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Navigating the Geoscience Information Landscape: Pathways to Success

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Navigating the Geoscience Information Landscape: Pathways to Success

Edited by
Jody Bales Foote

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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, 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 were given at the 2009 Annual Meeting of the Geological Society of America held in Portland, Oregon October 18-21, 2009. The papers are arranged in the order in which they were presented. Where the entire paper was not available due to publishing conflicts, the abstract is provided with the permission of GSA. Posters were presented all day with authors available for discussion during a two-hour session.

The proceedings volume is divided into three parts:

1. Oral papers presented at the GSA Technical Session T118: "Navigating the Geoscience Information Landscape: Pathways to Success"

2. Posters presented at Session No. 30 "Geoscience Information/Communication (Posters): New Horizons on the Digital Information Landscape"

3. Reports of the 2009 GSIS program sessions

Thank you to all the paper and poster presenters and other GSIS members who continue to support this scholarly research effort. Thanks also to Jan Heagy who provided superb leadership as 2009 program chair and to Lisa Johnston for her suggestions and advice as 2008 proceedings editor.

Jody Bales Foote
GSIS Technical Sessions Convener 2009

PART 1: GSA Topical Session T118

Navigating the Geoscience Information Landscape: Pathways to Success

Technical Session Convener

Jody Bales Foote
October 21, 2009
8 a.m. – 12:00 p.m.

DIGITAL CURATION AT THE U.S. GEOLOGICAL SURVEY

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Abstract - Digital Curation is an emerging practice in library and information science. It incorporates practices from libraries, archives, and the information management practices of organizations. The U.S. Geological Survey is exploring digital curation and how its implementation could support research in the geosciences both within the Survey and world-wide. The presentation will provide an overview of the components of digital curation and specific details about the USGS collections that could be come available in new ways in the future.

The USGS Library is one of the world's largest libraries in the earth and natural sciences and has been operating continuously since 1882. Many of their collections are in the public domain and are available for digitization and availability through new digital library services. The U.S. Geological Survey is exploring a variety of models to improve access to the geoscience literature and will explore some of the components of these models in their presentation.

PORTALS, PROJECTS, AND PATHWAYS: ADVICE FOR DEEP RESEARCH IN MAP LIBRARIES

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Abstract - This presentation will highlight current trends in map libraries that are changing the way that end-users find and user geo-spatial information. Many institutions are integrating historical materials with contemporary, born-digital geo-information. Others are building portals to distribute large, single-purpose datasets produced by government agencies or research teams.

These systems have a variety of search engines, metadata standards, and access mechanisms. To find comprehensive information about a given site, one might have to search GeoSpatial One Stop, a university library's catalog, a state data clearinghouse, and data archives of scholarly journals--none of which appear in Google results. Information sources might include hundred-year-old survey notes, printed geologic maps, and LiDAR data.

Integrating these legacy and contemporary resources is a challenge for users. By examining efforts at the University of Oregon, and comparing these efforts to other institutions, we will provide practical advice for those attempting to navigate these diverse information landscapes.

THE DGER LIBRARY THEN AND NOW – THE TRANSFORMATION OF A SMALL GEOSCIENCE LIBRARY FROM PAPER TO CYBERSPACE

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Abstract - The last few decades have seen profound changes in what libraries do and how they do it. We've gone from all-paper to all Internet, 24-7. This paper examines that transition through the example of the library of the Washington state geological survey. Some unusual aspects of geoscience library collections will be discussed. That library took that same ride from all-paper to the Internet, 24-7 that other geology libraries did. Because the DGER library was so primitive compared to other libraries, it had a longer way to go, but it got there.

Introduction

I worked at the DGER library (formally, the Washington Department of Natural Resources, Division of Geology and Earth Resources) from 1978 to 2003. During those years there were rapid advances in library technology, in libraries big and small.

We old-timers know how much of what we did and how we did it changed radically and dramatically from then to now. The newcomers might find some points in this brief history illuminating.

The Washington State Geological Survey Library

I first encountered the DGER library in 1977. I was just back to Seattle after spending two years creating a small library at a state agency in Wyoming. I got a letter from the Washington Department of Natural Resources: the librarian at the state geological survey was retiring. Would I like to apply?

Geology? Rocks? Dead old rocks? Well, maybe it was at least worth a look. They *had* written a nice letter.

I drove to Olympia to take a look. In 1977, the DGER library was in a converted garage in the basement of a former apartment house. There was one tiny window in the far back corner, in the librarian's office. He worked there, as far from the 'nasty public' as he could get. The door to the library was kept locked and could only be accessed by staff or by appointment.

The library was a mess. The quality of the collection was *superb*, but the access was wretched.

It was a large collection of documents and journals. There were full runs of U.S. Geological Survey (USGS) and Bureau of Mines reports, dating to the 1890s. There was an extensive run of Geological Survey of Canada reports and reports from provincial and state surveys. There were about 100 journal titles although only a few were very complete.

All of this was in chaotic order, stuffed just whereever they would fit, on homemade wooden shelves. (In about 1981, we moved from that basement to proper quarters. We got standard steel shelving. It was just like a real library.]

There was *no card catalog*, or even much of a shelf list.

The only access was through the printed, comprehensive bibliographies, current only to 1962 (Bennett, 1939; Reichert, 1960; Reichert, 1969) The Shelf list (such as it was) filled only about four drawers of a small card catalog cabinet and only included records for theses, journals and serials.

The only access to the more recent materials was the retiring librarian's memory. Unfortunately, he'd had a stroke a few years before and his memory had suffered.

I just shook my head. A cramped library in a basement? And all of it about dead old rocks? With so little access? Not in a million years!

But, oh well. Since they were nice enough to invite me, at least I could give them a little free consulting. I wrote them a memo.

It was a very long time ago, so I have no idea exactly what I wrote in that memo, but I'm sure it included this at least.

1. **Open the door and keep it open.**
2. Move the librarian's desk to *face* the door.
3. Catalog the collection.

I did the first two right away. I'd almost finished the third one when I left in 2003. (My leaving was their choice, not mine. Severe budget cuts made it impossible for them to keep me on.)

The minimum qualifications for the job were a library degree and three years' professional experience. (By chance, I had three years and a minute.)They first offered the job to a map librarian from California, but he turned them down. (I couldn't imagine why. This was my *Dream Job*– a big, in depth science collection in urgent need of cataloging and bibliography– just the things I most enjoyed and did best.)

I was their second choice. They offered me the job.

They liked me because I'd cataloged a small state agency library in my previous job and had prepared a few short bibliographies there. They especially liked the bibliography part. They took a chance of me: I got the job.

I had a big challenge ahead.

My first months were quite painful. I had no background in geology, knew absolutely *nothing* about geoscience libraries, and there was no one to help me. I had no idea that something like the Geoscience Information Society even existed. My predecessor hadn't known about it, either. I had to figure everything out from scratch. Fortunately there was a USGS office in Spokane. The public information folks there were my lifeline.

Libraries were *very* different in 1978. It's hard to believe from the perspective of 2010, but in 1977 there were *no* personal computers in any library anywhere because they didn't exist yet. The highest-tech library machines were typewriters, fax machines and microfilm readers. Many library procedures were paper-based, very labor-intensive, and thus very error-prone. MARC was just starting; I'd barely heard of it in my last library school courses in 1974.

We had copies of the old USGS print indexes and the print volumes of AGI's *Bibliography and Index of Geology.* But we didn't have dial-up access to GeoRef because we couldn't afford it. We didn't use GeoRef routinely until it was issued on CD in the late 1990s.

In 1978, I started to create a library like all the ones I'd worked in before, creating paper records for the print collection.

I didn't *want* to have to do original cataloging of the whole collection, so I checked for alternatives. (I'd worked at the Seattle Public Library while I was in high school and as an undergraduate. In those times, all cataloging was on cards. There was some copy cataloging but it was still relatively uncommon. There was still an awful lot of original cataloging. That's what I knew about and that's what I was taught in library school.) When I got to the DGER Library, I hoped for another possibility. I called the Washington State Library. Could they help me?

Well, yes, they *could* catalog the collection for me. The cost would be $6 per title for copy cataloging and $14 per title for original cataloging. **Thud!**

The DGER library was, and still is, an independent library with no affiliations with any organization other than the Department of Natural Resources. We had no larger library or university to help us. We were completely on our own for everything. And we had ***no*** *money*. (The library never had a budget at of any kind– No book budget, no journal budget. Nothing. And a travel budget? Forget it!) $6 to $14 per title to catalog perhaps 30,000 titles? That would be $18,000 to $42,000. I knew that requesting that kind of funding would be futile.

Because I had no better alternative, I started cataloging. I did original cataloging using just a typewriter. As I'd been taught, I typed up the Main Entry cards, typed the subject and added entries on the verso, and mailed them in batches to a card duplicating company. (That's what I'd done in Wyoming and I continued doing that at DGER until about 2000.) When the duplicated card sets came back, I'd type on the headings and file them by hand in the card catalog. It was labor-intensive, but it guaranteed that I had full quality control.

I eventually cataloged about 90% of the collection. That was a lot of work, but it was the only way to get the quality I demanded at a price we could afford.

Checking in the journals and serials was also completely paper-based. I'd check the new items in on 3 x 5 cards.

The *Bibliography of Washington Geology*

Periodically, my boss would ask me about the Bibliography.

Besides running the library, the librarian's primary job was to prepare the *Bibliography of Washington Geology*. I kept telling him that I'd get to it. In truth, I was terrified of it and had barely even thought about it at all. The last bibliography had only covered materials to 1962. And this was 1978. That was sixteen years worth of citations! The next update was so big and so out of date that I didn't have a clue about how to do it. I was in despair.

Then one day, I was innocently checking in new state pubs, and there it was: *the Bibliography of the geology and mineral resources of Oregon, 1976-1979* (Burnetti and Neuendorf, 1981).

Oregon had done their bib with GeoRef! My problem was solved! We could just get GeoRef to do it! (They'd already done the hardest part: capturing the bibliographic info and assigning the subject and geographic headings. We'd only have to get them to add the reports they'd missed.) I ran to my boss with the idea and then called the Oregon Librarian, and John Mulvihill at GeoRef to get more info. First we had to find the money. John Mulvihill thought there would be about 3,000 citations about Washington (there turned out to be about 5,500) and that they could do the project for $20,000. We wrote a grant request to the Bureau of Mines and got the funding. We started in.

The project had mixed results. GeoRef used a mainframe in those days and it was *extremely* inflexible: it was nothing like the word processors we use now. The smallest change required reprogramming by a programmer! Additionally, I was almost totally ignorant about computers, abjectly terrified of them, and *very* impatient. (Ah! The arrogance of youth!) But the important thing was that the bib got done, we were caught up and we somehow had all survived

Maintaining the *Bibliography of Washington Geology* In-house with a Personal Computer

It took us more than a year to do the 1963-1980 bib (Manson and Burnetti, 1983). We'd caught up with the backlog, but meanwhile the new citations kept pouring in. Mount St. Helens had erupted, spewing out a billion cubic yards of ash. Scientists had produced huge numbers of reports about the various events. (As of February 2010, the Washington bibliography included more than 3,000 items about Mount St. Helens.) (About that time, the DGER offices were moved from the converted apartment to proper office space. The library got standard steel shelving. I used that opportunity to completely shift and reorganize the collection. It went from chaotic to logical order. It was a transformation.)

Managing the Bibliography of Washington geology project became my highest priority. I'd been terrified of computers before we did Bulletin 76. But during that process, I lost my computer virginity and all my fear, awe, and respect for computers: they're just big *stupid* machines that count fast. But they count *very* fast. They're lovely and we couldn't live without them.

Thousands of new citations were coming in. We *had* to continue the bib. But the project was too big to be done by hand with just a typewriter– It had taken my predecessor seven years to prepare a bibliography that covered just four years!) We couldn't use a mainframe as we'd done with GeoRef but we *had* to use a computer.

This was the early 1980s and personal computers were only just emerging. The library got the very first PC in the Division, primarily to manage the bibliography. We got an IBM PC with dBaseII and Wordstar. Those were primitive by today's standards but they were our best options in 1981.

At that time, there were few if any packaged programs. Dbase was in Microsoft's DOS operating language. To make it work, original code had to be written. One of our young genius geologists, (William M. Phillips) wrote the code. It took us months to get the system designed, debugged, and running, but we finally got it to work. We had to call it something, so we called it "Bibliographic Information System" (BIS). I started entering citations.

Because there was no way to provide public access to BIS, I had to maintain two parallel systems: the card catalog for the books and BIS for the Bibliography of Washington geology. That continued until we could issue the bib on CD in 1998.

We started with an XT using DOS. In the following years we upgraded the hardware to an AT, to a 286 to a 386. I used those to prepare the later volumes of the bibliography (Manson, 1990; Manson, 1996). The library now uses a Pentium 4.

Like other libraries, we continually upgraded our software. We went from DOS to Windows and from Wordstar to Wordperfect to Word.

We used dBase until we got Inmagic in 1996. (dbase had many limitations, including file size. With the upgrade to Inmagic we could finally have all the citations in a single file.) We first issued the whole bib on CD in 1998 (Manson, 1998c). We got another Inmagic software upgrade and put the whole thing on the Internet in 2001 (Manson, 2001-2003).

The Oddities of Geoscience Libraries

As we know, geoscience libraries are quite different from other kinds of science libraries (Peoples, 2008). Peoples noted "The literature of geology is more difficult than that of many other subjects because of the confusing complexity of much of its source material" see http://lis.owu.edu/geo310literature.htm

In contrast to other disciplines, in the geoscience library:
– The materials are older (the old geoscience materials are often the foundation for the new ones, so many older materials never lose their value). Studies have shown that geoscience materials have one of the longest half-lives of all science materials (Manson, 2000)
– there is greater breadth of sub-disciplines (geophysics, geochronology, mineral resources, hydrology, etc.)
– The materials come in many types (books, journals, technical reports, government documents, theses, maps, conference reports, etc.)
– The materials have many formats (print, microform, online)
– Materials are issued from a wide array of public agencies and professional societies, locally and internationally,
– There is a heavy use of gray literature– materials like theses and some public agency "Open-file reports" that have little, if any, critical review or wide distribution.
– Materials are often issued in series. The intent and definition of those series sometimes change over time
– While digital materials are increasingly important, geoscience materials are primarily in print format.

The Business of the Survey is to Publish!

All Geologic surveys are primary sources for studies of the geology of their region. As a senior DGER geologist told me in my earliest days (while fuming at the low productivity of many of the junior staff) "The business of the survey is to publish!" (Wayne S.Moen, pers. comm, 1978). He said that *all* the DGER staff should publish, including me.
I found that surprising, because I'd never heard of librarians publishing. Wayne poked his finger at me and ranted that I should publish map indexes and thesis bibliographies and more. I took it to heart. Over the years, I prepared dozens of indexes and bibliographies, just as Wayne had advised. (The full list of my reports is available by searching GeoRef or the online Bibliography of Washington Geology http://www2.wadnr.gov/dbtw-wpd/washbib.htm)

DGER was like a vanity press– they'd issue just about anything we prepared. There was little if any external peer review– most products only needed administrative approval. Most of my reports were issued as "Open-File Reports".

Open-File Reports (OFRs) are a category of informal report relatively unique to the geosciences. The original intent may have been to release important data quickly in order to avoid the delay of the full editing process. (Some OFRs have been also issued as fully edited and peer-reviewed formal reports although that's less common now.) These days, the USGS and the state surveys are issuing more reports as OFRs than as formal reports because they're faster and cheaper.

In theory, an Open-File Report would be a single copy of a report deposited in the survey's library open to the public. The survey thus avoids the costs for full editing, printing and distribution. Unlike "published" reports, OFRs are only rarely deposited in other libraries.

Scientific Exchange

In the past, survey and university libraries acquired much of their material for free, on "scientific exchange". Organizations couldn't afford to buy all the new materials they needed from public agencies, so they just swapped. Lee Regan of the USGS gave an excellent paper on exchanges, (Regan, 1992).

At DGER, we would send the few reports we published each year to hundreds of geological surveys and university libraries around the world. The surveys would send us their new reports in exchange. For example, we'd send the USGS our three new reports and they'd send us hundreds of their reports in exchange. No one kept count to see if the exchanges were equitable. That's a good thing because they weren't fair at all– organizations like mine received far more than we gave. We liked it that way.

In 1978, the system of scientific exchange was the standard practice and was in full swing. Like many other libraries, we received free publications from organizations all over the world. In case you ever wondered, that's why your libraries have such long runs of publications from state surveys, the USGS, and the Bureau of Mines.

That system of scientific exchange started to shrivel in the1980s or so, due to cost constraints. By the time I left in 2003 it was relatively rare.

Years, ago, I got a call from someone at the Washington State Library. They, too, had extensive runs of state survey pubs. But they were moving to smaller quarters and had to downsize the collection. They were going to de-accession (i.e., throw away) lots of their state survey pubs. They didn't have time to try to re-home them, so they were going to simply put them all in a dumpster!

Shocked, I immediately grabbed all the boxes and able-bodied geologists I could find. We raced to the State Library, barged in and boxed up reports as quickly as we could. We couldn't save them all, but we could save some of them. A librarian challenged me as we were leaving. I explained that we weren't *really* stealing them– we were just keeping them out of the dumpster. The librarian reluctantly agreed.
Once we were back at DGER, we could relax. We had no interest in those reports for our own collection; we'd de-accessed our eastern U.S. state survey reports long before. We posted lists of the reports on the Internet, hoping they'd find good homes. They ultimately did.

My proudest moment of that episode was when we sent an original copy of the 1932 work "Butterflies of the Allegany state park" to the Allegany state park– they no longer had a copy!

Such older works can be invaluable: they can include descriptions of sites or biota that cannot be replicated today. In our own times the natural world has rapidly deteriorated. How can the butterflies of the Allegany state park be conserved or restored if we don't know how they used to be?

Our Libraries Include Vast Riches

Our libraries contain vast numbers of scientific reports. Each of those reports is the culmination of a significant public investment. If we totaled those investments, even a small library like DGER surely represents millions of dollars worth of research funds. The collections at the largest libraries surely reflect research expenditures in the billions or more.

Unlike other resources, using those results or conclusions in those reports does not deplete them. Although it's difficult to quantify the value of geoscience reports, some authors have tried. (Bernkopf and others, 1993; Laprade, 1998; Manson, 1998b; Walsh and Reed, 1998;Weil, 1980). It was the topic of the 1997 Geoscience Information Society symposium, "The costs and values of geoscience information" (Manson, 1998a.)

The ubiquity of computers has revolutionized our libraries. The use of computers has transformed report preparation and publishing, too. I came to DGER at what we now see as the end of the print era. Geologists wrote their reports, often by hand. Typists would type them up, and they would then go through cycles of editing and revision. The final copy would be typed in columns and pasted on stiff paper ("boards") using scissors, exacto knives and hot wax. We did this at a light table to be sure the lines were straight . We didn't have spell checkers, so it took two people and many hours to proof-read a document. One person would read the text out loud while the other person read along silently. Color maps were prepared by laboriously preparing multiple layers of 'peal coats'. Personal computers have greatly speeded those processes. Today, maps and reports are often born digital and posted on the Internet.

The Bad Old Days

In the Bad Old Days we were still thinking inside the box, in a black and white, manual, analog world.
-- Union lists Online Public Access Catalogs (OPACs) did not exist. In order to compare library holdings of particular items (like geologic field trip guidebooks) we laboriously compiled "Union Lists" of those materials at various libraries. Those Union lists were, of course, error laden and instantly obsolete.
-- We checked in serials by hand on paper
-- Catalog cards had typed on headings and were filed by hand
-- We checked print indexes by hand and wrote down the info.
-- We gave talks using photographic slides mounted in slide carousels
– Preservation: for years we were perplexed by how to physically preserve the older geoscience reports printed on crumbling paper. The oversized colored maps, had their own problems.
– For years the computer experts struggled with how to preserve (or present) text and illustrations on the same page. Fortunately, the Adobe folks figured it out.

In the last few decades, we've all been on this wild Matterhorn ride as we've raced to the future.

It all happened so incredibly fast! But it was tremendous fun!

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GEOLOGIC FIELD TRIP GUIDEBOOKS: PROGRESS ON A PROJECT TO IDENTIFY INDEXING GAPS

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Abstract - Field trip guidebooks are an important part of the geological literature. Indexing of the various guidebook series is incomplete, and indexing gaps continue to increase. Recently, a six-month sabbatical project was conducted to determine mutual and unique gaps in three indexes used to identify and locate geologic field trip guidebooks. The three indexes are: GeoRef and OCLC WorldCat (both by subscription), and Geologic Guidebooks of North America Database (Guidebooks Database), published online by American Geological Institute (AGI) in cooperation with Geoscience Information Society (GSIS). Information from this project will be used to reduce indexing gaps in GeoRef and the Guidebooks Database, and will help determine which missing guidebooks need to be found and added to library collections.

INTRODUCTION

Reasons for the project

Geologists and geology librarians recognize the value of geologic field trip guidebooks as important information resources (Joseph, 2006). They also recognize the value of the various indexes for identifying and locating guidebooks, although many geologists are unaware of some of these finding aids and usually appreciate learning about them. The usefulness of these finding aids is diminished due to missing material: field trip guidebook titles are missing from the Guidebook Database, GeoRef, and WorldCat, the three major indexes that contain field trip guidebooks.

The searchable Geologic Guidebooks of North America Database (Guidebook Database or GBDB) is cooperatively maintained by American Geological Institute (AGI) and the Geoscience Information Society (GSIS). It consists of the titles in the 6th print edition of Union List of Geologic Field Trip Guidebooks of North America (Geoscience Information Society, 1996) and subsequent, sporadic updates. There is no charge for using the database. GeoRef indexes articles, books and other publications on geology and earth sciences. GeoRef is produced by American Geological Institute, and can be accessed via a number of vendors by subscription. WorldCat is the combined union catalog of more than 1500 OCLC member libraries worldwide, with over 52 million records representing materials in all formats, and it includes records for materials in 400 languages. It is available by subscription, and there is also a free version.

There are a number of reasons that guidebook titles are missing from the three databases. Titles may be missing from the Guidebooks Database

- if they were published after the last print edition (6th, 1996) of the Union List,
- if the series is international and the specific trip was not in North America (until recently, non-North American trips were not included in the GBDB),
- for older guidebooks, if they were not in any Union member library,
- if a series is not analytically cataloged (in other words, if individual titles within the series are not cataloged),
- if there was no road log (this restriction has recently been lifted, although inclusion of a road log is still encouraged),
- or a particular title might simply have been missed when compiling the Union List or during updates.

Updates of the online version, created after the last print edition of the Union List, have been sporadic.

Guidebook titles may be missing from GeoRef

- if GeoRef is unaware of the guidebook,
- if GeoRef is unable to borrow a copy of the guidebook to index it,
- or because of work load; the guidebook may not have as high priority as other publications.

Until recently, guidebooks were not consistently being added to GeoRef, however that has changed.
Guidebook titles may be missing from WorldCat

- if the guidebook is not in a library collection or catalog,
- or if the guidebook series is not "analyzed" by any library (i.e. individual titles within the series are not cataloged).

In order to improve the indexing of geologic field trip guidebooks, a six-month sabbatical project to indentify and begin filling gaps in the indexing of geologic field trip guidebooks was initiated.

METHOD

Preliminary work

The AGI Guidebooks Database list (http://guide.georef.org/dbtw-wpd/help/series.htm) was consulted to determine the series included in the database. There are currently 1067 series in the Guidebooks Database, and over 10,700 individual trips. The list was sorted into groups for the purpose of this report (Table 1).

Table 1. Numbers of series in groups in the Guidebooks Database

Groups	**Number of Series**
Societies & Associations	605
Government Agencies	178
Academic	208
Museums	22
Journals and other	33
Academies of Science	21
Total Series in Guidebooks Database	1067

The decision was made to concentrate on guidebooks produced by societies and associations for the purpose of this report. A series list spreadsheet was created for the societies and associations group, and information was added from the Guidebooks Database, including number of field trips, number of years, and last year in the database, and WorldCat was consulted as a further indication as to whether a series was continuing. An arbitrary cut-off date of 1997 was selected, therefore guidebooks series having a guidebook produced in the years 1998 to present were considered to be active. There are 199 series that can be considered "active" (including 12 not in the GBDB), of the 632 Associations/Societies series (605 plus 27 not in the GBDB). Thirteen were not used for this study due to problems with the series, and 81 remain to be finished and therefore are not included in this report. Therefore, 105 guidebook series were used for this report (12 not in the GBDB).

Spread sheets

Spread Sheets were created for each of the series. Student workers filled in each spread sheet with data from the Guidebooks Database. A blank year was entered if there was no guidebook in the Guidebooks Database for that year. This was a first indication of the number of gaps in the series. Additional information added included volume number, which helped determine whether there was truly a gap, or whether no trip had been held; and whether a missing guidebook was on the Waiting List to be added.

GeoRef was then searched for the series to determine 1) whether the individual titles in the Guidebooks Database were also in GeoRef, and 2) to identify guidebooks missing from the Guidebooks Database. Searching for guidebook series in GeoRef is not always straightforward: If a trip was sponsored by several societies or organizations, some of the sponsors may not appear in the record; the organization name may differ slightly from record to record; the name may appear only in a notes field; the name may be abbreviated and the abbreviations may not be consistent. Therefore, if a guidebook title in the Guidebooks Database was not found in GeoRef with the series search, the individual title was subsequently searched in GeoRef. Another factor to note: The Guidebook Database is trip oriented. In other words, a series search returns a list of individual trips. An individual guidebook may contain several trips, and in order to determine the title of the guidebook, it is necessary to click to the full record. GeoRef may index only the guidebook title, or it may include the individual trips, plus it may also index other material such as related articles within the guidebook. All of these factors make direct comparison of the two databases difficult, and make multiple, iterative searches of both databases necessary.

WorldCat was searched to identify guidebooks missing from the Guidebooks Database and GeoRef. A library source for borrowing a guidebook for indexing was added to the spreadsheet if the guidebook was missing from the Guidebooks Database, GeoRef, or both.

When time permitted, other information sources were consulted, including society lists in guidebooks, web pages of societies, and newsletters, as well as e-mailing field trip leaders and other individuals directly. In the future, more of these resources will be consulted, and depending on the type of series, publication pages of agencies, bulletins, journals, etc. will also be searched.

RESULTS

The purpose of this project was to indentify the extent of a problem and to begin to correct the problem, rather than to conduct research. The results of this project are somewhat unclear because, in a sense, the comparisons are like comparing apples and apple seeds. Remember that the Guidebooks Database focuses on trips within guidebooks (“apple seeds”), WorldCat indexes guidebooks (“apples”), and GeoRef contains a variable combination of trips and guidebook titles (both “seeds” and “apples”). Some tips for identifying and locating geologic field trip guidebooks were learned during this project, and are outlined in Appendix A.

A summary spreadsheet was used to compile the information from the individual spreadsheets, including: The total range of years through 2008, the total unknown years, the number of trips/guidebooks in the Guidebooks Database, the number of guidebooks in GeoRef, the number in both databases, and the number in neither database.

The total range of years through 2008 gives an idea of the ongoing history of a particular association and its field trip activity. There were a total 1616 unknown years, years for which no trips or guidebooks were discovered. This gives an indication of the number of potential guidebooks missing for the 105 series in this report. Even though a year may be filled in, there may still be missing guidebooks for that year, and there could be multiple trips in a guidebook.

There were 5982 total known trips/guidebooks identified for the 105 series (Figure 1). Of the known trips/guidebooks, 1432 (24%) were only in the Guidebooks Database, 823 (14%) were only in GeoRef, 2509 (42%) were in both databases, and 1218 (20%) were in neither database. The 1218 items in the “Neither” category include guidebook titles only in WorldCat, and titles missing from all three databases but reported by librarians and added to the Waiting List, or discovered by other means such as lists on society web pages, etc. Another way of looking at the results, searching the Guidebook Database would have identified approximately two thirds of the known trips/guidebooks, and searching GeoRef would have identified somewhat over half. However, the two databases also vary according to time period: The Guidebook Database is more complete for older titles, and GeoRef is more complete for newer titles.

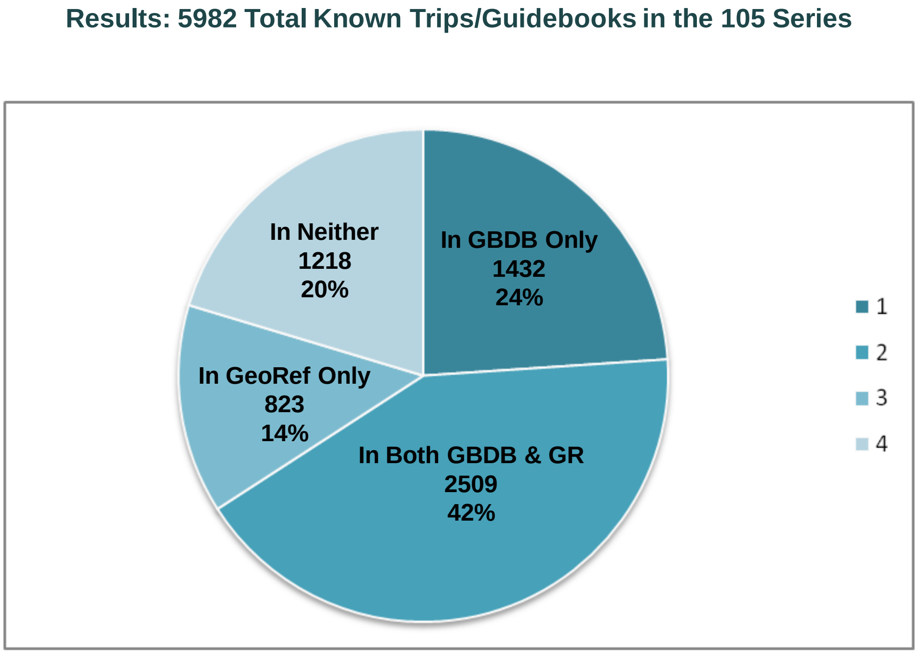

Figure 1. Results

CONCLUSIONS

The most significant finding is that 20% of the known guidebooks/trips would have been missed even if both GeoRef and the Guidebooks Database had been searched. Further, even after searching all three databases and other resources, there could be as many as 1616 or more guidebooks that are yet to be identified, just for the 105 series that have been studied so far.

Even though these 105 series are only a small percentage of the total 1067 series, work on other groups such as survey publications indicates similar indexing gaps. Clearly, there is much work still to be done, both to catch up, and to remain caught up. The best way to fill the gaps in GeoRef and the Guidebooks Database is to report missing titles to AGI or the Geoscience Information Society Guidebooks Committee. The best way to fill indexing gaps for guidebooks in WorldCat is to analytically catalog guidebook series.

<u>The following remains to be accomplished</u>:

1) Finish the Associations/Societies series: Finish identifying gaps, and discovering the missing titles. Look at additional resources such as society web pages and publications, the web, etc. to fill in more gaps, or verify that no trip was held or no guidebook was produced.
2) Do the same for the other groups of series.
3) Keep up to date by adding new guidebook information as they are produced.
4) Begin work on non-North American series and trips.
5) Index the guidebooks that have been identified (GBDB & GeoRef). Concentrate on filling in those that are missing from both the GBDB and GeoRef.

Benefits of the project:

- By identifying ongoing series, efforts can be concentrated
    - when updating the Guidebook Database.
    - when contacting field trip leaders regarding Guidebook Standards.
- There is a better grasp of the problem and solutions.
- There is a start to identifying titles that need to be indexed by GeoRef, and where to borrow them.

Societies and field trip leaders:

Societies and field trip leaders need to take responsibility for making sure that guidebooks get into library collections, and are indexed in GeoRef. There are several societies that are doing a commendable job of identifying their guidebooks and publishing lists. Some have even made most or all of their guidebooks available on the web.

Some of these commendable societies are:

Association of Missouri Geologists (most guidebooks online)
http://www.missourigeologists.org/FieldtripsandGuidebooks.htm
Carolina Geological Society (list; online)
http://www.carolinageologicalsociety.org/cgspubs.htm ;
http://www.carolinageologicalsociety.org/cgscdguide.htm
Friends of the Pleistocene. Rocky Mountain Cell (list in publication, p. x, 1952-2007)
http://pubs.usgs.gov/of/2007/1193/pdf/OF07-1193_TOC.pdf
Institute on Lake Superior Geology (most online; searchable index)
http://www.lakesuperiorgeology.org/publications/proceedings.html ; http://search.grainger.uiuc.edu/ilsg/
Georgia Geological Society (list; some online)
http://www.westga.edu/~ggsweb/
Kentucky Society of Professional Geologists (formerly Geol. Soc. of Kentucky; list [some missing]; some online; others for sale)
http://www.kspg.org/pages/fieldtrips.html
Northern California Geological Society (list of guidebooks; also list of missing guidebooks; List provided by Sandy Figures, who has been working on a complete list of California Guidebooks!)
http://www.ncgeolsoc.org/NCGSGuidebooks1.pdf ; http://www.ncgeolsoc.org/MissnGuidebooks.pdf
Virginia Geology Field Conference (list; CD for sale containing 1969-2009 guidebooks)
http://web.wm.edu/geology/vgfc/?svr=www

Librarians:

Librarians should consider analytic cataloging of guidebook series. This would greatly help when identifying guidebooks, both when using a local online catalog, and when using WorldCat.
Librarians can help by reporting new field trip guidebooks as they are added to their collections, and by volunteering to “adopt” a guidebook series in order to fill in more blanks. Geology Librarians can educate other librarians regarding the importance of this “grey literature”.

SUMMARY

Although most geologists and geology librarians recognize that guidebooks are valuable information resources, some individual authors seem unconvinced that their guidebook has future value and should be preserved. If it was valuable enough to hand out to participants, it has future value and should be preserved.

This project has revealed the extent of the problem. Progress has been made to identify the gaps in the three major indexes, and the work will continue. Many missing titles have been identified, and will be added to both the Guidebooks Database and GeoRef. Both databases should be maintained unless GeoRef eventually is updated to include everything in the Guidebooks Database. Both field trip leaders and librarians can help reduce the gaps in the indexes, and thereby increase access to this valuable information.

REFERENCES

Geoscience Information Society, 1996, Union list of geologic field trip guidebooks of North America, 6th ed.: Alexandria, VA, American Geological Institute, 329 p.

Joseph, Lura E., 2006, Where are geologic field trip guidebooks when you need them?: Geoscience Information Society Proceedings, v. 35, p. 23-29.

ACKNOWLEDGEMENTS

- Student Workers at the University of Illinois Geology Library input the information from the GBDB into the spreadsheets.
- A number of members of the Geoscience Information Society helped search and fill in data for some of the series.
- American Geological Institute (AGI) helps maintain the GBDB, and indexes guidebooks for GeoRef
- University of Illinois made the sabbatical possible.

APPENDIX A

TIPS FOR SEARCHING FOR GUIDEBOOKS

Searching OCLC WorldCat via FirstSearch:

- Use the first line for series, and enclose the phrase in quotes.
- Use the second line for this string: “guidebook* OR field trip* OR excursion* OR road log*”.
- Make sure to capitalize the Boolean terms.
- Rank by: defaults to “number of libraries”. Change to “Date”.
- Use the back button on the browser for the next search, or “Rank by” will revert to “number of libraries”.
- Use the last line for series subdivisions (such as “rocky mountain cell”).
- Make sure to delete the last line before the next search.

Searching GeoRef:

- Use the Advanced Search option…or the Command Search option.
- When looking for guidebooks from a specific society:

    - Use the first line for the association
    - Use the second line for this string: guidebook* [OR] field trip* [OR] excursion*
    - Use the last line for series subdivisions (such as “rocky mountain cell”).
    - It may be necessary to try various abbreviations of the society.

- If the title of the guidebook is known, search that instead. It may also be necessary to try possible variations of the title. Sometimes less works better; use short phrases or terms.
- If sponsored by several groups, not all of the sponsoring groups may appear in GeoRef. These are sometimes in a notes field, and may be abbreviated (and abbreviations may not be consistent).

Factors contributing to search problems:

- There are differences in the information between the Guidebooks Database and GeoRef.
- Sometimes **individual trips** are **not** in GeoRef…only the **title** of the **guidebook**. (Note the distinction between “trip” and “guidebook”)
- In other cases, more than the trips are in GeoRef (extra chapters and papers; supporting material; other when part of proceedings or transactions volume).
- Often, the society is abbreviated in GeoRef, so a series search fails to return all of the relevant records.
- If the guidebook is produced or sponsored by more than one society, the other societies may not appear in the GeoRef record, so those records will be missed when conducting a series search.
- If a series has not been analyzed by any library, the individual guidebooks will not appear in WorldCat.
- In the Guidebook Database, when searching by series, the guidebook title is only in the individual trip record, not in the list that is returned, so it is necessary to drill down another level to find the guidebook title.

Search terms:

- guidebook* OR field trip* OR excursion* OR excursion guide* OR road log* ….
- OR guide OR trip …
- OR guide book OR fieldtrip …

PROFESSIONAL SOCIETY JOURNALS, A CHANGE IN THE LANDSCAPE?

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Abstract - Scientific journals form the largest part of the geoscience information landscape. Professional societies were the progenitors of much of the geoscience literature, but over time, some societies have moved their journals to commercial publishers. Other societies used commercial publishers to start new journals for them. There has been a recent increase in the move of society journals to commercial publishers. Sometimes a society decides that its journal needs better visibility through all the Web resources and marketing capabilities of a commercial publisher. Perhaps the move provides financial benefits for the society. The change can reduce some library subscriptions, because the price of the moved journal may increase substantially. On the other hand, some libraries may obtain new access to the journal through automatic inclusion in one of the library's e-journal packages

This study identifies geoscience and other scientific society journals that have moved to commercial publishers. Journal prefaces and editorials, publisher newsletters, and announcements were examined to determine the reasons for moving specific journals to commercial publishers. Then the effect of the change in publisher was gauged through price histories, changes in library holdings, changes in journal impact measurements, and citation patterns. What is the impact of a shift of journal publishing from society to commercial publishers?

INTRODUCTION

Journal publishing is an important part of the mission of professional societies. For example, the Geological Society of America's constitution states that "the purpose of the Society is the promotion of the science of geology by the issuance of scholarly publications," (Geological Society of America, 2010) among other activities. SEPM "supports members in their professional objectives by publication of two major scientific journals," (SEPM, Society for Sedimentary Geology, 2010). The American Geophysical Union "is dedicated to furthering the sciences of geophysics…through publishing scientific journals…" (American Geophysical Union, 2010).

Scientific societies communicate via journals, conferences, annual meetings, newsletters, and now Web sites. Often societies gain a major source of revenue from the journals, particularly from library subscriptions. For example, all the activities for the Federation of European Biochemical Societies are funded by income from their journals (Elsevier, 2007). When many journals started, there were costs for peer review, printing, promotion, and distribution, as well as some financial contribution to the society. Some societies decided to forgo these costs by having commercial publishers handle the production and distribution of the journals right from the start. Then electronic journals arrived, and more societies decided to move their journals to commercial publishers to handle all the extra features that are needed to have an effective e-journal. Finally, commercial publishers and some large professional societies started to scan the backfiles of their journals. Earlier volumes were linked to the current electronic journals, and electronic access to each full journal run became a reader expectation. The costs of putting up these electronic backfiles have driven still more societies to look for commercial publishers to handle their journals.

Professional societies generally have kept their journal prices stable for a couple years at a time, made small increases each year, or made one-time large price adjustments. Commercial journals often increased their journal prices every year, particularly if they expected to publish more pages or issues. Librarians were concerned that the price of society journals would jump to a new level when they changed to a commercial publisher. It was expected that journal prices of these society/commercial journals would increase steadily afterwards. Some sample price histories are shown in Appendix 4.

This study is an exploration of the effects of movenent of professional society journals to commercial publishers. Springer has announced 52 new society journal partners in 2010 (Springer, 2010a). Nature Publishing notes that, "Publishing partnerships are a growing part of our business," (Nature Publishing, 2010). First there is a characterization of the extent of commercial publishing of society journals. Then some of the reasons for the society journal movement will be noted. The main part of the study is an analysis of the response of libraries to moves of seven society journals to commercial publishers. Geoscience society journals are the focus of the study.

CHANGING OUTLETS FOR SOCIETY JOURNALS

Societies have a variety of relationships with commercial publishers. A society may retain the copyright, and the commercial publisher publishes the journal. A journal may be an official publication for a society, or perhaps the society just has an affiliation with the journal. Some journals are not really products of societies, but members are offered discounted subscriptions. Some society journals start with a commercial publisher with the first issue. Other commercial journals have initiated a relationship with societies after several years of publication.

Examples of these relationships are listed in a sample of more than 800 science and engineering journals that had some relationships to societies. Appendix 1 lists journals that have relationships with geoscience societies. Appendix 2 lists journals from other science and engineering societies. Some journals actually come from museums or institutes rather than societies, but they have relationships with commercial publishers.

