chair this year and no report.

Nominating: Kimball reported sending out 100 ballots and receiving 50 back. This topic will be discussed further under New Business.

Preservation: No Committee Chair.

International Initiatives: Judie Triplehorn reported that she sent out information to 41 international organizations but received no responses. Libraries in foreign countries are not held in high regard right now. She noted that last year's winner got a visa but no funding to attend the conference. If you have items for the Silent Auction fundraiser, please give them to Judie or the other International Initiatives Committee members Dorothy McGarry and Dena Hanson.

Web Site: Janet Dombrowski described how she worked with a library school student to redesign the GSIS website. The student came up with the redesign template and Janet is now looking at how to put up our content within new framework.

Publications: GSIS Newsletter Reviews editor Carol La Russa asked members for recommendations of publications for review, especially grey literature items. GSIS Newsletter Editor Janet Dombrowski asked for more member news contributions, especially news about changing responsibilities, job moves, etc. Although many newsletters are changing to a single column formation, the GSIS Newsletter will maintain the double column format. Jody Foote reported that publication of the 2009 *Proceedings* is in progress and hopes they'll out in time to be in your holiday stocking.

Geonet Moderator: Carolyn Laffoon announced that she will be retiring in May, 2011 and asked for someone to take on the list moderator role.

Topical Session report: Our sponsored topical session will be Tuesday morning (November 2) at 8 a.m. There were a good number of paper submissions and the final session roster includes papers from outside GSIS. Information resources featured in some papers will be published in the *GSIS Newsletter*.

Publicity: Shaun Hardy has handled publicity for Geoscience 101 for five years now and would like to swap with someone else. It's not a hard job, basically sending out press releases, contacting library schools in the meeting area, taking pictures, and sending out follow up press releases. During the meeting Adonna Fleming agreed to take on publicity if Hardy would remain as photographer.

Geoscience Librarianship 101: Clara McLeod reported on the 6th workshop held Saturday, October 30th. There were 46 registered attendees including four students and one recent graduate. Evaluations indicate that providing the workshop is a valuable service and students felt encouraged to look into geosciences librarianship. The workshop added Adonna Fleming, who was instrumental in getting GL 101 started, as an instructor this year in addition to Lisa Dunn, Lura Joseph, and Linda Zellmer. McLeod also thanked Shaun Hardy for publicity and Lisa Dunn for local arrangements.

CUAC meeting: McLeod reported that the CUAC (Cartographic Users Advisory Council) meeting was held in June this year and hosted by George Mason University-Arlington, Virginia. The program included speakers from 11 agencies, including 2 speakers from the USGS. Presentations focused on matters concerning maps (printed and digital), data archiving and delivery. A full report will appear in the *GSIS Newsletter* and be distributed on Geonet when the minutes are finalized.

Conference updates: Kay Johnson announced that a few tickets are still available for the GSIS luncheon and that ten people have signed up for the Wednesday field trip to the Denver Museum of Nature and Science. Those wishing to travel to the Museum in a group should meet in the lobby of Grand Hyatt. Admission to the museum is $11 and bus fare is $2 each way.

V. Old Business

Our old business is New Business of how to invigorate the organization.

VI. New Business

Guidebooks: The University of New Hampshire is digitizing the guidebooks for the New England Intercollegiate Geological Conference. The NEIGC has noticed a drop-off in sales of guidebooks after the meeting. Is it libraries who have stopped buying or individuals? Noga suggested that purchasing information is hard to find. Joseph commented that many institutions have problems with buying from small vendors. Mary Scott would like to see links created to online guidebooks. Noga would like to see better information about forthcoming guidebooks and suggested posting the information on Geonet. Joseph suggested funneling new and forthcoming guidebook information to her for posting on Geonet and announcing in the GSIS Newsletter with purchase information. Referring back to the earlier report about ideas for improving the guidebook information on the GSIS website, it was suggested that the Guidebook Committee post the list of ideas on the GSIS website and request feedback.

Nominating: Kimball noted the work involved in sending out paper ballots for GSIS elections and asked if the group would consider going to electronic balloting using software such as Survey Monkey. Discussion considered various software packages that could be used, possible roadblocks such as needing a subscription to the survey software, and whether the GSIS bylaws would need to be changed provide for electronic voting. Heagy volunteered to review the bylaws and report back to the group.

Ocean Drilling Program: Kimball is the liaison to Texas A&M's Integrated Ocean Drilling Program. Administrators of the program are discussing digitizing back to day one. Currently the program is producing content on DVDs. Are people using the DVDs? Kimball will send out a survey.