Some journals have relationships with multiple societies. This is more common with medical journals. For example, Elsevier's *Journal of Prosthetic Dentistry* is the official publication of 25 U.S. and international prosthodontic organizations (*Journal of Prosthetic Dentistry*, 2010). The Academy of Prosthodontics founded the journal with two other societies, so they might the leaders. Perhaps the other sponsoring societies do not handle the editorial work, but instead provide the journal as a member benefit. A publisher might want to lend more prestige to a journal by getting societies to sponsor it or perhaps several societies do not need more than one major research journal in their field.

REASONS FOR MOVING SOCIETY JOURNALS TO COMMERCIAL PUBLISHERS

Societies decide to move their journals to commercial publishers for a variety of reasons: to use the expertise of the commercial publisher; to increase the reputation of the journal, particularly on an international scale; to get indexed by the *Science Citation Index* and get an ISI Impact Factor; to add the journal's backfile to its e-journal site; and to achieve some financial benefits for the societies and member services. Some editorial comments best illustrate these motivations.

Access Publishing Expertise and Support

Commercial publishers encourage societies to become partners with them. Elsevier mentions "customized electronic delivery services designed to enhance quality, usability, universal access and archiving," and that it "continuously monitors and assesses new solutions and technologies," (Elsevier, 2010).

Here is an example of society journal (*Bulletin of Volcanology*) that migrated to a commercial publisher for this reason.

"The task of maintaining the highest standards of scientific communication can be accomplished with the **substantial expertise and support by an international publishing house**." (Schminke and Sparks, 1986, p.1)

Reputation

Several societies want to maintain and strengthen their journal's reputation, often on an international scale. Commercial publishers offer marketing capabilities to increase the exposure of society journals, For example, Wiley-Blackwell "invests in targeted, journal-specific sales and marketing strategies…to increase global readership and generate submissions for each individual society journal," (Wiley, 2010). Sage "offers its society partners a true global presence," (Sage, 2010). Taylor & Francis has a publishing team that is "truly international," (Taylor and Francis, 2010b).

Here are some examples of societies that migrated journals to commercial publishers for this reason.

"The move to one of the world's most respected and well-known scientific publishers, the Oxford-based Blackwell Publishers, is an important step aimed at **further strengthening** the position of *Geografiska Annaler* as a qualitative and **truly international journal**." (Mattson, 1989).

"The Netherlands Society for Aquatic Ecology (NVAE) has decided to give this new journal (*Aquatic Ecology*) a more international character through several major changes designed to preserve and further **improve the scientific quality** of the papers accepted for publication, and to achieve a **more international readership and participation**. In addition to the new name, these changes include a new publisher" (Gulati, 1997, p. V)

"The partnership is a positive step for both parties creating **more exposure and reach** for *International Geology Review* through Taylor & Francis' extensive marketing, online and distribution networks." (Wright, 2008)

Increase ISI Impact Factor

Some journals have not been able to be included in the *Science Citation Index* and get an ISI Impact Factor. Commercial publishers foster increase rankings in the *Journal Citation Reports*. Taylor and Francis announced that "more than 150 of our journals increased their Impact Factor by 25% or higher in 2007," (Taylor & Francis, 2010a).

The *Bulletin of Engineering and the Environment* moved to Springer-Verlag in 1998, and it finally got its first ISI Impact Factor for 2007: 0.463 (*Bulletin of Engineering and the Environment*, 2009). Appendix 5 provides two more examples of Impact Factor changes.

Adding Journal Backfiles

Society journal often have long histories, and it may be hard for a society to put up its backfile on its e-journal site. Readers do not want to have to seek paper copies of older issues. They expect seamless connections between the new and old literature. Commercial publishers may expand access to the society's journal archive quickly.

Financial and Members Benefits for the Society

Societies may derive financial benefits from affiliating with a commercial publisher. Oxford University Press (a nonprofit publisher) offers in its Oxford Journals Production "economies of scale to achieve highly competitive pricing on all aspects of outsourced work" and "make use of relevant technologies to improve working processes in order to reduce costs," (Oxford Journals, 2010). Springer "is committed to increasing your revenues…count on our proven track record, consistent ROI, easy terms and guaranteed royalty," (Springer, 2010b).

Commercial publishers may offer "online member access" and "dedicated membership service support," (Elsevier, 2010). Cambridge University Press (a nonprofit publisher) offers "society eTOC alerts…allowing societies to specify the title of the message, message content and start/end dates," (Cambridge Journals, 2010).

Here are two examples of societies that migrated to commercial publishers partly to achieve some financial benefits.

"The increases in the size of our journal have placed a **significantly increased financial burden** on the society and its members…a solution that would not only **address some of the financial issues related to the journal**…the Society of Vertebrate Palaeontology has signed a five year publishing agreement with the Taylor & Francis Group, a major publisher of scholarly and professional journals." (Society of Vertebrate Paleontology, 2009)

"The main advantages to the [Meteoritical] Society in collaborating with a publisher like Elsevier include **better financial security in the current climate of global uncertainty**, increased visibility via their electronic portal and increased institutional distribution, improved electronic publication, and **potentially reduced subscription/membership fees** to Society members," (Nagahara, 2009)

LIBRARY HOLDINGS OF SOCIETY JOURNALS PUBLISHED BY COMMERCIAL PUBLISHERS

Methodology

Detailed analysis of library holdings may reveal whether a society journal is currently reaching its intended audience in U.S. academic institutions. Six journals from Appendix 1 were chosen for this study. They are all covered in *GeoRef* (Ameican Geological Institute, 2010b), and they are published in English. The *Bulletin of Engineering Geology and the Environment*, *Facies*, and the *Bulletin of Volcanology* are more specialized than *Eclogae Geologicae Helvetiae*, *Geologische Rundschau*, and *Terra Nova*. The first two general journals began as national journals, and *Terra Nova* focused on Europe. The research specialties of geoscience departments were examined for all three specialized journals, and the research specialties of civil and environmental engineering departments were examined for the *Bulletin of Engineering Geology and the Environment*.

Current geoscience programs were identified in the *Directory of Geoscience Departments* (Keane and Martinez, 2008). Colleges and community colleges that did not have current data were excluded from the study. The research specialties of geoscience programs that might match the three specialized journals (*Bulletin of Engineering Geology and the Environment*, *Facies*, and the *Bulletin of Volcanology*) were scanned in the *Directory of Geoscience Departments* and the Web sites for graduate geoscience programs. The *Bulletin of Engineering Geology and the Environment* may support civil, environmental, and geotechnical engineering programs, so the research interests of these departments were scanned when *WorldCat* reported holdings for their libraries.

Journal holdings in U.S. libraries were identified through *WorldCat* searches, searches of individual library catalogs, and searches of e-journal lists at specific universities and colleges. Several schools did not have holdings of any of the journals in this study. Appendix 3 shows the distribution of these schools. Also, some universities that have PhD. programs in geoscience did not have any library holdings of these journals, according to *WorldCat*. The library catalogs and e-journal lists for these institutions were searched to see whether their researchers and students do indeed have some access to the journals. Often *WorldCat* does not include e-journal holdings.

Overall results of the specialized journals

Table 1 summarizes the correspondence between library holdings of the three match the three specialized geoscience journals with the academic programs that they serve. Overall, most of the researchers and students have access to the specialized journals. The most striking result is the large number of graduate geoscience programs that do not have volcanology but have access to the *Bulletin of Volcanology*. Perhaps geochemistry and igneous petrology programs should been classified as part of the journal's target audience. Then the number that of institutions that had specific interest in the journal would have been much higher.

The other results in this table show that these specialized journals are reaching a wide audience, including several institutions that do not offer geoscience degrees. Springer is the current publisher of all three of these titles, and it offers libraries large journal packages that include these journals. This widening of the potential audience is one of the main reasons that societies move their journals to commercial publishers.

Table 1. Correspondence between journal holdings and academic programs at U.S. universities and colleges – Specialized journals.

Academic Institutions that have current access to the journals			
	Bulletin of Eng Geol and the Envt	***Facies***	***Bulletin of Volcanology***
Graduate programs and undergraduate geoscience programs that have some of the specific interests covered by the journal	74	145	63
Graduate geoscience programs that don't have the specific interests covered by the journals	8	31	121
Undergraduate geoscience programs that don't have the specific interests covered by the journals	6	20	34
Academic Institutions that lack current access to the journals			
	Bulletin of Eng Geol and the Envt	***Facies***	***Bulletin of Volcanology***
Graduate programs and undergraduate geoscience programs that have some of the specific interests covered by the journal	14	23	4
Graduate geoscience programs that don't have the specific interests covered by the journals	5	6	10
Academic Institutions that have current access to the journals but no relevant geoscience academic programs			
	Bulletin of Eng Geol and the Envt	***Facies***	***Bulletin of Volcanology***
No geoscience programs	12	41	34

Bulletin of Engineering Geology and the Environment

The International Association for Engineering Geology and the Environment (IAEG), based in France, started its *Bulletin* in 1970. In 1997 the association reviewed the journal and decided to "make the journal available to as many people as possible, hence it was decided to set up a contract with an international publishing house who could enable the IAEG to take advantage of new technology," (Hawkins, 1998, p. 2). IAEG specifically wanted to use the new publishing house to "become more widely available in libraries," (International Association for Engineering Geology and the Environment, 2010).

Engineering geology is not a common program in geoscience departments, so four approaches were taken to find academic programs that might match library holdings of the *Bulletin of Engineering Geology and the Environment*. Entries in the *Directory of Geoscience Departments* and departmental Web sites showed which geoscience programs have an engineering geology interest. A list of student chapters and interested faculty from the Association of Environmental and Engineering Geologists (AEG) (2010) also identified engineering geology interest. Many geotechnical engineering programs were identified in *Peterson's Graduate Schools in the U.S.* (2008, p.101). Several schools that had holdings of the *Bulletin* were left. Their civil, environmental, and geological engineering programs were scanned for potential interest in the subjects of the *Bulletin.* This process identified a large group of academic institutions that might be interested in a library subscription to the journal.

The *Bulletin* is reaching most of its American academic audience with the 74 subscriptions noted in Table 1. Only 14 universities or colleges had engineering geology interests but lacked current access to the *Bulletin*. A few additional graduate geoscience programs did not have access as well. In the past, geoscience libraries tried to maintain wide collections of journals, but now they are focused on current interests. A library that supports a graduate program may not need an engineering geology journal for current users.

Only four current print subscriptions to the *Bulletin* were found (Table 2). The print cancellation pattern is striking (Chart 1). There is a peak at 1997, just before the journal was moving to Springer. The next peak occurs in the mid 2000s, when electronic journal backfiles were available and libraries were moving to just e-only subscriptions.

IAEGs decision to go to Springer did actually expand access in American academic institutions. The expansion may not have been intentional in some cases, because 12 current Springer journal package subscribers have electronic access but no geoscience or engineering programs that might be interested in it. Fourteen schools that have an engineering interest but no access to the *Bulletin* include six that never had the journal. Perhaps the libraries do not have Springer journal packages, may be adding few journals, or were not interested in an engineering geology journal with an international focus.

Chart 1. Pattern of U.S. library cancellations of the print version of the *Bulletin of Engineering Geology and the Environment* and its predecessors.

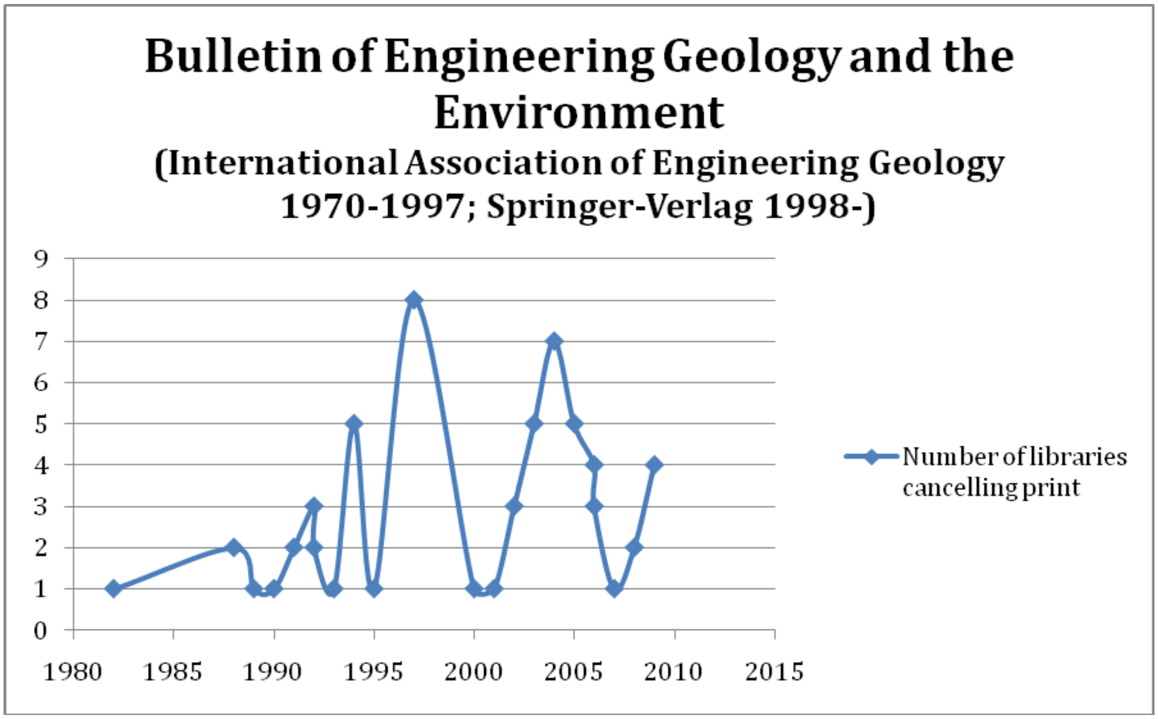


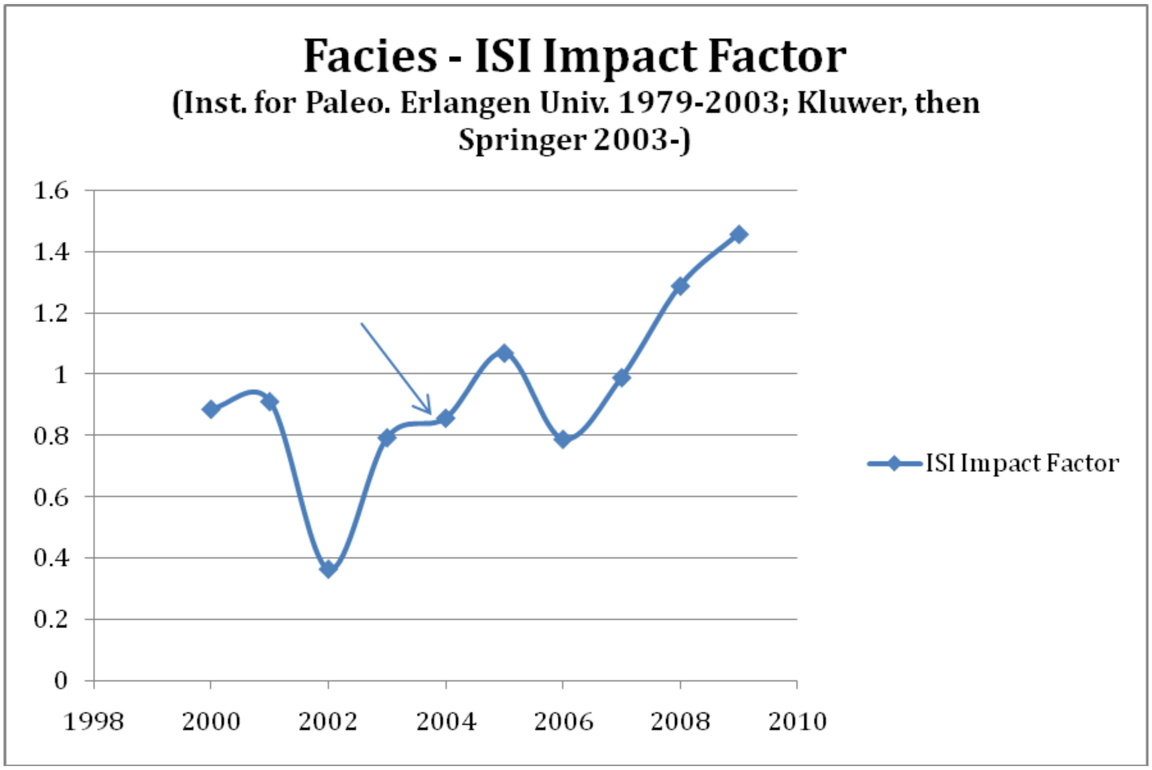
Table 2. Status of library subscriptions to *Bulletin of Engineering Geology and the Environment*.

Status of Library Subscription	**Libraries**
Cancelled print	4
Some access to electronic backfile, but no current subscription	4
Current print subscription only	2
Current print and electronic subscription	2
Current e-only subscription, never had print	49
Current e-only subscription, replacing print subscription	47

Facies

Facies is a journal of paleontology, sedimentology and geology. Special emphasis is placed on carbonate sedimentology, paleobiology, paleoecology, basin evolution, and studies that emphasize the impact of life on earth history (*Facies*, 2010). For nearly 25 years, it was produced by the Institute of Paleontology in Erlangen, Germany. It is not a society journal *per se*, but an institutional journal. However, its behavior is similar to other society journals that switched to commercial publishers. The editorial in the first issue under Springer in 2004 notes that "it is a pleasure to see the journal in the hands of such an experienced publisher, and to have it managed by the 'geo-action team,' which also publishes related journals such as the *International Journal of Earth Sciences*," (also included in this study) (Freiwald, 2004). It is interesting to note that the editorial goes on to mention achievements of the journal that occurred several years before the move to Springer: "*Facies* rapidly gained a steadily increasing profile amongst the scientific community worldwide. Since 1995, *Facies* has been selected for coverage in ISI." The ISI Impact Factor has increased in the last three years under Springer (Chart 2).

Chart 2. ISI Impact Factor pattern for *Facies*.



Any geoscience program that had some interest in paleobiology, sedimentology, sedimentary petrology, palebiology, or related subjects was considered a potential audience for this journal. These subject programs are more widespread than engineering geology in American universities and colleges, so a larger number of academic institutions might be interested in *Facies* than in the *Bulletin of Engineering Geology and the Environment*. *Facies* is reaching a substantial amount its potential audience. 176 universities and colleges that have an interest in the focus of *Facies* have access; only 23 interested graduated programs lack access to the journal. 41 schools do not have geoscience degrees but still have access through their libraries, primarily through Springer journal packages. Library consortia such as CUNY, one in Oregon, one in Pennsylvania, and one in Florida provide access to several libraries that are only interested in parts of the journal packages. IAEG may want the extra coverage, but these libraries would probably cancel their subscriptions if the consortial journal packages were reduced or cancelled.

After the *Facies* moved to Springer, several libraries cancelled their print subscriptions (Chart 3), though there were a few cancellations before the transition. The print cancellations probably occurred when libraries switched to e-only access and bought journal backfile packages. In fact, 30 libraries have switched to e-only subscriptions (Table 3). Only 5 current print subscriptions were found. Most of the current subscribers never had the journal before they subscribed to Springer e-journal packages.

Chart 3. Pattern of U.S. library cancellations of the print version of *Facies*.

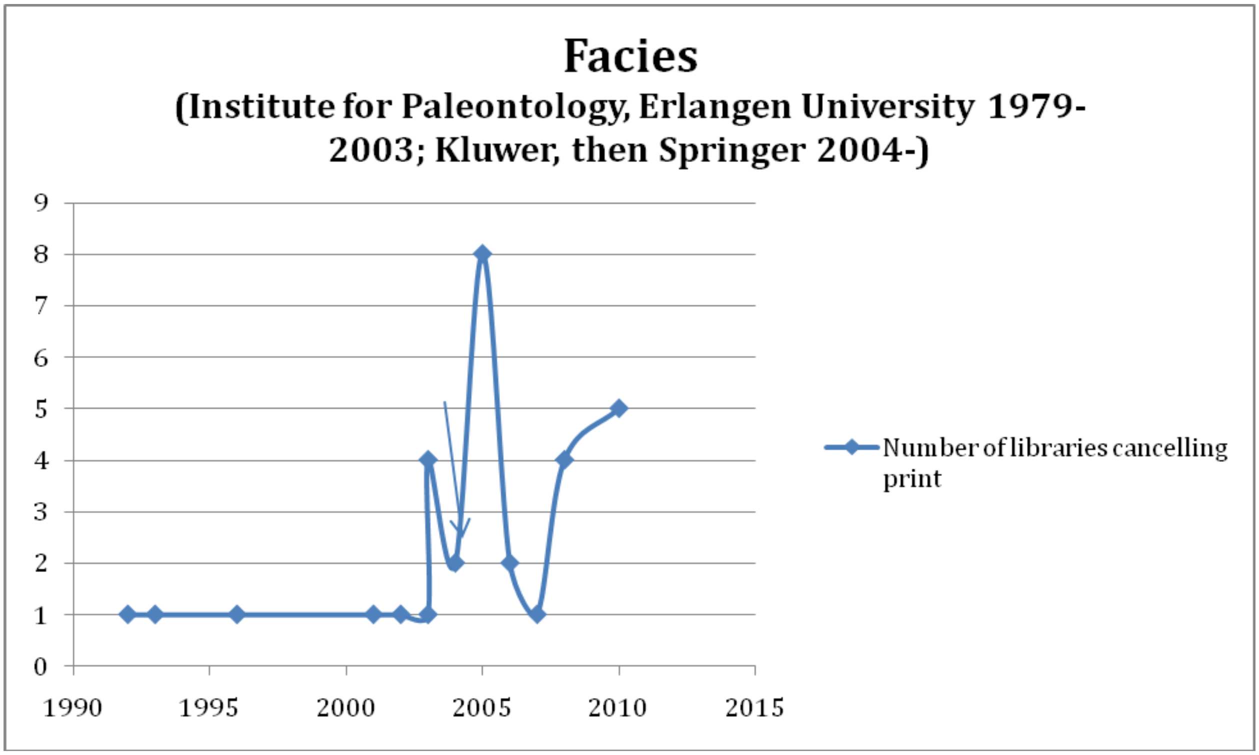


Table 3. Status of library subscriptions to *Facies*.

Status of Library Subscription	Libraries
Cancelled print	1
Some access to electronic backfile, but no current subscription	4
Current print subscription only	1
Current print and electronic subscription	4
Current e-only subscription, never had print	203
Delayed e-only subscription, never had print	2
Current e-only subscription, replacing print subscription	30

Bulletin of Volcanology

Bulletin of Volcanology is included in the *GeoRef* priority list for indexing (American Geological Institute, 2010a). The International Association of Volcanology and Chemistry of the Earth's Interior started *Bulletin Volcanologique*, its official journal, only two years after its founding in 1922 (*Bulletin of Volcanology*, 2010). In 1986, the journal moved to Springer. The journal publishes papers on volcanoes, their behavior, and hazards. Library holdings were compared to U.S. geoscience programs with these interests.

The *Bulletin* is widely held by U.S. libraries (Table 1). Almost twice as many graduate geoscience programs (121) that did not specifically have a volcanology interest had access to the journal than did graduate programs that included volcanology (63). Perhaps if the *Bulletin*-related subject interests were redefined to include igneous petrology and geochemistry programs, the results would be reversed. Some undergraduate geoscience programs were matched to the *Bulletin of Volcanology* using the list of volcanology schools from the U.S. Geological Survey Cascades Volcano Observatory (2006).

The common two-peak cancellation pattern was observed in library holdings of the *Bulletin of Volcanology* (Chart 4). Several libraries cancelled their subscriptions when Springer-Verlag took over the journal publication in the mid-1980s. In the mid-2000s, other libraries cancelled their print subscriptions and moved to e-only access. Since the mid 1990s, 135 subscriptions changed from print to electronic (Table 4). Only 20 libraries cancelled the print subscriptions and did not pick up electronic access later.

The *Bulletin of Volcanology*'s coverage of American libraries increased substantially with the move to a commercial publisher. Most of the increase came from libraries that bought the Springer electronic journal package and the historical electronic journal archives for earth and environmental science. Several of the libraries are part of consortia, which may account for the 34 libraries (Table 1) that do not have geoscience programs and therefore little interest in the journal. A move by libraries away from big e-journal packages might reduce the coverage of the *Bulletin* substantially.

Chart 4. Pattern of U.S. library cancellations of the print version of *Bulletin of Volcanology*.

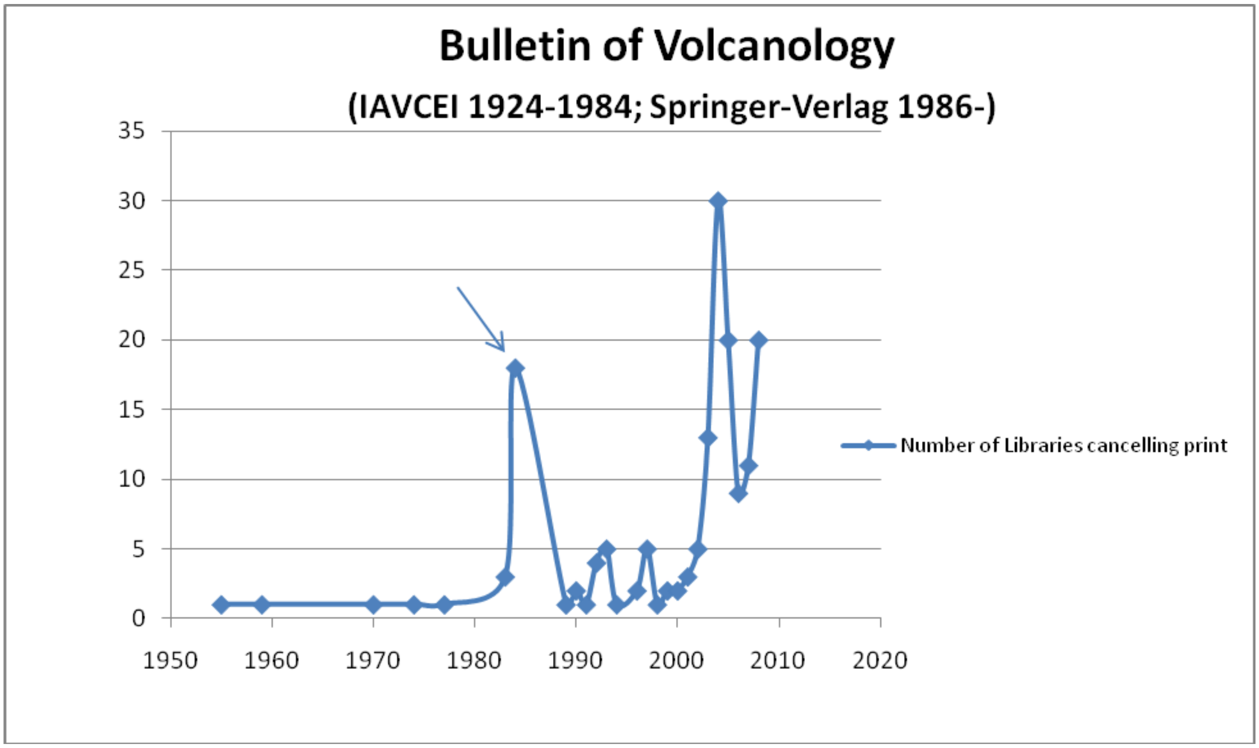


Table 4. Status of library subscriptions to *Bulletin of Volcanology*.

Status of Library Subscription	Libraries
Cancelled print	20
Cancelled print and have delayed e-access	2
Some access to electronic backfile, but no current subscription	3
Current print subscription only	4
Current print and electronic subscription	11
Current e-only subscription, never had print	101
Delayed e-only subscription, never had print	2
Current e-only subscription, replacing print subscription	135

Overall results of the general geoscience journals

Table 5 summarizes the analysis of how well library holdings of three general geoscience journals correspond to the academic programs at the libraries' institutions. The journals *Geologische Rundschau*, *Eclogae Geologicae*, and *Terra Nova* cover much of geoscience. It is expected that they would match most graduate and undergraduate geoscience programs. The results indeed back this expectation, though a large number of graduate programs still do not have access. Perhaps many American libraries are not interested in journals that have their origins in European national geoscience societies.

Table 5. Correspondence between journal holdings and academic programs at U.S. universities and colleges – General journals.

Academic Institutions that have current access to the journals			
	Geologische Rundschau	***Eclogae Geologicae***	***Terra Nova***
Graduate programs in the geosciences	180	133	129
Undergraduate programs in the geosciences	36	18	21
Academic Institutions that lack current access to the journals			
	Geologische Rundschau	***Eclogae Geologicae***	***Terra Nova***
Graduate programs in the geosciences	17	39	41
Undergraduate programs in the geosciences	20	5	16
Academic Institutions that have current access to the journals but no relevant geoscience academic programs			
	Geologische Rundschau	***Eclogae Geologicae***	***Terra Nova***
No geoscience programs	43	17	27

Geologische Rundschau, International Journal of Earth Sciences

Geologische Rundschau is included in the *GeoRef* priority list for indexing (American Geological Institute, 2010a). *Geologsche Rundschau*, now known as the *International Journal of Earth Sciences*, covers the history of earth with a wide range of topics such as the lithosphere, volcanology, sedimentology, the evolution of life, marine and coastal ecosystems, and surface processes. The Geologische Vereinigung started the journal in 1910. Some smaller presses handled the physical production until 1993, when the journal moved production to Springer-Verlag. Then the journal started using the word "international," and English was required for article abstracts. *Geologische Rundschau* aimed "to increase circulation, and for the Geologische Vereinigung to increase its membership," (Zankl and Dullo, 1993, p.1).

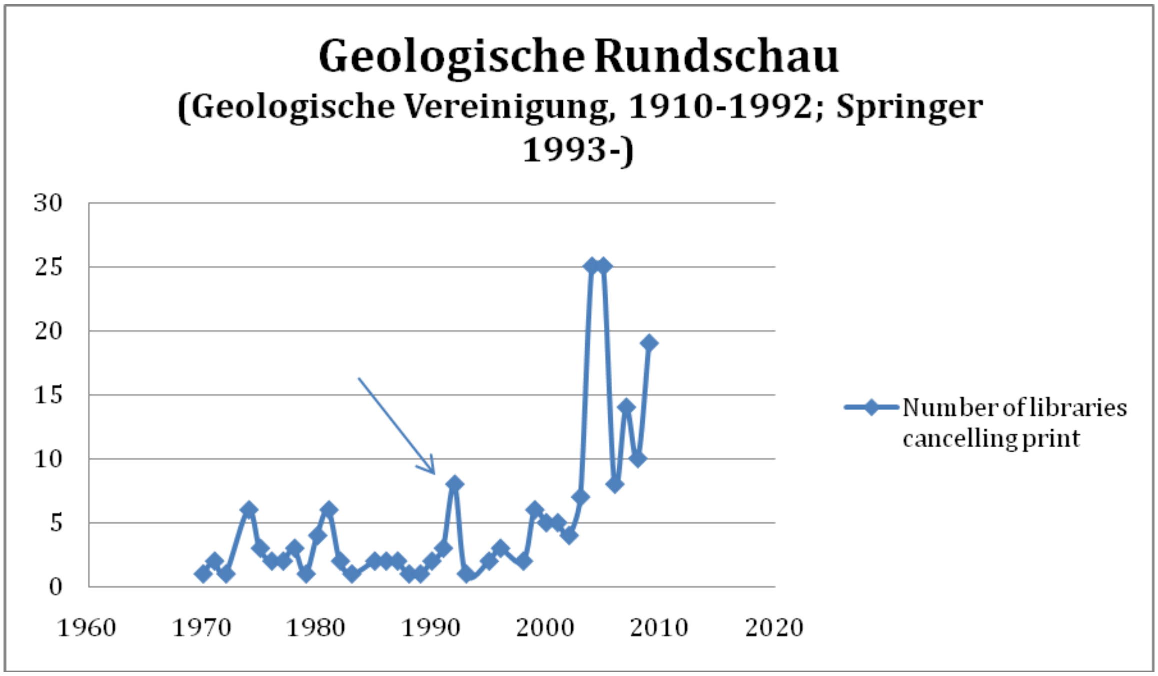
Table 6. Status of library subscriptions to *Geologische Rundschau*.

Status of Library Subscription	**Libraries**
Cancelled print	28
Cancelled print and have delayed e-access	4
Some access to electronic backfile, but no current subscription	3
Current print subscription only	5
Current print and electronic subscription	6
Current e-only subscription, never had print	99
Delayed e-only subscription, never had print	7
Current e-only subscription, replacing print subscription	140

Geologische Rundschau ***is available from most of the libraries that serve graduate geoscience programs and from more than half of libraries that serve undergraduate programs (Table 5). Only 11 current print subscriptions were identified (Table 6). Libraries that cancelled print subscriptions in the 1970s (Chart 5) often did not subscribe to the electronic journal 20 years later. Some subscriptions were cancelled when the journal went to Springer, but most subscriptions (140) were cancelled in the 2000s and converted to electronic subscriptions (Table 6 and Chart 5).***

There are a large number of e-only subscriptions (99) for libraries that never had the print (Table 6). Almost half (43) come from libraries that do not support geoscience programs (Table 5). Many of these libraries serve smaller institutions that are part of state or regional library consortia in large states such as New York, California, Florida, and Pennsylvania.

Chart 5. Pattern of U.S. library cancellations of the print version of *Geologische Rundschau*.



Eclogae Geologicae Helvetiae

Eclogae Geologicae Helvetiae was started in 1880 by the Schweizerische Geologische Gesellschaft. In 1988, the journal moved to Birkhaeuser. In 2007, it combined with the *Swiss Bulletin of Mineralogy and Petrology* (*Schweizerische Mineralogische und Petrologische Mitteilungen*) to form the *Swiss Journal of Geosciences*. Only the library holdings for *Eclogae Geologicae Helvetiae* were identified, because the transition to Birkhaeuser occurred before the merger of journals. *Eclogae Geologicae Helvetiae* "had a long tradition in publishing articles in the fields of geology and palaeontology," (Bucher, Billon-Bruyat, and Gnos, 2007).

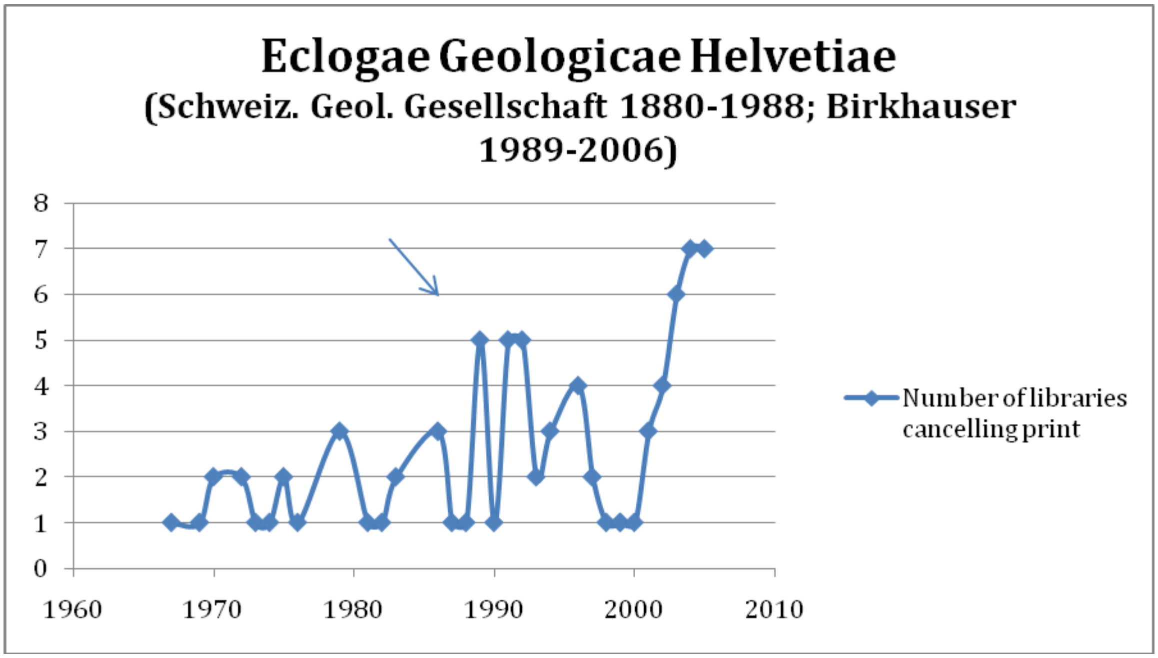
The cancellation pattern of *Eclogae Geologicae Helvetiae* is interesting (Chart 6). The large cancellation peak occurred in the mid-2000s as expected because libraries were converting their journals to e-only subscriptions. The next two highest peaks occurred right before and after the journal went to Birkhaeuser. Perhaps the transition caused the libraries to assess the journal's relevance to their constituencies. All the academic libraries that cancelled print during this time eventually started online subscriptions to the journal later.

This journal merged in 2007, and there were still a lot of print subscriptions (32) that had not converted to only online (Table 7). The total number of print subscriptions of the *Swiss Journal of Geosciences* is now probably lower than the 38 holdings of *Eclogae Geologicae Helvetiae* at the end of its run. The move to Birkhaeuser did seem to increase the availability of the journal to American academic institutions through *SpringerLink*. About one-third of the new e-only subscriptions reached PhD. geoscience programs that did not have access to the journal in print. There was still an audience of 9 PhD. programs that had no print or e-journal holdings. Their libraries must not have participated in library consortia deals to get access or just did not have the funds or inclination to do so.

Table 7. Status of library subscriptions to *Eclogae Geologicae Helvetiae*.

Status of Library Subscription	**Libraries**
Cancelled print	6
Current print subscription only	6
Current print and electronic subscription	32
Current e-only subscription, never had print	81
Current e-only subscription, replacing print subscription	47

Chart 6. Pattern of U.S. library cancellations of the print version of *Eclogae Geologicae Helvetiae*.



Terra Nova

Terra Nova is published by Wiley-Blackwell for nineteen national European geoscience societies: the Geological Society of Austria, Geologica Belgica, Czech Geological and Mineralogical Society, Geological Society of Denmark, Societe Geologique de France, Deutsch Geologische Gesellschaft, Geologische Vereinigung, Geological Society of Greece, Geological Society of Finland, Irish Geological Association, Societa Geologica Italiana, Geological Society of London, Association Géologique du Luxembourg, Royal Geological and Mining Society of the Netherlands, Geological Society of Norway, Geological Society of Poland, Geological Society of Spain, Geological Society of Sweden, and the Geological Society of Switzerland. Several of these societies publish their own official journals; so *Terra Nova* might be considered more of a "sponsored" journal.

The European Union of Geosciences (EUG) started the journal *Terra Cognita* in 1981. In 1989, the journal changed its name to *Terra Nova* and moved to Blackwell, eventually Wiley-Blackwell. *Terra Cognita* was a newsletter for the activities of the EUG. *Terra Nova* is the official journal of the EUG. It "publishes short, innovative and provocative papers of interest to a wide readership and covering the broadest spectrum of the Solid Earth and Planetary Sciences," (Schlich, 2003). These papers might appeal to most of the American graduate and many undergraduate geoscience programs.

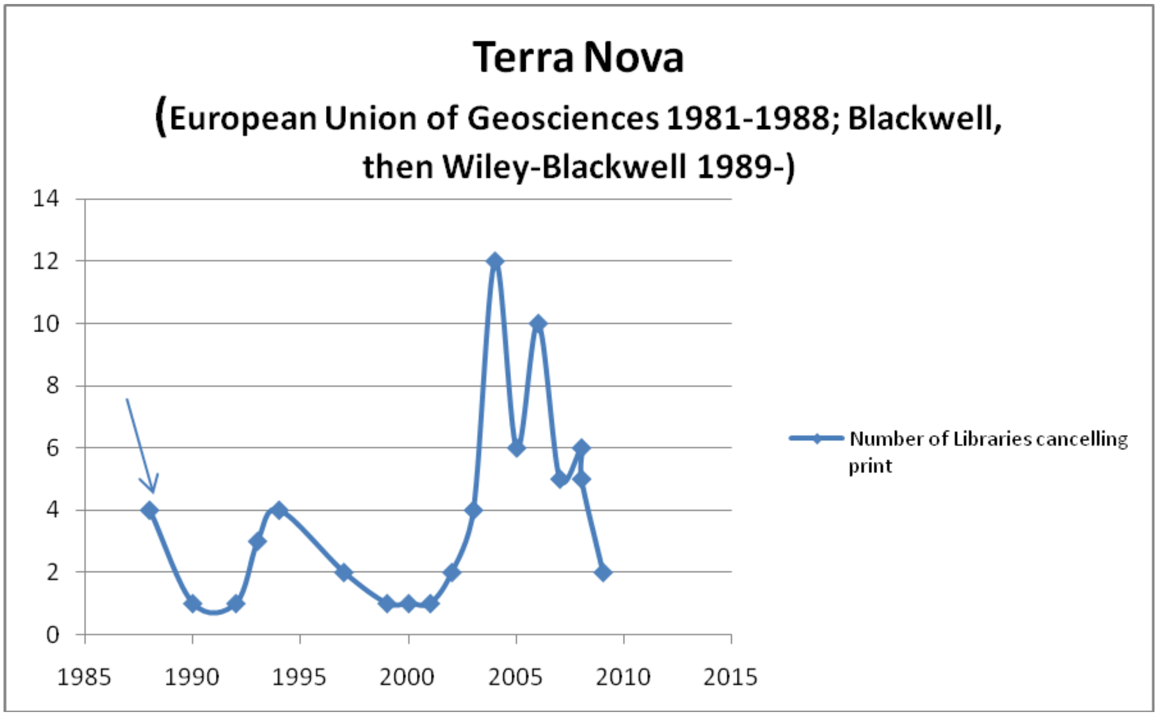
Terra Nova is reaching most of the graduate geoscience programs (Table 5), but 41 do not have current access. About half of these programs (18) had some electronic access to *Terra Nova* in *Academic Search Premier*, a journal package which lacks the current year of the journal. Almost all of the 78 libraries that have delayed online access (Table 8) have *Academic Search Premier subscriptions*. The 27 libraries that have access but no geoscience programs (Table 5) have Wiley-Blackwell packages. *Terra Nova* is reaching a wider audience after the switch to Blackwell, but the type of library electronic journal package affects the currency of the articles for members of academic geoscience programs.

The pattern of *Terra Nova* print cancellations is similar to the patterns for other journals (Chart 7), except that there were not many cancellations right after *Terra Cognita* changed to Terra Nova and Blackwell. The two publications are rather different. Libraries that wanted a research journal did not cancel the print version until Terra Nova was online and backfiles were available in the mid-2000s.

Table 8. Status of library subscriptions to *Terra Nova*.

Status of Library Subscription	**Libraries**
Cancelled print	7
Cancelled print and have delayed e-access	2
Some access to electronic backfile, but no current subscription	7
Current print subscription only	2
Current print and electronic subscription	8
Current e-only subscription, never had print	117
Delayed e-only subscription, never had print	78
Current e-only subscription, replacing print subscription	52

Chart 7. Pattern of U.S. library cancellations of the print version of *Terra Nova.*



Bioscience Reports

Bioscience Reports is produced not by a geoscience society, but by the Biochemical Society, a major British biochemical society. It is an example of one of the society journals that has changed publishers recently. It was published by the Biochemical Society from 1981 to 1985. Then it moved to Plenum, which was acquired by Kluwer, which was acquired by Springer. In 2008 it moved to Portland Press, which is actually the Biochemical Society's publishing arm.

Library holdings of *Bioscience Reports* were identified through *WorldCat*, library catalogs, and library e-journal lists. Table 9 is a summary of the status of library subscriptions, and Chart 8 shows the cancellation pattern, including online subscriptions.

Several libraries (86) cancelled print and relied on online subscriptions, but they did not pick up the current Portland Press subscription to *Bioscience Reports*. A substantial number of libraries (155) only had the electronic access that was free through 2007 or a SpringerLink subscription. They did not continue their online access with Portland Press. Chart 8 shows this striking change in subscriptions.

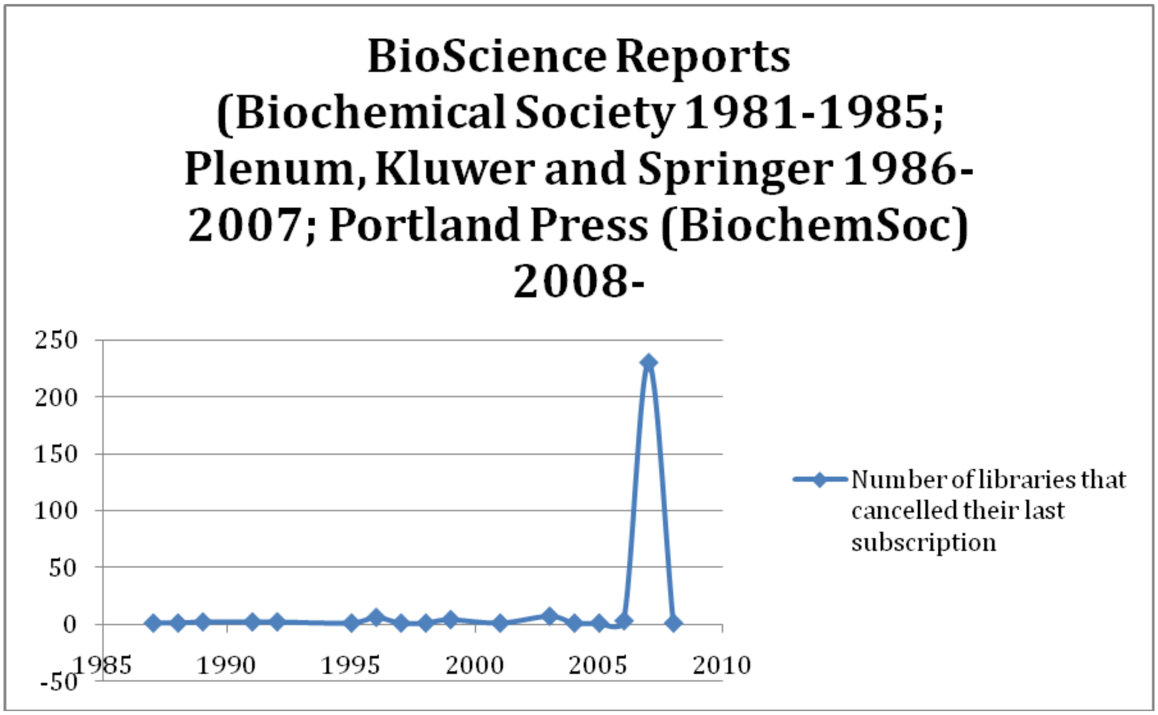
Bioscience Reports holdings were matched with a list of U.S. academic institutions that granted PhD.s in 2008 (Fiegener, 2009). Only 19 of the 156 doctoral programs had current online access to this journal. One had only a current print subscription. The vast majority (124) had online access until the journal moved from Springer to Portland Press. Perhaps some of these libraries will learn of the change and reinstate access, but it is surprising that most of the libraries do not have online access to a general bioscience journal from a major society, even if the society is not American.

This is an interesting journal. After *Bioscience Reports* moved from Springer to Portland Press, it made several initiatives. A knowledge environment called *BJ ChemBio* was created. The publisher is applying semantic Web features. In 2009, Portland Press agreed to publish another society journal, *Cell Biology International*, on behalf of the International Federation for Cell Biology. This is a good example of a society journal that can offer a lot of the features that commercial publishers promote to society journals.

Table 9. Status of library subscriptions to *Bioscience Reports.*

Status of Library Subscription	**Libraries**
Cancelled print	19
Cancelled print and later cancelled e-only access	86
Cancelled e-only access, never had print	155
Current print subscription only	2
Current print and electronic subscripton	4
Current e-only subscription which replaces print	16
Current e-only subscription	3

Chart 8. Pattern of U.S. library cancellations of the print version of *Bioscience Reports.*



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CONCLUSIONS

Societies have been partners with commercial publishers for several decades. The relationship has varied between working with a commercial publisher to start a new journal, establishing a sponsorship with a current commercial journal, or moving the journal from society publication to the commercial publisher. The society may have editorial control and control of the copyright. The publisher handles print production, marketing, preparation of the electronic journal site, archiving, and specialized services for society members and readers. The society may also receive financial benefits from the publishers.

Commerical publishers are not the only choice for societies that want larger entities to handle their publishing. The Biochemical Society and its Portland Press is an example of a society that can offer several advanced e-journal features for other societies. Additional societies such as the Geological Society of London and the American Institute of Physics offer publishing services for other societies. There are also aggregates such as GeoScienceWorld and BioOne that can offer societies electronic publishing features that they may not want to handle on their own.

Twenty years ago libraries would select specific journals. Only a few journals were sold in bundles and packages. Now most academic libraries have licenses for at least some journal packages from large societies and commercial publishers. Library users do gain access to a lot more content with this model. Most of the libraries that support research in the subjects of the journals in this study provide current access, with the notable exception of *Bioscience Reports*. There was not a complete match between the intended audience of each journal and library holdings. Several graduate programs do not have current access, and several libraries provide access to these journals without having any of the academic programs that relate to the journal subjects. However, the move to commercial publishers would probably be rated as a beneficial move by the societies that publish these journals, because library access has increased.

This study is just an initial exploration of the movement of professional society journals to commercial publishers. It will be interesting to see what happens if libraries cannot afford large journal packages. Then they might cancel the packages, select few specific journals, and rely on document delivery for the rest. Their library users might still get the articles they want, but will the users lose their awareness of the society journal as a brand? Will the researchers remember the journal when they decide where to publish?

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APPENDIX 1. Some Geoscience Society Journals with Commercial Publisher Relationships

Journal/Society	Move to Commercial Publ.	Relationship to society
Alcheringa/Association of Australasian Palaeontologists	Taylor & Francis	Official journal
Annales Geophysicae/European Geophysical Union	Gauthiers (1983), Springer (1991), EGU (2001)	Official journal
Applied Geophysics/Chinese Geophysical Society	English ed. (1989), Springer (2004)	Official English-language journal for Society
Australian Journal of Earth Sciences/Geological Society of Australia	Blackwell Science (1984), Taylor & Francis (2005)	Official journal
Bulletin of Engineering Geology and the Environment/International Association for Engineering Geology and the Environment (IAEG)	IAEG (1970), Springer (1998)	Official journal
Bulletin of Volcanology/IAVCEI	IAVCEI (1924), Springer (1986)	Official journal
Earth and Environmental Science Transactions of the Royal Society of Edinburgh	Royal Society of Edinburgh to Cambridge Univ. Press (2007)	Marketed and distributed by
Eclogae Geologicae Helvetiae/Swiss Geological Society	Schweiz. Geol. Gesellschaft (1888), Birkhaeuser (1989)	Official journal
Facies/Institute of Palaeontology, Univ. of Erlangen	Institute of Palaeo. Univ of Erlangen (1979), Springer (2004)	Published on behalf of Institute
Geochimica et Cosmochimica Ata/Geochemical Society and the Meteoritical Society	Pergamon (1950), later merged into Elsevier	Official journal
Geografiska Annaler. Series A. Physical Geography/Swedish Society for Anthropology and Geography	Blackwell (1997), later merged into Wiley-Blackwell	On behalf of society
Geologische Rundschau/Geologische Vereinigung	Geologische Vereinigung (1910), Springer (1993)	Official journal
GFF/Geological Society of Sweden	Taylor & Francis (2009)	Official journal
International Journal of Sediment Research/International Res and Training Center on Erosion and Sedimentation	Elsevier	Electronic version published on behalf of Center
Journal of Systematic Palaeontology/Natural History Museum (London)	From the Bulletin of the Natural History Museum, Geology Series to Cambridge Univ Press (2003)	Published for the Museum
Meteoritics & Planetary	Meteoritics Society (1957),	Published on behalf of the

Science/Meteoritics Society	**Wiley-Blackwell (2010)**	**Society**
Organic Geochemistry/European Association of Organic Geochemists	**Originated with Elsevier (1986)**	**Official Journal**
Palaeontologische Zeitschrift/Palaontologische Gesellschaft	**E. Schweizerbart'sche to Wiley-Blackwell (2009)**	**Official Journal, publisher has copyright**
Palaeontology/The Palaeontological Association	**Basil Blackwell (1988), Blackwell Publishing (1995), later merged into Wiley-Blackwell**	**Official journal, society has copyright**
Polar Record	**Scott Polar Research Institute from beginning (1931) published by Cambridge University Press**	**Official Journal**
Studia Geophysica et Geodaetica/Institute of Geophysics (Czech Republic)	**Kluwer, later merged into Springer**	**Published for Institute**
Terra Nova/European Union of Geosciences	**EUG (1981), Blackwell (1989), later Wiley-Blackwell**	**Official journal**

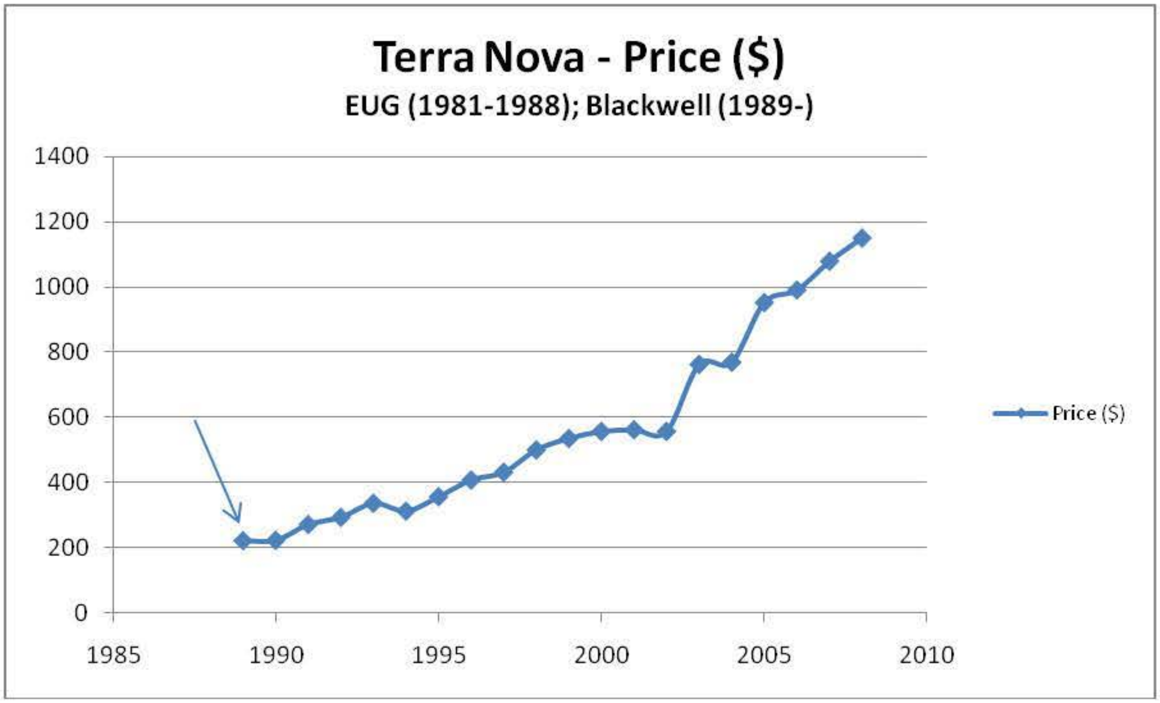
APPENDIX 2. Some non-Geoscience Society Journals with Commercial Publisher Relationships.

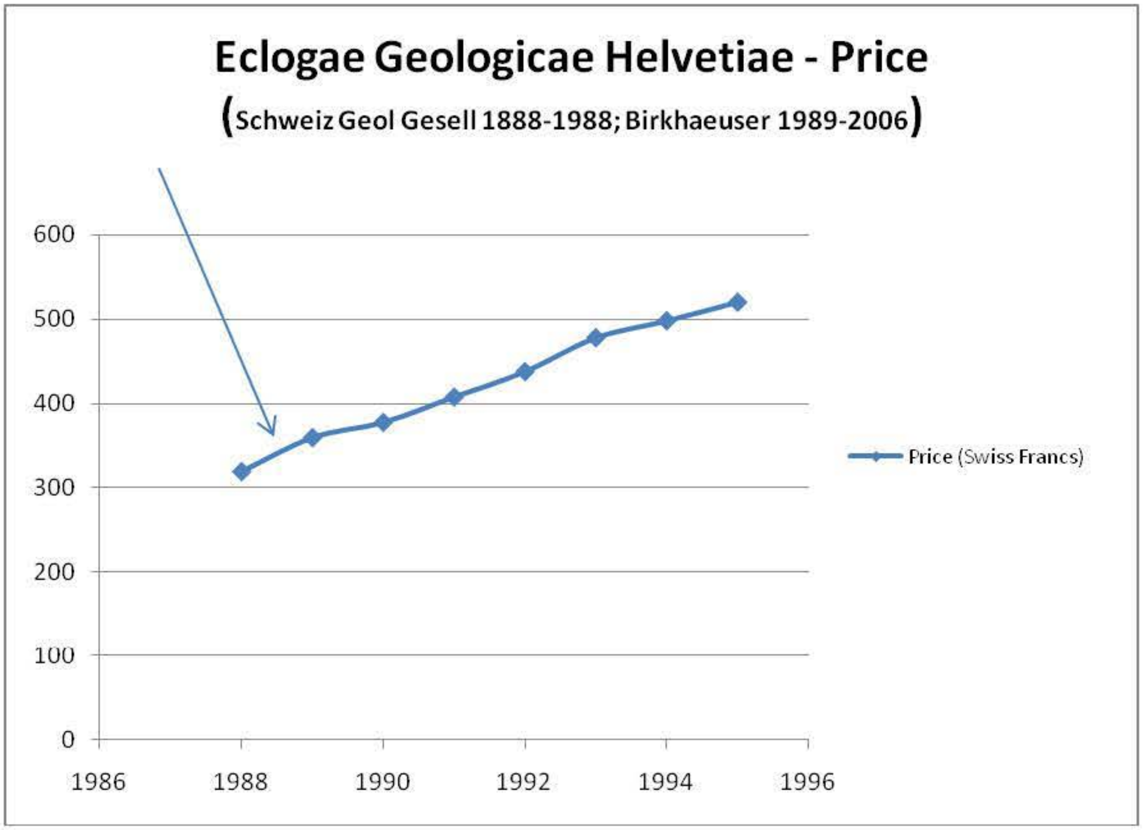
Journal/Society	Move to Commercial Publ.	Relationship to society
Academic Radiology/Association of University Radiologists and 7 other societies	Elsevier	Official journal
American Jorunal of Gastroenterology/American College of Gastroenterology	Nature Publishing	On behalf of society
Bioscience Reports/Biochemical Society	Biochemical Society (1981) & (2008), Plenum, Kluwer, and Springer (1986)	On behalf of society
Canadian Journal of Chemical Engineering/Canadian Society for Chemical Engineering	Canadian Society for Chemical Engineering (1957), Wiley-Blackwell (2008)	Published on behalf of society
Biology of the Cell/Societe Francaise des Microscopies and the Societe de Biologie Cellulaire de France	Societe Francaise de Microscopie Electronique (1981); Elsevier (1986); Portland Press (Biochemical Society) (2005)	Official journal
Molecular Oncology/Federation of Biochemical Societies (FEBS)	Elsevier	Published by Elsevier from the beginning on behalf of FEBS
Nature Reviews Cardiology/World Heart Association	Nature Publishing	Started by NPG, not the official journal of the association, but members receive a discount
Theriogenology/International Embryo Transfer Society	Elsevier	Members are entitled to discount
Transplantation Proceedings /Transplantation Society and 20 other societies	Elsevier	Official publication

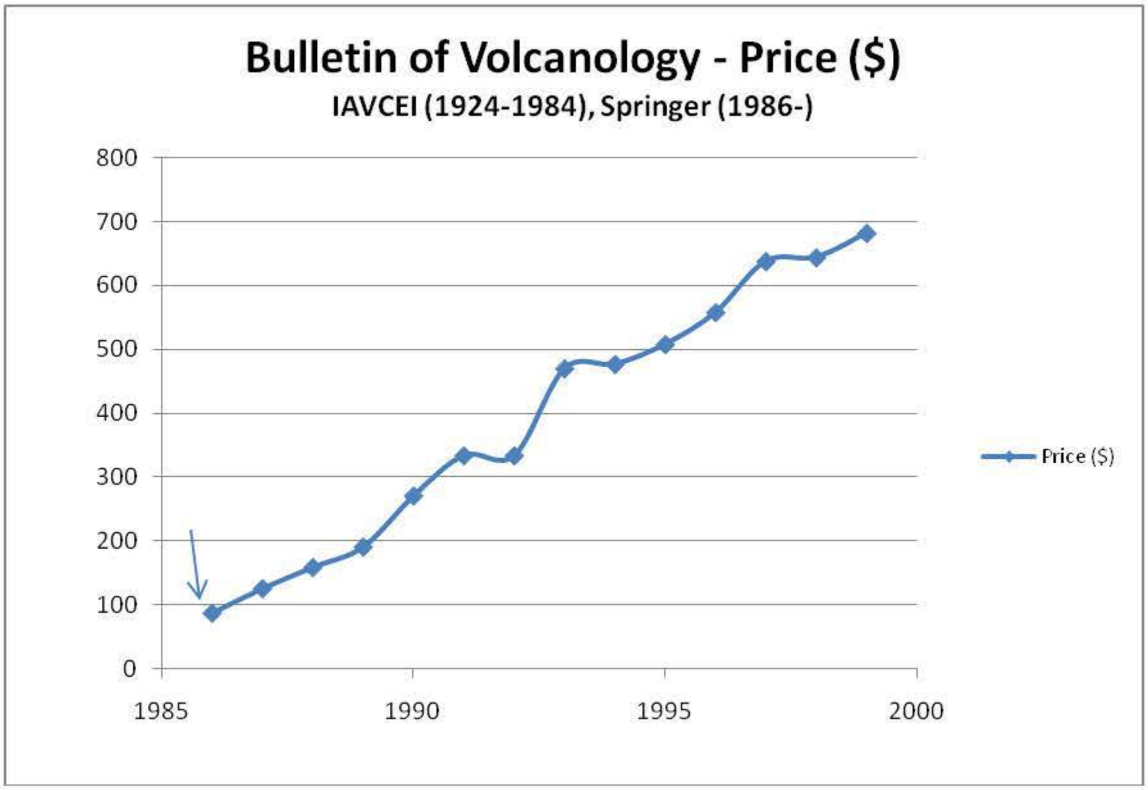
APPENDIX 3. Academic institutions that recently conferred geoscience degrees, but do not have holdings of the 6 geoscience journals in the study.

State	Associate's degree	Bachelor's degree	Master's degree
Arizona	1		
Arkansas		2	
California	11	2	
Colorado	1	7	
Connecticut		3	1
Florida	3	4	
Georgia	3	5	
Idaho	1	2	
Illinois	1	7	
Indiana		5	
Iowa		2	
Kansas			2
Kentucky		1	2
Louisiana		3	1
Maine		5	
Maryland		2	
Massachusetts		8	
Michigan	2	7	
Minnesota		7	
Mississippi		1	
Missouri	2	3	
Montana		2	
Nebraska		2	
New Hampshire		2	
New Jersey		6	1
New Mexico	1	2	
New York	2	15	3
North Carolina		6	
North Dakota		1	
Ohio		7	1
Oklahoma		2	
Oregon	1	2	
Pennsylvania		14	1
South Carolina		1	
Tennessee		5	
Texas	6	8	1
Utah	1	2	
Vermont		4	
Virginia	2	5	1
Washington	1	4	1
West Virginia	1	2	
Wisconsin	1	9	
Wyoming	1		
TOTAL	41	177	15

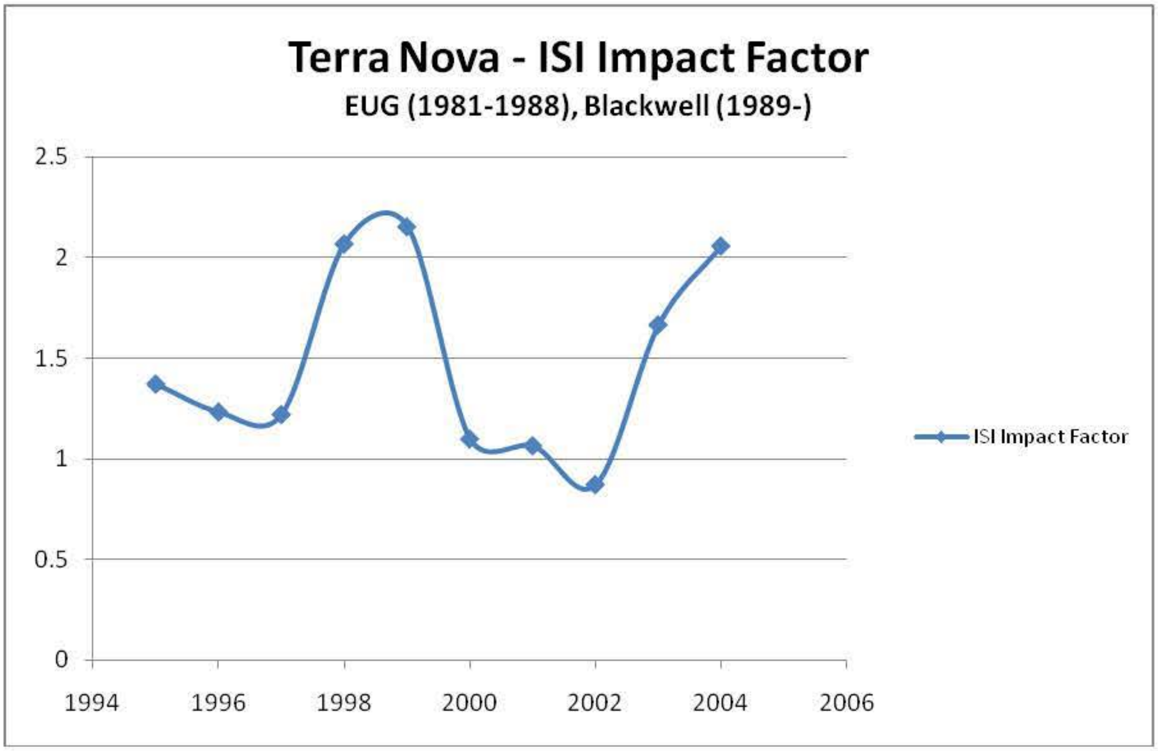
APPENDIX 4. Price histories after geoscience society journals changed to commercial publishers (arrow marks the time of change).

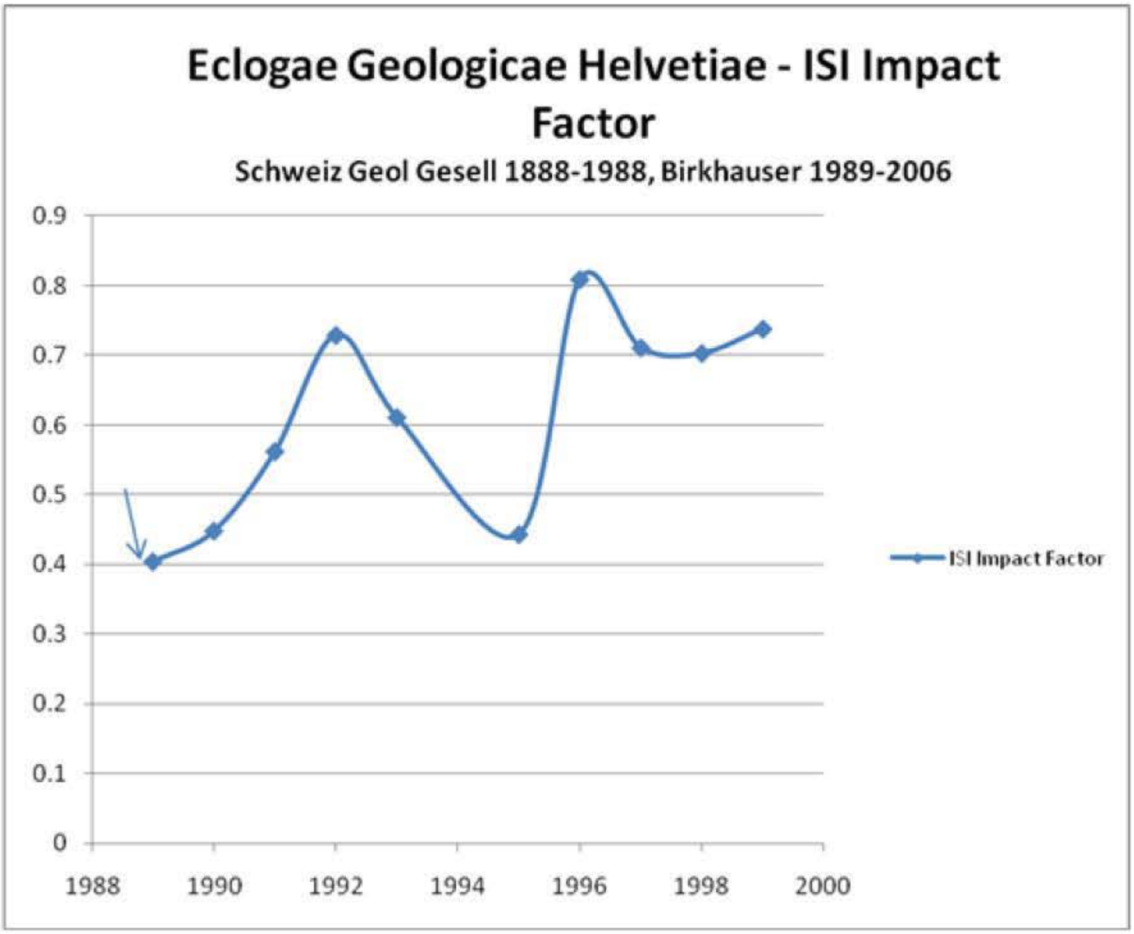





Bulletin of Volcanology - Price ($)
IAVCEI (1924-1984), Springer (1986-)
800
700
600
500
400
300
200
100
0
1985
1990
1995
2000
Price ($)

APPENDIX 5. ISI Impact Factors after geoscience society journals changed to commercial publishers.





FILLING LIBRARIAN-SIZED GAPS IN GEOINFORMATICS: TACTICS FOR LIBRARIAN ENTRÉE INTO THE REVOLUTION

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Abstract - Trends in geoscience librarianship seem to have fallen behind trends in geoscience generally, at least in the area of cyberinfrastructure and geoinformatics. Geoinformaticians are busy building data-rich systems on the ideas of interoperability, shareability, re-use, and long-term sustainability. Librarians, where they are working on data preservation, discovery, or dissemination issues, are similarly tasked. This presentation delineates various ways geolibrarians can push (or be pulled) into the world of geoinformatics, which welcomes librarian participation (but will not sacrifice progress to wait for it). Libraries-led education initiatives, librarian contributions to CI-building projects such as Purdue University's IsoMAP project, and high-potential (but largely untapped) projects such as the U.S. Geoscience Information Network will be discussed vis-a-vis their potential for librarian participation as a way to help steer, rather than navigate, the information landscape.

INTRODUCTION

I'm here with a bit of a tough sell -- that geolibrarians should be doing more work. And complicated, time-consuming work at that, involving particularly tough challenges; cutting or even bleeding edge technologies; with partners and in domains with which we are perhaps not altogether familiar; through more (and more diverse) collaboration; and at greater expense of time and resources. Specifically, I'll be arguing the importance of geolibrarians to the work happening all over the landscape under the umbrella of geoinformatics. I'll also offer some admittedly broad ideas about where and how librarians can attach themselves -- like barnacles to a whale -- to a rapidly-growing phenomenon with some serious weight and support behind it.

LIBRARY-TANGENT GEOINFORMATICS

To librarians, I think, the term "geoinformatics" should refer rather generally to inter- or multi-disciplinary applications, built on rapidly-advancing cyberinfrastructure, that adhere to standards, uphold or foster interoperable designs, push against existing limits of web and semantic web technologies, and exhibit concern for the future of their data products as well as the mechanisms by which those products are located and consumed. This is a suitably vague perspective that highlights an aspect of geoinformatics that I began noticing at conference after conference and in various kinds of literature: in much of the ongoing work there is a considerable amount of library science work. My concern, and so the reason I'm out proselytizing, is that the work is often being performed as an afterthought by domain or computer scientists (when it is being done at all), and rarely by professional librarians. So *if* geoinformaticians are thinking about data curation, sharing, long-term discoverability, reusability, and metadata, they tend to do so without the perspectives and skills a librarian would bring to these same issues. And while geoinformatics work is not altogether simple or easy, I will not concede that librarians shouldn't be part of it, ensuring long- or even short- term access to its projects and products. In fact, if you picture geoinformatics as a massive, lumbering, but very complicated and capable robot (as I do), I believe you should be able to rip its head off, peer down into its guts and see a gaggle of librarians, domain scientists, educators and computer scientists in there tinkering with stuff. And isn't that a better metaphor than barnacles on a whale?

But how should librarians contribute? And where? Where are there points of access into geoinformatics

projects for librarians? Where are there missing pieces of the puzzle? A glib but legitimate answer to this could be "anywhere." But here are three key areas that librarians could begin addressing immediately with fairly immediate results:
1. Building & Research 2. Psychopompity & Education 3. Services & Support

BUILDING & RESEARCH

One piece of Building & Research will have to go without saying (almost). If you are a librarian and your personal research agenda includes such topics as data repositories, standards-based information and data delivery protocols, metadata sharing and crosswalking, or ontologies, then odds are you're already helping. Please proceed.

There is a trend in some libraries, however, that warrants a little more description. This is where librarians are becoming collaborators with geoinformaticians. Like so many other partners in research, these librarians are on research teams, attending project planning sessions and progress meetings, on proposals and grants, and generally involved in research as any other partnered researcher on campus. Where a computer scientist might help an atmospheric scientist develop geostatistical models, the librarian helps them to build pieces of cyberinfrastructure that will allow for data curation or sharing; metadata writing, indexing, or harvesting; data or tools access; or other mechanisms with which the librarian might have particular expertise.

The upstreaminess of these arrangements are significant. Librarians in project planning meetings can ask particularly librariany questions about how data will live when funding ends; about how other scholars or constituents should be able to use the project's data and tools; about how other populations should be able to find and re-use the project's results; about who will be responsible for documenting the project's results and how. More important still, the librarian can direct development toward better strategies for all of these issues. In other words, if you think of geoinformatics and cyberinfrastructure as a big, lumbering, shiny, intelligent robot – and I do – then librarians should be somewhere in the guts of that machine, tinkering with stuff. Helping the machine survive and operate.

One quick example is Purdue's IsoMAP, an NSF-funded project that is building CI to allow public access to (and execution of) spatially-explicit, grid-enabled stable isotope models. Librarian presence on this project is ensuring that the shared results of the models (maps, primarily, with additional contextual information) will be well-described and connectable by systems (such as data repositories) that might want to expose the assets through other contexts, not just IsoMAP's own web application. The details are less important, however. It's the upstreaminess of the librarian's position here that illustrates A) the value to the library and data communities of having librarians so close to the heart of research, and B) how welcome (so far, at least) we are to researchers who are perfectly willing to let librarians handle the untoward, unseemly data curation, sharing, and documentation pieces of their work.

PSYCHOPOMPITY & EDUCATION

Liaising or simply talking with researchers about their data practices makes it quite clear that a librarian who is willing to usher researchers through the dark world of data management, markup, and sharing is a librarian worth including in proposals and grants. But this escort role (I think "psychopomp" carries more prestige) is important outside of the echelons of directed and sponsored research. In fact, it's really just a cute way to say that librarians are uniquely situated to preach the tenets and technologies of geoinformatics to more researchers and more students than perhaps anyone.

I spoke about exactly this at the Cyberinfrastructure Summer Institute for Geoscientists (CSIG) in 2009. Ostensible there to report on formal geoinformatics education efforts at Purdue, I mostly argued that until there is a coordinated, national curriculum for geoinformatics and cyberinfrastructure (I'm not sure I would bother starting your stopwatch on that), there is plenty of guerilla work that can be done to expose administrators, faculty, and students to the important things happen in the area of data and tool sharing, standards-based interoperability, and data-driven computation. Because librarians have such distributed, discipline-agnostic avenues through which we can howl and moan about these issues, ours may be the only voice that can introduce these ideas in a coherent way or, better still, be the beacon that draws together decision makers and researchers from across campus who might throw resources toward solutions. But in short, decisive strikes rather than massive, lumbering initiatives -- dropping talks into GIS Day celebrations, giving departmental seminars, running our mouths at disciplinary conferences, even cornering faculty in their coffee shops or during other transactions to drop morsels of information about the benefit of getting on board. Some might call it pestering or proselytizing, I call it preparing our faculty for the coming storm. Soon enough their funding agencies will be forcing them to have data management plans in their proposals, so even if they're not always interested in the kumbaya world of open data and sharing, they still want that cash, and will need to have at least a modicum of awareness of geoinformaticsy ideas.

Having said that, while it may not be necessary to launch heavier initiatives such as teaching courses in order to educate our local faculty and student bodies...it couldn't hurt. So we did. In 2008 Purdue Libraries faculty teamed with Earth & Atmospheric Sciences faculty to teach an upper 500-level course, "Geoinformatics," which was designed as a survey of issues rolled up in doing research with geospatial data and tools, including GIS. The course was designed to introduce students to the "arc of geoscience": the gamut that spans from locating, evaluating, and using sources of data, to, yes, desktop analysis and visualization, but then on to metadata, sharing, and redistribution of derived or new data.

SERVICES & SUPPORT

Now, admittedly, having librarians attached to and embedded in individual research projects or teaching semester-long courses introduces some scalability issues. A third approach has librarians pitching into geoinformatics via their institutions. Where libraries are building data curation or even just data consultation services for locally-produced data; where librarians are able to help write data dissemination and sharing and sustainability portions of project proposals (even if they don't expect to be able to actually build those mechanisms); where deans and directors can tour their campuses and identify areas of concern vis-á-vis the ability to handle research data in the not-so-distant future; all are areas where a more coordinated, strategic approach to geoinformatics from the libraries will no doubt contribute to the cause. Naturally, the approach described here is largely out of the hands of us as individuals, although I would argue that any single librarian, given even a little success in the area of geoinformatics (but of course generally with research data and cyberinfrastructure) could begin making the case for the importance of moving the rest of the libraries in that direction.

CONCLUSION

So, yes, there is a ton of work to do (on top of a ton of work we already have). Presented here are three (relatively) easy approaches toward pushing librarians and libraries closer to the heart of geoinformatics and geo-CI efforts and solutions. Two are immediate and can happen anywhere, the third (libraries-wide services and initiatives) is happening in some places already and is developing with increasing attention. The robot will march on with or without us, and librarians will or will not be there inside the beast, pulling levers and turning dials (I admit I may not know exactly how robots work). Fortunately (and this is not always the case) we seem to have the good fortune of choosing whether or how to involve ourselves.

HOW DEEP ARE GEOSCIENTISTS WILLING TO DIG? – A CITATION ANALYSIS ADDRESSING THE CHANGING INFORMATION-SEEKING BEHAVIOR IN THE DIGITAL AGE

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Abstract - To better understand the information-seeking behavior of geoscientists due to ever-changing research habits, an exhaustive citation analysis was performed on a local population of geology dissertations from a large academic research university spanning the years 1888-2008. Past studies have shown that literature-use in the geosciences declines more slowly than in other scientific disciplines, therefore geology dissertations present an interesting litmus test on how changing information-seeking behavior can affect the obsolescence of scientific literature over time. This diasynchronous review analyzes citation patterns of dissertations by comparing the average citation age for each year and normalizing this data with the earliest citation year (potential) to establish an "average citation depth" for the last 120 years of the university's geoscience PhD graduates. The results indicate that citations have become increasingly younger suggesting that information-seeking behavior has shifted in the last 10 years. These shifts are discussed in terms of potentially disruptive events including the physical location change of the geosciences library, the increased reliance on electronic bibliographic databases, and the role of individual dissertation advisors as affecting the average citation depth of dissertations.

THE BRITISH GEOLOGICAL SURVEY LEXICON OF NAMED ROCK UNITS

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Abstract - The British Geological Survey's Lexicon of Named Rock Units provides freely accessible definitions and supplementary information on lithostratigraphic and lithodemic units of Member status, or equivalent, and above used on BGS maps and in BGS publications, products and services. It also includes information on some units of lesser rank, and information on obsolete and alternative names. It can be searched online on the British Geological Survey website. Information is currently available relating to more than 18 600 unit names from the surface outcrop and subsurface of the United Kingdom and its continental shelf, although the level of completeness of entries is variable.

As well as being a repository of information, the Lexicon is used to constrain the rock units that appear in the Survey's products and services, and to provide the lithostratigraphic and lithodemic information that backs them up. A rock unit is not allowable in a BGS product until a definition, at least at index level, exists within the Lexicon.

The precise nature of a complete Lexicon entry depends upon categorization according to a theme (Bedrock, Superficial, Mass Movement or Artificial) and class (including Lithostratigraphic, Lithodemic, and Litho-morph-genetic, among others). The information available includes: rank; parent and child units; previous, current and alternative names; age; lithology; environment of deposition / mode of origin; shape; thickness; boundaries; type and reference localities and sections; geographical distribution; and associated landforms.