International Initiatives: Committee members will gather Monday at 9 a.m. at the GSIS booth in the Exhibit Hall then move to another location for their meeting.

2011 Topical Session: Dombrowski called attention to the need for a convener for the topical session in Minneapolis. Kimball volunteered.

2011 GSIS Conference in Minneapolis: Lisa Johnston briefed us on plans for next year's conference. The conference will be held October 9-12. GSA's conference theme for next year is ―The Past is the Key to the Future.‖ Are we interested in developing a short course on data management with the GSA Geoinformatics Division? Johnston has ideas for specifics within course. Anyone interested in participating in planning please contact Johnston. She's been developing a workshop at her institution on data management. Huffine commented that he and Mary Scott had attended a Geoinformatics Division session yesterday and see a definite opportunity for collaboration with that group. He suggested co-sponsoring a reception next year as a first step since this year our two receptions are held concurrently and there is not a good opportunity for cross over. Huffine also suggested that GSIS members who are also GSA members consider joining the Geoinformatics Division. Dombrowski pointed out the Geoinformatics session this afternoon from 1:30-3 p.m. on data preservation. Huffine noted that members of Geoinformatics seem to be geologists who've been conscripted to be computer scientists or rather, subject specialists with computer expertise. It is definitely a computer science based conversation. However, he sees cross pollination opportunities with GSIS in the development of thesauri and ontologies.

WebEx meeting: Heagy, looking for more ways for members to participate in a meaningful way and to make GSIS more accessible for those who cannot attend the annual conference, proposed offering a WebEx session on information resources and how different institutions are dealing with vendor moves in pricing and services. Huffine commented that a possible journal article could be coupled with a WebEx session. Joseph suggested sending out Geonet message to gauge interest in such a session before investing the time and energy to organize it.

National Library for Geosciences: Huffine reported that the USGS is forwarding a proposal to make the USGS Library a National Library for Geosciences. The proposal requests no appropriation, so there would be no budget. However, content authorizations similar to those of the National Library of Medicine would be set-up. The proposal has support from ALA, AGI, and GSA. USGS is trying to show why they need legislative authorities and what can be done with them, and how our nation is being poorly served by having a bureau library rather than a national library.

Huffine observed that recent reorganizations within the USGS were positive overall for the library. The library has been redefined within bureau and where it had been operated by regional directors now it has been brought back under a national library director in support of research. This move in effect raised the library two levels within USGS. By 2012 Huffine expects that the library budget will be defined as separate item in the overall USGS budget.

Digitization: Joseph, who did a major study (2006) on the quality of graphics in 35 digitized Elsevier earth and planetary titles, stated that the publisher has said they have finished the rescanning project to upgrade images in the ScienceDirect backfiles. Joseph did another study and confirms that the rescanning has improved the graphics especially photos. However, the bad news is that Elsevier rescanned materials published in 1994 and earlier. Born digital didn't start until 1999 or so, so graphics in journals published 1994-98 are still as bad as ever. Also, the algorithm to find bad graphics didn't really find line graphs, so print backup is still needed.

Support for conference attendance: Hardy asked if the Executive Board had discussed support for conference attendance. He thinks that hundreds of dollars in conference attendance support could be an incentive for new members. Heagy would like an ad hoc committee to study how to sponsor student attendance in meaningful way, although it may mean limiting eligibility to students within the region of the meeting. Suggestions ranged from finding vendors who would underwrite sponsorship to tying financial support to time support to man exhibit booth or other support activities.

Committee size: Noga asked what is the size of committees these days? He remembers some discussion from a previous meeting. Heagy answered that membership had agreed on three to a committee unless there was a need for more such as for the Guidebook Committee. However, she noted that some committees this year had zero. Support for conference attendance: Hardy asked if the Executive Board had discussed support for conference attendance. He thinks that hundreds of dollars in conference attendance support could be an incentive for new members. Heagy would like an ad hoc committee to study how to sponsor student attendance in meaningful way, although it may mean limiting eligibility to students within the region of the meeting. Suggestions ranged from finding vendors who would underwrite sponsorship to tying financial support to time support to man exhibit booth or other support activities.

Pacific Section: Connie Manson announced that the Pacific Section will be meeting following the conclusion of the business meeting downstairs in the hotel's restaurant.