INTRODUCTION

One of the primary functions of a national geologic survey is to collect, collate and make available as widely as possible basic information on the geology of the nation; indeed out of six challenges presented in the current British Geological Survey (BGS) strategy, the first two are: "acquire, interpret and enhance the UK geoscience knowledge base and make it accessible and interoperable", and "improve the communication of geoscience knowledge so that it can better support policy and decision-making by government and society" (British Geological Survey, 2009).

The Lexicon of Named Rock Units is a freely-accessible digital resource of definitions of lithostratigraphic and lithodemic rock units from the British Isles that appear on maps and in other publications, products and services produced by BGS. The Lexicon focuses mainly on units of Member, Formation, Group and higher status or equivalent, although it also includes information on some units of lesser rank, notably economically important coal seams and laterally extensive and mappable marine bands. The Lexicon is hosted in a relational database, and is made available to the Survey's staff and to the wider world via web-based interfaces.

The purpose of the Lexicon is two-fold: first it comprises a dictionary against which we constrain our other data- and information systems; second it is a publicly-accessible repository of information relating to the definitions and inter-relationships of British rocks.

The Lexicon was initially developed in 1990 to replace a digital 'Dictionary of Stratigraphy' kept by BGS that held a much restricted set of information, and which was backed up by paper records. The new Lexicon enabled BGS to store the wealth of information required to describe each rock unit digitally for the first time. Over subsequent years the design of the database and user interfaces has been refined from time to time in response to evolving user requirements.

The Lexicon currently holds approximately 13 200 records, including both rock units currently recognised by BGS and those considered obsolete. Because records can include not only the current name of the rock unit but also alternative and previous names, definitions exist for approximately 18 650 rock unit names.

The Lexicon can be searched by visitors to the British Geological Survey website, and receives an average of approximately 3000 hits each month.

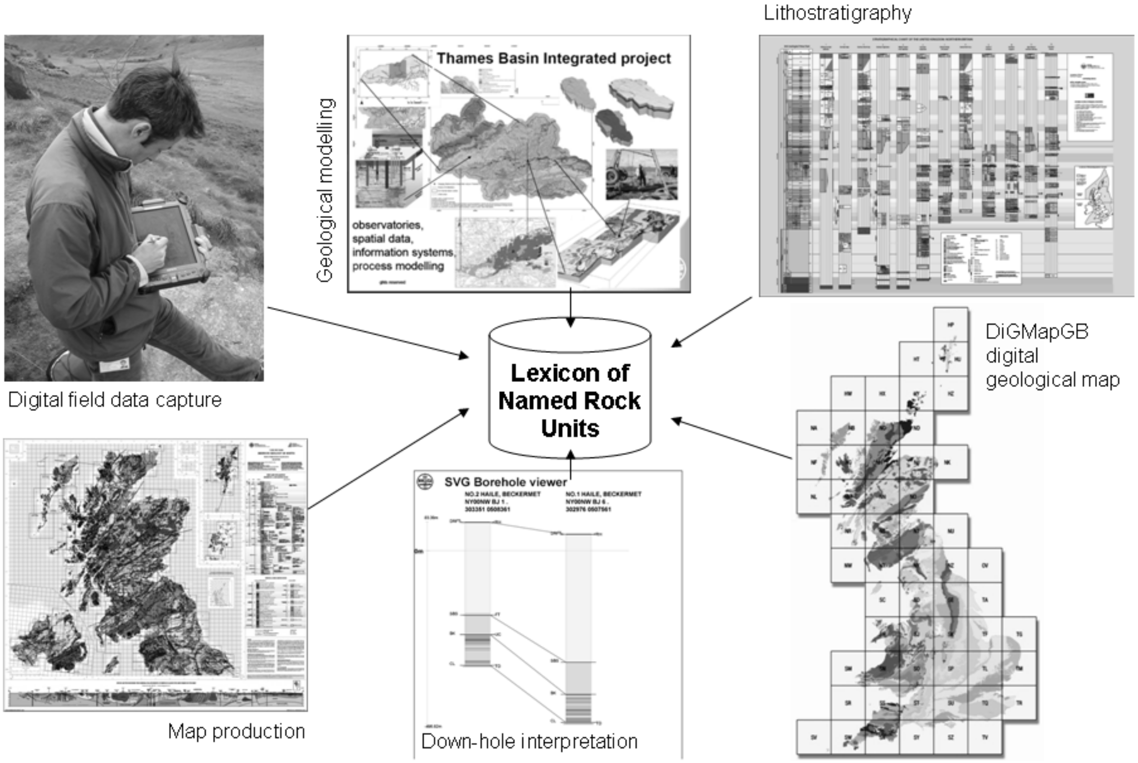


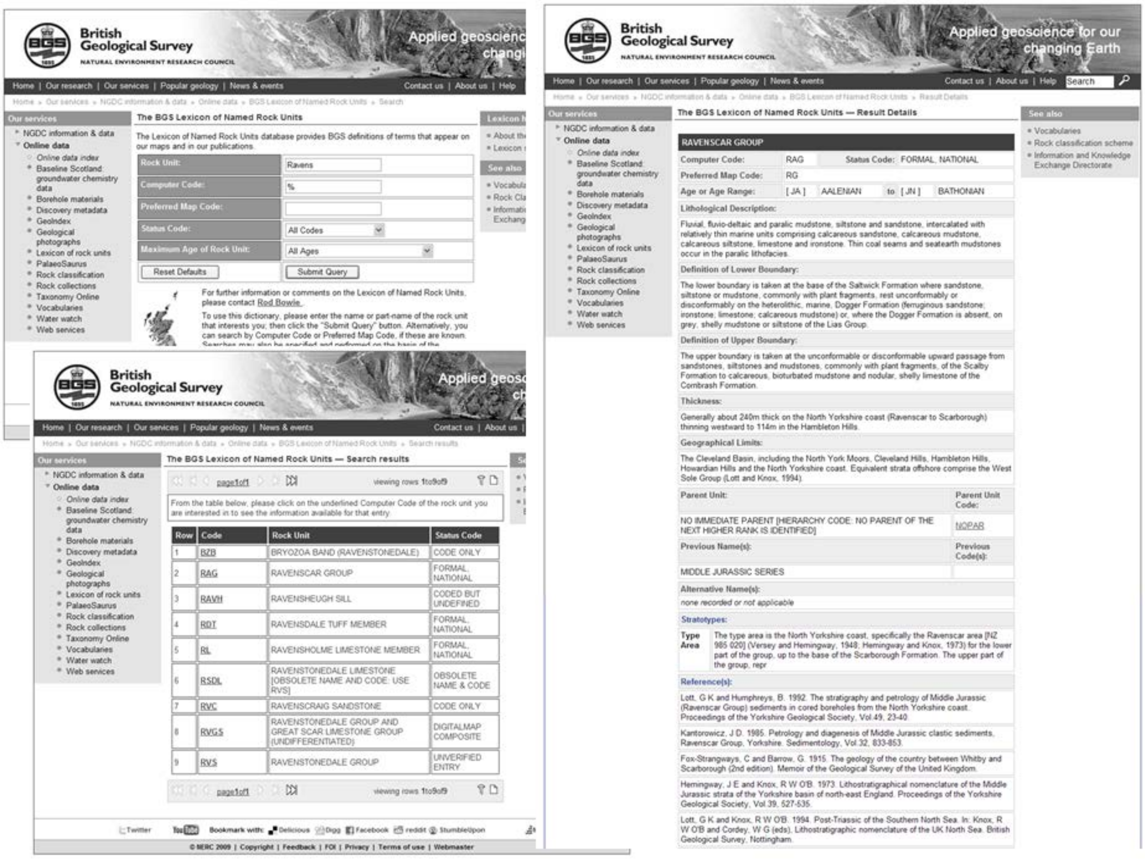
Figure 1. The dictionary function of the Lexicon of Named Rock Units. Workflows, products and services refer to the Lexicon for lithostratigraphic attribution. Examples shown are, clockwise from top left: digital field data capture, geologic 3D modelling, stratigraphic charts, BGS DiGMapGB digital geologic map products, subsurface interpretation, and printed map production.

THE DICTIONARY FUNCTION OF THE BGS LEXICON

BGS has many information systems that reference named British rock units, including digital databases, geographic information systems (GIS), geologic models, map production and other publication workflows (Figure 1). Each rock unit that is referenced in one of these systems is recorded in the BGS Lexicon.

Each rock unit is assigned a unique identifier consisting of an alphanumeric code up to five characters in length, often a mnemonic for the unit name. For example, the code representing the Ravenscar Group, a unit of Aalenian-to-Bathonian (Jurassic) fluvio-deltaic and marine clastic rocks that crops out across NE England is 'RAG'. Once assigned, this unique code is used in all systems that reference that rock unit. This is enforced through various means appropriate to the particular system. Databases stored in the Survey's relational database management software reference the Lexicon via mandatory foreign key relationships. GIS and geologic modelling software running on networked computers within BGS access the Lexicon via data download or network data connectivity. Digital systems taken out into the field have the relevant Lexicon entries downloaded to them prior to commencement of work. These procedures are enforced by formally documented workflows. In effect, each information system and workflow within the Survey has a foreign key relationship to the Lexicon. This ensures that all products, services and workflows use consistent lithostratigraphic information across the organization. For example, wherever the Ravenscar Group appears in a workflow, it is always referred to by its unique Lexicon identifier, and its attributes (correctly spelt name, age, lithology, boundaries, geographic extent, and others) are consistently available from the Lexicon.

Two examples illustrate this function. Firstly, the 1:50 000 scale geologic map data for England, Scotland and Wales may be downloaded from the British Geological Survey OpenGeoscience website via a web map service. The rock unit attributes that come along with the polygons are populated by export from the Lexicon of Named Rock Units. Secondly, the OneGeology Portal allows interactive display of geologic map data supplied by, at time of writing, some 137 organisations in 114 countries around the world. The rock unit attributes displayed for 1:50 000 scale polygons for Great Britain are populated from the Lexicon.



The BGS Lexicon of Named Rock Units

The Lexicon of Named Rock Units database provides BGS definitions of terms that appear on our maps and in our publications.

Rock Unit: Ravens
Computer Code: %
Preferred Map Code:
Status Code: All Codes
Maximum Age of Rock Unit: All Ages
Reset Defaults | Submit Query

For further information or comments on the Lexicon of Named Rock Units, please contact Rod Bowie.

To use this dictionary, please enter the name or part-name of the rock unit that interests you; then click the "Submit Query" button. Alternatively, you can search by Computer Code or Preferred Map Code, if these are known.

The BGS Lexicon of Named Rock Units — Search results

page1of1 viewing rows 1to9of9

From the table below, please click on the underlined Computer Code of the rock unit you are interested in to see the information available for that entry

Row	Code	Rock Unit	Status Code
1	BZB	BRYOZOA BAND (RAVENSTONEDALE)	CODE ONLY
2	RAG	RAVENSCAR GROUP	FORMAL, NATIONAL
3	RAVH	RAVENSHEUGH SILL	CODED BUT UNDEFINED
4	RDT	RAVENSDALE TUFF MEMBER	FORMAL, NATIONAL
5	RL	RAVENSHOLME LIMESTONE MEMBER	FORMAL, NATIONAL
6	RSDL	RAVENSTONEDALE LIMESTONE [OBSOLETE NAME AND CODE: USE RVS]	OBSOLETE NAME & CODE
7	RVC	RAVENSCRAIG SANDSTONE	CODE ONLY
8	RVGS	RAVENSTONEDALE GROUP AND GREAT SCAR LIMESTONE GROUP (UNDIFFERENTIATED)	DIGITALMAP COMPOSITE
9	RVS	RAVENSTONEDALE GROUP	UNVERIFIED ENTRY

page1of1 viewing rows 1to9of9

The BGS Lexicon of Named Rock Units — Result Details

RAVENSCAR GROUP

Computer Code: RAG Status Code: FORMAL, NATIONAL
Preferred Map Code: RG
Age or Age Range: [JA] AALENIAN to [JN] BATHONIAN

Lithological Description:
Fluvial, fluvio-deltaic and paralic mudstone, siltstone and sandstone, intercalated with relatively thin marine units comprising calcareous sandstone, calcareous mudstone, calcareous siltstone, limestone and ironstone. Thin coal seams and seatearth mudstones occur in the paralic lithofacies.

Definition of Lower Boundary:
The lower boundary is taken at the base of the Saltwick Formation where sandstone, siltstone or mudstone, commonly with plant fragments, rest unconformably or disconformably on the heterolithic, marine, Dogger Formation (ferruginous sandstone; ironstone; limestone; calcareous mudstone) or, where the Dogger Formation is absent, on grey, shelly mudstone or siltstone of the Lias Group.

Definition of Upper Boundary:
The upper boundary is taken at the unconformable or disconformable upward passage from sandstones, siltstones and mudstones, commonly with plant fragments, of the Scalby Formation to calcareous, bioturbated mudstone and nodular, shelly limestone of the Cornbrash Formation.

Thickness:
Generally about 240m thick on the North Yorkshire coast (Ravenscar to Scarborough) thinning westward to 114m in the Hambleton Hills.

Geographical Limits:
The Cleveland Basin, including the North York Moors, Cleveland Hills, Hambleton Hills, Howardian Hills and the North Yorkshire coast. Equivalent strata offshore comprise the West Sole Group (Lott and Knox, 1994).

Parent Unit:	Parent Unit Code:
NO IMMEDIATE PARENT [HIERARCHY CODE: NO PARENT OF THE NEXT HIGHER RANK IS IDENTIFIED]	NOPAR
Previous Name(s):	**Previous Code(s):**
MIDDLE JURASSIC SERIES	

Alternative Name(s):
none recorded or not applicable

Stratotypes:
Type Area The type area is the North Yorkshire coast, specifically the Ravenscar area [NZ 985 020] (Versey and Hemingway, 1948; Hemingway and Knox, 1973) for the lower part of the group, up to the base of the Scarborough Formation. The upper part of the group, repr

Reference(s):
Lott, G K and Humphreys, B. 1992. The stratigraphy and petrology of Middle Jurassic (Ravenscar Group) sediments in cored boreholes from the North Yorkshire coast. Proceedings of the Yorkshire Geological Society, Vol.49, 23-40.
Kantorowicz, J D. 1985. Petrology and diagenesis of Middle Jurassic clastic sediments, Ravenscar Group, Yorkshire. Sedimentology, Vol.32, 833-853.
Fox-Strangways, C and Barrow, G. 1915. The geology of the country between Whitby and Scarborough (2nd edition). Memoir of the Geological Survey of the United Kingdom.
Hemingway, J E and Knox, R W O'B. 1973. Lithostratigraphical nomenclature of the Middle Jurassic strata of the Yorkshire basin of north-east England. Proceedings of the Yorkshire Geological Society, Vol.39, 527-535.
Lott, G K and Knox, R W O'B. 1994. Post-Triassic of the Southern North Sea. In: Knox, R W O'B and Cordey, W G (eds), Lithostratigraphic nomenclature of the UK North Sea. British Geological Survey, Nottingham.

Figure 2. The Lexicon of Named Rock Units on the BGS website. The user specifies search criteria using the form (top left), and in response a list of matching results is displayed (bottom left). The user clicks on one of the entries on the list to see the full definition for that unit (right).

THE REPOSITORY FUNCTION OF THE BGS LEXICON

The second major function of the BGS Lexicon is to act as a repository for the organization's knowledge about British rocks. The Lexicon is made available both to staff within BGS, and to visitors to the BGS website, via searchable web interfaces (Figure 2).

An entry in the Lexicon should provide enough information for a user to know the general lithology, age, spatial distribution and origin of a rock unit. It should also provide a way into the literature for those who require more detailed information. This means the user can avoid possibly spending several hours on a literature search. The attributes used to describe a rock unit include: its unique identifier (described above); name; lithostratigraphic or lithodemic rank; chronostratigraphic age; preferred code used to identify the unit on BGS geologic maps; lithology; thickness; definitions of boundaries; geographic extent of outcrop; descriptions of associated landforms; lithogenetic description; parent unit; any previous and/or alternative names the unit has been/is known by; details of type and reference localities and sections; and important literature references.

Lexicon entries are generally created in response to the activities of the Survey. New rock units are defined as the geologic maps of areas of the country are revised and the lithostratigraphy is refined. Also, reassessment and revision of intervals of the stratigraphic column are occasionally carried out. The Lexicon is populated by BGS geologists who write the entries based both on a survey of the literature and their own knowledge and experience of the rocks being described. Typically a Lexicon author is an experienced field geologist who knows the rocks and their area of occurrence extremely well. Indeed, with many of our most experienced field mappers approaching retirement age, a crucial function of the Lexicon is to allow us to capture their accumulated knowledge so that it is not lost to the organization.

The first step in creating a brand new Lexicon entry is for the geologist, the Lexicon Manager, and the BGS expert for the geographic region and/or stratigraphic interval concerned, to agree that the new entry is required. The Lexicon Manager satisfies himself that the unit does not already exist in the Lexicon (possibly under an old or alternative name or spelling). If it is agreed that the new entry is necessary, the geologist provides sufficient information to create a stub entry; typically name, age, lithology and parent. At this stage the Lexicon Manager creates the unique identifier for the unit. The geologist can now go ahead and use the rock unit in her work, be it drafting a geologic map, creating a model, or writing a map sheet description or report.

At this stage, the Lexicon entry exists only as a stub. It is the geologist's responsibility to fill it out and turn it into a complete definition. The geologist submits the completed entry to the Lexicon Manager in due course, and the Lexicon Manager circulates the entry to two approvers – the relevant BGS regional or stratigraphic expert, and one of three Lexicon Curators ('North Britain', 'South Britain', and 'Offshore') – who both comment on it. Only when both have approved the entry can it be inserted into the Lexicon as an approved BGS description. Major revisions to existing Lexicon entries go through the same approval process. The Lexicon is considered a dynamic resource, and all entries remain open to revision at any time.

Until recently this approval process has been entirely paper-based, with the attendant problems of delays while paper forms are mailed between the two main BGS offices in Keyworth, England and Edinburgh, Scotland, occasionally lost, or on one occasion turning up in an office drawer after the office's occupant has retired. We are now in process of moving over to a digital system, in which Lexicon entries are edited, checked and approved using a web-based system.

SCOPE, COVERAGE AND COMPLETENESS

As well as the lithostratigraphic and lithodemic rocks of Member status or equivalent or higher on which the Lexicon primarily focuses, there are also entries for allostratigraphic units, for example river terrace gravels and till sheets, and some quasi-stratigraphic units, for example alluvium and peat. The Lexicon also holds some information on unit definitions that BGS regards as obsolete. It covers England, Scotland, Wales and Northern Ireland, and it covers both onshore areas (surface and subsurface) and the continental shelf.

While the aspiration is that the Lexicon should hold complete and verified descriptions for all qualifying rock units, in fact the completeness of entries is variable. There are a number of reasons for this. Many of the entries were inherited from the previous digital 'Dictionary of Stratigraphy' or other sources, and had incomplete supporting information. Some entries are of unknown provenance. Approximately 21% of the entries may be considered formal and complete definitions that meet the requirements of the North American Stratigraphic Code (NASC). There are approximately 5.5% of ‘informal entries’, *i.e.* entries that fail to comply with the NASC and expedients created for various purposes, for example ‘lumped’ composites consisting of more than one rock unit used to attribute polygons on large-scale geologic maps. Approximately 36% are ‘code only’ entries for which full definitions are not considered necessary, usually because they are below Member level or equivalent. There are approximately 26% of incomplete or provisional entries that should be turned into formal definitions in due course. Provisional entries are often the result of a desk study and may relate to rock units that have not recently been surveyed in the field by a BGS geologist. Finally, approximately 11.5% of entries are for obsolete units that have been superseded by more-recently defined rock units. These should cross-reference the accepted current definitions.

A NEW CONCEPTUALISATION OF ROCK UNIT DEFINITIONS

The relational data model used by the current version of the Lexicon is still very similar to the original design of 1990, although modifications have been made from time to time in response to requirements of BGS geologists. It has become clear over recent years that this data model no longer meets the evolving requirements of the users. It is necessary to record additional types of information not available in the existing data model, and to perform spatial searches that it does not facilitate.

A particular problem has been that the existing data model is very much a ‘one size fits all’ system; it offers the same fields no matter what kind of rock unit is being described, and at whatever rank, whether it be a sandstone formation, a basaltic dyke swarm, or a metamorphic assemblage. This is clearly inappropriate. For a sedimentary formation, appropriate information includes definitions of the upper and lower boundaries and environment of deposition, whereas for an igneous intrusion important information includes which host rocks are intruded and the relationship to regional deformation. The precise usage of fields also varies with the nature of the unit being described. For a sedimentary formation, ‘age’ refers to the time of deposition, whereas for a metamorphic assemblage ‘age’ is the date of metamorphism.

As part of a redesign of the Lexicon’s data model now being carried out, we have gone back to first principles to consider what information it is desirable to record for named rock units and we have formalised our conceptualisation of rock units into four ‘Themes’ and 10 ‘Classes’ (Figure 3). The particular combination of theme and class a unit belongs in controls which fields are available and mandatory for that unit, and the web interface used to populate and edit entries offers and constrains the fields as appropriate.

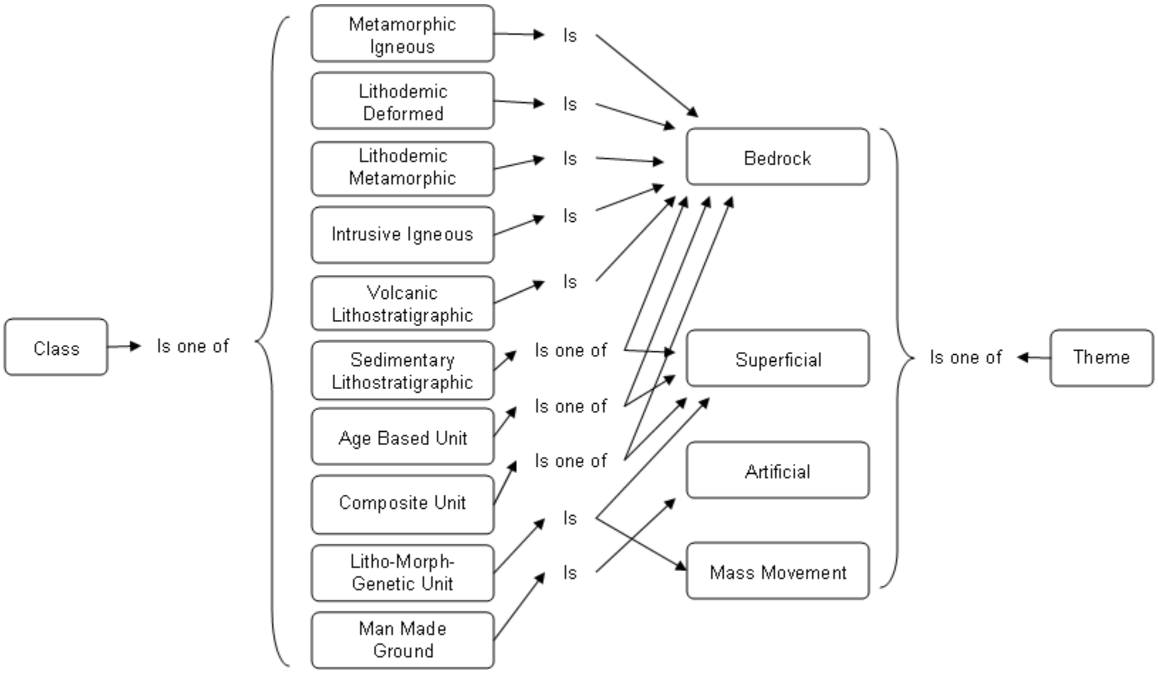


Figure 3. Rock units are conceptualised as belonging in one of ten classes and four themes. The combination of theme and class a unit belongs in determines which attributes are mandatory and permitted to describe that rock unit.

THE FUTURE

The BGS Lexicon of Named Rock Units is going through something of a transitional phase at time of writing, with redesign of its database and implementation of the new digital environment for creating, editing and approving entries. Beyond these changes, our planned future enhancements focus on improving the experience of the user visiting the Lexicon on the BGS website. Currently the information provided to the user is purely textual (Figure 2). However, Lexicon entries could be made much more informative and attractive by illustrating them with pictures of the rocks in the field, thin sections, landforms, sketch maps and graphic logs, which in many cases are available from the Survey's extensive collection of digital images. The spatial distribution of a rock unit could be indicated by displaying the relevant digital map polygons on a map alongside the textual information. Such polygons are available as part of the BGS 'Digital Geological Map' product and in the future could be displayed as part of the Lexicon webpage.

For visitors to the BGS website, using the Lexicon is at present a one-way process. Visitors may search and display information, but cannot comment on it or contribute to it. We recognise that users from outside BGS may have comments to make on the information given, or valuable observations to contribute. These could include information that a rock unit is represented by a particular facies in a particular area that we have not noted, or that notable structures can be seen in a particular place. We plan to provide a mechanism for visitors to the Lexicon pages to annotate entries with their own comments, which would be visible to subsequent visitors. This would require a mechanism to alert the Lexicon Manager when an entry has been annotated, so that some measure of moderation can be provided.

ACKNOWLEDGEMENTS

I thank Mr H Johnson and Dr P Stone for reading and commenting on a draft of this article, and Dr DJ Lowe, Mr A Smith and Dr CN Waters for discussions and suggestions for improvements to the Lexicon. The work of Mr RC Bowie, Mrs M Hyson and Mrs J Rippingale has been invaluable in populating the Lexicon. This article is published with the permission of the Executive Director, BGS.

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USING EXHIBITS TO PROMOTE SCIENCE

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Abstract - Creating a highly visible history of science exhibit can be a great way to promote interest in science and the library. The Coalition on the Public Understanding of Science is promoting 2009 as the Year of Science in an effort to engage the public in science and improve public understanding about how science works, why it matters, and who scientists are. Inspired by this, the Penn State University Libraries designed a two month history of science exhibit. On display in the most highly trafficked area of the main library, the exhibit highlights some of the important scientific developments throughout the history of Penn State. The process of putting together this exhibit involved a collaborative effort across departments within the library to identify significant individuals and scientific developments at Penn State. Creating a historical exhibit like this can be scaled to fit the size of any library or organization and the breadth of the subjects covered and can serve to illustrate the organization's impact to people outside the sciences as well as across scientific disciplines. Additional benefits include promoting the sciences within the library itself and increasing staff awareness of the important developments of our institutions.

INTRODUCTION

Science libraries often look for ways to promote science and the library to their users. There are many possible ways to do this and this article will discuss one possible way through the use of a library exhibit on the history of science at Penn State in one of the library's exhibit galleries. The primary purpose of this exhibit was to promote the sciences at Penn State to non-science majors as well as providing some science history for everyone passing through the library.

The idea for putting together this exhibit originated from two sources. First, the Penn State University Libraries marketing department was looking for exhibit ideas for the Pattee Library, the main library facility on the University Park campus, which has a number of exhibit display areas. Exhibits cover a broad range of interesting topics, but rarely focus on science and engineering topics. This would provide an excellent opportunity to create an exhibit to promote science and engineering to the general campus population.

Second, the Coalition on the Public Understanding of Science (COPUS) was promoting 2009 as the Year of Science and encouraging organizations to put on public events and develop projects that would promote science to the general public. This provided an initial focus for the development of the exhibit.

PUTTING THE EXHIBIT TOGETHER

Creating this exhibit involved collaboration with many department and individuals across the University Park campus of Penn State. Initial work on the exhibit involved the University Libraries' Public Relations and Marketing department which handles the scheduling and general planning and marketing for exhibits in the two primary exhibit areas in the Pattee Library. I worked with the director of the department on the scheduling of the exhibit space and the time frame that the exhibit would be displayed. I then worked extensively with the department's exhibits coordinator throughout the process on the basic display criteria, such as number of display panels, getting all of the necessary image and text materials together for the final display. The exhibits coordinator also did the layout and graphic design for the display panels. This department also did marketing for the exhibit as the time of the exhibit opening approached.

Early in the development stages of this project, I contacted each of the subject libraries on the University Park campus and asked the library to provide me with contact in the library who could work with me on identifying important individuals or developments in their subject areas that would be possible subjects for the exhibit. Initially, the project was envisioned to cover science very broadly, including its impact on subjects outside of science including the humanities, social science, and business, so I talked to staff from these libraries as well as the science and engineering subject libraries. The input received from these library staff members provided the base information for the exhibit.

The Special Collections Library was an important resource for identifying images for the exhibit. This library includes the Penn State University Archives which collects images and documents on the history of the university. The University Archivist and her staff met with me to discuss the exhibit and provided me with information on what materials they had available which helped in focusing the theme of the exhibit. They helped me identify the what materials in their collection I would want to examine and helped me throughout the processes of identifying images.

In addition to input from library staff, I found two books on the history of science at Penn State (Miller, 1992; Yarmey, 2006) which were helpful in identifying scientific achievements and important researchers. The University's website included two very useful websites on the history of research at Penn State and import teaching and research innovations that were initiated at Penn State. Additionally, the university has installed historical markers across campus identifying important features, individuals, and developments, many in science and engineering fields, which were also useful and this list can be found online.

THEME

The theme of the exhibit evolved throughout the early stage of developing this exhibit as I worked with individuals throughout the different subject libraries. Initially, the exhibit took a very broad view of science with the intent of looking across disciplines and focusing on major advances in science with the idea of including some of the developments from Penn State, but primarily focusing on promoting the scientific ideas and development themselves. With input from the staff of the subject libraries and, in particular, the staff of the University Archives, it became clear that there had been significant advances in science and engineering made by Penn State researchers and sufficient material on these researchers in the University Archives to focus the exhibit on the science advances made at Penn State.

An additional development in the theme of the exhibit was to include developments in science education as well as the research. The mission of Penn State University places the emphasis on education as well as research, so the exhibit includes the educational milestones as well as the research.

FINDING IMAGES IN THE UNIVERSITY ARCHIVES

Images for the exhibit were obtained from the Penn State University Archives. The University Archivist and here staff were extremely helpful in explaining what they had in the archives and in helping me identify image collections to look through. Some of the images in the archives were organized by individual and others were grouped by department, institute, or building. Images were stored in archival boxes and grouped alphabetically, but they were not individually cataloged, so it took some time to go through all of the relevant boxes of images. Another issue that came up was that many of the photographs did not have dates to identify what year they were taken. For the purpose of this exhibit, specific dates would have been helpful, but were not necessary.

THE EXHIBIT

The exhibit ran from early November 2009 through early January 2010 and was located in the main display gallery of the Pattee Library which, along with the adjoining Paterno Library, is the primary library on the

University Park campus. This location is just inside one of the main entrances to the library (Figure 1) and is part of the main hallway running through the library connecting the three entrances open to library users (Figure 2). This is a prominent location that most of the libraries' users will pass by. The display area has room for up to 20-25 display panels. The final display consisted of 26 display panels covering a broad range of science and engineering topics. Figures 3 and 4 show examples of the finished display panels from the exhibit, and Figure 5 is the description that went along with the exhibit.

During the course of preparing this exhibit another opportunity arose to use historical images from the University Archives within the library. Every fall term the University Libraries host an open house to help acquaint students, especially freshmen. This year, I took some of the images from the archives to create posters for the Earth & Mineral Sciences Library for the open house. There are many possible uses for these archival images, including web pages and instruction.

Figure 1. Exhibit area seen from Pattee Library entrance

Figure 2. Exhibit area and Pattee Library hallway and main circulation desk

Figure 3. Sample display panel from exhibit: Atmospheric Research

Hans Panofsky (Meteorology) conducted important research on atmospheric turbulence, air pollution, ozone depletion, and planetary atmospheres at Penn State between 1952 and 1982.

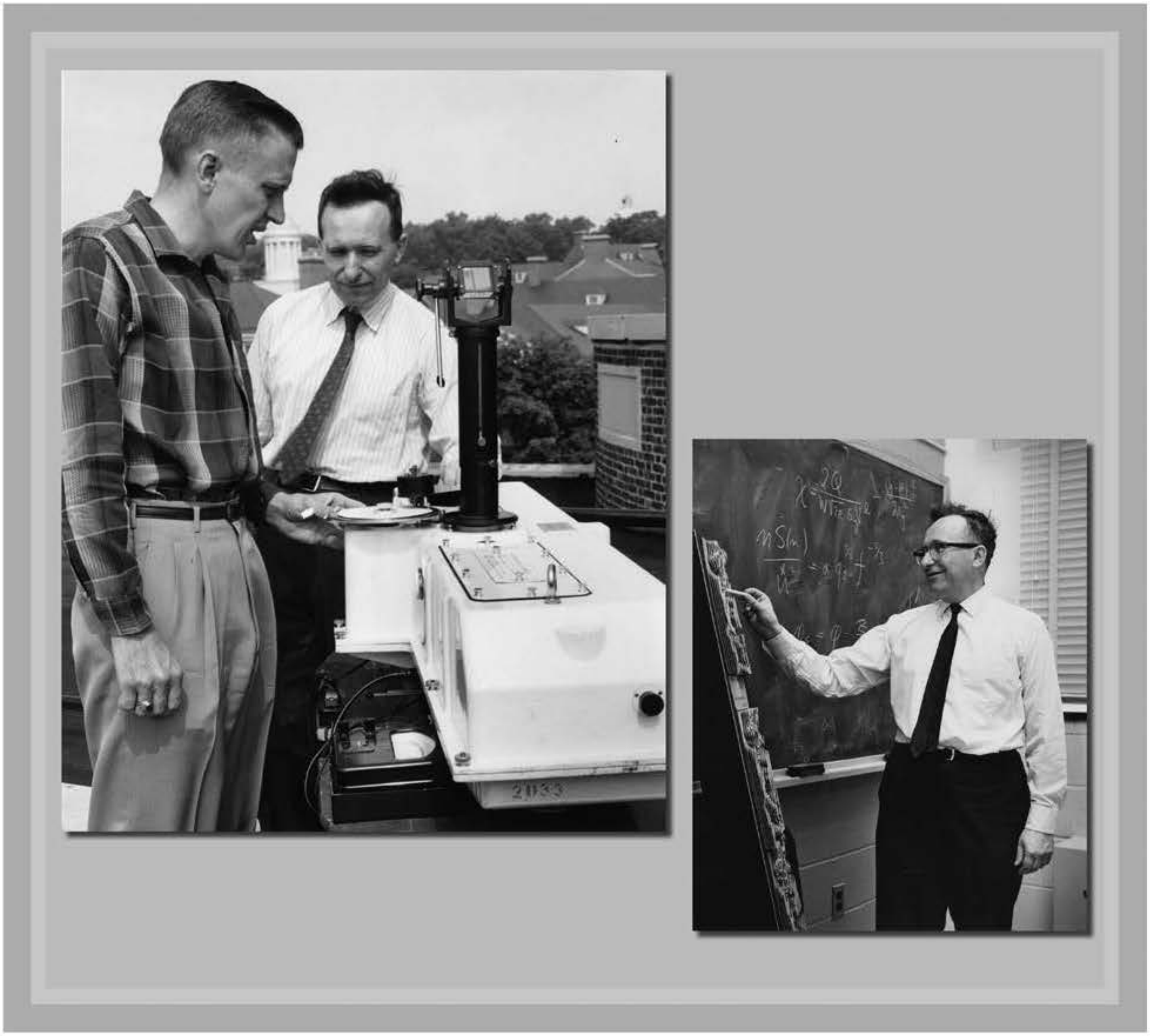

Figure 4. Sample exhibit panel: "Seeing" atoms

In 1955, Erwin W. Mueller (Physics) became the first person to “see” an atom using a field ion microscope which he designed. His microscope magnified atoms more than two million times and was an important advance in science instrumentation.

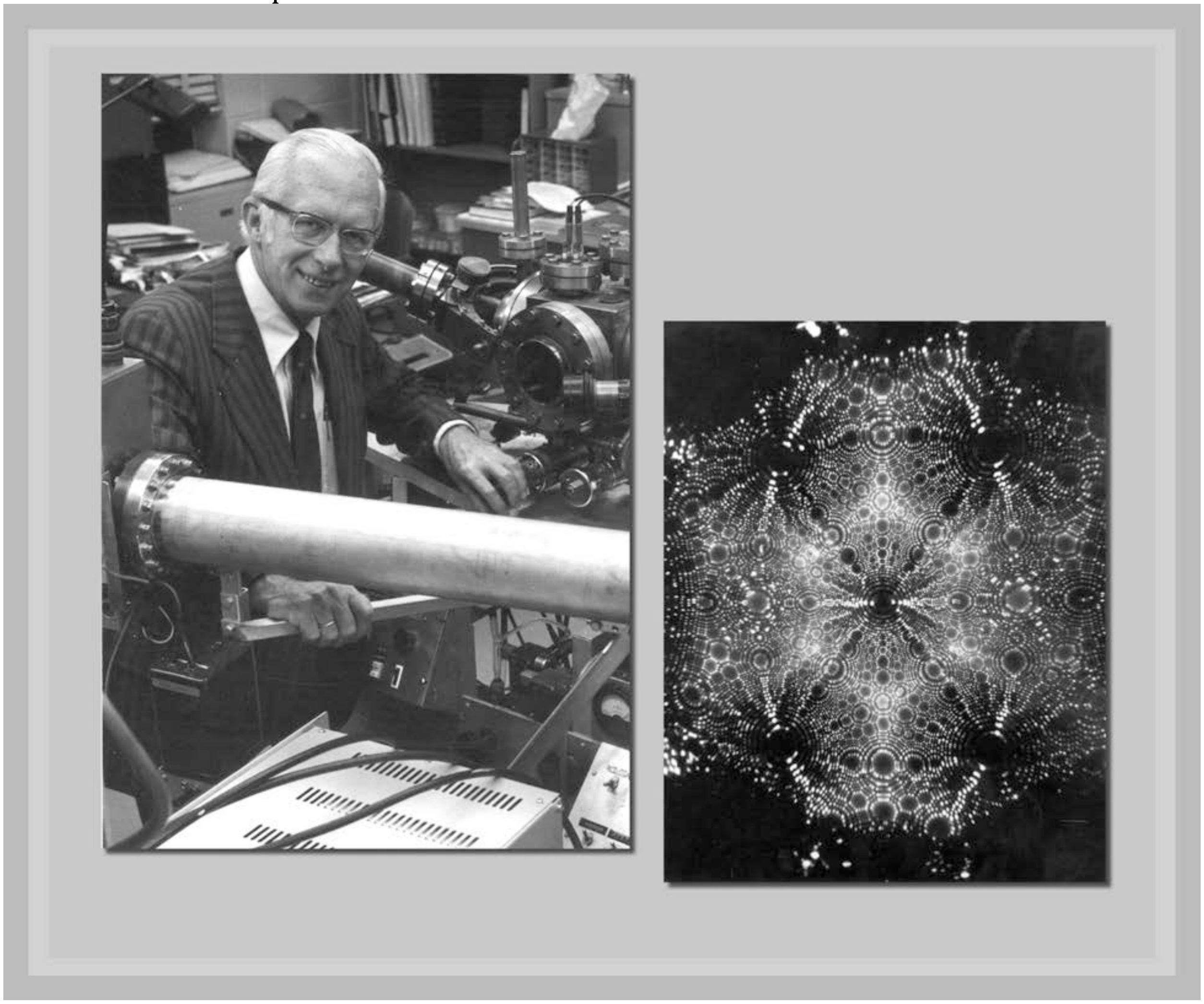

Figure 5. Exhibition Text

Pioneers of Scientific and Engineering Discoveries at Penn State

As Evan Pugh, recently returned to America from Europe, arrived at Penn State in October 1859 to assume his duties as the school's first president, it is not surprising that with his first glimpse of The Farmers' High School, he did not realize that he was looking at the embodiment of a new and fundamental concept in higher learning—that a college education should be made available to any competent person, not just members of the social or economic elite, and that this education should have practical as well as cultural value.

And so Penn State, founded in February 1855, and offering classes in 1859, began as The Farmers High School with a focus on agriculture. In spring of 1862, it became the Agricultural College of Pennsylvania in a successful bid to become Pennsylvania's "land-grant institution," which it achieved in 1963.

The college's first scientific advances began in agricultural fields in the late 1800s. By 1895, courses of study included general scientific; Latin-scientific; agriculture; biology; chemistry; civil engineering; electrical engineering; mathematics; mechanical engineering; mining engineering; and physics.

As the college expanded, so did faculty achievements spread to other areas of science and engineering. This exhibit highlights some of Penn State's scientific achievements, up to 1980—on its 125th anniversary.

It highlights many research and education "firsts" that occurred at Penn State. The first practical synthesis of the hormone progesterone by chemist Russell Marker led to the development of the birth control pill. Using a field ion microscope of his own design, Physicist Erwin Mueller saw an atom for the first time. A team of researchers in mechanical engineering and medicine developed the first surgically implantable, seam-free, pulsatile, heart-assist pump to receive widespread clinical use.

Penn State also offered the first baccalaureate and graduate degrees in agriculture; the first baccalaureate degree program in industrial engineering; the first baccalaureate curriculum in fuel science in the nation; and the first interdisciplinary curriculum in solid-state technology.

Today the rich tradition of contributions to research and education continue at Penn State.

The exhibit will be on display through January 8, 2010. Photographs are from the Penn State University Archives. For more information, contact Robert Tolliver, earth sciences librarian, at HYPERLINK "mailto:rlt17@psu.edu"rlt17@psu.edu or 814-865-3694

Thanks to Jackie Esposito, Paul Dzyak, and Paul Karwacki from University Archives for their help in locating images for this exhibit and thanks to Catherine Grigor and Jamie DiSarno from the Library's Office of Public Relations and Marketing for their assistance in putting together this exhibit. Additional thanks to staff throughout the University Park libraries for their suggestions on individuals and developments to include in this exhibit.

CONCLUSIONS

Science exhibits can be a great way to promote science and your institution to your users, as well as a great way to promote your institution and learn about its history. I learned a lot about Penn State through the process of creating this exhibit.

Putting together this exhibit also demonstrated the value of special collections libraries and archives to library staff. The archives were a valuable resource, not only for this display, but for other needs within my own library, as well as a valuable source of information on the history of the departments that my library serves. Due to the nature of special collection s and archives, they do lack some of the detailed cataloging information that indicates exactly what is held, and this needs to be taken into account when planning a project.

ACKNOWLEDGEMENTS

I would like to thank Catherine Grigor and Jamie DiSarno from the library's Public Relations and Marketing Department for their assistance throughout the development of this exhibit. Thanks to Jackie Esposito, Penn State University Archivist, and her staff, Paul Dzyak and Paul Karwacki, for all of their help in identifying images for the exhibit. Thanks to the staff at all of the Penn State University Park subject libraries for their input during the development of this exhibit. Finally, thanks to Linda Musser for her input throughout the development of the exhibit and for reviewing materials for the exhibit and this manuscript.

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ADD SOME “WOW” TO YOUR PUBLICATIONS LISTING WITH GOOGLE MAPS

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Abstract - We have all used the Google Maps™ mapping service to find our way around town. At the Natural Resources Canada (NRCan) Library, we use it to highlight the geospatial footprints of our new publications.

The NRCan Library maintains GEOSCAN™, the bibliographic search engine for the publications of the Earth Sciences Sector of Natural Resources Canada. In 2008, we added an RSS feed to allow our clientele to be alerted to the release of new publications.

Drawing on the latitude and longitude metadata in the GEOSCAN records, the RSS feed was enhanced with GeoRSS Simple encoding to allow the geographic coverage of these publications to be displayed with Google Maps. Our clients expressed a certain “wow” factor as the publications' footprints were displayed at the click of a button.

This paper illustrates how we implemented our GeoRSS feed and linked it to the Google Maps mapping service without having to know a lot about XML and RSS feeds.

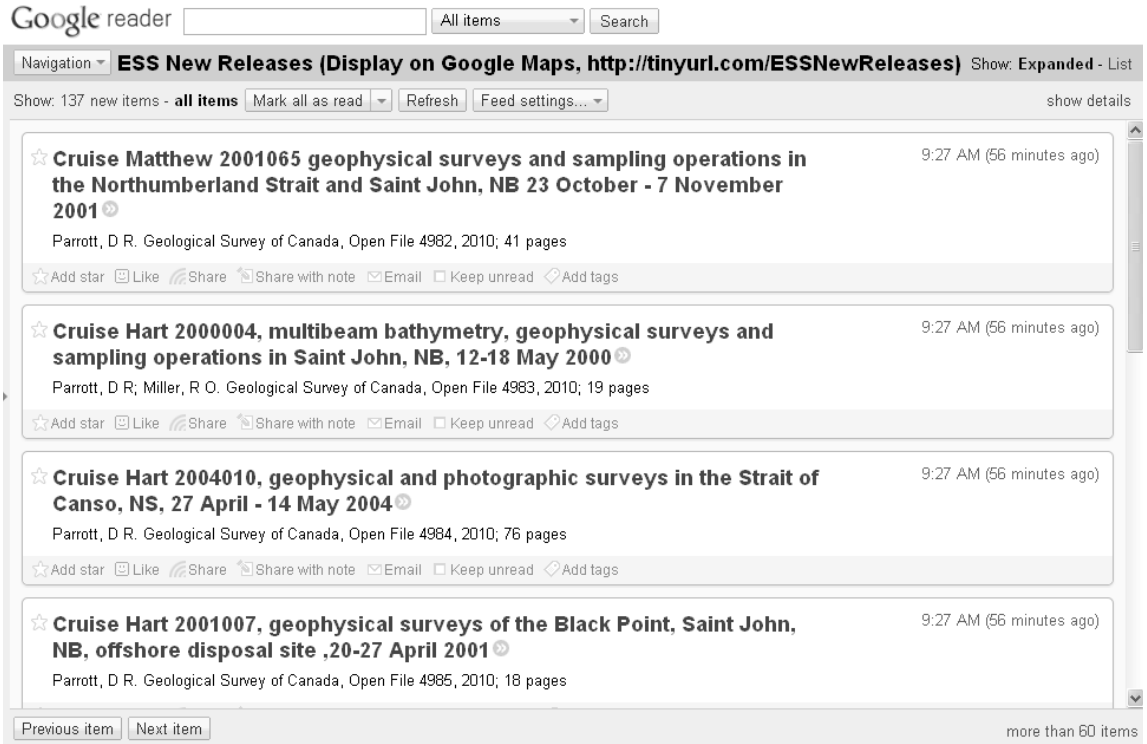
(Google Maps is a trademark of Google Inc.; GEOSCAN is a trademark of Natural Resources Canada)

PUBLICATIONS, DISCOVERY, AND GOOGLE MAPS

We use Google Maps for many things every day. We use it to find where someone lives, where that new store is, and how to drive to your child’s soccer game. It is easy to use, just put an address in the Google Maps search box and a map displays your destination. This paper presents how we at Natural Resources Canada are making use of Google Maps to enhance our New Releases listings.

The NRCan Library maintains the bibliographic metadata for the publications of the NRCan’s Earth Sciences Sector in the GEOSCAN database. In 2008, we added an RSS feed to GEOSCAN to announce our newly released publications. This is a powerful tool for informing our clientele about the new releases. By subscribing to the RSS feed the clients’ feed reader tracks the RSS feed for them, alerting them when new publications have been added to the feed. We have our database re-create our RSS feed automatically whenever new publications are released.

As welcome and effective as this RSS feed was, it still suffered from what most bibliographic listings suffer from, a very dry, text-only display. There is very little, aside from some formatting, to grab the users’ attention. It would benefit from some visuals to make the presentation more engaging and informative.



ESS New Releases (Display on Google Maps, http://tinyurl.com/ESSNewReleases)

Cruise Matthew 2001065 geophysical surveys and sampling operations in the Northumberland Strait and Saint John, NB 23 October - 7 November 2001
9:27 AM (56 minutes ago)
Parrott, D R. Geological Survey of Canada, Open File 4982, 2010; 41 pages

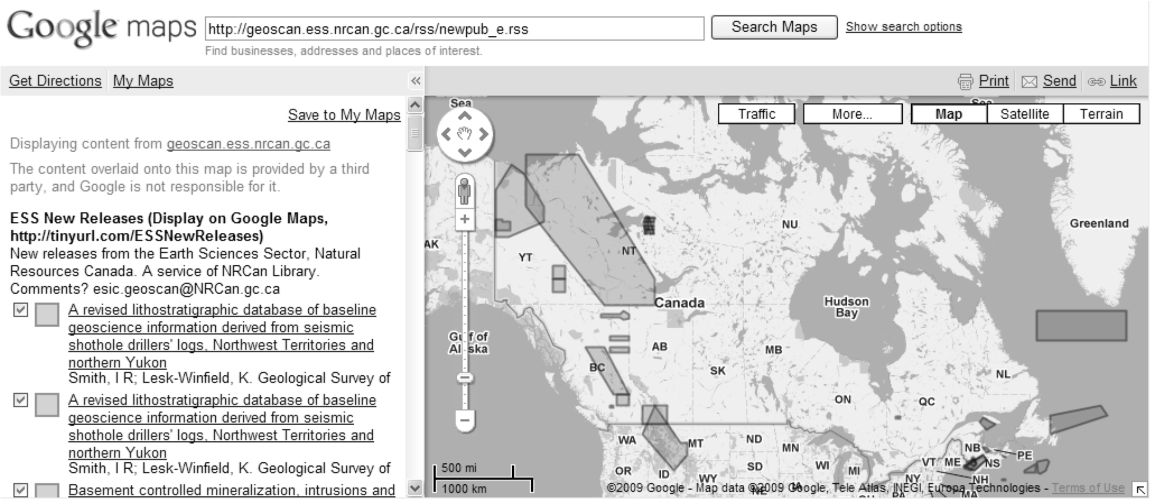
Cruise Hart 2000004, multibeam bathymetry, geophysical surveys and sampling operations in Saint John, NB, 12-18 May 2000
9:27 AM (56 minutes ago)
Parrott, D R; Miller, R O. Geological Survey of Canada, Open File 4983, 2010; 19 pages

Cruise Hart 2004010, geophysical and photographic surveys in the Strait of Canso, NS, 27 April - 14 May 2004
9:27 AM (56 minutes ago)
Parrott, D R. Geological Survey of Canada, Open File 4984, 2010; 76 pages

Cruise Hart 2001007, geophysical surveys of the Black Point, Saint John, NB, offshore disposal site ,20-27 April 2001
9:27 AM (56 minutes ago)
Parrott, D R. Geological Survey of Canada, Open File 4985, 2010; 18 pages

Figure 1:ESS New Releases RSS feed as viewed with Google Reader ©2010 Google

Since our bibliographic metadata includes latitude and longitude geospatial data, we reworked out RSS feed to present some "eye-candy" to our users by displaying a Google map showing the area covered by the publications.



http://geoscan.ess.nrcan.gc.ca/rss/newpub_e.rss

Displaying content from geoscan.ess.nrcan.gc.ca

The content overlaid onto this map is provided by a third party, and Google is not responsible for it.

ESS New Releases (Display on Google Maps, http://tinyurl.com/ESSNewReleases)
New releases from the Earth Sciences Sector, Natural Resources Canada. A service of NRCan Library. Comments? esic.geoscan@NRCan.gc.ca

☑ A revised lithostratigraphic database of baseline geoscience information derived from seismic shothole drillers' logs, Northwest Territories and northern Yukon
Smith, I R; Lesk-Winfield, K. Geological Survey of

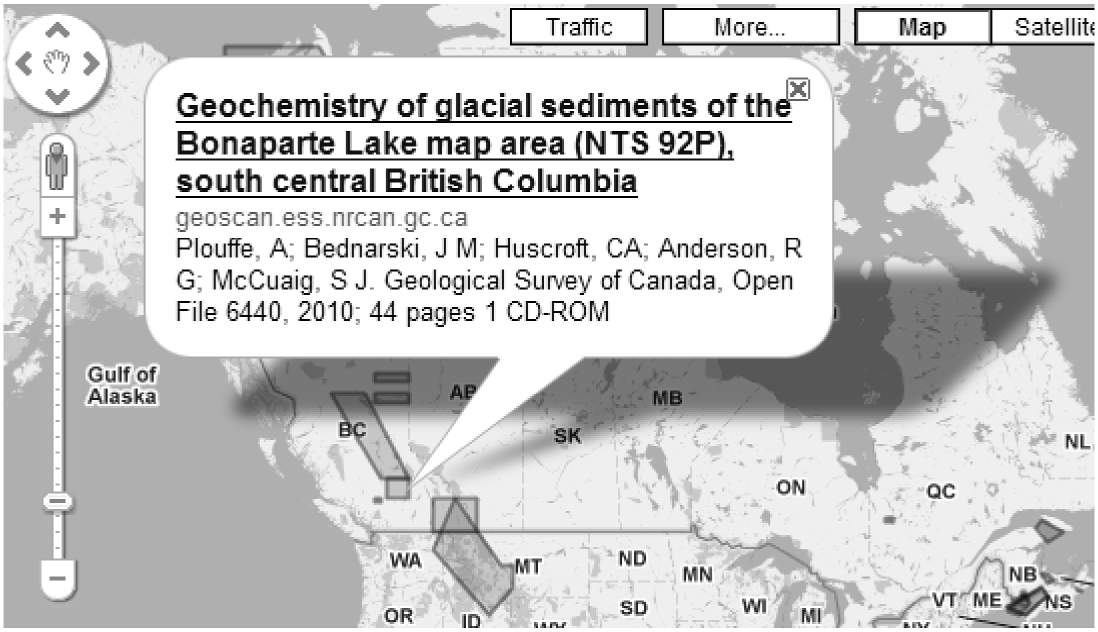
☑ A revised lithostratigraphic database of baseline geoscience information derived from seismic shothole drillers' logs, Northwest Territories and northern Yukon
Smith, I R; Lesk-Winfield, K. Geological Survey of

☑ Basement controlled mineralization, intrusions and

Figure 2: Display of our GeoRSS feed in Google Maps ©2010 Google

Beyond the pleasing visual that augments the publication listing, the Google Maps display shows the geographic areas being addressed by the publications. This provides our clients with an alternative discovery method. They can see where the publications are talking about.

The functionality of Google Maps allows us to link the citations in the left-hand panel (Fig. 2) and their geospatial footprints on the map display with our database. Clients clicking on a publication's citation or its footprint will bring up a Google map bubble (Fig. 3) linked to the full metadata for that publication, including sales information and download links.



Geochemistry of glacial sediments of the Bonaparte Lake map area (NTS 92P), south central British Columbia

geoscan.ess.nrcan.gc.ca

Plouffe, A; Bednarski, J M; Huscroft, CA; Anderson, R G; McCuaig, S J. Geological Survey of Canada, Open File 6440, 2010; 44 pages 1 CD-ROM

Figure 3: GeoRSS feed in Google Maps: Description bubble links clients to the full metadata. ©2010 Google

But enough about what I have done, this paper is about how <u>you</u> can do this for your publication listing. First, you will need an RSS feed, and then you will turn it into a GeoRSS.

CREATING AN RSS FEED

You do not need to be an RSS guru to create an RSS feed. There are many ways to create an RSS feed. We create our feed dynamically from the database, but it can also be created manually with a simple text editor, like Notepad (Notepad is a trademark of Microsoft Corp.). Although I am presenting how to create a very simple RSS feed, please note there are other forms of feeds and other data elements that could be used.

My RSS feed has four parts: a header, a title, items and a footer (Table 1). All data elements are found in xml tags. The simplest way to create your RSS feed is to copy an existing one. There are many online guides to help you make your RSS feed. I enjoyed Stephen Downes' very informative, "How to create an RSS feed with Notepad, a Web server, and a beer" (Downes, 2003).

Table 1: A sample RSS feed.

Header	<?xml version="1.0" encoding="ISO-8859-1"?> <rss version="2.0"> <channel>
Title	<title>ESS New Releases</title> <description>New releases from Natural Resources Canada. A service of NRCan Library. Comments? esic.geoscan@NRCan.gc.ca</description> <lastBuildDate>Thu, 28 Jan 2010 00:03:00 EDT</lastBuildDate>

Items	<item> <title>Bedrock geology of the QUEST map area, central British Columbia</title> <link>http://geoscan.ess.nrcan.gc.ca/cgi-bin/starfinder/0?path=geoscan.fl&id=fastlink&pass=&search=R%3D261517&format=FLFULL</link> <description>Logan, J M; Schiarizza, P; Struik, L C; Barnett, C; Nelson, J L; Kowalczyk, P; Ferri, F; Mihalynuk, M G; Thomas, M D; Gammon, P; Lett, R; Jackaman, W; Ferbey, T. Geological Survey of Canada, Open File 6476, 2010; 1 sheet</description> <guid isPermaLink="false">261517</guid> <pubDate>2010 01 18 00:00:00 EDT</pubDate> </item> <item> <title>Geology, Chasm Provincial Park and vicinity, British Columbia</title> <link>http://geoscan.ess.nrcan.gc.ca/cgi-bin/starfinder/0?path=geoscan.fl&id=fastlink&pass=&search=R%3D261496&format=FLFULL</link> <description>Farrell, R -E; Anderson, R G; Simpson, K A; Andrews, G D M; Russell, J K. Geological Survey of Canada, Open File 6230, 2010; 1 sheet</description> <guid isPermaLink="false">261496</guid> <pubDate>2010 01 13 00:00:00 EDT</pubDate> </item>
Footer	</channel> </rss>

The header section can be pasted as-is to commence your RSS file. It identifies the file as an XML file that follows the rules for RSS version 2.0. It also opens the <channel> tag, in which all the other tags are nested.

The title section records what your RSS feed will be entitled. The <description> tag is an opportunity for you to include some expanded information. I also include a date/time stamp to indicate when the RSS feed was created/updated, in the <lastBuildDate> tag.

The item section is where you will include all your new publications. The <title> tag holds the publication's title, the <link> tag holds a link to the publication (the pdf or perhaps its metadata, and the <description> tag, which hosts the citation. I also include a unique id (database record number) in the <guid> (Global Unique ID) tag. The format for the publication date, <pubDate>, is year month day hour:minute:second timezone (yyyy mm dd hh:mm:ss tz). The item section is repeated for each item that is to show up in your feed.

The footer section closes the two tags that are still open, </channel> and </rss>.

FROM RSS TO GEORSS

There are two forms of GeoRSS, Simple and GML. For details, go to www.georss.org.
If your publications' metadata contains latitude and longitude data, whether it is point, box or polygon in shape, you can make your RSS feed also serve as a GeoRSS feed. There are two data elements that you have to add, one in the header section and one in the item section.

In the header, you will need to add an xml namespace. An xml namespace is an identifier that groups some tags used in an xml file. The xml namespace we will group the tags we will use to identify "where" our publications are talking about. You do this by adding another parameter to the <rss> tag. Change the <rss version="2.0"> tag to become
<rss version="2.0" xmlns:georss=http://www.georss.org/georss>.

In my GeoRSS file, I added several xml namespaces, just in case I ever need them. I have included them in Table 3.

Within each <item> tag, you will add a tag to handle your lat/long data. GeoRSS Simple supports several basic geometries, including point, line, box and polygon, and is well described online at http://www.georss.org/simple#Geometry. These geometries add the data in a "latitude longitude" order. The latitude and longitude values are expressed in decimal degrees, with the southern and western hemispheres recorded as negative values.

Table 2: GeoRSS geometries and the "georss" tags

point	<georss:point>lat long</georss:point> - latitude and longitude of the point
line	<georss:line>lat1 long1 lat2 long2 lat3 long3</georss:line> - latitude and longitude pairs, minimum of two pairs
box	<georss:box>South_lat West_long North_lat East_long</georss:box> - maximum and minimum lats and longs in S-W-N-E order
polygon	<georss:polygon> lat1 long1 lat2 long2 lat3 long3 lat1 long1</georss:polygon> - latitude and longitude pairs of the points that define the polygon, with a duplication of the first lat/long pair to close the polygon. Minimum of four pairs (three sides)

My latitude and longitude data define polygons, so I have used the <georss:polygon> tag.
My <polygon> tag looks like this:

<georss:polygon>52.0 -120.0 52.0 -122.5 56.5 -127.0 56.5 -124.0 52.0 -120.0
</georss:polygon>
(Note that as my longitudes are in the western hemisphere, they have negative values)

Save your file as yourfilename.rss (any name you wish, with an .rss or .xml extension) onto your web server, and voilà, you're in business. Your GeoRSS feed is now available to your clients.

Table 3: NRCan Library's New Releases GeoRSS file.

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<rss xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
 xmlns:dc=http://purl.org/dc/elements/1.1/
 xmlns:media="http://search.yahoo.com/mrss"
 xmlns:gml="http://www.opengis.net/gml"
 xmlns:taxo="http://purl.org/rss/1.0/modules/taxonomy/"
 xmlns:georss="http://www.georss.org/georss"
 xmlns:content="http://purl.org/rss/1.0/modules/content/"
 xmlns:geo="http://www.w3.org/2003/01/geo/wgs84_pos#" version="2.0">
<channel>
<title>ESS New Releases (Display on Google Maps,
http://tinyurl.com/ESSNewReleases)</title>
<link>http://tinyurl.com/ESSNewReleases</link>
<description>New releases from Natural Resources Canada. A service of NRCan
Library. Comments? esic.geoscan@NRCan.gc.ca</description>
<lastBuildDate>Thu, 28 Jan 2010 00:03:00 EDT</lastBuildDate>
<item>
<title>Bedrock geology of the QUEST map area, central British Columbia</title>
<link>http://geoscan.ess.nrcan.gc.ca/cgi-
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CONNECTING TO GOOGLE MAPS

Now that you have a GeoRSS feed of your publications, you want to link it to Google Maps. Implementing a connection to the Google mapping service is simple and free. All you have to do is enter the URL of your GeoRSS feed into the search box at Google Maps (http://maps.google.com/), click "Search Maps" and enjoy watching the geospatial footprint of your publications display on a map of the world.

It is good to have a consistent link for your clients to click on to see the latest publications' footprints. To do this, you should save your updated GeoRSS files with the same name every time. In so doing, the link to Google Maps will remain the same. Google Maps can provide you with a persistent link to your GeoRSS feed. With your GeoRSS feed displayed in Google Maps, click on the "Link" option above the top right corner of your map. This will give you a link, "Paste link in email or IM".

You will find this link to be quite long and it may be cumbersome to include on your web site display. The Google Maps link to our New Releases GeoRSS feed is (http://maps.google.com/maps?f=q&source=s_q&hl=en&geocode=&q=http:%2F%2Fgeoscan.ess.nrcan.gc.ca%2Frss%2Fnewpub_e.rss&ie=UTF8&ll=75.584937,-91.40625&spn=29.254334,174.726563&z=2). Rather than work with this lengthy URL, I created an entry in the TinyURL.com web service, which is also free. In my case, my Google Maps link shortens to http://tinyurl.com/ESSNewReleases. I added a <link> tag after the <title> tag in the GeoRSS title section that pointed to this TinyURL (Table 3). The advantage is that now our clients can go directly from our RSS feed to Google Maps simply by clicking the RSS feed title. I have noticed that this ability to click on the RSS feed title and activate the link, varies from software to software. It works in Internet Explorer 7+ and in Google Reader, but not in Firefox 3.5. This is why I display the TinyURL in the GeoRSS feed title, so that Firefox users can copy/paste it into their address bar.

THE PAY-OFF

So why should you create an RSS feed for your publication listings, GeoRSS-enable it and hook it up to Google Maps? Beyond providing your clients with visual stimulation on an otherwise all-text web page, you will be providing them with an alternative method to discover your publications.

Consider an RSS feed of 30 new publications. As a web page of bibliographic citations, it would contain about 1000 words. Your clients would have to scan these 1000 words to discern if any of the publications were of interest to them. If they are looking for new releases in a geographical area of interest, a map of these publications displaying their geospatial extents would provide this service with a single, interactive graphic. Certainly worth a 1000 words.

RESOURCES

Downes, S (2003). How to create an RSS feed with Notepad, a Web server, and a beer, http://www.downes.ca/cgi-bin/page.cgi?post=56

GEOSCAN	http://geoscan.ess.nrcan.gc.ca/site.php?id=geoscan_e
Google Maps	http://maps.google.com
TinyURL	http://tinyurl.com

THE DEVELOPMENT OF THE GEOSCIENCE STUDENT DATA NETWORK AS A BASIS FOR AN INTEGRATED RESEARCH-CENTERED CURRICULUM

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Abstract - Promoting the use of data in the classroom can pose challenges to instructors and students alike in how to best access, process, and analyze data and subsequently disseminate the results. We present the blueprint for a classroom, laboratory, and field-based curriculum that combines traditional geoscience training with data management, visualization, and web publication, which we call the Geoscience Student Data Network (GSDNet). The GSDNet's goal is to harness students' social networking habits to drive data sharing and collaboration and to foster sound data-handling practices that will prepare the next generation of geoscience students for careers in government, environmental consulting, education, and academia. The project design is geared toward training students in state-of-the-art geochemical analysis and GIS techniques, introduce students to geoinformatics sources for data related to the research themes, and encourage interest in the subject through field study and application to real-world problems. A proposed software tool that leverages technology currently being developed for the GeoStrat System would contain a public GeoBook and private Project Space that provide environments where students combine their individual contributions in an online, interactive, and customizable work environment and access to relevant databases such as PetDB and EarthChem via web-services. We suggest that students who participate in integrated traditional and cyberinfrastructure-based learning will be more competitive in the job market by being able to conduct high level undergraduate research using this unique set of scientific skills.

INTRODUCTION

The use of new internet-based scientific tools for accessing and sharing information to engage undergraduate students in learning activities is also a compelling strategy for enticing students to pursue geoscience careers. Forays into the use of geoinformatics resources for education have been generally geared toward integration of data from large repositories into course curriculum. Educational application of these resources often occurs in the form of course modules that use some aspect of a database or visualization tool to engage students and enable discovery through a web interface or browser. CCLI examples include the use of GeoMapApp in MARGINS mini-lessons (CCLI Project #0633081, P.I.: Jeff Ryan, Co-P.I.: Geoff Abers; http://serc.carleton.edu/margins/minilessons.html) and the use of visualizations to improve student comprehension of a subject ("Empowering student learning in the geologic sciences with 3D interactive animation and low-cost virtual reality"; CCLI Project #0536739, P.I.: Laura Leventhal; Inventions and Impact 2: CCLI Conference Report)

In the few instances where geoinformatics has been incorporated as a discipline, the impact has been significant and is shown to provide a sound foundation for providing training to in-service high school teachers as well as upper level undergraduates from diverse backgrounds. Specifically, a geoinformatics curriculum at the University of Alaska-Fairbanks (Prakash, 2006) that integrates field data, database management, cartography, GIS, and visualization resulted in students' ability to address problems ranging from locating and obtaining data to exploring how geoinformatics is applicable to science and industry. Assessment demonstrated that the course successfully influenced student attitudes and abilities, which leads the author to conclude that geoinformatics might serve as a "capstone course that could be useful for students from many programs across campus (Prakash 2006, p. 559)."

Equally uncommon is the use of social networking and internet-based resources for enticing students to participate in undergraduate research. The age of Web 2.0 and user-generated content has produced a generation of students who are comfortable with sharing resources and interacting with one another via multiple internet-based technologies (Instant Messaging, Facebook, Twitter, blogs, etc.). In at least one application of social networking in science education, the focus has been on recording student experience to perform better assessment of learning outcomes ("Botany through Web 2.0, the Memex and Social Learning"; CCLI Project #0737466, P.I.: Janet Greenberg). Another CCLI project that employs Web 2.0 is "Using Electronic Portfolios to Assess Student Learning as a Result of Undergraduate Research" (Project # 0618617, P.I.: Kathryn Wilson; Inventions and Impact 2: CCLI Conference Report) which involves the creation of portfolios by students documenting undergraduate research progress and interactions with faculty collaborators to nurture the student's sense of intellectual growth. We propose that along with online collaboration, data sharing can be fostered as a natural extension of the social networking habits of current and future generations of students.

Furthermore, extensive federal investments in data management projects translate into a need for a talented workforce that is comfortable with cyberinfrastructure and trained in underlying technologies, such as databases. Despite the obvious benefit to the greater good, cyberinfrastructure efforts in the geosciences are often hindered by conventional attitudes of ownership and dissemination regarding sharing of data. These attitudes are increasingly challenged by pressure from funding agencies and publication editors for complete disclosure and efforts to create long-term archives of scientific data. Our inclusion of a geoinformatics component into an undergraduate research-based curriculum is intended to be a model of how geoscience instruction can integrate the use of existing data collections, while encouraging the practice of data sharing to help democratize access to scientific research and discovery.

The curriculum we outline here guides and trains students through the process of data compilation, acquisition and organization for analysis and distribution via the web and geoinformatics data outlets. We envision bringing these elements together through the creation of a platform-independent tool that builds on existing capabilities of an existing geoinformatics application.

Hurdles To Data Use And Discovery In Education

The distributed nature of geoinformatics resources pose a significant hurdle for non-specialist educators and students who may not be able to invest the significant amount of time required to locate these resources, discern how to combine multiple data types, and acquire and use tools to assess the data. Currently, the closest example of a multiple platform tool that uses geoinformatics resources is the very successful GeoMapApp (http://www.geomapapp.org) browser, which uses web services to map data sets on native and contributed grids. The tool described here draws inspiration from GeoMapApp's use of web services but creates a two-way environment in which users can contribute data to the appropriate geoinformatics system directly. In addition to data entry and data access capability, our tool will provide a work environment where users can collaborate as a group by adding static and dynamic widgets for mapping, blogging, plotting data and even posting video feeds. The intent is to provide users with a seamless means of obtaining data through the web, adding data collected by students or researchers, designing a workspace and instantaneously publishing collaborative work to the web.

The technology used for this workspace is based on the Microsoft Silverlight programming environment and draws on the platform-independent tools currently under development by GeoStrat application. GeoStrat provides secure private working space, access to public data, imbedded GIS capabilities, and visualization and analytical tools, for use by individuals, collaborative projects, and organizations in support of research, publication, and public outreach. In effect, our system is an educational manifestation of the GeoStrat system, which we call the Geoscience Student Data Network (GSDNet) (Figure 1).

Figure 1. The GSDNet provides access to multiple data types form distributed systems, visualization tools for analysis, and data submission capability through a single user interface.

GSDNET: GEOSCIENCE STUDENT DATA NETWORK

Project Space

The GSDNet ProjectSpace will serve as the core working environment for student researchers. Students will be able to obtain data as well as submit data and metadata to the appropriate distributed systems. The ProjectSpace will be equipped with social-networking functionality through which students can collaborate and blog on their progress. The ProjectSpace RSS (Real Simple Syndication) feeds will give students the option to broadcast blog posts and project progress to the public via the GSDNet GeoBook or to the team Facebook page, Twitter or any website or reader that accepts RSS feeds.

Data Access and Sample Registration

Students will be able to access relevant data through Web Mapping Services (WMS), for example the Marine Geoscience Data Systsem's Global Multi-Resolution Tileset (GMRT; Ryan et al. 2009, doi:10.1594/IEDA.0001000), and Web Feature Services (WFS) configured using Open Geospatial Consortium (OGC) standards. These services accommodate multiple data layers, e.g., sample locations or earthquake epicenters. Additional web services will be developed in partnership with geoinformatics systems such as the emerging "National Geothermal Database" (being developed by a consortium of groups including GeoStrat), Geoinformatics for Geochemistry (GfG, http://www.geoinfogeochem.org, which includes PetDB; Lehnert et al. 2000) and its collaborator EarthChem (www.earthchem.org), the System for Earth Sample Registration (SESAR, http://www.geosamples.org), and others.

GeoBook

GeoBook will have a similar look and feel to PowerPoint, which should reduce the learning curve for students and instructors alike. Although the details will change as we move forward with development the general concept of producing a GeoBook will include the following steps and features (Figure 1).

<u>Registration:</u> Captures the data necessary to assign a DOI to the publication, e.g., authors and affiliations, the GeoBook name, and other information.
<u>Roles:</u> The "lead author" assigns roles to co-authors for creating and working with the GeoBook.
<u>Page Size:</u> The basic size of each page is set to a standard 8.5 x 11 inch or any poster size the user prefers. The user can create multiple pages via the "Add New Page" tab - similar to the feature available in most browsers. Each page can have its own format size.
<u>Object:</u> The user positions the "object box", where the object will be placed on the page and set its relative size. The "type" of selection does not need to be specified since this will be automatically detected, (e.g., *.doc,

*pdf, *.jpg). As with most commonly used programs, a right click within the object box produces a pop-up that allows the user to browse for a file to. An object can have a border if the user selects one. Once the object is selected, the user may choose whether it is: 1) dynamic, 2) interactive, or 3) static (the default). Dynamic objects are updated as data are added to the data source; this can serve as a valuable interactive tool for users to see the progress of a project. Interactive objects inherit any interactive capability of the source. For example, a GIS-based map with information boxes that open when a point is clicked would work, as would our stratigraphic visualization tool - or any tool provided by other databases that link via requisite web services. Static objects are simple images and document files.
Caption: The user adds a title and caption to their object if desired, positioning as for an object.
Save / Save As: "Save" to the GeoBook name selected by the user. "Save As" for either a new name for the GeoBook or output as a file. Output will be user-selectable in a number of formats, e.g., PowerPoint, PDF, Canvas, Illustrator, etc.

Table 1: Collaborative private and public components of the GSDNet

Project Space	GeoBook
• Private collaboration space • Data access via web services • Add components (maps, data, blog) • Sample and data registration interface (IGSN and DOI) • Data submission tool	• Public collaboration space • Collaboration **Roles** are assigned • Customizable look • Creation of **Objects** such as videos, graphs, text • Instant publication to the web.

A MULTI-YEAR RESEARCH BASED CURRICULUM

The curriculum that accompanies GSDNet development immerses students in scientific research, analytical techniques, data management, field study, and professional presentation and is focused on providing students with a unique skill set that will translate to competitiveness in the workforce. The tectonic evolution of the western United States will serve as the thematic umbrella for the activities outlined in the curriculum. Within this general theme, a basic research and an applied research component will be explored. We believe this will arm students with perspective on the range areas they might pursue as they begin their careers as geoscientists.

Curriculum Components

i. Coursework

Coursework will include thematic classes to provide students with sound geologic and scientific background, introduce them to data management and geoinformatics, and deliver practical instruction on field methods. Classes will be held simultaneously at BSU and CCNY via distance learning.

ii. Guest Speakers

As part of the greater outreach effort to benefit all students who are potentially interested in geoscience careers, speakers from the scientific research community and the geothermal industry will be invited by each school to give talks on current research and development efforts.

iii. Fieldwork

Fieldwork will be conducted in the western U.S. Prior to commencement of coursework or student activities, PI and team members will determine field sites by assessing suitability for student fieldwork.

iv. Analytical Work

A major goal of this project is to instill confidence in student participants and thus prepare them for careers in industry, government (e.g., EPA or USGS), or for continued graduate study. Students will engage in various aspects of analytical work including GIS/remote-sensing spatial analysis, trace-element geochemistry and basic mineralogy.

v. Data analysis and synthesis

The core of this project is focused on improving students' facility in handling data and understanding the basic links between science and data. In combination with assigned coursework and using the GSDNet, students will obtain data from geoinformatics outlets such as PetDB to garner a sense of what to expect from data they collect in the field. The GSDNet will allow students to assemble in a collaborative ProjectSpace each element of their research in order to facilitate synthesis of the work.

vi. Visual and Oral Presentation

Students from both institutions will collaborate on both the basic and applied research with the guidance of faculty mentors. In the second year, faculty mentors will assign students specialized projects in accordance with their particular interests. Both groups will synthesize their research components in project GeoBooks, which will help students learn how to work in a scientific team environment. At the end of the project students will generate reports, submit abstracts and begin preparing their senior theses and conference presentations (Table 2).

Table 2: Curriculum components for the basic and applied research themes

Basic Research Theme	Applied Research Theme
• Courses Tectonics of N. America Digital information systems for geosciences Laboratory techniques and data analysis	• Courses Geothermal energy resources and field methods Digital information systems for geosciences Laboratory techniques and data analysis
• Field work Oceanic terranes in the Western U.S.	• Field work Geothermal fields in the Western U.S.
• Data collection Chemistry and GIS	• Data collection Chemistry and GIS
• Data analysis Combine with PetDB/EarthChem data	• Data analysis Combine with NAVDAT/EarthChem data

DOCUMENTATION AND ARCHIVING

Students will register their samples with SESAR (http://www.geosamples.org) to obtain unique identifiers and store basic metadata (e.g., sample owner, geospatial coordinates, sample description, and location description) and links to databases or repositories to which related data is submitted. The GSDNet will capitalize on OGC-compliant web services already developed available for SESAR for EarthChem samples. Geochemical datasets generated by students will also be submitted to the Integrated Earth Data Applications (IEDA; http://www.iedadata.org) system to obtain DOIs for future referencing in publications. Upon completion of the project, students will submit analytical data and associated metadata to the appropriate repository -- EarthChem or the National Geothermal Data System (NGDS; Snyder and Moore, 2009).

EXPECTED OUTCOMES

The goal of this project is to prepare students for workforce and research careers in the geosciences. We expect that students who participate in the program will be well- prepared to compete and excel in science and industry by participating in team-based data driven research using cutting edge laboratory and geoinformatics technology. The sample and data analysis techniques practiced in this program will provide students from diverse backgrounds with the ability to apply for jobs in the EPA, USGS, environmental consulting, and industry.

The development of the GSDNet is intended to be an extensible platform that can be duplicated and modified to suit educator's needs. We expect the GSDNet to be sustainable and able to reside with and be maintained by any of the NSF-sponsored geoinformatics projects. The technical specifications of the tool will work with OGC standards, in tandem with current efforts for interoperability already spearheaded by GeoSciNet (Snyder et al., 2008) and the state geological survey consortium, the Geoinformatics Information Network (GIN). We expect to produce a conceptual template that other instructors or geoscience departments can modify or expand, to establish a blueprint or workflow of how a geoinformatics-integrated program can work for any number of educational applications.

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MARINE REALMS INFORMATION BANK: A DIGITAL LIBRARY OF COASTAL AND MARINE SCIENCE FOR SCIENTISTS, EDUCATORS, PUBLIC SERVANTS, AND CONCERNED CITIZENS

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Abstract –The Marine Realms Information Bank (MRIB) provides access to georeferenced scientific information about oceans, coasts, and coastal watersheds. The MRIB user searches a centralized collection of metadata records for information about specific places or topics and then links to the original online resources distributed across the Internet. MRIB shares its database with the thematically focused Coastal Change Hazards Digital Library and the regionally focused Monterey Bay Science Digital Library, but these libraries employ different user interfaces to reach their intended audiences.

MRIB employs a knowledge organization system (KOS) with 12 topical categories to guide users through the language and concepts of coastal and marine science. Users can browse the KOS for specific authors, agencies, disciplines, issues, or product types; search MRIB metadata for keywords; zoom in on a map; or select named locations from a gazetteer. These operations can be applied repeatedly until the search is appropriately focused. MRIB displays search results in tables and maps that link to the original online resources. Searches can be performed interactively at the MRIB Web site, or metadata records can be harvested by calling a URL that includes the desired search parameters.

Every entry in MRIB is assigned an electronic index card (EIC) including controlled-vocabulary terms from the KOS, additional keywords, geographic coordinates, and the network location (URL) of the original information resource. MRIB features an EIC Creation Utility to guide users through the procedure for contributing new resources to MRIB. The MRIB librarian reviews all user contributions before including them in the database.

INTRODUCTION

The U.S. Geological Survey (USGS) is a public science and information agency, with the double mission of conducting scientific research and providing scientific information. The USGS delivers timely, reliable data and information essential to meeting national needs and international obligations (Committee on Future Roles, Challenges, and Opportunities for the U.S. Geological Survey, National Research Council, 2001; Hutchinson et al., 2003). In the marine realm, the role of the USGS as an information agency has taken on added importance as the United States moves toward an integrated ocean policy (see U.S. Commission on Ocean Policy, 2004). The USGS Coastal and Marine Geology Program (CMGP) fulfills this responsibility in part by creating digital libraries for a wide range of users wishing to learn about coastal and marine science, gather data for research, and make informed decisions.

The Marine Realms Information Bank (MRIB; http://mrib.usgs.gov/) is a digital library designed to classify, integrate, and facilitate access to free, online, scientific information about the oceans, coasts, and coastal watersheds, as well as information about the people, techniques, and organizations involved in marine science (see Lightsom and Allwardt, 2007). MRIB provides access to scientific reports, maps, databases, descriptive Web pages, educational materials, and institutional information. Although MRIB emphasizes USGS information, it is not exclusively for USGS information.

This paper has three purposes: 1) to provide an overview of MRIB design and operability, 2) to share some of the insights we have gained in creating MRIB, and 3) to encourage feedback so that we can improve MRIB.

WHAT DOES MRIB DO?

MRIB helps people discover online information when they are not sure exactly what they are looking for. The type of question it answers is, "What information is available about a particular topic, in a particular region?" MRIB was developed on three fundamental principles:

1. Provide in-house quality control for selecting information resources for inclusion in the database and tagging them with appropriate metadata.
2. Allow users to search and evaluate information in the context of a knowledge organization system that provides assistance in understanding how topics are related to each other (as well as how places are geographically related).
3. Offer users choice in how they search for and organize information.

The implementation of these three principles is discussed in more detail below.