VII. Adjournment: Heagy thanked everyone for their participation. Jim O'Donnell made the motion to adjourn, Noga seconded, and the motion carried. The meeting was adjourned at 11:30 a.m.

GSIS PROFESSIONAL ISSUES ROUND TABLE

Hyatt Colorado Convention Center, Centennial Ballroom A
November 1, 2:00-5:00 p.m.

Schedule:

2:00-2:02 – Welcome

2:02-2:15 – Neal Marriott of The Geological Society presents a Lyell Collection update.

2:15-2:55 – Discussion Topics

Six tables will be set up with a different discussion questions. Participants sit at the table with the topic they wish to discuss. Each table will pick a facilitator and/or a presenter. Jan Heagy and Kay Johnson will moderate. The topics are below:

1. **GSIS in the 21st Century** – What can GSIS do to best serve our members? How should we market ourselves and increase membership? Do we need to make adjustments?

2. **Collection Management. E-books.** The options: pick & choose, buy large packages, tailored packages, or buy on demand? How do your users respond to only e-book access? Do you duplicate in print for some types of material? Do your users prefer certain e-book features?

3. **Collection Management. Document Delivery Challenges**

   a. **Theses** – Many library users want to see non-North American theses. Recent theses often end up in university repositories, and some schools (particularly in Germany, Scandinavia, and the Netherlands) published their theses in series. The older theses that don't show up in repositories or publication series are really hard to obtain. How do geoscience librarians get these theses? Do you use a document supplier? Do you try to track down authors? How much effort do you place on foreign theses requests? Other issues include country non-lending policies (copyright).

   b. **Service Delivery Companies** – Many smaller document delivery services are either being absorbed by larger corporations or are being dissolved. What impact does this trend have on the geoscience library?

   Innovation in the Workplace: Social Media – How are people using social media (Facebook, Twitter, Wikis, blogs, social bookmarking, user-generated tags, etc.) in their libraries?

   Innovation in the Workplace: Mobile Devices – How are mobile devices (smart phones, PDAs, iPads, etc.) changing how we serve our users? What do we need to do to adapt?

   Managing More with Less – How do we stay relevant and valuable to our organizations?

2.55-3:15 – Break

3:15-5:00 – Reports -- Each table takes about 15 minutes to report their ideas to the group. Feedback will be captured and posted to the GSIS website, with follow-up expected on suggestions.

The Geological Society

serving science & profession

Thank you to the Geological Society of London for sponsoring the Round Table

GEOSCIENCE INFORMATION SOCIETY AWARD WINNERS 2010

Presented at the GSIS Reception, Awards, and Silent Auction
Tuesday, November 2, 6:00 p.m.-9:00 p.m.
HyattCCC, Mineral Hall A
Denver, Colorado

Mary B. Ansari Distinguished Service Award

Julie Hallmark, Professor Emeritus, University of Texas

Julie Hallmark was unable to attend. Miriam Kennard, University of North Carolina, accepted the award on Julie's behalf and offered the following remarks.

> I'm sorry Julie is unable to be here to accept this award. I am honored to accept on her behalf.
>
> I first met Julie 30 years ago in 1980, when I attended my first GSIS meeting. At that time, Julie was Past President of the Society. I got to know her well over the years, from the papers she presented, her active participation in discussions, and our overlapping service on the GeoRef Advisory Board Committee of AGI, which met twice a year. I was on that committee with Julie for 6 years; she served on it many more years.
>
> We often shared a room together at meetings. She was one of the original members of GSIS back in the mid 1960's. When I roomed with Julie in 2005, it was her 40th year as a member of GSIS.
>
> The things that stand out to me about Julie are her tremendous enthusiasm for the profession and field of geoscience information. She presented many papers at our meetings, authored many others, and received two GSIS Best Paper Awards. Much of her interest was in scholarly communication -- how geologists learn about publications, use the literature and communicate. One of her early papers dealt with how to improve the GeoRef database and make it more useful and user friendly.
>
> She also had a keen interest in international issues and worked to foster communication and cooperation among international geoscience librarians and information professionals.
>
> There was also, of course, her mentoring of students over the years. As a professor of Information Science at the School of Information at the University of Texas, Austin, she taught science information courses and actively promoted the geosciences to her students. I can think of two of her students, Steve Hiller and Jan Heagy, who became active in GSIS.
>
> Julie is very sorry she couldn't be at our meeting to accept the award in person. I'd like to read from some e-mail which conveys her thoughts on receiving the Ansari Distinguished Service Award.

> *Monday July 19, 2010*
>
> *Dear Patricia,*
>
> *I am thrilled and delighted by this honor. Thank you so very much.*
>
> *Decades ago, I was hired by Southern Methodist University to work for*

GEOSCIENCE INFORMATION SOCIETY AWARD WINNERS 2010, cont.

the Southwest Center for Advanced Studies (now UT Dallas) as their science librarian. At that time the Center had no information services so we used a delivery service to transport books and articles to the Center each day. As a former chemist, I knew nothing whatsoever about geology so I figured I'd better get with it! I started taking classes at SMU and soon fell in love with the discipline. I was hooked! We also learned practical tips for field trips such as "If you're climbing up a steep escarpment, be sure to toss up a stone or two before reaching the top." Over the years I met so many wonderful friends and colleagues, participating in projects such as the Union List of Field Trip Guidebooks and the Proceedings. I miss you all and would so love to join the gang at the Denver conference. Julie

---

Wednesday, October 13, 2010

Dear Miriam, How I wish I could be there in person to receive this prestigious award! I'm still walking on air. Please give all my friends in GSIS my very best regards and love. All the best, Julie

---

Friday, October 15, 2010

Dear Miriam, I received my wonderful little plaque and am so delighted to have it! I've installed it in a place where everyone who visits me will immediately see it. I'm still so thrilled with this honor and wish so much I could be with all of you at the GSIS conference. Very best wishes, Julie

---

I think it is clear how excited Julie is to receive this prestigious award. Congratulations and best wishes to her!

Best Paper Award

Linda R. Musser.

For her paper "Progress in the Citation of Geoscience Data," published in *Proceedings of the Geoscience Information Society,* v. 39, 2010, p. 55-58.

The members of the committee believe that her paper performs a valuable service by educating the geoscience community about the importance of citing the sources of data and explaining a publication's stand on the issue of data citation. The paper is published in volume 39 of Proceedings of the Geoscience Information Society and was based on a paper given at the 2008 meeting of the Society.

Linda R. Musser is Librarian and Head of the Fletcher L. Byrom Earth and Mineral Sciences Library at Pennsylvania State University.

GEOSCIENCE INFORMATION SOCIETY AWARD WINNERS 2010, CONT.

Mary B. Ansari Reference Work Award

The GSIS Mary B. Ansari Best Reference Work Award Committee reviewed ten nominations for the 2010 award:

- *Encyclopedia of Earthquakes and Volcanoes*
- *Evolution of Matter*
- *Handbook of Gold Exploration and Evaluation*
- *Manual of Mineral Science, 23rd Edition*
- *Metamorphic Rocks*
- *Michigan Geography and Geology*
- *Ocean: An Illustrated Atlas*
- *Petroleum Engineering Handbook*
- *Planetary Crusts*
- *Treatise on Geophysics*

The committee members based their selection on average scores of a ten-point, ten-criteria scale. The winners for the 2010 award are

S. Ross Taylor and Scott McLennan

for their book, *Planetary Crusts: Their Composition, Origin and Evolution,* Cambridge University Press, 2009.

This work received high scores for its uniqueness in subject coverage, the quality of the work, and the authoritativeness of the authors.

Best Website Award

Dr. Andrew B. Smith, The Natural History Museum, London

For his website: "*The Echinoid Directory"*
http://www.nhm.ac.uk/research-curation/research/projects/echinoid-directory/

Comments by the committee and nominator:

This is an excellent website for anyone interested in echinoids. The site has a clear layout and is well organized and has a great deal of information on echinoids including sections on morphology, keys to identification, classification, 3D models, an index to taxa, and a glossary. The index of taxa is very extensive and informative with images, in some cases of the type specimen. (Robert Tolliver)

This site, an open community project maintained by Dr. Andrew Smith of the Natural History Museum in London, provides a non-technical overview as well as a detailed taxonomic resource for Echinoids, a major group of marine invertebrates with an extensive and well documented fossil record. Most of the site is highly technical with a large glossary, illustrated keys for identification, hierarchical classification, and searchable index. Without a doubt, one of the most striking and noteworthy features of the site are the exquisite, sharply focused high resolution images and interactive 3-D models. (John Kawula)

The imagery is spectacular, the information is accurate, and the educational value is huge. It excels in so many ways, every year it gets a little bit better until now it is the most authoritative work on echinoids for the online world. It is a truly remarkable production by Andrew Smith at the Natural History Museum in London. It is a must for paleontologists both academic and amateur…and just anyone who wants to be educated...painlessly! This site is an open community project which currently provides access to images of the type species of almost all described genera of echinoid, both recent and fossil. Some additional non-type species are also illustrated. (Ann M. Molineux- nominator)

Best Guidebook Award

Scott Southworth, D. K. Brezinski, R.C. Orndorff, J.E. Repetski., and D.M. Denenny

for their guidebook *Geology of the Chesapeake and Ohio Canal National Historical Park and Potomac River corridor, District of Columbia, Maryland, West Virginia, and Virginia,* U.S. Geological Survey Professional Paper 1691, 2008. (Also available online at http://pubs.usgs.gov/pp/1691/.)