Quality Control

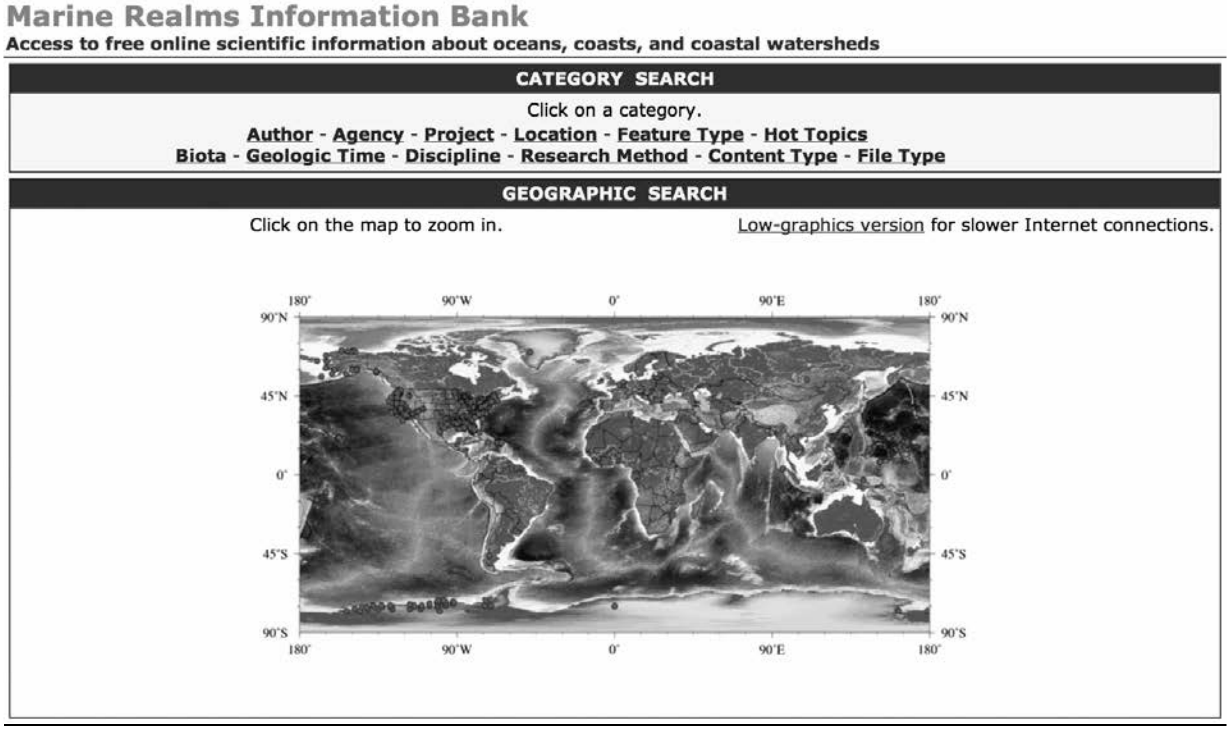
MRIB is a distributed digital library (see Panel on Distributed Geolibraries, National Research Council, 1999), with centralized metadata on the MRIB server linking to widely distributed online resources. Centralized metadata is the key to quality control, allowing the MRIB team to manage 1) what is included in MRIB (a collection policy based on relevance and institutional provenance), 2) how information resources are indexed to guide the search process (a faceted classification with controlled vocabularies), and 3) how information resources are georeferenced for enhanced access (geographic footprints linked to a gazetteer of relevant place names).

Knowledge Organization System

A knowledge organization system (KOS) helps the users of a digital library cope with an enormous amount of online information by providing a common language and conceptual orientation for users lacking prior knowledge of the relevant keywords, leading authors, and benchmark papers in a given field. The use of knowledge organization systems in digital libraries was popularized by Hodge (2000), among others.

Information scientists use the term *faceted classification* for knowledge organization systems that categorize information resources based on a set of independent criteria (e.g., see Kwasnik, 1999). The KOS for MRIB consists of a faceted classification with 12 main categories, several of which include hierarchies of broader and narrower concepts (Fig. 1). The *Location* facet includes a gazetteer of place names for natural features, political units, and administrative areas. The mapping capabilities of MRIB also function as a KOS. This system of interactive maps includes layers that can be turned on and off to show geographical relationships.

Figure 1. The Marine Realms Information Bank (MRIB) home page, with links to the 12 search categories in the faceted classification. The home page also provides a geographic search option utilizing interactive maps.



Marine Realms Information Bank

Access to free online scientific information about oceans, coasts, and coastal watersheds

CATEGORY SEARCH

Click on a category.

Author - Agency - Project - Location - Feature Type - Hot Topics
Biota - Geologic Time - Discipline - Research Method - Content Type - File Type

GEOGRAPHIC SEARCH

Click on the map to zoom in. Low-graphics version for slower Internet connections.

Why Use a Faceted Classification?

In many ways, the Internet is changing the way we find knowledge, understanding, meaning—and even authority. In the terms of Weinberger (2007), the "first order of order" is like books on the shelves of a library. The second order of order is the library catalog, which points to specific locations on the shelves. The third order of order makes use of the flexibility offered by the Internet. In the third order of order, we respect the ability of our audience to organize and select what they need, instead of giving them carefully designed answers to the questions we think they should be asking. By offering a selection of facets that allow users to organize information to meet their own needs and preferences, a digital library can combine the advantages of the third order of order with those of a knowledge organization system. Instead of providing a set of correct answers to predetermined questions, we can maximize the potential usefulness of a mass of information, allowing people to organize and select the information they need.

User Choice

MRIB offers three types of searches: by category (facet), by keyword, and by location.
Users can select broad categories or narrow subcategories from the faceted classification, search MRIB metadata for specific keywords or phrases, zoom in on a map, or select named locations from the gazetteer. These operations can be applied repeatedly in any combination until the search is appropriately focused. At each stage of this process, MRIB displays the search results in browsable tables or interactive maps (at the user's discretion) and provides links to the original online resources. For an overview of the MRIB search process, see Lightsom and Allwardt (2009).

MRIB FEATURES

This section summarizes the major features of MRIB:

1. The MRIB metadata profile, called an "electronic index card" (EIC).
2. The MRIB knowledge organization system (KOS).
3. The gazetteer, which is the geographical part of the KOS.
4. Interactive maps that can be used to search, evaluate, and link to information.
5. Special collections that present a subset of the MRIB database in customized user interfaces.

The Electronic Index Card (EIC)

The "electronic index card" (EIC) is a concept originally developed for the WHOI 4DGeoBrowser, which was the original platform for MRIB (see Lerner and Maffei, 2001). The EIC captures basic bibliographic and subject information, like an index card in an old-fashioned library catalog, but it also includes the KOS classification and supplemental metadata that allow the MRIB user to sift through information resources more effectively (Fig. 2).

Figure 2. An electronic index card (EIC), the searchable metadata profile for an individual information resource in the Marine Realms Information Bank (MRIB) database. This screenshot shows the basic bibliographic metadata at the top of the EIC; additional subject and location metadata are included farther down the page.

North Bounding Latitude: 30:30N
South Bounding Latitude: 29:30N
West Bounding Longitude: 89:30W
East Bounding Longitude: 88:00W

Record Type:	Collection of Documents
Title:	Hurricane Katrina Impact Studies
URL:	http://coastal.er.usgs.gov/hurricanes/katrina/
Date Created/Modified:	2005/09/14
Description:	Overview of investigations coordinated by the USGS Coastal and Marine Geology Program, with links to before-and-after LIDAR surveys and oblique aerial photography.
Author/Responsible Party:	• Sallenger, Asbury H., Jr. (asallenger@usgs.gov)
Webmaster/Custodian:	• CCWS Webmaster (webmaster-coastal@usgs.gov)
Project:	• Hurricane and Extreme Storm Impact Studies
Agency:	• Governments > United States of America > Federal > Department of the Interior > US Geological Survey (USGS) > Geology Discipline > Coastal and Marine Geology Program > Saint Petersburg Field Center • Governments > United States of America > Federal > National Aeronautics and Space Administration (NASA) • Governments > United States of America > Federal > Department of Defense > Department of the Army > US Army Corps of Engineers (USACE) • Academic Institutions > United States of America > Louisiana > University of New Orleans
Parent Collection:	USGS Coastal and Marine Geology Program: Hurricane and Extreme Storm Impact Studies
Parent Collection URL:	http://coastal.er.usgs.gov/hurricanes/

The MRIB Knowledge Organization System (KOS)

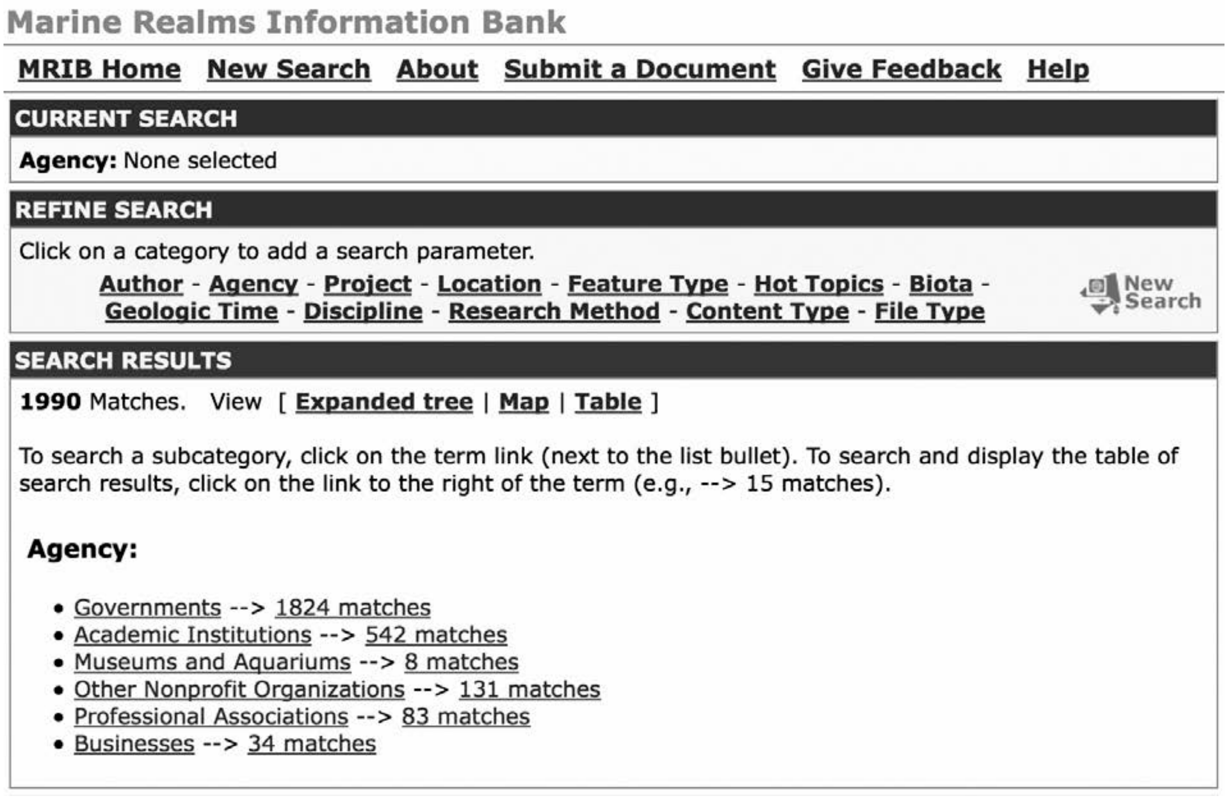
MRIB encourages its users to discover online scientific information by browsing a faceted classification with twelve independent categories. Each category includes indexing terms arranged in simple lists or in conceptual hierarchies, which can be browsed for appropriate search parameters. The indexing categories (facets) include the following:

Author, *Agency* (Fig. 3), and *Project* list the names of the persons, organizations, and activities responsible for an information resource.

Location includes a gazetteer of place names, both natural and cultural. Undersea feature names will be included in a future version of MRIB (see **Gazetteer Improvement Project**, below).
Feature Type offers lists of generic features, including landforms, geological features, biological features, administrative areas, and human constructions.
Hot Topics includes issues of concern to scientists, policy makers, and the general public.
Biota includes the common names of organisms, arranged in five kingdoms: animals, plants, fungi, protists, and bacteria.
Geologic Time is a simplified relative time scale (eon, era, period, and epoch) for information resources that address the geologic past.
Discipline includes a list of traditional academic fields.
Research Method includes techniques commonly used to conduct scientific investigations.
Content Type and *File Type* characterize the "intellectual" form and "transmission" form of an information resource, respectively.

For more information on the MRIB faceted classification, see Lightsom and Allwardt (2009) and Linck et al. (2009).

Figure 3. The *Agency* facet (indexing category), including six top-level subcategories. Clicking a hot-linked subcategory will display lower levels in the hierarchy. Clicking a hot-linked number of matches will open a table of search results.



Agency: None selected

Click on a category to add a search parameter.

1990 Matches.

To search a subcategory, click on the term link (next to the list bullet). To search and display the table of search results, click on the link to the right of the term (e.g., --> 15 matches).

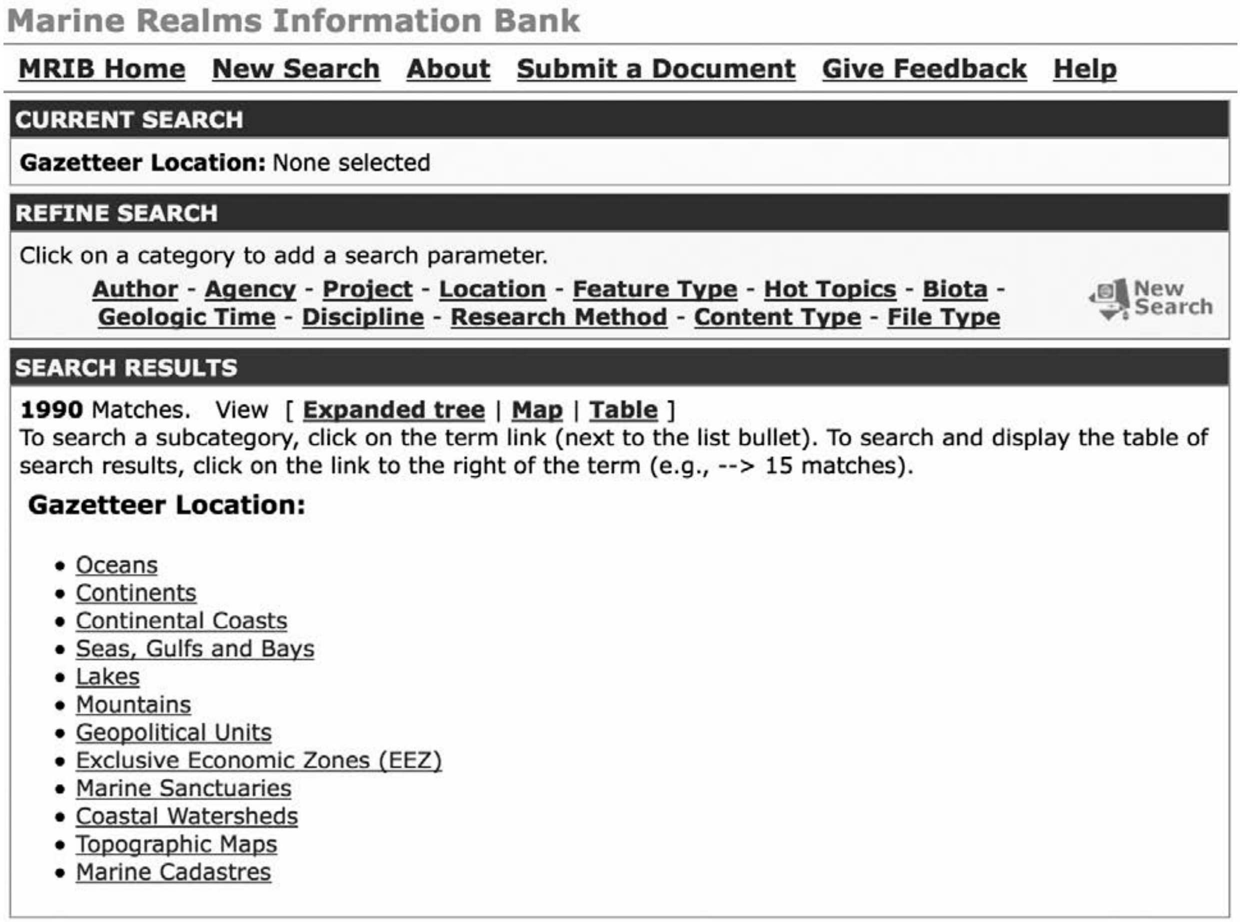
Agency:

- Governments --> 1824 matches
- Academic Institutions --> 542 matches
- Museums and Aquariums --> 8 matches
- Other Nonprofit Organizations --> 131 matches
- Professional Associations --> 83 matches
- Businesses --> 34 matches

Gazetteer

Location is an essential information parameter for the spatially oriented earth sciences. MRIB offers a gazetteer of relevant place names, in addition to map-based geographic searching. Place names in the gazetteer are converted to bounding boxes when they are selected and viewed in the map interface (see below). The gazetteer itself is a hierarchical tree of many different kinds of locations—including natural features, political units, and administrative areas—starting, of course, with oceans (Fig. 4).

Figure 4. The *Location* facet (indexing category), consisting of a gazetteer with 12 top-level subcategories. Clicking a hot-linked subcategory will display the hierarchy of named features within that subcategory. Clicking a hot-linked number of matches will open a table of search results. The search results will include all electronic index cards (EICs) with geographic footprints that fall within the rectangular bounding box of the selected gazetteer location.



CURRENT SEARCH

Gazetteer Location: None selected

REFINE SEARCH

Click on a category to add a search parameter.

Author - Agency - Project - Location - Feature Type - Hot Topics - Biota - Geologic Time - Discipline - Research Method - Content Type - File Type

SEARCH RESULTS

1990 Matches. View [Expanded tree | Map | Table]
To search a subcategory, click on the term link (next to the list bullet). To search and display the table of search results, click on the link to the right of the term (e.g., --> 15 matches).

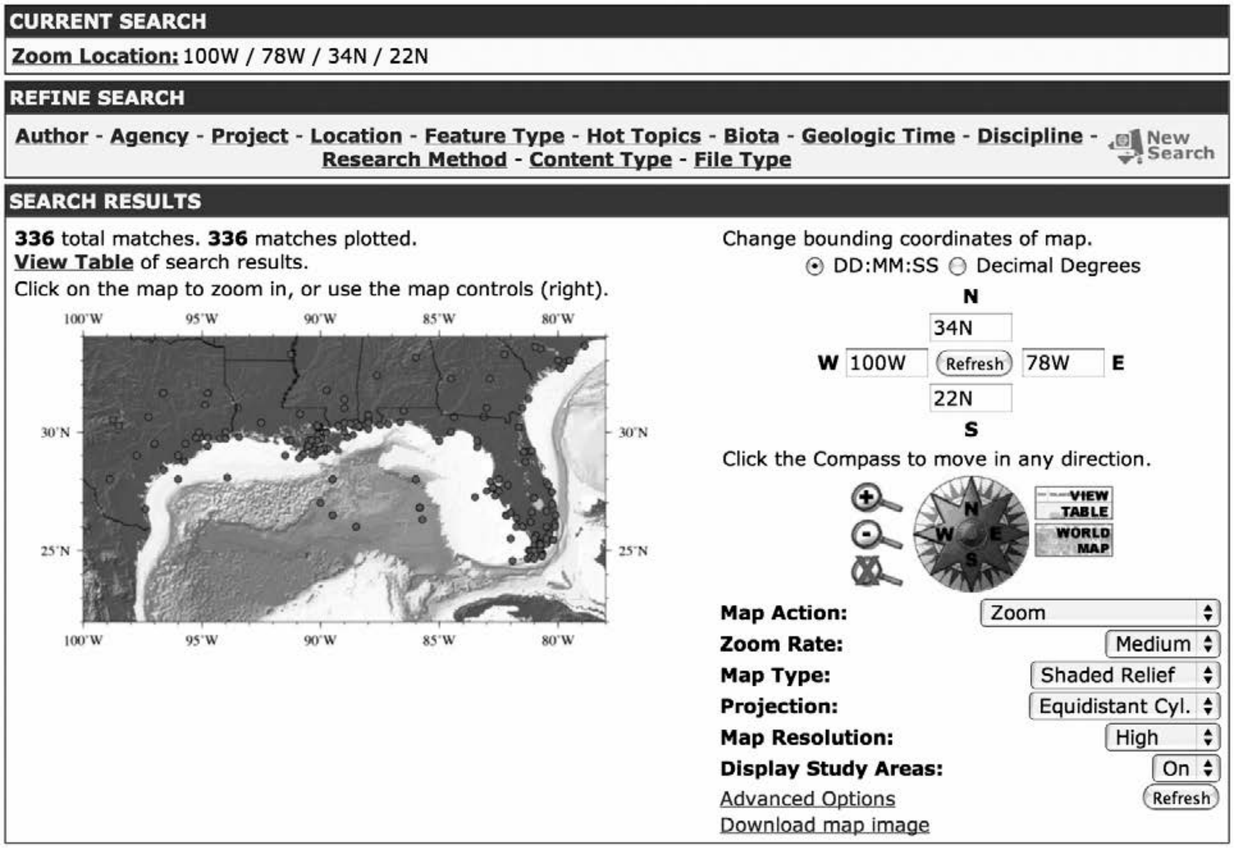
Gazetteer Location:

- Oceans
- Continents
- Continental Coasts
- Seas, Gulfs and Bays
- Lakes
- Mountains
- Geopolitical Units
- Exclusive Economic Zones (EEZ)
- Marine Sanctuaries
- Coastal Watersheds
- Topographic Maps
- Marine Cadastres

Maps

Maps can be used directly to search for information. The dots on the map show the locations of places that are discussed in the information resources in the MRIB database.
The maps are interactive: note the controls to zoom, pan, and change the appearance of the map (Fig. 5). The "GIS lite" features of the MRIB map interface make it easy to compare study locations with geographic regions and features. For instance, the Advanced Options link opens a menu of background map layers that can be turned on and off, including the boundaries of Exclusive Economic Zones, National Marine Sanctuaries, Minerals Management Service (MMS) Official Protraction Diagrams, and USGS-defined hydrologic units (watersheds). MRIB utilizes the open-source Generic Mapping Tools (GMT) subroutines (see Wessel, 2010).

Figure 5. The Marine Realms Information Bank (MRIB) interactive map interface, with controls to zoom, pan, and change the appearance of the map. The Advanced Options link (lower right) opens a menu of background map layers that can be turned on and off. The dots on the map show the locations referenced by information resources in the MRIB database. Clicking the View Table link will display a table of these information resources.



CURRENT SEARCH

Zoom Location: 100W / 78W / 34N / 22N

REFINE SEARCH

SEARCH RESULTS

336 total matches. **336** matches plotted.

View Table of search results.

Click on the map to zoom in, or use the map controls (right).

Change bounding coordinates of map.

● DD:MM:SS ○ Decimal Degrees

N: 34N
W: 100W
E: 78W
S: 22N

Click the Compass to move in any direction.

Map Action: Zoom
Zoom Rate: Medium
Map Type: Shaded Relief
Projection: Equidistant Cyl.
Map Resolution: High
Display Study Areas: On

Special Collections with Customized User Interfaces

The MRIB platform has been used to create two specialized digital libraries: the thematically focused Coastal Change Hazards (CCH) Digital Library (http://mrib.usgs.gov/cch/) and the regionally focused Monterey Bay Science (MBS) Digital Library (http://mrib.usgs.gov/mbs/). Each has a customized user interface and intensive collection development drawing upon information resources from the USGS and other institutions. For the CCH Digital Library we also created a new *CCH Topics* facet, with crosswalks to the MRIB *Hot Topics* facet so that the indexed resources can be found through either interface.

FEATURES IN DEVELOPMENT

Work in progress and recently implemented features include the following:

1. We have started work on an improved marine gazetteer with polygon shapefiles for the locations of geographic regions and undersea features. These polygons will allow more precise searching than the currently employed rectangular bounding boxes.
2. MRIB can be used as a Web service as well as an interactive Web site. We have documented the method for automatically harvesting MRIB metadata records.
3. Although MRIB will always have in-house indexing and quality control, another way to get information about relevant Internet resources is directly from Internet users. The Electronic Index Card (EIC) Creation Utility is a Web site that allows MRIB users to nominate online resources for the MRIB database and populate the EIC indexing fields. This is our way of harnessing the “wisdom of crowds.”

These points are discussed in more detail below.

Gazetteer Improvement Project

We have long been dissatisfied with rectangular bounding boxes to define the places listed in our gazetteer. The "poster child" for this problem is the bounding box for the Pacific Ocean, which includes the Gulf of Mexico, the Caribbean Sea, the Great Lakes, the Gulf of Maine, and Hudson Bay (to say nothing of Australia and most of North America.)

To rectify this problem, we are currently compiling a gazetteer providing polygons for the spatial extents of ocean regions and undersea features. We are using existing resources as much as possible for the limits of major oceans and seas, but for undersea features we are creating polygons based on bathymetry.

Shapefiles for Oceans and Seas

We have adopted the limits of oceans and seas as defined by the International Hydrographic Organization (1953) and interpreted by the Flanders Marine Institute (2005). We also plan to create polygons for U.S. coastal features, starting with linear and irregularly shaped features for which a bounding box produces noticeable retrieval errors.

Shapefiles for Undersea Features

We are currently creating polygons for the high-priority undersea features identified by the Subcommittee on Undersea Feature Names (SCUFN) of the General Bathymetric Chart of the Oceans (see GEBCO, 2009). Major ridges, fracture zones, and basins will be included worldwide, along with lesser features as warranted in the U.S. Exclusive Economic Zone (EEZ). Our final product will comply with U.S. Board on Geographic Names (BGN) policies and guidelines.

Search URL Documentation

MRIB is a Web service as well as an interactive Web site. MRIB uses a Common Gateway Interface (CGI) program to search its collection, which allows automated search requests using Uniform Resource Locators (URLs). For example, a simple search request for records matching the value *Environment > Climate Change* in the *Hot Topics* field is executed using this URL:

http://mrib.usgs.gov/cgi-bin/search?topics=environment.climate_change

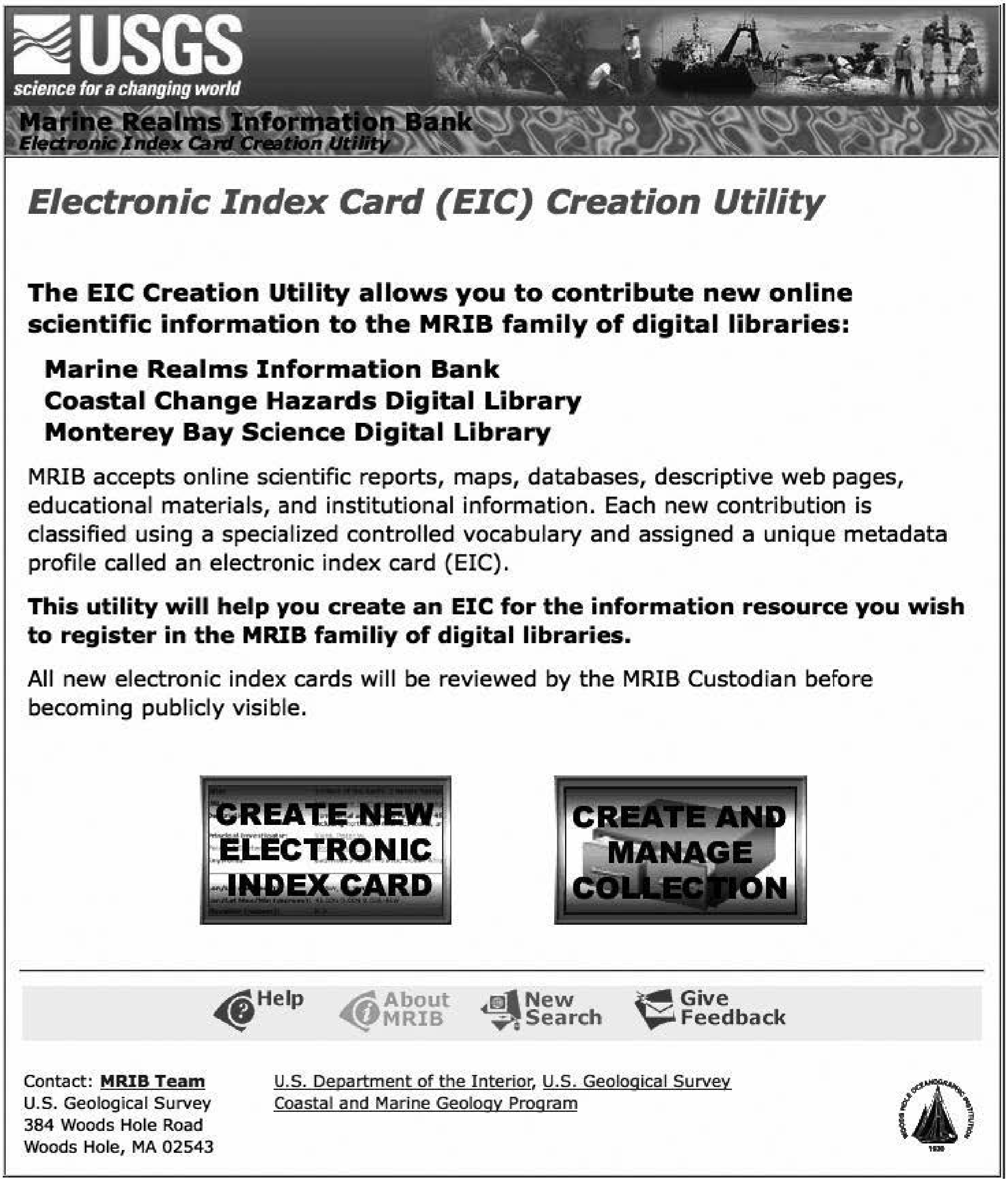
More complex queries can also be constructed, and the way the search results are displayed or exported can be stipulated (see Linck et al., 2009). You can use the MRIB user interface to create a search URL, submit it to the CGI, and retrieve the search results—or you can harvest the search results automatically using another Web service, or simply bookmark the search URL in your Web browser.

EIC Creation Utility

MRIB has an in-house librarian who adds information resources to the catalog, but we also encourage MRIB users to contribute to the database by using the Electronic Index Card (EIC) Creation Utility (https://mrib.usgs.gov/eic/), which guides the user through the indexing process (Fig. 6). The MRIB librarian evaluates all outside contributions before including them in the publicly available database, but in the meantime the user-contributor can utilize the full functionality of MRIB to search and sort provisional EICs—much like having a private MRIB.

Figure 6. The Electronic Index Card (EIC) Creation Utility, which allows users to contribute new online resources to the shared databases of the Marine Realms Information Bank and its two specialized offshoots,

the thematically focused Coastal Change Hazards Digital Library and the regionally focused Monterey Bay Science Digital Library.



Electronic Index Card (EIC) Creation Utility

The EIC Creation Utility allows you to contribute new online scientific information to the MRIB family of digital libraries:

Marine Realms Information Bank
Coastal Change Hazards Digital Library
Monterey Bay Science Digital Library

MRIB accepts online scientific reports, maps, databases, descriptive web pages, educational materials, and institutional information. Each new contribution is classified using a specialized controlled vocabulary and assigned a unique metadata profile called an electronic index card (EIC).

This utility will help you create an EIC for the information resource you wish to register in the MRIB familiy of digital libraries.

All new electronic index cards will be reviewed by the MRIB Custodian before becoming publicly visible.

Contact: **MRIB Team**
U.S. Geological Survey
384 Woods Hole Road
Woods Hole, MA 02543

U.S. Department of the Interior, U.S. Geological Survey
Coastal and Marine Geology Program

CONCLUSION

Digital libraries differ from Internet search engines by *adding value* to online resources. A well-designed digital library offers a carefully selected, manageable collection of resources, organized to provide context and to highlight interrelationships that might otherwise be overlooked. Lagoze et al. (2005) argue that a digital library should also encourage user collaboration in order to benefit from the “wisdom of crowds.” MRIB illustrates these points: MRIB adds value to online resources for coastal and marine science by providing selectivity, topical context, and spatial context. The Electronic Index Card (EIC) Creation Utility allows users to contribute new metadata records and help the MRIB Team keep the old ones current. This “grassroots” collaboration by users will also ensure that MRIB remains abreast of emerging research.

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A COMPARATIVE ANALYSIS OF GEOSCIENCE LITERATURE DATABASES

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Abstract - A comparative analysis and relative ranking of seven databases which index geoscience journal literature (Academic Search Premier, GeoRef (CSA), Google Scholar, SciFinder, Scirus, Scopus, Web of Science) and four databases which index geoscience books (Google Books, GeoRef (CSA), OCLC WorldCat, Scirus) was performed utilizing specific criteria (coverage of top geoscience journals, freshness of indexing, completeness of indexing, comprehensiveness, size, and coverage of geoscience books or book chapters) established primarily from a citation analysis of graduate theses and dissertations from The University of Montana Geosciences Department. The citation analysis indicated that the geoscience literature includes a diverse mix of types and ages of information sources. Databases recommended for searching the geoscience literature are: Scopus and/ or Web of Science; Google Scholar; GeoRef; WorldCat; and Google Books.

INTRODUCTION:

Information resources commonly available for geoscience literature research and the information resources routinely used by academic geoscience researchers have dramatically changed in a relatively short period of time. Fifteen years ago as a Science Librarian working at a North American university, in the Northwest, I would have recommended that students use the following resources for comprehensive literature searches in geosciences: GeoRef on CD-ROM (Silverplatter), Infotrac on CDROM, Science Citation Index (print or fee based Dialog searching online), the university library catalog online, and Lasercat (the CD-ROM union catalog of WLN with 4.5 million bibliographic records and holdings of member libraries), and to be really thorough perhaps an online RLIN search. Today the list of electronic resources under the subject of Geosciences at my university library includes a bewildering number (over 30 resources) of interfiled electronic indexes, fulltext databases, ejournal packages, and electronic reference sources, to select from.

Students and faculty are increasingly turning to non-traditional and recently available web based sources of information. I have heard directly from some Geosciences department faculty that traditional, discipline specific indexes such as GeoRef are not of value to them and that they prefer to use Scopus, Web of Science, SciFinder, and Google Scholar. When pressed they often state that these newer indexes provide better (more comprehensive and up to date) access to the journal literature that they are most interested in. Database selection and literature search habits, for both librarians and researchers, once established may be resistant to change and likely to be infrequently re-examined even when the local availability of databases changes. However, as database options change over time, the relative performance of databases may also change as well. What was once considered one of the “best” databases for a particular topic may no longer be so.

METHODS and RESULTS:

There were 657 total citations examined from the bibliographies of eight randomly selected theses and dissertations (Appendix 1) from the 22 total produced by graduate students in The University of Montana, Geosciences Department during 2006 and 2007. With regard to type of information source: 56% of the citations were journal articles; 16% were books or book chapters; 9% were government documents; 5% were theses or dissertations; and 14% were other types of information sources (e.g. Proceedings, Maps, Museum Reports, etc.) or uncategorized. With regard to age of information source: 26% of the citations were published from 2000 – 2006; 30% were from 1990 – 1999; 25% were from 1980 – 1989; 10% were from 1970 – 1979; and 8% were from pre 1970.

From the 657 total citations examined there were approximately 150 individual journal titles identified. Of those 150 journal titles there were 12 journal titles that were cited 5 or more times. Those 12 journal titles were identified, for the purpose of this study, as the most important journals for geoscience (Table 1).

Table 1: Top 12 Most Important Journals for Geoscience

(based on a citation analysis of 657 citations from bibliographies of 8 randomly sampled theses and dissertations from University of Montana Geosciences Department graduate students for 2006 and 2007):

Geochimica et Cosmochimica Acta (40 citations)
Applied and Environmental Microbiology (21 citations)
Geological Society of America Bulletin (17 citations)
Limnology and Oceanography (16 citations)
Environmental Science & Technology (13 citations)
Geology (11 citations)
AAPG Bulletin (9 citations)
The Journal of Geology (8 citations)
Canadian Journal of Earth Sciences (6 citations)
Geomorphology (5 citations)
Soil Science Society of America Journal (5 citations)
Tectonophysics (5 citations)

Of the 10 citations randomly selected (Appendix 2) from the bibliographies of the 8 theses/ dissertations and used for subsequent database analyses, 3 of the 10 were journal articles, 2 were book chapters, 2 were books, 2 were reports, and 1 was a map. And 5 of the 10 citations were published ten years or more before inclusion in the bibliographies.

All of the 7 primary literature databases were analyzed and ranked using criteria and procedures described in the Methods section. And the results are listed in Tables 2 - 7. The 4 databases which index books and/or book chapters were analyzed using criteria and procedures described in the Methods section and listed in result order in Tables 8 - 10.

Table 2: Coverage of Top 12 Geoscience Journals (note: >3 years behind = excluded)

Rank (Lowest is Best)	Database	Score: # Top 12 Journals Excluded
1	Google Scholar	0
1	Scopus	0
1	Web of Science	0
2	SciFinder	1
3	Academic Search Premier	2
3	GeoRef (CSA)	2
4	Scirus	5

Table 3: Freshness of Indexing (Recency of Issues of Top 12 Geoscience Journals)

Rank (Lowest is Best)	Database	Score: Average # Issues Behind
1	Google Scholar	0.25
2	Scopus	0.83
3	Academic Search Premier	1.0
4	Web of Science	1.6
5	SciFinder	2.45
6	Scirus	4.86
7	GeoRef (CSA)	10.3

Table 4: Completeness of Table of Contents Indexing (Top 12 Geoscience Journals)

Rank (Lowest is Best)	Database	Score: Aver. # Articles Excluded (out of the first 10 articles)
1	Academic Search Premier	100%
1	Scopus	100%
1	Web of Science	100%
2	GeoRef (CSA)	90%
3	Google Scholar	82%
4	Scirus	74%
5	SciFinder	73%

Table 5: Comprehensiveness: Inclusion of Citations (Biblio. of 8 Theses/ Dissertations)

Rank (Lowest is Best)	Database	Score: # Citations Excluded (out of 10 citations sampled)
1	Google Scholar	2
2	SciFinder	5
3	Scopus	6
4	GeoRef (CSA)	7
4	Scirus	7
4	Web of Science	7
5	Academic Search Premier	10

Table 6: Size (Title Keyword Search of geological or geology or geoscience)

Rank (Lowest is Best)	Database	Score: # for 2007 + 1987 = **Total**
1	GeoRef (CSA)	6,740 + 15,530 = **22,270**
2	Scopus	9,322 + 3,696 = **13,018**
3	Scirus	7,787 + 253 = **8,040**
4	Google Scholar	3,603 + 4,246 = **7,849**
5	SciFinder	768 + 468 = **1,236**
6	Web of Science	590 + 557 = **1,147**
7	Academic Search Premier	339 + 30 = **369**

Table 7: Overall Ranking of Databases based on Relative Performance on Geoscience Literature Searches (i.e. sum of 5 previous category ranks)

1) Scopus
2) Google Scholar
3) Web of Science
4) GeoRef (CSA)
5) SciFinder
~~5) Academic Search Premier~~ - eliminate based on small comprehensiveness and size
~~6) Scirus~~ - eliminate based on coverage of top geoscience journals

Table 8: Book and Book Chapter Literature Search (Title Keyword Search of geological; geology; geoscience; restricted to books and book chapters document type)

Database	Date	Title Keyword	Total Results
OCLC WorldCat	2007	geological	891
OCLC WorldCat	2007	geology	675
OCLC WorldCat	2007	geoscience	66
OCLC WorldCat	1987	geological	4,629
OCLC WorldCat	1987	geology	2,131
OCLC WorldCat	1987	geoscience	86
Google Books	2007	geological	392
Google Books	2007	geology	683
Google Books	2007	geoscience	88
Google Books	1987	geological	576
Google Books	1987	geology	735
Google Books	1987	geoscience	92
GeoRef (CSA)	2007	geological	34
GeoRef (CSA)	2007	geology	93
GeoRef (CSA)	2007	geoscience	3
GeoRef (CSA)	1989	geological	943
GeoRef (CSA)	1989	geology	987
GeoRef (CSA)	1989	geoscience	63
Scirus	2007	geological	0
Scirus	2007	geology	2
Scirus	2007	geoscience	0
Scirus	1987	geological	0
Scirus	1987	geology	2
Scirus	1987	geoscience	0

Table 9: Comprehensiveness: Inclusion of Citations (Biblio. of 8 Theses/ Dissertations)

Rank (Lowest is Best)	Database	Score: # Citations Excluded (out of 10 citations sampled)
1	Google Books	3
2	OCLC WorldCat	6
3	GeoRef (CSA)	7
3	Scirus	7

Table 10: Overall Ranking of Databases for finding Geoscience Book and Book Chapter and other non journal literature based on relative performance (i.e. Tables 8 & 9 above)

1) OCLC WorldCat
2) Google Books
3) GeoRef (CSA)
~~4) Scirus~~ - eliminate based on coverage of geoscience books and book chapters

DISCUSSION and CONCLUSIONS:

Geoscience, based on the citation analysis of theses and dissertations produced by University of Montana Geosciences Department graduate students, utilizes lots of different types of information sources, often cites older (published more than 10 - 15 years before citing) literature, and is less dependent on journal literature than many other science disciplines. Although Table 8 indicates that there were generally a greater number of books and book chapters produced or indexed in the 1980's then in the recent decade.