GEOSCIENCE INFORMATION SOCIETY FIELD TRIP 2010

Wednesday, November 3, 9:30 a.m. – 12:00 noon
Denver Museum of Nature and Science
Jan Heagy

About a dozen GSIS members participated in the field trip to the Denver Museum of Nature and Science to meet Dr. Logan Ivy, Collections Manager, and take a behind the scenes paleontology tour. Dr. Ivy is not only an expert on paleontology, but also manages metadata and databases used by paleontology researchers. The Museum's current collection management system is ARGUS, and their data is contributed into a shared paleontological database network using the Darwin Core metadata schema. SydneyPLUS has purchased ARGUS and the museum is looking to move to Re:discovery or EMu database software systems.

As you might expect, the museum's dinosaur collection is amazing. Although the public displays were being renovated during our visit, we saw impressive fossils behind the scenes. Our tour started by looking at a huge, disarticulated Apatosaur skeleton housed on a range of shelving. Dr. Ivy took us into the shelving area to look at fossils from crocodiles and rhinos. We also saw invertebrate skeletons, including a sizeable ammonite. The tour ended at a large slab filled with stegosaur pieces. The stegosaur was literally flattened.

Afterwards, we split up and wandered around the museum enjoying the permanent displays including Egyptian Mummies and Expedition Health, and the temporary ―Amazon Voyage‖ exhibition (complete with live bugs and fish, including piranhas). Coors Mineral Hall has impressive displays of rhodochrosite from the Sweet Home Mine in Colorado as well as ore minerals from local mining districts and gems from around the world.

An observation deck at the museum boasts the ―Best view of Denver. All of us enjoyed the trip and found the Denver bus system reliable and easy to use.

Originally published in *GSIS Newsletter* No. 247, February 2011.

GEOSCIENCE JOURNAL PRICES

Compiled by Michael Mark Noga

Journal Title				% Price Change	
	2009	2010	2011	2009/2010	2010/2011
AAPG Bulletin	350	385	385	10%	0%
Alcheringa	173	201	253	16%	26%
American Journal of Science	185	200	200	8%	0%
American Mineralogist	825	875	900	6%	3%
American Scientist	70	75	75	7%	0%
Annales de Paleontologie	726	678	814	-7%	20%
Annales Geophysicae	2893	3161	2411	9%	-24%
Annals of Glaciology	419	328	455	-22%	39%
Annual Review of Earth Planetary Sci	234	234	240	0%	3%
Antarctic Science	835	865	915	4%	6%
Applied Earth Science	384	411	432	7%	5%
Applied Geochemistry	1439	1497	1557	4%	4%
Arctic	155	200	200	29%	0%
Arctic Antarctic and Alpine Research	230	255	255	11%	0%
Astronomy and Geophysics	406	430	456	6%	6%
Atlantic Geology	75	75	75	0%	0%
Australian Journal of Earth Sciences	1449	1500	1530	4%	2%
Basin Research	1378	1461	1549	6%	6%
Biogeochemistry	2524	2587	2706	2%	5%
Boreas	372	387	407	4%	5%
Bulletin of Eng Geol & the Envt	647	708	741	9%	5%
Bulletin of Marine Science	505	505	580	0%	15%
Bulletin of Volcanology	1873	1976	2067	5%	5%
Canadian Journal of Earth Sciences	1215	1325	1445	9%	9%
Canadian Mineralogist	495	525	550	6%	5%
Carbonates and Evaporites	400	418	418	5%	0%
CATENA	1712	1780	1851	4%	4%
Chemical Geology	4751	4941	5139	4%	4%
Chemie der Erde	480	507	569	6%	12%
Clay Minerals	421	380	392	-10%	3%
Climate Dynamics	4033	4658	4888	15%	5%
Climatic Change	3317	3499	4026	5%	15%
Computational Geosciences	487	514	538	6%	5%
Computers & Geosciences	2702	2810	2922	4%	4%
Continental Shelf Research	2663	2770	2881	4%	4%
Contrib of Mineral & Petrology	4810	4906	5129	2%	5%
Coral Reefs	1324	1397	1505	6%	8%
Deep Sea Research Pts. I & II	6137	6364	6619	4%	4%
Doklady Earth Science Sections	5939	6355	6800	7%	7%
Earth and Envi Sci. Trans Roy Soc Edinburgh	384	390	406	2%	4%

Journal Title				% Price Change	
	2009	2010	2011	2009/2010	2010/2011
Earth & Planetary Science Letters	4698	4886	5081	4%	4%
Earth Moon and Planets	1194	1295	1335	8%	3%
Earth-Science Reviews	1773	1933	2068	9%	7%
Earthquake Science	846	893	976	6%	9%
Ecosystems	751	792	828	5%	5%
Elements	150	150	170	0%	13%
Environmental Fluid Mechanics	264	279	292	6%	5%
Environmental Earth Sciences	3449	3898	4077	13%	5%
Estuarine Coastal and Shelf Science	2888	3004	3124	4%	4%
Eurasian Soil Science	4477	4790	5125	7%	7%
Evolution	671	712	755	6%	6%
Facies	552	582	609	5%	5%
Geoarchaeology	1799	1907	2022	6%	6%
Geochemistry: Exploration, Envt, Analysis	452	450	464	0%	3%
Geochemistry International	5198	5468	5851	5%	7%
Geochimica et Cosmochim Acta	3262	3392	3511	4%	4%
Geoderma	3073	3196	3324	4%	4%
Geofluids	761	800	848	5%	6%
Geoforum	1341	1408	1500	5%	7%
Geografiska Annaler A: Phys Geog	427	453	481	6%	6%
Geological Journal	1596	1692	1794	6%	6%
Geological Magazine	792	823	1000	4%	22%
Geology of Ore Deposits	1993	2133	2282	7%	7%
Geology	700	800	800	14%	0%
Geology Today	841	892	946	6%	6%
Geomagnetism and Aeronomy	1643	1758	1881	7%	7%
Geo-Marine Letters	1235	1303	1363	6%	5%
Geomicrobiology Journal	1302	1348	1375	4%	2%
Geomorphology	2533	2660	2766	5%	4%
Geophysical Journal International	2272	2408	2553	6%	6%
Geophysical Prospecting	1329	1409	1494	6%	6%
Geosphere	85	200	200	135%	0%
Geotectonics	1214	1299	1390	7%	7%
Geothermics	1432	1514	1575	6%	4%
Global and Planetary Change	1946	2024	2105	4%	4%
Ground Water	507	538	571	6%	6%
Ground Water Monitoring & Remed	251	267	284	6%	6%
Grundwasser	235	248	259	6%	4%
GSA Abstracts with Programs	150	120	120	-20%	0%
GSA Bulletin	700	800	800	14%	0%
Hydrogeology Journal	1131	1244	1301	10%	5%
Hydrological Processes	4631	4909	5204	6%	6%
Icarus	3956	4114	4279	4%	4%
International J of Rock Mech/Min Sci	3250	3380	3515	4%	4%
International Journ of Coal Geology	2505	2605	2709	4%	4%