Many recently available databases (e.g. Google Books, Google Scholar, Scopus, Web of Science, WorldCat) are powerful tools for searching the science literature. They are large, comprehensive, multidisciplinary indexes. Several reviews and comparisons have now been published with various combinations of Google Scholar, Scirus, Scopus and Web of Science (Bosman et al. 2006; Deis and Goodman 2005; Dess 2006; Giustini and Barsky 2005; Howland et al. 2009; Jasco 2005, 2009; Tompson 2007). Google Scholar is acknowledged as large, comprehensive, scholarly, and quite useful for literature searching but is often criticized for the uncertainty of what is indexed in it, and from what publishers, and the incompleteness of content from some journals, and the errors contained in some of the citing records. Despite the widespread popularity amongst researchers for Google Scholar, Scopus, and Web of Science there is a surprising lack of librarian inclusion of them in the databases compared and listed as best for finding geoscience literature.

GeoRef is large but, based on the results of this analysis, not as comprehensive as Scopus, Web of Science, and Google Scholar for journal literature or WorldCat or Google Books for book literature. GeoRef also appears to have a severe lag time in indexing journals. Previous studies (Brown 2007a, 2007b; Christianson, 2007) indicated that Google Scholar had a significant indexing lag time but this current study shows that it is now extremely up to date. Scopus appears to be the best commercial database for finding geoscience literature. Google Scholar is clearly one of the best, and certainly the most cost effective database, for finding geoscience literature. Based on the results of this analysis, the final database recommendations for researchers wishing to comprehensively search the Geoscience Literature are all of the following:

Scopus and/ or Web of Science
Google Scholar
GeoRef
WorldCat
Google Books

These database ranking results are similar to those found by Brown (2007a; 2007b) for ecology literature and freshwater ecology literature with Scopus, Web of Science, and Google Scholar performing well for finding journal literature, and WorldCat and Google Books performing well for books and nonjournal literature. Borrelli et al. (2009), examining the use of geology journals at Washington State University, found an increased trend in interdisciplinary research and the citing of journal articles for geology. Joseph (2001) stated that geology has always been an interdisciplinary science linking biology, chemistry, physics, etc. So perhaps it is no wonder that large, multidisciplinary indexes such as Scopus, Web of Science, and Google Scholar capture important geoscience literature so well. Joseph (2007) in a different study found that GeoRef contained the largest number of total records and unique records for the search terms: Quaternary or Pleistocene or Holocene, out of 11 databases; however, she did not analyze Scopus, Web of Science or Google Scholar. Joseph (2007) reviewed a large number of database comparison studies and concluded that her study supported the recommendations of previous studies that in order to perform a comprehensive literature search multiple databases must be searched.

Limitations of this analysis include a relatively small sample size of theses and dissertations, and total number of citations, from one institution. The University of Montana Geosciences Department has research concentrations in Earth History and Interior Processes; Sedimentary Record, Processes, Paleontology; and Water, Environment, and Paleoclimate which may or may not be typical of geoscience research. Two additional databases should ideally also have been compared in this analysis: Geobase and Inspec. However, the author is confident in predicting that the final ranking of databases would not have changed with the inclusion of those two databases. Given the diverse types of information sources cited by geoscience researchers it might be of interest to further analyze nonjournal and nonbook literature (i.e. technical reports, government documents, maps, proceedings, etc.) and the performance of databases for discovering that type of literature.

ACKNOWLEDGEMENTS:

Grateful acknowledgement and thanks are given to Cheryl Cote who completed the initial data compilation and citation analysis of the 657 citations from the bibliographies of the 8 University of Montana Geoscience Department graduate theses and dissertations.

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Howland, J. L.; Wright, T. C.; Boughan, R. A.; Roberts, B. C. 2009. How scholarly is Google Scholar? A comparison to library databases. College and Research Libraries 70(3): 227-234.

Jasco, P. 2005. As we may search – Comparison of major features of the Web of Science, Scopus, and Google Scholar citation-based and citation enhanced databases. *Current Science* 89(9): 1537-1547.

Jasco, P. 2009. Newswire Analysis: Google Scholar's ghost authors, lost authors, and other problems. Library Journal 9/24/2009.

Joseph, L. E. 2001. Geology librarianship: current trends and challenges. Science & Technology Libraries 21(1/2): 65-85.

Joseph, L. E. 2007. Comparison of retrieval performance of eleven online indexes containing information related to Quaternary research, an interdisciplinary science. Reference & User Services Quarterly 47(1): 56-65.

Tompson, S. 2007. Scirus – for scientific information*.* *Issues in Science and Technology Librarianship* 49.

APPENDIX 1: Random sample of 8 theses/ dissertations produced by graduate students in The University of Montana Geosciences Department during 2006 and 2007:

Bradway, M. D. 2007. Stratigraphy and structural geometry at the leading edge of the Montana Thrust Belt, east of Sun River Canyon, Lewis and Clark and Teton Counties, Montana. MS Thesis. University of Montana--Missoula. Dept. of Geology.

Bush, D. A. 2006. 3-D geostatistical lithofacies mapping of Pleistocene flood deposits in a portion of the Hanford Nuclear Site, Richland, Washington. MS Thesis. University of Montana--Missoula. Dept. of Geology.

Edwards, J. O. 2006. Evidence for glacial outburst floods along the lower Flathead River results from geologic mapping, geomorphologic analysis, and a gravity survey near. MS Thesis. University of Montana--Missoula. Dept. of Geology.

Foster, M. L. 2005. K-bentonites of the Middle Proterozoic Belt Supergroup, Western Montana. MS Thesis. University of Montana--Missoula. Dept. of Geology.

Naylor, S. 2006. Influence of glacial erosion on landscape evolution and basin morphology in the Bitterroot Mountains, Montana. MS Thesis. University of Montana--Missoula. Dept. of Geology.

Pete, S. H. 2006. Characterization of pre and post re-naturalized surface water/groundwater exchange, Jocko River, Flathead Indian Reservation, Montana. MS Thesis. University of Montana--Missoula. Dept. of Geology.

Strumness, L. A. 2006. Phosphorus cycling in Octopus Spring, Yellowstone National Park, Wyoming, U.S.A. MS Thesis. University of Montana--Missoula. Dept. of Geology.

Tooke, D. L. 2006. Sulfur transport and fate in a pulp mill wastewater treatment system. PhD Dissertation. University of Montana--Missoula. Dept. of Geology.

APPENDIX 2: Random sample of 10 citations from the bibliographies of the 8 theses/ dissertations listed in Appendix 1:

Andrea, M. O.; Jaeschke, W. A. 1992. Exchange of sulfur between biosphere and atmosphere over temperate and tropical regions. Sulphur cycling on the continents. Howarth, R. W.; Stewart, J. W. B.; Ivanov, M. V. Chichester, John Wiley and Sons.

Bak, F.; Cypionka, H. 1987. A novel type of energy metabolism involving fermentation of inorganic sulphur componds. Nature 326: 891-892.

Baker, V. R.; Bjornstad, B. N.; Busacca, A. J.; Fecht, K. R.; Kiver, E. P.; Moody, U. L.; Rigby, J. G.; Stradling, D. F.; Tallman, A. M. 1991. Quaternary geology of the Columbia Plateau, pages 215-250 in Quaternary nonglacial geology conterminous U.S., v. K-2, Boulder, CO, U.S. Geological Survey of America.

Foster, D. A.; Schafer, C.; Fanning, C. M.; Hyndman, D. W. 2001. Relationships between crustal partial melting, plutonism, orogeny, and exhumation: Idaho-Bitterroot Batholith. Tectonophysics 342: 313-350.

Last, G. V.; Horton, D. G. 2000. Review of geophysical methods used at the Hanford Site. Richland, WA, Pacific Northwest National Laboratory.

Liu, S. M.; Zhang, J.; Li, D. J. 2004. Phosphorus cycling in sediments of the Bohai and Yellow Seas. Estuarine, Coastal and Shelf Science 59: 209-218.

Madigan, M. T.; Martinko, J. M.; Parker, J. 2000. Biology of microorganisms. Upper Saddle River, Prentice Hall Inc.

Postgate, J. R. 1984. The sulfate reducing bacteria. London, Cambridge University Press.

Smith, L. N. 2000. Altitude of and depth to the bedrock surface in the Flathead Lake Area, Flathead and Lake counties, Montana. Montana Bureau of Mines and Geology Groundwater Assessment Atlas 2, Map 7, scale 1:150,000.

Wheeler, R. J.; Lehne, G. M.; Frojen, W.; Knudsen, K.; Chesbro, C.; Krowen, D.; Piippo, K. A.; Farbo, W. B. 1969. Jocko Valley: a geography field project. University of Montana, Missoula.

PART 2: GSA Poster Session No. 30

Geoscience Information/Communication (Posters): New Horizons on the Digital Information Landscape

Abstracts and Posters

October 18, 2009

OPEN ACCESS OPPORTUNITIES IN THE GEOSCIENCES:
"GREEN OA"

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Abstract - Changes in the field of publishing and in scholarly communication have been impacting the distribution of scientific knowledge for years. The economics of publishing continues to have an impact on subscribers' ability to maintain access and therefore the readership of established publications may diminish or look for legitimate alternatives to gain access.

For an audience of both scientists and librarians, this poster session will provide an overview of Green Open Access (OA) in the Geosciences. Green Open Access provides an opportunity to balance a scholar's need to publish in respected journals with the importance of widespread distribution of research. Authors, publishers, and repository managers can work together to ensure widespread access to high quality research. The author will describe "Green OA" vs. "Gold OA", highlighting opportunities that are available to many authors through institutional and in some cases subject repositories, and review publishers and their associated high-impact journals for their support of Green Open Access.

OPEN ACCESS

Open Access (OA) refers to scholarly literature which is "digital, online, free of charge, and free of most copyright licensing restrictions" (Suber, 2007). The philosophy behind OA is that research should be made free and available to anyone with an interest rather than locked up behind subscriptions at academic and other research institutions. The widespread use of the internet makes OA feasible.

Gold Open Access

There are two main methods by which research might become freely available. Either journals themselves can be open access or individual publications (articles) can be made freely available.

In order for journals to be considered an OA title, they must make all their content freely available online without requiring the author to pay an additional fee to make their article freely accessible. There are many income models by which a journal can be financially viable as an OA title (see Crow, 2009, for a description of income models). Some well known examples of OA journals are the PLoS publications (http://www.plos.org/) which have a strong biological science focus. In geosciences, the Directory of Open Access Journals (DOAJ, 2010) includes approximately 130 journal titles (de-duplicated) in the categories of earth sciences, geography, geology, and geophysics and geomagnetism.

Green Open Access

Green open access is achieved when the author posts their work online – typically placed into a subject or institutional repository ("self-archiving"). In order to do this legitimately and without worry of infringing on the publisher's copyright, an author must carefully review (and make necessary changes to) their Copyright Transfer Agreement (CTA) before they sign it. In some instances, the author may find the publisher has a favorable view of self-archiving and allows one or more versions of the work to be posted online. However, some publishers do not allow self-archiving or only allow the un-refereed version ("pre-print") of the article to be posted by the author. For obvious reasons, it is best for authors and the readers if-- at the very least-- the author's final accepted (peer-reviewed) version of the article is posted (referred to as "post-print" hereafter). In addition, it is relatively rare that publishers will allow the final PDF to be posted online by the author. In order to post the most authoritative version, authors may need to ask the publisher for more rights to their own work than originally offered in the CTA.

"Authors rights" refers to much more than just self-archiving and may include re-use of publications in future works, distribution of the work to students for teaching purposes, and development of derivative works. For the purposes of this article, the focus is on self-archiving – one method of achieving open access.

Honing negotiation skills

When a work is accepted for publication in a journal, the author is typically asked to sign the CTA or similarly named form. The main purposes of the form are to assure the publisher that they have permission to publish the work, can protect it from copyright infringement (Gadd, Oppenheim & Probets, 2003), and can protect their own investment of time and resources in the work. Frequently, however publishers will ask for more rights than they need by requesting complete transfer of copyright and/or an exclusive license.

Hence, making an article "green" often requires that authors negotiate for rights they are not offered by the publisher. Often authors do not realize they can amend the agreement with the publisher – or at least attempt to do so through negotiation.

Authors can opt to use an addendum to make changes to the publisher's CTA. There are several available addenda online including those from the Scholarly Publishing and Academic Research Coalition (SPARC, n.d.), Science Commons (n.d.), and the Committee on Institutional Cooperation (CIC, 2008). The addenda from SPARC, the Science Commons, and CIC all include the author's right to "use, reproduce, distribute, and create derivative works" as well as the right to make the final version of the article (publisher's PDF, with typesetting) available to others through an institutional or subject repository or the author's own website. Variations in how soon the final formatted version is made available exist between the addenda (e.g. the CIC requests permission to post the PDF six months after publication).

Once an author sends an addendum to the publisher, the publisher may respond in a variety of ways – from acceptance of the addendum as-is, to acceptance of some variation of the requests, or flat out rejection. At this point the author must weigh the importance of having the article published in the journal in question against his or her desire to retain rights to their works. Only the author(s) can judge effectively and make decisions that will best support his or her professional needs.

Options for posting works online

Once an author has ensured they have the right to post their work online, they may choose do so through their own personal, university, or organization website. However, institutional and subject repositories are superior to these webpages for two important reasons. First, many repositories use the Open Archives Initiative (OAI) (Suber, 2007) protocol which allows internet search engines to find the contents contained within. In addition, for many repository managers, the goal is not just to post the work, but rather to preserve the research and therefore ensure long-term access.

There are many repositories in existence. A search of *Open*DOAR (Directory of Open Access Repositories, 2010) reveals that there are 262 institutional repositories in the United States, many of which are affiliated with academic institutions, this number increases substantially to 1284 when searching for institutional repositories worldwide. Likewise there are 77 subject based or disciplinary repositories listed for the United States and 207 worldwide. There are few repositories listed as specializing in earth and planetary sciences (12 in the U.S., and 28 worldwide). However, since institutional repositories focus on the research of the institution, geoscientists at universities, colleges, and other organizations with repositories would likely find their work is welcome there.

How 'Green' are Geoscience Publishers?

Some of the major publishers of geoscience titles are supportive of self-archiving and some less so. Although generalizations can be made about a publisher's support of self-archiving, authors should always refer to the CTA they receive from the publisher.

Caveats aside, the SHERPA/RoMEO database of "Publisher copyright policies & self-archiving" (2010) provides a breakdown of the nuances of the different self- archiving conditions and restrictions and often a link to an example CTA from the publisher. The SHERPA/RoMEO database also presents an expanded color-coding for journals that describes the self-archiving rights allowed. In addition to 'green' publishers (post-print and pre-print can be archived), 'blue' publishers allow archiving of the post-print only, 'yellow' publishers only allow archiving of the pre-print, and 'white' publishers do not allow any type of archiving.

Examples of the level of support for self-archiving are below in Table 1. This table compiles publishers and their highly ranked titles from *JCR*'s "Geosciences, Multidisciplinary" category (top ten titles), with data from the SHERPA/RoMEO database. When looking at these titles one can see that several of the well-known publishers of geosciences titles do support self-archiving (without the author having to act further).

Table 1: *Journal Citation Reports* category “Geosciences, Multidisciplinary” (2008) journals arranged by publisher, with level of self-archiving

Publisher	**Titles** (***with impact factor from*** **JCR)**	**Self-archiving level allowed** **(from SHERPA/RoMEO database)**
American Geophysical Union (AGU)	• *Global Biogeochemical Cycles* (4.09) • *Paleoceanography* (3.626)	can archive pre-print and post-print, subject to some restrictions, publisher's PDF can be used (Green)
Annual Reviews	• *Annual Review of Earth & Planetary Sciences* (6.364)	can archive pre-print and post-print, not publisher's PDF (Green)
Elsevier	• *Earth-Science Reviews* (6.558) • *Geotextiles & Geomembranes* (3.701) • *Gondwana Research* (3.728) • *Precambrian Research* (3.736) • *Quaternary Science Reviews* (3.693)	can archive pre-print and post-print, not publisher's PDF (Green)
Wiley Blackwell	• *Geobiology* (3.596)	can archive pre-print only (Yellow)
Copernicus Publications	• *Biogeosciences* (3.445)	can archive pre-print and post-print, check with publisher regarding use of PDF (Green) note: This an Open Access journal

Why Go "Green"

Readers may be asking themselves why authors would want to go to all of this trouble. There are a couple of reasons to explore briefly. One relates to an author's likely desire to have an impact in their field and therefore demonstrate the relevance and importance of their work through the number of their peers that cite the work. The second reason is that going "green" promotes improved access to journal articles, which supports the greater good of research, researchers, and the public.

Many studies have addressed the aspects of how OA affects citations. This brief synopsis highlights just two such studies. Norris, Oppenheim, and Rowland (2008) looked at the literature of several subject areas (ecology, economics, applied mathematics, and sociology) in order to determine if there was "an OA citation advantage from articles published in a range of high-impact journals" (pg. 1965). They found that the OA citation advantage ranged as high as 88 percent for sociology to a low of 44 percent for Ecology. Overall they found that there was "a statistically significant difference in the mean number of citations that OA articles received when compared to [toll access] articles" (pg. 1969).

In another study, which also reviewed four subject areas (philosophy, political science, electrical and electronic engineering, and mathematics), Antelman (2004) found that OA articles from the four disciplines studied "have a greater research impact" (pg. 374) than those that are not. Increases in citations rates ranged from 45 percent for philosophy to 91 percent for mathematics.

Authors may be motivated by a sense of obligation to make their works available as well. For example, in a survey of faculty at 17 research institutions, Kim (2008) found that some authors who had been positively influenced by the "ease of access to OA materials in return wanted to self-archive their research" and others "felt obligated to make their research publicly accessible on the Internet because their research was funded by taxpayer money, or they worked in public universities" (pg. 219). Other authors may be motivated by the messages they have been hearing for years from librarians about the "serials crisis" and reductions in the journal subscriptions available from the libraries at their own institutions.

CONCLUSION

Authors can work to make research published in traditional, respected (high impact) journals freely available via the model of green open access and many publishers are supportive of authors doing so. However, authors should always carefully read the copyright transfer agreements they sign and make requests for changes to the rights offered as needed. There is support for making these changes and posting works online including a variety of author addenda and the availability of institutional repositories. Authors may be encouraged to take on the work required to retain their rights for reasons of both self-interest and making the research available to a wider audience.

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Gadd, E., Oppenheim, C., & Probets, S., 2003, RoMEO studies 1: The Impact of Copyright Ownership on Academic Author Self-Archiving. *Journal of Documentation*, 59(3), 243-277.

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SHERPA/RoMEO. 2010, Publisher copyright & Self-Archiving. Retrieved January 20th, 2010 from http://www.sherpa.ac.uk/romeo/.

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EARTH SCIENCE LITERACY PRINCIPLES: A GEOCOMMUNITY CONSENSUS

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Abstract - The Earth Science Literacy Principles, released in the spring of 2009, represent a geocommunity consensus about what all Americans should understand about Earth sciences. The document, presented as a published brochure and available on the Internet at www.earthscienceliteracy.org, was created through the work of the NSF-funded Earth Science Literacy Initiative (ESLI). Nearly 1000 geoscientists and geoeducators were involved in identifying nine "big ideas" and seventy-five "supporting concepts" fundamental to terrestrial geosciences. The content scope was designed to complement similar documents from the Oceans, Atmospheres, and Climate communities and involved the geosphere and land-based hydrosphere as addressed by the NSF-EAR program, including the fields of Geobiology and Low-Temperature Geochemistry, Geomorphology and Land-Use Dynamics, Geophysics, Hydrologic Sciences, Petrology and Geochemistry, Sedimentary Geology and Paleobiology, and Tectonics.

The creation of the Principles through the involvement of the geoscientists and geoeducators occurred in several stages. A 2-week online workshop run by the College of Exploration involved 350 people in a dialogue that began to define the essential big ideas and supporting concepts of Earth science. An organizing committee of a dozen people reviewed the workshop output and presented it at a writing workshop of 35 people, where a rough draft of the ESLI Principles was created. These principles were continuously reviewed and revised through presentations at national meetings, such as of the GSA and AGU, and online through web surveys. The ESLI Principles were reviewed and endorsed by many professional organizations including the AAPG, AGI, AGU, GSA, NAGT, NESTA, and USGS. The final document was crafted, published with accompanying graphics, and presented on the www.earthscienceliteracy.org web site. The ESLI Principles will be regularly updated to adapt to growth and change in the scientific understandings of Earth science. The document is already providing guidance for formal and informal education and within the government, and will continue to do so in the future.

NEW HORIZONS FOR THE INDIANA GEOLOGICAL SURVEY'S GEOLOGIC NAMES DATABASE AND WEB SITE

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Abstract - The Indiana Geological Survey (IGS) launched the Indiana Geologic Names Web site in 2009. The Web site and supporting Indiana Geologic Names Information System were developed by the IGS Geologic Names Committee (GNC) with assistance from the IGS Information Technology and Photography and Imaging Sections. The primary purpose of the Web site is to make current information about geologic names that are recognized by the IGS available to a broad spectrum of users from academia, industry, government, and the general public. Recent work plus planned future work includes adding databases and search options to further bridge the gap between technical geoscience information and general geologic information sought by the public Web site users.

The initial database created to support the Indiana Geologic Names Web site was the Indiana Stratigraphic Names Database, which represents a complete revision of Indiana's Paleozoic nomenclature. This database includes: 1) formal names of all bedrock stratigraphic units recognized by the IGS; 2) distribution of these units within the five Indiana areas delineated in the Midwestern Basin and Arches Region chart (COSUNA); 3) the hierarchy of the formal terminology for each unit; and 4) equivalent stratigraphic names that have been used in Indiana.

The Indiana Geologic Names Web site accesses the Indiana Geologic Names Information System, which includes the Stratigraphic Names Database as well as a reference database of pertinent references in which bedrock stratigraphic units have been described. The information system has recently been expanded to include the newly developed IGS Image Database containing photographs of Indiana type localities and reference sections, maps showing the distribution, structure, and thicknesses of units, and other figures showing key characteristics of units. Future databases that will be added to the Indiana Geologic Names Information System will include information about structural features, physiographic features, and the economic and environmental significance of stratigraphic units in Indiana. These links to the proposed databases will allow future visitors to the Indiana Geologic Names Web site to learn much more about Indiana stratigraphic units than just formal nomenclature. The Web site will guide professionals and lay persons to a greater understanding and appreciation of Indiana geology.

BACKGROUND

The purpose of the IGS GNC is to assist IGS authors in preparing abstracts, manuscripts, and maps that present formal geologic information in a consistent, systematic, and predictable manner. The proper use of geologic names and related terms allows for a more rapid, accurate, and comprehensive dissemination of the author's geologic information and concepts within the accepted language of the geologic literature.

The GNC uses the provisions of the North American Stratigraphic Code (The North American Commission on Stratigraphic Nomenclature, 2005) as its guide and maintains an official stratigraphic nomenclature for Indiana that IGS authors should use for both IGS and non-Survey manuscripts. The GNC is responsible for the approval of the use of both Indiana and non-Indiana names. Authors, of course, are free to revise stratigraphic classification and to create new nomenclature in accord with standard practices.

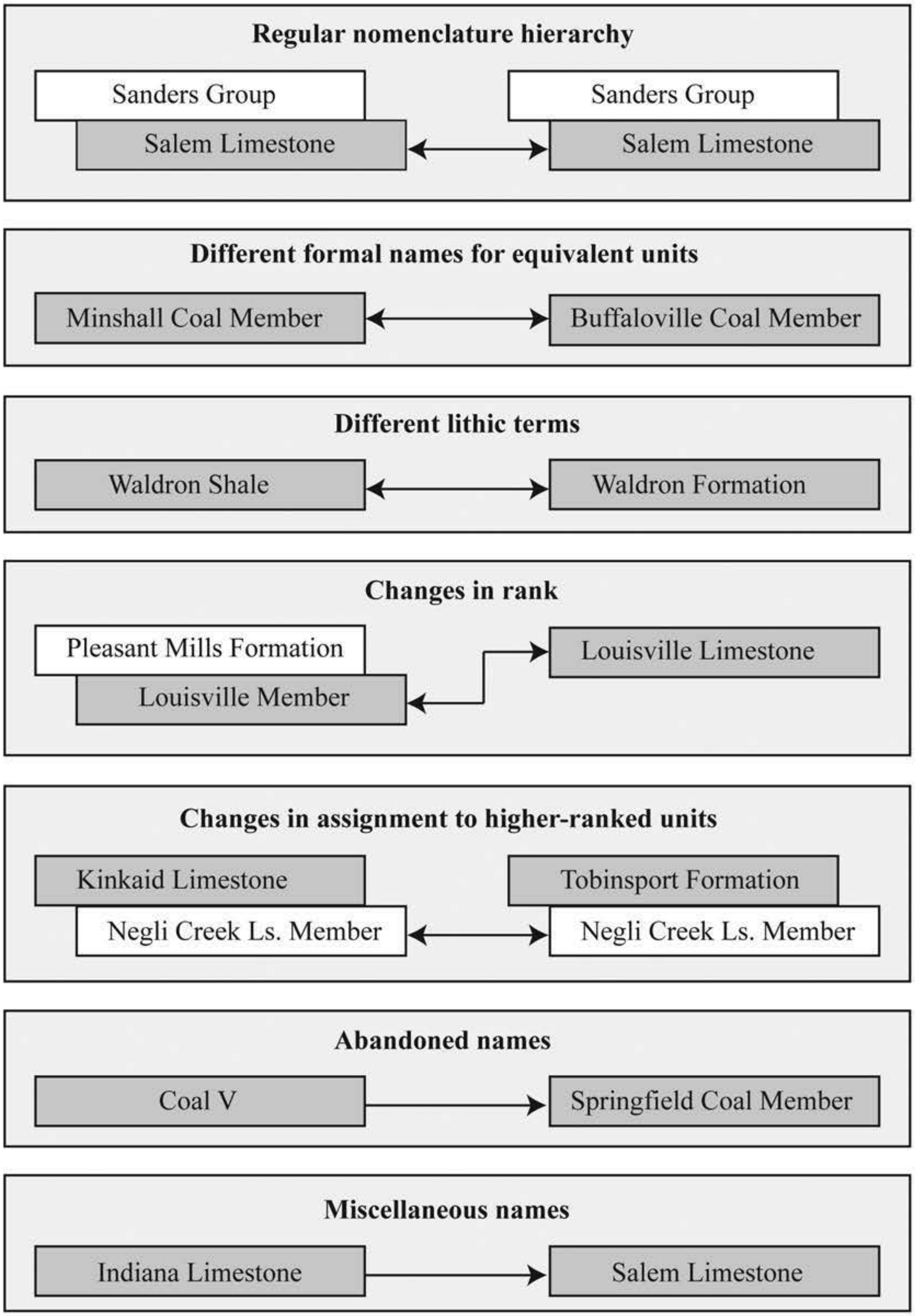
The paper-based publications summarizing the bedrock stratigraphy in Indiana, i.e., *Compendium of Rock-Unit Stratigraphy in Indiana* (Shaver *et al.*, 1970) and *Compendium of Paleozoic Rock-Unit Stratigraphy in Indiana—A Revision* (Shaver *et al*., 1986), needed to be updated. Because of the ongoing stratigraphic work by the researchers, these documents had become obsolete. Publishing an updated compendium is expensive and the publication would quickly become dated. A paper publication also makes it difficult for researchers and for managers of geological repositories to use current geological nomenclature. The creation of a Web-accessible Indiana Geologic Names Information System will enable the Geologic Names Committee to update and to revise the stratigraphic nomenclature, making the updated information quickly available to a wider audience (Hasenmueller and others, 2009).

INDIANA GEOLOGIC NAMES INFORMATION SYSTEM

Supporting Databases

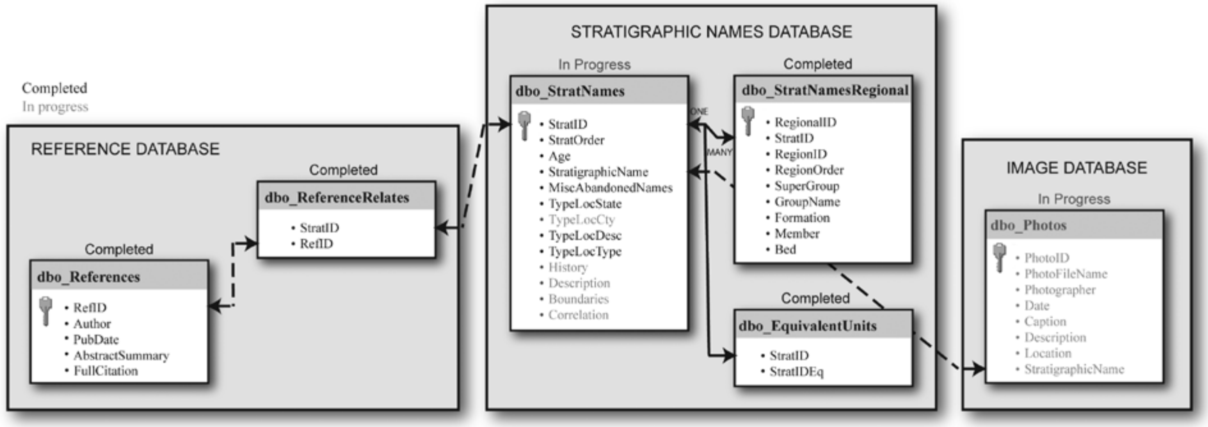
The initial database created to support the Indiana Geologic Names Web site was the Indiana Stratigraphic Names Database, which represents a complete revision of Indiana's Paleozoic nomenclature. Modern stratigraphic nomenclature conforms to a set of standards and procedures used to define and classify rock bodies (North American Stratigraphic Code, 2005). As such, formal stratigraphic nomenclature is not a fixed set of terms arranged in an invariant hierarchy. A database of stratigraphic names, therefore, must have sufficient flexibility to accommodate the evolution of nomenclature through time as well as geographic variations in nomenclature for equivalent units or a unit’s assignment to higher-ranking units. The common nomenclature relationships that must be incorporated into a stratigraphic names database are illustrated in Figure 1.

Figure 1. Nuances of stratigraphic nomenclature incorporated into the Stratigraphic Names Database (from Hasenmueller and others, 2008)



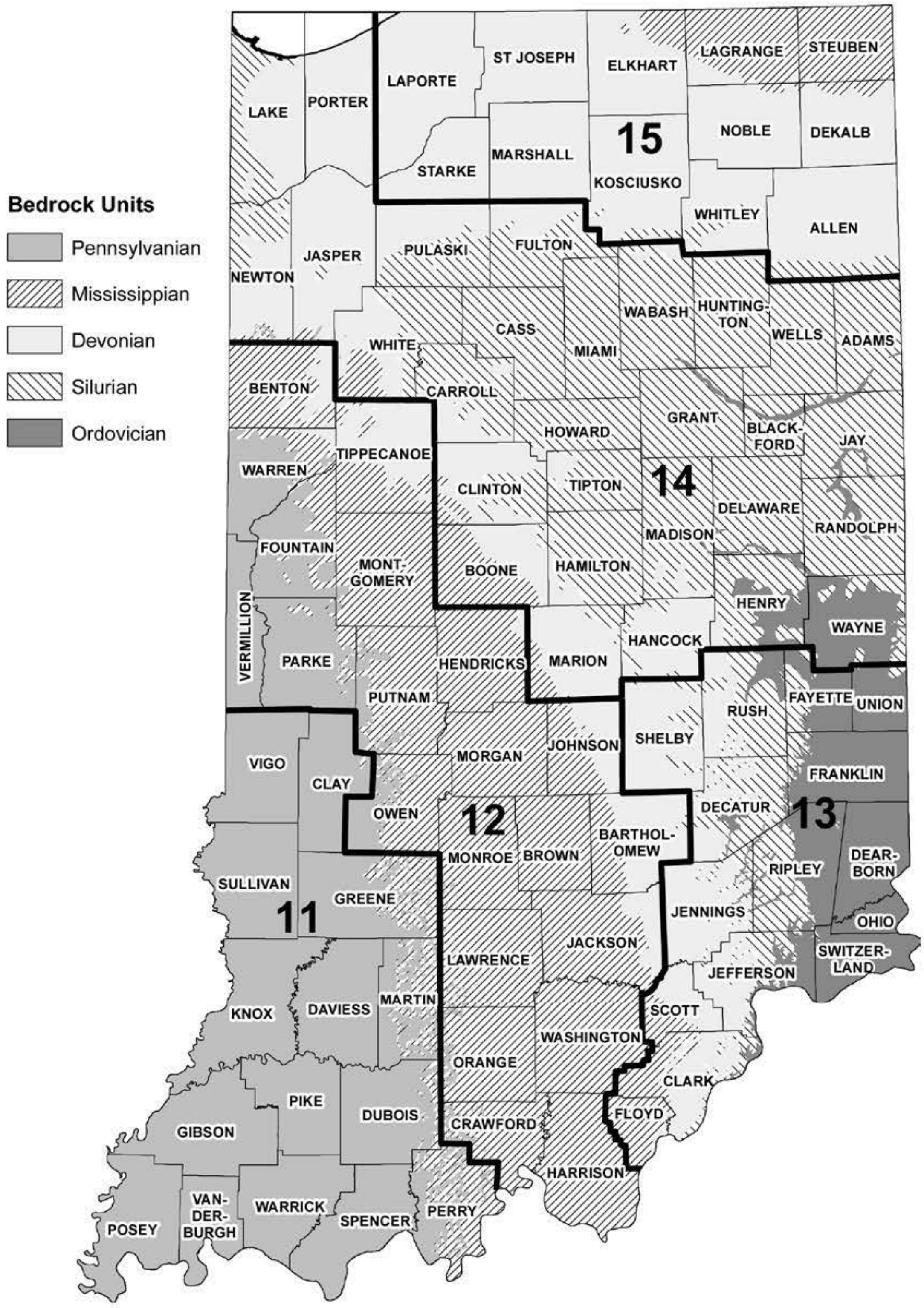
The IGS Stratigraphic Names Database is a relational database that uses one-to-many relationships to link geologic names to regional variations in nomenclature and the appropriate nomenclature hierarchy for each region (Fig. 2).

Figure 2. Figure showing current interrelationships of the Indiana Geologic Names Information System databases (modified from Hasenmueller and others, 2009)



The regional table (dbo_StratNamesRegional in Fig. 2) is designed to accommodate any number of regional subdivisions. However, the current version of the database is limited to the five Indiana areas delineated in the Midwestern Basins and Arches Region chart (COSUNA Project [Shaver, 1984]) (Fig. 3).

Figure 3. The map shows the COSUNA areas (heavy black lines), which approximate regional bedrock outcrop patterns and major structural features in Indiana, and the COSUNA numbers for these areas. The COSUNA areal boundaries are limited to state and county boundaries to facilitate coding.



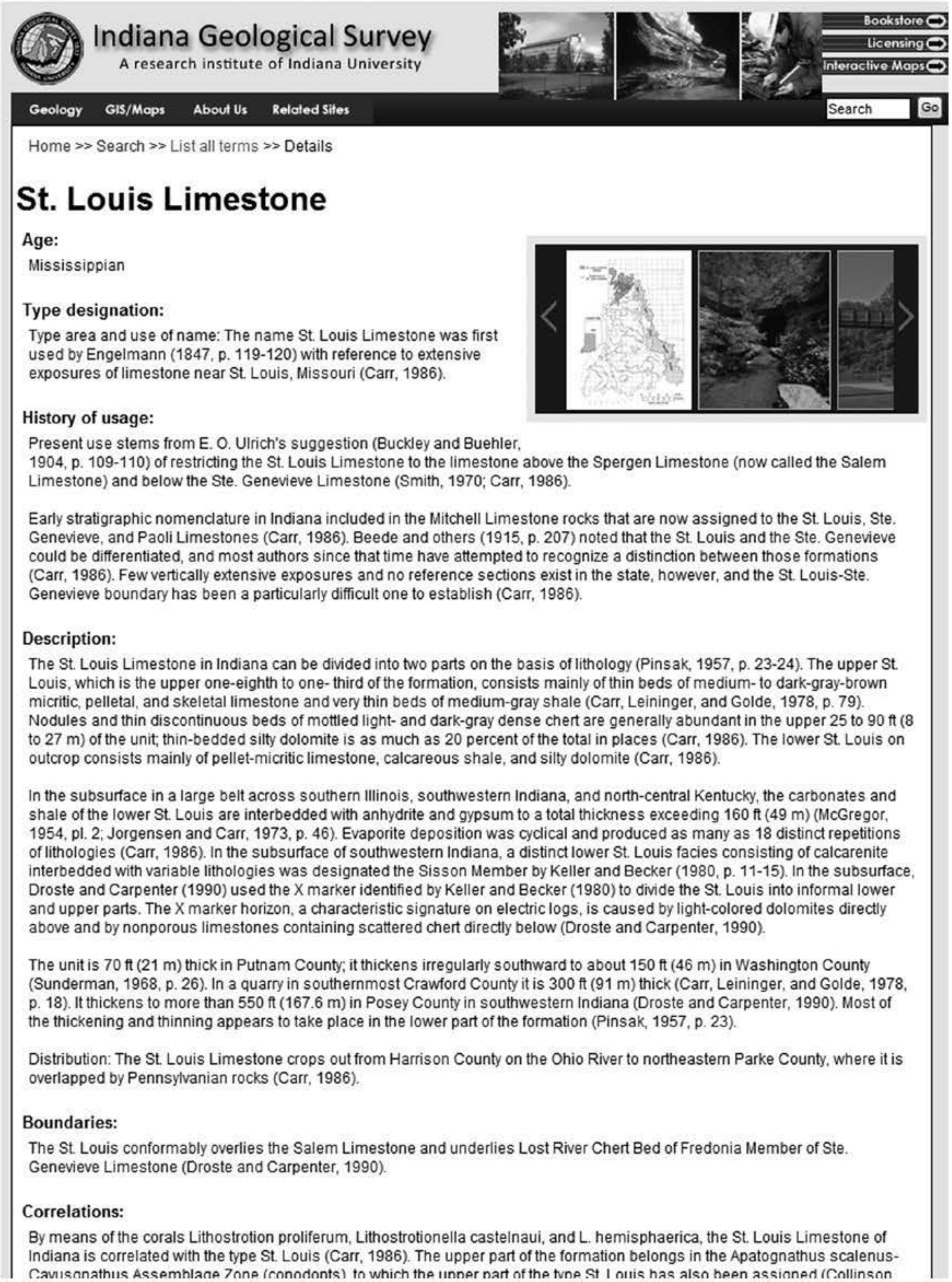
The IGS GNC, Information Technology Section, and the Photography and Imaging Section partnered to expand the Indiana Stratigraphic Names Database and to link the database with other IGS databases (Fig. 2) in order to create the Indiana Geologic Names Information System, which can be accessed through the Indiana Geologic Names Web site. The design of this information system anticipates the addition of new database tables and creation of links to other databases that will enhance the utility of the Web site for a broad audience of technical and nontechnical users. The information system was recently expanded to link to the IGS Image Database containing images of Indiana type localities and reference sections, maps showing the distribution, structure, and thicknesses of units, and other figures showing key characteristics of units.

Indiana Geologic Names Web Site

The Indiana Geologic Names Web site at http://igs.indiana.edu/geology/geologicNames allows users to quickly access information about a specific formal stratigraphic name, abandoned name, or miscellaneous unofficial name. The Web site shows IGS nomenclature for the selected unit, names of equivalent units, miscellaneous and abandoned names, and applicable higher-rank stratigraphic terms for the five Indiana areas delineated in the Midwestern Basins and Arches Region chart (COSUNA Project [Shaver, 1984]) (Fig. 3) to emphasize geographic changes in rank, lithic term, and assignment to a higher-ranked unit.

At this Web site, the user can search for either a specific stratigraphic unit or a list of stratigraphic units. On the Web site home page, the Search for Formal Names search box takes the user directly to the Details Web page that contains the information for a specific stratigraphic unit (Fig. 4).

Figure 4. The Indiana Geologic Names Information System Details Web page. Currently, the Details pages contain information pertaining to the type designation, regional Indiana usage of the stratigraphic term, miscellaneous or abandoned stratigraphic names, and reference sources. Stratigraphic information concerning unit name histories, lithologic descriptions, boundaries, correlations, and photographs of exposures and key features of units will be added to the Details pages in the future.