Journal Title				% Price Change	
	2009	2010	2011	2009/2010	2010/2011
International Journal of Earth Sciences	1440	1519	1637	5%	8%
Island Arc	1123	1191	1262	6%	6%
Izvestiya Atmos & Oceanic Physics	1845	1974	2112	7%	7%
Izvestiya Physics of Solid Earth	1755	1878	2009	7%	7%
Journal of African Earth Sciences	2882	2941	3044	2%	4%
Journal of Applied Geophysics	1371	1426	1483	4%	4%
Journal of Asian Earh Sciences	1454	1527	1603	5%	5%
Journal of Atmos and Solar-Terr Phys	4150	4179	4325	1%	3%
Journal of Climate	755	785	825	4%	5%
Journal of Coastal Research	499	519	519	4%	0%
Journal of Foraminiferal Research	175	175	175	0%	0%
Journal of Geochemical Exploration	1722	1791	1863	4%	4%
Journal of Geodesy	1406	1765	1846	26%	5%
Journal of Geology	191	197	213	3%	8%
Journal of Geodynamics	2019	2047	2119	1%	4%
Journal of Glaciology	476	496	514	4%	4%
Journal of Glaciology and Geocryology	86	86	115	0%	34%
Journal of Hydrology	6430	6687	6954	4%	4%
Journal of Marine Research	160	160	160	0%	0%
Journal of Micropalaeontology	277	328	350	18%	7%
Journal of Mining Science	620	682	710	10%	4%
Journal of Molluscan Studies	620	682	710	10%	4%
Journal of Mountain Science	565	596	686	5%	15%
Journal of Ocean University of China	622	656	686	5%	5%
Journal of Oceanography	1128	1190	1190	5%	0%
Journal of Paleontology	330	330	330	0%	0%
Journal of Petroleum Geology	624	662	702	6%	6%
Journal of Petroleum Science and Eng	2196	2284	2398	4%	5%
Journal of Petrology	1672	1840	1913	10%	4%
Journal of Physical Oceanography	645	670	695	4%	4%
Journal of Quaternary Science	1929	2045	2168	6%	6%
Journal of Sedimentary Research	625	625	650	0%	4%
Journal of Seismology	490	517	541	6%	5%
Journal of Soils and Sediments	343	430	463	25%	8%
Journal of South Amer Earth Sci	1215	1264	1315	4%	4%
Journal of Structural Geology	1925	2002	2082	4%	4%
Journal of Systematic Palaeontology	360	326	333	-9%	2%
Journal of the Atmos Sciences	755	785	755	4%	-4%
Journal of the Geol Soc of London	1570	1730	1782	10%	3%
Journal of Vertebrate Paleontology	270	428	437	59%	2%
Journal of Volcanol & Geotherm Res	3600	3744	3894	4%	4%
Landslides	403	425	445	5%	5%
Leading Edge	135	145	155	7%	7%
Lethaia	318	334	355	5%	6%

Journal Title				% Price Change	
	2009	2010	2011	2009/2010	2010/2011
Limnology & Oceanography package	975	1025	1025	5%	0%
Lithos	1881	1956	2034	4%	4%
Lithosphere	350	350	350	0%	0%
Marine and Petroleum Geology	2450	2549	2651	4%	4%
Marine Chemistry	2705	2813	2926	4%	4%
Marine Environmental Research	1939	2017	2098	4%	4%
Marine Geodesy	551	605	617	10%	2%
Marine Geology	4420	4569	4729	3%	4%
Marine Geophysical Researches	745	786	822	6%	5%
Marine Micropaleontology	1710	1778	1849	4%	4%
Marine Pollution Bulletin	1667	1817	1908	9%	5%
Mathematical Geosciences	1290	1361	1424	6%	5%
Meteoritics and Planetary Science	1100	1200	1272	9%	6%
Mineral Processing & Extractive Metallurgy	384	411	432	7%	5%
Mineralium Deposita	1909	2014	2107	6%	5%
Mineralogical Magazine	673	607	626	-10%	3%
Mineralogical Record	190	190	190	0%	0%
Mineralogy and Petrology	1693	1786	1868	5%	5%
Minerals Engineering	1664	1814	1905	9%	5%
Mining Technology	384	411	432	7%	5%
Molluscan Research	120	150	165	25%	10%
Moscow University Geology Bulletin	2565	2745	2937	7%	7%
Moscow University Soil Science Bulletin	2258	2416	2585	7%	7%
Natural Hazards	1629	1719	1798	6%	5%
Natural Resources Research	514	542	567	5%	5%
Nature	2920	3095	3280	6%	6%
Nature Geoscience	3060	3520	4048	15%	15%
Nautilus	85	88	88	4%	0%
New Zealand J of Geol & Geoph	340	350	340	3%	-3%
New Zealand J of Mar & Freshwater Res	340	350	340	3%	-3%
Ocean & Coastal Management	1677	1919	1996	14%	4%
Ocean Dynamics	521	550	690	6%	25%
Ocean Modelling	677	718	757	6%	5%
Ocean Science Journal	448	473	480	6%	1%
Oceanology of Russian Acad Science	1686	1804	1930	7%	7%
Oil and Gas Science Technology	646	660	687	2%	4%
Ore Geology Reviews	1169	1227	1288	5%	5%
Organic Geochemistry	3768	3919	4076	4%	4%
Origins of Life & Evol of Biosphere	826	843	882	2%	5%
Palaeo, Palaeo, Palaeo	4678	4865	5060	4%	4%
Palaeobiodiversity & Palaeoenvironments	174	175	182	1%	4%
Palaeontology	1014	1075	1140	6%	6%
Palaeoworld	532	553	575	4%	4%
Palaios	415	415	450	0%	8%

Journal Title				% Price Change	
	2009	2010	2011	2009/2010	2010/2011
Palaontologische Zeitschrift	447	447	468	0%	5%
Paleobiology	200	200	209	0%	5%
Paleontological Journal	5619	6012	6433	7%	7%
Permafrost & Periglacial Processes	1260	1336	1417	6%	6%
Petroleum Chemistry	5797	6203	6637	7%	7%
Petroleum Geoscience	484	508	600	5%	18%
Petroleum Science & Technology	5223	5406	6406	4%	18%
Petrology	2016	2517	2308	25%	-8%
Physical Geography	495	520	549	5%	6%
Physical Oceanography	941	993	1039	6%	5%
Physics and Chem of the Earth	3042	3116	3241	2%	4%
Physics and Chemistry of Minerals	2797	2951	3395	6%	15%
Physics of the Earth & Planet Inter	3293	3405	3541	3%	4%
Planetary and Space Science	3983	4011	4151	1%	3%
Polar Geography	394	408	416	4%	2%
Polar Record	410	426	447	4%	5%
Polar Science	689	717	742	4%	3%
Powder Diffraction	205	205	215	0%	5%
Precambrian Research	3269	3392	3528	4%	4%
Proceedings of the Geologists' Association	589	613	638	4%	4%
Proceedings of Yorkshire Geo Soc	239	300	309	26%	3%
Progress in Oceanography	3178	3277	3408	3%	4%
Pure and Applied Geophysics	3624	3696	3639	2%	-2%
Quarterly J of Eng Geo & Hydrogeo	796	826	851	4%	3%
Quaternary Geochronology	438	460	492	5%	7%
Quaternary International	1254	1304	1350	4%	4%
Quaternary Research	876	911	947	4%	4%
Quaternary Science Reviews	2289	2403	2523	5%	5%
Radiocarbon	210	225	280	7%	24%
Regional Environmental Change	310	327	376	5%	15%
Remote Sensing of Environment	3292	3457	3595	5%	4%
Reservoir	71	71	75	0%	6%
Resource Geology	410	435	470	6%	8%
Review of Palaeobotany & Palynology	2792	2825	2924	1%	4%
Revue de Micropaleontologie	212	273	300	29%	10%
Revista Espanola de Palentologia	107	107	107	0%	0%
Rivista Italiana di Paleontologia e Strat	296	296	296	0%	0%
Rock Mech and Rock Eng	877	965	1009	10%	5%
Rocks & Minerals	164	172	184	5%	7%
Russian Geology and Geophysics	1090	1112	1156	2%	4%
Russian Journal of Pacific Geology	1300	1391	1488	7%	7%
Russian Meteorology and Hydrology	2841	3040	3523	7%	16%
Science	835	910	990	9%	9%
Scientific American	40	40	300	0%	650%

Journal Title				% Price Change	
	2009	2010	2011	2009/2010	2010/2011
Sedimentary Geology	3749	3858	3993	3%	3%
Sedimentology	1650	1766	1872	7%	6%
Seismic Instruments	723	774	828	7%	7%
Seismological Research Letters	150	150	157	0%	5%
Shale Shaker	35	35	50	0%	43%
Soil Science	542	590	644	9%	9%
Soil Science Soc of America Journal	650	650	673	0%	4%
Solar Physics	4803	5067	5300	5%	5%
Solar System Research	3285	3515	3761	7%	7%
South African Journal of Geology	233	250	270	7%	8%
Stratigraphy and Geological Correl.	2023	2165	2317	7%	7%
Surveys in Geophysics	945	997	1043	6%	5%
Swiss Journal of Earth Sciences	964	983	998	2%	2%
Tectonophysics	6137	6229	6447	1%	3%
Tellus	455	476	496	5%	4%
Terra Nova	1139	1208	1293	6%	7%
Vadose Zone Journal	325	325	347	0%	7%
Veliger	120	120	120	0%	0%
Water Research	5777	6008	6217	4%	3%
AVERAGE PRICE CHANGE PER JOURNAL				6%	8%
AVERAGE PRICE CHANGE FOR POOL				5%	5%

Note: The average price change of the overall pool of journals measures the increase in funds needed to purchase this particular pool of journals. This measure dampens the effect of a large % price increase of a specified journal.

AUTHOR INDEX