Home >> Search >> List all terms >> Details

St. Louis Limestone

Age:

Mississippian

Type designation:

Type area and use of name: The name St. Louis Limestone was first used by Engelmann (1847, p. 119-120) with reference to extensive exposures of limestone near St. Louis, Missouri (Carr, 1986).

History of usage:

Present use stems from E. O. Ulrich's suggestion (Buckley and Buehler, 1904, p. 109-110) of restricting the St. Louis Limestone to the limestone above the Spergen Limestone (now called the Salem Limestone) and below the Ste. Genevieve Limestone (Smith, 1970; Carr, 1986).

Early stratigraphic nomenclature in Indiana included in the Mitchell Limestone rocks that are now assigned to the St. Louis, Ste. Genevieve, and Paoli Limestones (Carr, 1986). Beede and others (1915, p. 207) noted that the St. Louis and the Ste. Genevieve could be differentiated, and most authors since that time have attempted to recognize a distinction between those formations (Carr, 1986). Few vertically extensive exposures and no reference sections exist in the state, however, and the St. Louis-Ste. Genevieve boundary has been a particularly difficult one to establish (Carr, 1986).

Description:

The St. Louis Limestone in Indiana can be divided into two parts on the basis of lithology (Pinsak, 1957, p. 23-24). The upper St. Louis, which is the upper one-eighth to one- third of the formation, consists mainly of thin beds of medium- to dark-gray-brown micritic, pelletal, and skeletal limestone and very thin beds of medium-gray shale (Carr, Leininger, and Golde, 1978, p. 79). Nodules and thin discontinuous beds of mottled light- and dark-gray dense chert are generally abundant in the upper 25 to 90 ft (8 to 27 m) of the unit; thin-bedded silty dolomite is as much as 20 percent of the total in places (Carr, 1986). The lower St. Louis on outcrop consists mainly of pellet-micritic limestone, calcareous shale, and silty dolomite (Carr, 1986).

In the subsurface in a large belt across southern Illinois, southwestern Indiana, and north-central Kentucky, the carbonates and shale of the lower St. Louis are interbedded with anhydrite and gypsum to a total thickness exceeding 160 ft (49 m) (McGregor, 1954, pl. 2; Jorgensen and Carr, 1973, p. 46). Evaporite deposition was cyclical and produced as many as 18 distinct repetitions of lithologies (Carr, 1986). In the subsurface of southwestern Indiana, a distinct lower St. Louis facies consisting of calcarenite interbedded with variable lithologies was designated the Sisson Member by Keller and Becker (1980, p. 11-15). In the subsurface, Droste and Carpenter (1990) used the X marker identified by Keller and Becker (1980) to divide the St. Louis into informal lower and upper parts. The X marker horizon, a characteristic signature on electric logs, is caused by light-colored dolomites directly above and by nonporous limestones containing scattered chert directly below (Droste and Carpenter, 1990).

The unit is 70 ft (21 m) thick in Putnam County; it thickens irregularly southward to about 150 ft (46 m) in Washington County (Sunderman, 1968, p. 26). In a quarry in southernmost Crawford County it is 300 ft (91 m) thick (Carr, Leininger, and Golde, 1978, p. 18). It thickens to more than 550 ft (167.6 m) in Posey County in southwestern Indiana (Droste and Carpenter, 1990). Most of the thickening and thinning appears to take place in the lower part of the formation (Pinsak, 1957, p. 23).

Distribution: The St. Louis Limestone crops out from Harrison County on the Ohio River to northeastern Parke County, where it is overlapped by Pennsylvanian rocks (Carr, 1986).

Boundaries:

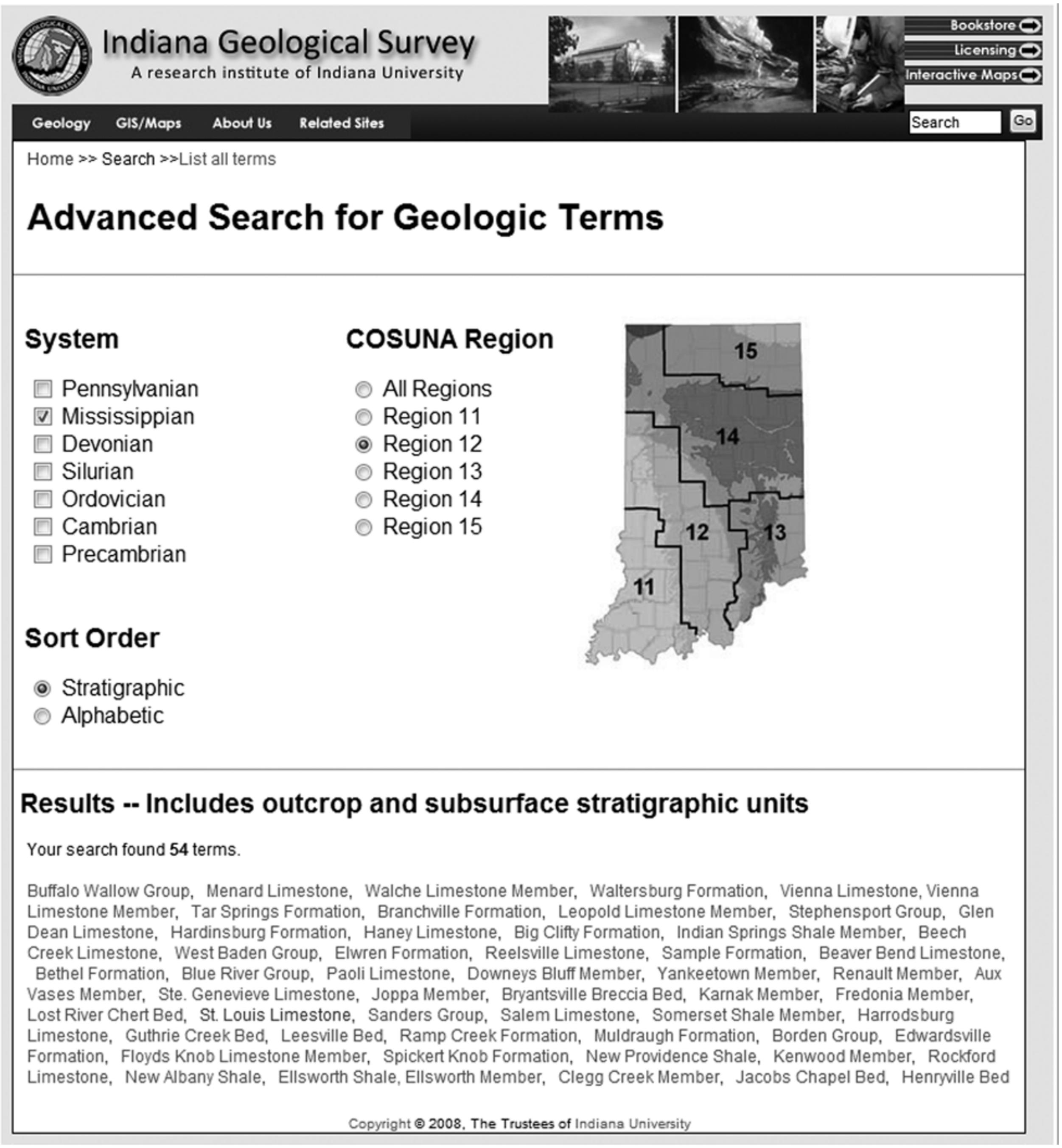
The St. Louis conformably overlies the Salem Limestone and underlies Lost River Chert Bed of Fredonia Member of Ste. Genevieve Limestone (Droste and Carpenter, 1990).

Correlations:

By means of the corals Lithostrotion proliferum, Lithostrotionella castelnaui, and L. hemisphaerica, the St. Louis Limestone of Indiana is correlated with the type St. Louis (Carr, 1986). The upper part of the formation belongs in the Apatognathus scalenus-Cavusgnathus Assemblage Zone (conodonts) to which the upper part of the type St. Louis has also been assigned (Collinson

The Advanced Search option takes the user to a Web page where the user can select from a list of stratigraphic units by specifying geologic system and/or COSUNA region and retrieve a list of pertinent units (Fig. 5).

Figure 5. The Indiana Geologic Names Information System Advanced Search for Geologic Terms Web page where users can search for information about a stratigraphic unit by either system or the COSUNA region. The user can select to have the search results listed in either stratigraphic of alphabetic order. The names in this example are listed in approximate stratigraphic order. Clicking on a name in the list redirects a user to the Details Web page (see Figure 4).



Advanced Search for Geologic Terms

System

☐ Pennsylvanian
☑ Mississippian
☐ Devonian
☐ Silurian
☐ Ordovician
☐ Cambrian
☐ Precambrian

COSUNA Region

○ All Regions
○ Region 11
● Region 12
○ Region 13
○ Region 14
○ Region 15

Sort Order

● Stratigraphic
○ Alphabetic

Results -- Includes outcrop and subsurface stratigraphic units

Your search found **54** terms.

Buffalo Wallow Group, Menard Limestone, Walche Limestone Member, Waltersburg Formation, Vienna Limestone, Vienna Limestone Member, Tar Springs Formation, Branchville Formation, Leopold Limestone Member, Stephensport Group, Glen Dean Limestone, Hardinsburg Formation, Haney Limestone, Big Clifty Formation, Indian Springs Shale Member, Beech Creek Limestone, West Baden Group, Elwren Formation, Reelsville Limestone, Sample Formation, Beaver Bend Limestone, Bethel Formation, Blue River Group, Paoli Limestone, Downeys Bluff Member, Yankeetown Member, Renault Member, Aux Vases Member, Ste. Genevieve Limestone, Joppa Member, Bryantsville Breccia Bed, Karnak Member, Fredonia Member, Lost River Chert Bed, St. Louis Limestone, Sanders Group, Salem Limestone, Somerset Shale Member, Harrodsburg Limestone, Guthrie Creek Bed, Leesville Bed, Ramp Creek Formation, Muldraugh Formation, Borden Group, Edwardsville Formation, Floyds Knob Limestone Member, Spickert Knob Formation, New Providence Shale, Kenwood Member, Rockford Limestone, New Albany Shale, Ellsworth Shale, Ellsworth Member, Clegg Creek Member, Jacobs Chapel Bed, Henryville Bed

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This list of units can be sorted in alphabetic or approximate stratigraphic order. Selecting a specific stratigraphic unit from this list will take the user to the Details Web page for the unit.

Because of the links to the reference and image databases, the Indiana Geologic Names Web site also provides the user with the reference sources for type sections, type localities, and reference sections and pertinent photographs of Indiana type localities and reference sections, maps showing the distribution, structure, and thicknesses of units, and other figures showing key characteristics of units.

CURRENT AND FUTURE WORK

The IGS GNC plans to continue developing the stratigraphic names information stored in the Stratigraphic Names Database and to expand the functionality of the Indiana Geologic Names Information System to allow users to access this new data. The IGS are in the process of expanding the Stratigraphic Names Database by adding: 1) type sections, localities, and reference sections; 2) reference sources for type sections, localities, and reference sections; and 3) miscellaneous and abandoned names. Also, additional images of Indiana type localities and reference sections, maps showing distribution, structure, and thicknesses of units are currently being incorporated in the IGS Image Database.

In the future, stratigraphic information pertaining to unit name histories, lithologic descriptions, and correlations will be added to the Stratigraphic Names Database and photographs of fossils, outcrop and subsurface characteristics, economic uses, historical sites, and scenic views will be added to the Image Database. Also, new databases containing information about the structural features, physiographic features, and the economic and environmental significance of stratigraphic units in Indiana will be compiled and these databases will become a part of the Indiana Geologic Names Information System.

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Shaver, R. H., Burger, A. M., Gates, G. R., Gray, H. H., Hutchison, H. C., Keller, S. J., Patton, J. B., Rexroad, C. B., Smith, N. M., Wayne, W. J., and Wier, C. E., 1970, Compendium of rock-unit stratigraphy in Indiana: Indiana Geological Survey Bulletin 43, 229 p

KANSAS GEOLOGICAL SURVEY GEOSCIENCE INFORMATION ON THE INTERNET

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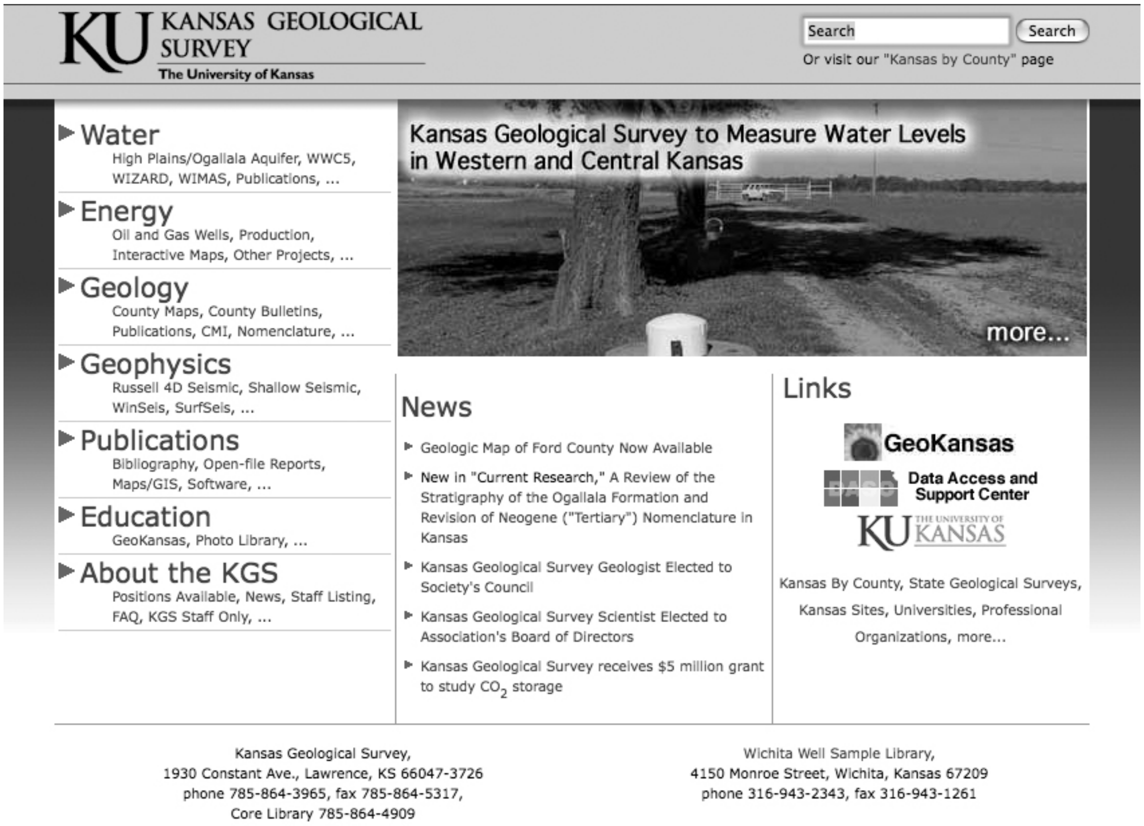
Abstract - The Kansas Geological Survey website, in operation since 1995, offers a wide range of geoscience information, databases, and applications. With a goal of presenting as much as possible of our resources online, the KGS continually adds to its natural resources databases, and to its complement of publications, reports, and educational resources. It continues to develop practical applications and interactive tools for use on the web. Resource topics include information on ground water, oil and gas, general geology, geophysics, geological publications, and educational resources. Considerable effort is expended on our petroleum and water databases, which see the most use by visitors. Data is entered from the well records, and the forms themselves are scanned and posted to the website. Website users can choose from a number of searches of well records, and interactive applications are available for mapping the locations of the wells.

Adding and editing data is facilitated through centralized relational databases and uses the internet as the only interface to the data; thus the only software needed for retrieving or creating data is a web browser. Scientists, government agencies, policy makers, private industry, and the public have come to rely heavily on the geologic information available on the KGS website, which typically averages 490,000 visits per month.

INTRODUCTION

The Kansas Geological Survey (KGS) has been disseminating information over the internet since 1995. Early web pages focused on educational information and news, but since then we have worked continuously to build and improve our website. With the ultimate goal of presenting as much as possible of our geoscience information via the website and aiding users in utilizing and interpreting the information, we continually increase and improve our natural resources databases; add selected in-print and out-of-print publications, reports, and educational resources; provide pertinent links; and build practical applications and interactive tools. Resource topics on the KGS website (www.kgs.ku.edu) (Figure 1) include information on groundwater, oil and gas, general geology, geophysics, geological publications, and educational resources.

Figure 1. KGS web home page



Or visit our "Kansas by County" page

▶ Water
High Plains/Ogallala Aquifer, WWC5, WIZARD, WIMAS, Publications, ...

▶ Energy
Oil and Gas Wells, Production, Interactive Maps, Other Projects, ...

▶ Geology
County Maps, County Bulletins, Publications, CMI, Nomenclature, ...

▶ Geophysics
Russell 4D Seismic, Shallow Seismic, WinSeis, SurfSeis, ...

▶ Publications
Bibliography, Open-file Reports, Maps/GIS, Software, ...

▶ Education
GeoKansas, Photo Library, ...

▶ About the KGS
Positions Available, News, Staff Listing, FAQ, KGS Staff Only, ...

Kansas Geological Survey to Measure Water Levels in Western and Central Kansas

News

- ▶ Geologic Map of Ford County Now Available
- ▶ New in "Current Research," A Review of the Stratigraphy of the Ogallala Formation and Revision of Neogene ("Tertiary") Nomenclature in Kansas
- ▶ Kansas Geological Survey Geologist Elected to Society's Council
- ▶ Kansas Geological Survey Scientist Elected to Association's Board of Directors
- ▶ Kansas Geological Survey receives $5 million grant to study CO_2 storage

Links

Data Access and Support Center

Kansas By County, State Geological Surveys, Kansas Sites, Universities, Professional Organizations, more...

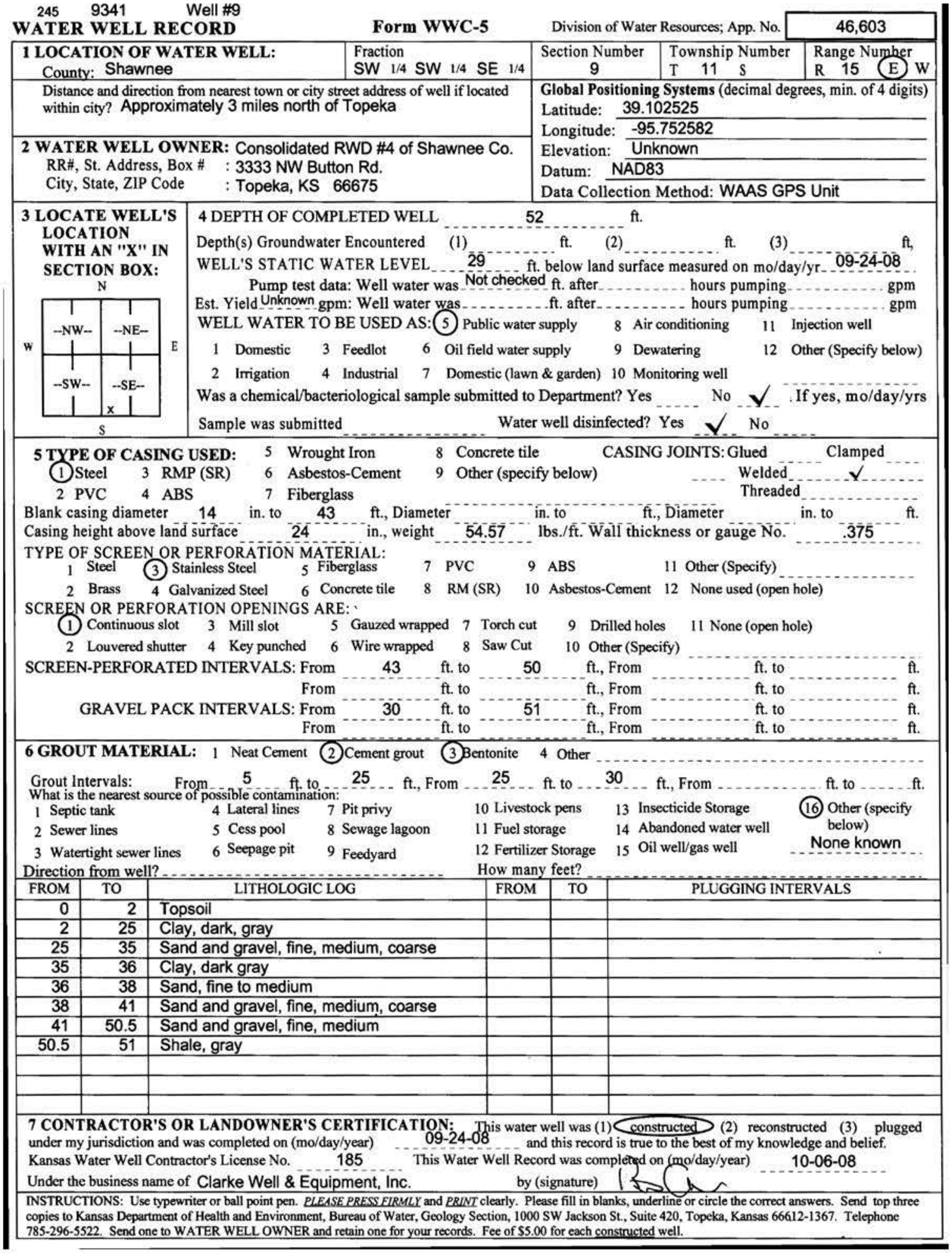
Kansas Geological Survey,
1930 Constant Ave., Lawrence, KS 66047-3726
phone 785-864-3965, fax 785-864-5317,
Core Library 785-864-4909

Wichita Well Sample Library,
4150 Monroe Street, Wichita, Kansas 67209
phone 316-943-2343, fax 316-943-1261

WATER

On the Water page of the KGS website, the viewer can find information on the High Plains/Ogallala Aquifer, other aquifers, research projects carried out by KGS hydrogeologists, and related publications. The most heavily used part of the Water page, however, revolves around the three water well and water rights databases. First among them is the WWC-5 database. WWC-5 is the name of the form submitted to the state by water well contractors any time a water well is drilled in Kansas (Figure 2).

Figure 4 Example of a WWC-5 form



245 9341 Well #9

WATER WELL RECORD **Form WWC-5** Division of Water Resources; App. No. 46,603

1 LOCATION OF WATER WELL: County: Shawnee

Fraction SW 1/4 SW 1/4 SE 1/4

Section Number 9

Township Number T 11 S

Range Number R 15 [✓ E] W

Distance and direction from nearest town or city street address of well if located within city? Approximately 3 miles north of Topeka

Global Positioning Systems (decimal degrees, min. of 4 digits)
Latitude: 39.102525
Longitude: -95.752582
Elevation: Unknown
Datum: NAD83
Data Collection Method: WAAS GPS Unit

2 WATER WELL OWNER: Consolidated RWD #4 of Shawnee Co.
RR#, St. Address, Box # : 3333 NW Button Rd.
City, State, ZIP Code : Topeka, KS 66675

3 LOCATE WELL'S LOCATION WITH AN "X" IN SECTION BOX:

N
W --NW-- --NE-- E
--SW-- --SE-- x
S

4 DEPTH OF COMPLETED WELL 52 ft.

Depth(s) Groundwater Encountered (1) ft. (2) ft. (3) ft,

WELL'S STATIC WATER LEVEL 29 ft. below land surface measured on mo/day/yr 09-24-08

Pump test data: Well water was Not checked ft. after hours pumping gpm

Est. Yield Unknown gpm: Well water was ft. after hours pumping gpm

WELL WATER TO BE USED AS: [✓ 5] Public water supply 8 Air conditioning 11 Injection well

1 Domestic 3 Feedlot 6 Oil field water supply 9 Dewatering 12 Other (Specify below)

2 Irrigation 4 Industrial 7 Domestic (lawn & garden) 10 Monitoring well

Was a chemical/bacteriological sample submitted to Department? Yes No ✓ . If yes, mo/day/yrs

Sample was submitted Water well disinfected? Yes ✓ No

5 TYPE OF CASING USED: [✓ 1] Steel 3 RMP (SR) 5 Wrought Iron 6 Asbestos-Cement 8 Concrete tile 9 Other (specify below) 2 PVC 4 ABS 7 Fiberglass

CASING JOINTS: Glued Clamped Welded ✓ Threaded

Blank casing diameter 14 in. to 43 ft., Diameter in. to ft., Diameter in. to ft.

Casing height above land surface 24 in., weight 54.57 lbs./ft. Wall thickness or gauge No. .375

TYPE OF SCREEN OR PERFORATION MATERIAL:

1 Steel [✓ 3] Stainless Steel 5 Fiberglass 7 PVC 9 ABS 11 Other (Specify)

2 Brass 4 Galvanized Steel 6 Concrete tile 8 RM (SR) 10 Asbestos-Cement 12 None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE:

[✓ 1] Continuous slot 3 Mill slot 5 Gauzed wrapped 7 Torch cut 9 Drilled holes 11 None (open hole)

2 Louvered shutter 4 Key punched 6 Wire wrapped 8 Saw Cut 10 Other (Specify)

SCREEN-PERFORATED INTERVALS: From 43 ft. to 50 ft., From ft. to ft.
From ft. to ft., From ft. to ft.

GRAVEL PACK INTERVALS: From 30 ft. to 51 ft., From ft. to ft.
From ft. to ft., From ft. to ft.

6 GROUT MATERIAL: 1 Neat Cement [✓ 2] Cement grout [✓ 3] Bentonite 4 Other

Grout Intervals: From 5 ft. to 25 ft., From 25 ft. to 30 ft., From ft. to ft.

What is the nearest source of possible contamination:

1 Septic tank 4 Lateral lines 7 Pit privy 10 Livestock pens 13 Insecticide Storage [✓ 16] Other (specify below)

2 Sewer lines 5 Cess pool 8 Sewage lagoon 11 Fuel storage 14 Abandoned water well

3 Watertight sewer lines 6 Seepage pit 9 Feedyard 12 Fertilizer Storage 15 Oil well/gas well None known

Direction from well? How many feet?

FROM	TO	LITHOLOGIC LOG	FROM	TO	PLUGGING INTERVALS
0	2	Topsoil			
2	25	Clay, dark, gray			
25	35	Sand and gravel, fine, medium, coarse			
35	36	Clay, dark gray			
36	38	Sand, fine to medium			
38	41	Sand and gravel, fine, medium, coarse			
41	50.5	Sand and gravel, fine, medium			
50.5	51	Shale, gray			

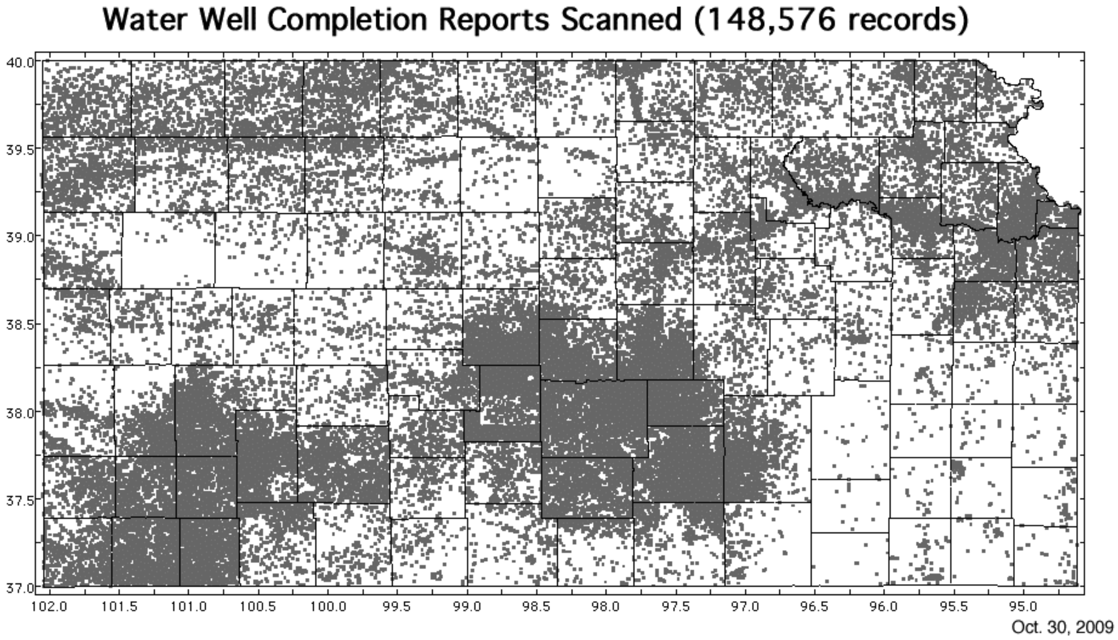
7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was [✓ (1) constructed] (2) reconstructed (3) plugged under my jurisdiction and was completed on (mo/day/year) 09-24-08 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 185 This Water Well Record was completed on (mo/day/year) 10-06-08

Under the business name of Clarke Well & Equipment, Inc. by (signature)

INSTRUCTIONS: Use typewriter or ball point pen. *PLEASE PRESS FIRMLY* and *PRINT* clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Bureau of Water, Geology Section, 1000 SW Jackson St., Suite 420, Topeka, Kansas 66612-1367. Telephone 785-296-5522. Send one to WATER WELL OWNER and retain one for your records. Fee of $5.00 for each constructed well.

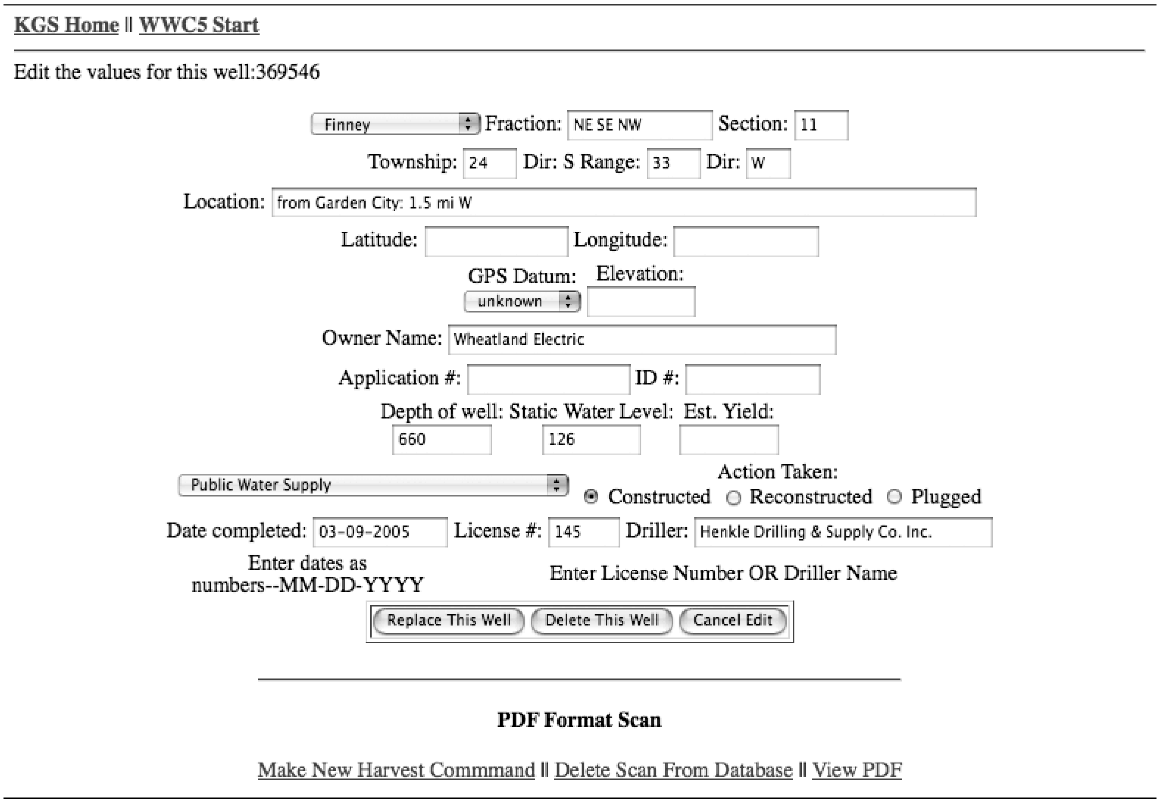
These forms have been required since 1974. The WWC-5 database contains those records. They include many different types of water wells, including domestic, irrigation, industrial, public water supply, ground-source heat pump, monitoring wells, and others. The KGS enters data from the forms into the database, scans the WWC-5 forms themselves (Figure 3), and makes it all available on the website for anyone to use.

Figure. 3. Map showing locations of water wells for which WWC-5s have been scanned (148,576 records as of this writing).



Entered data fields include location, owner, well depth, static water level, yield, well use, date completed, driller, among others (Figure 4).

Figure 4. KGS data entry page for water well records (WWC-5s)



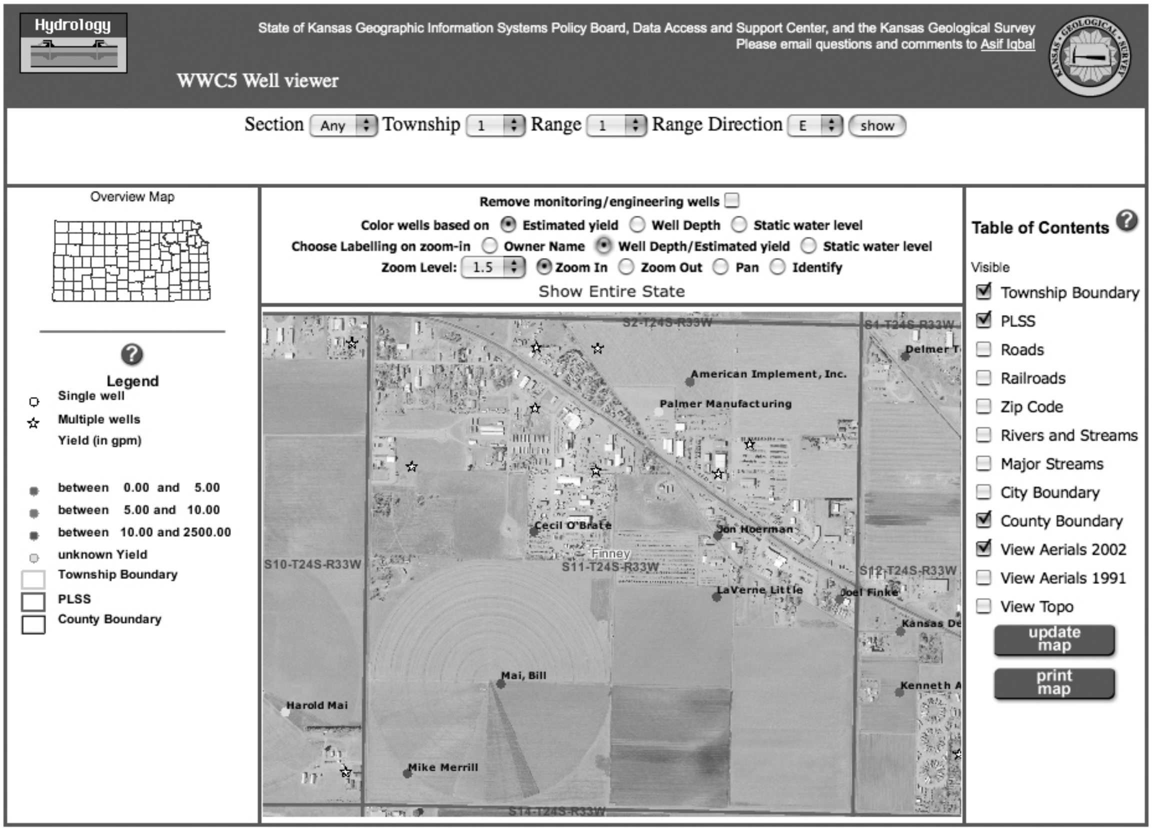
Edit the values for this well:369546

Finney Fraction: NE SE NW Section: 11
Township: 24 Dir: S Range: 33 Dir: W
Location: from Garden City: 1.5 mi W
Latitude: Longitude:
GPS Datum: unknown Elevation:
Owner Name: Wheatland Electric
Application #: ID #:
Depth of well: 660 Static Water Level: 126 Est. Yield:
Public Water Supply Action Taken: ● Constructed ○ Reconstructed ○ Plugged
Date completed: 03-09-2005 License #: 145 Driller: Henkle Drilling & Supply Co. Inc.
Enter dates as numbers--MM-DD-YYYY
Enter License Number OR Driller Name

The scanned forms also give information about down-hole lithologies. WWC-5s continue to arrive at the KGS in a steady stream; in 2009, we entered data and scanned new and old forms for 10,799 water wells, 6,042 of which were new records.

Another feature that gets a lot of use is the mapping tool associated with the WWC5 database (Figure 5).

Figure 5. Water well mapping tool



Hydrology

State of Kansas Geographic Information Systems Policy Board, Data Access and Support Center, and the Kansas Geological Survey
Please email questions and comments to Asif Iqbal

WWC5 Well viewer

Section Any Township 1 Range 1 Range Direction E show

Overview Map

Remove monitoring/engineering wells ☐

Color wells based on ● Estimated yield ○ Well Depth ○ Static water level

Choose Labelling on zoom-in ○ Owner Name ● Well Depth/Estimated yield ○ Static water level

Zoom Level: 1.5 ● Zoom In ○ Zoom Out ○ Pan ○ Identify

Show Entire State

Legend

○ Single well

☆ Multiple wells

Yield (in gpm)

● between 0.00 and 5.00

● between 5.00 and 10.00

● between 10.00 and 2500.00

○ unknown Yield

☐ Township Boundary

☐ PLSS

☐ County Boundary

Table of Contents

Visible

☑ Township Boundary

☑ PLSS

☐ Roads

☐ Railroads

☐ Zip Code

☐ Rivers and Streams

☐ Major Streams

☐ City Boundary

☑ County Boundary

☑ View Aerials 2002

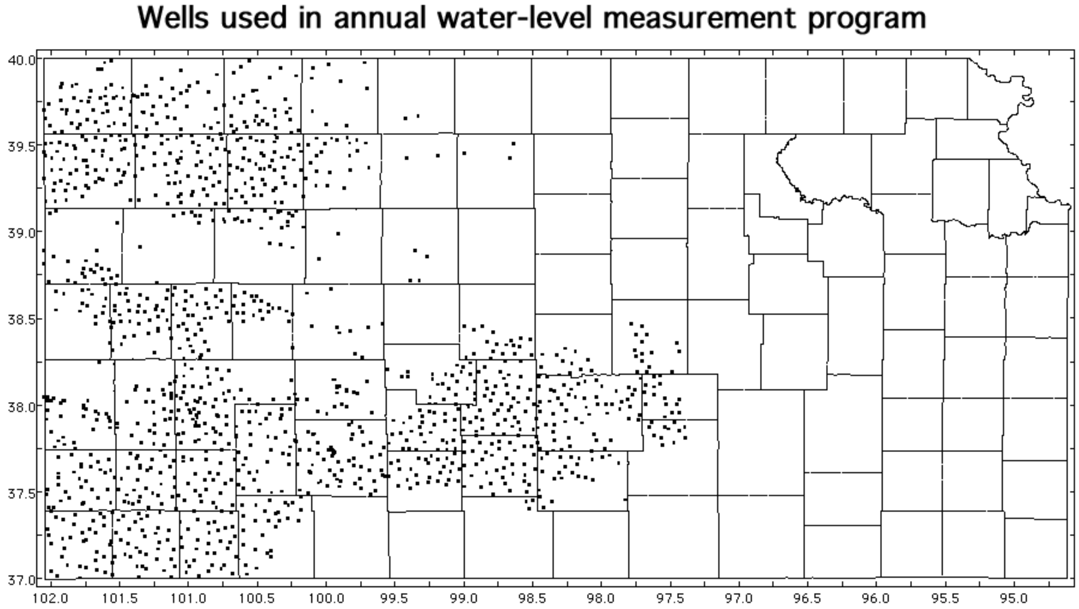
☐ View Aerials 1991

☐ View Topo

It can be accessed through a link on any of the well pages. Once in the mapping tool, the user can add a number of different map layers, such as the Public Land Survey System (section, township, and range), roads, aerial photos, topographic maps, and others. Options available for labeling the wells include owner's name, well depth/estimated yield, and static water level. The colors of the dots showing the well locations can be chosen to represent well depth, yield, or static water level, which gives the viewer a quick visual image of trends among the wells. The user can zoom in or out and pan across the area. Individual well information can be accessed by clicking on the dot for a particular well.

The WIZARD database records information for wells in the GWSI (Ground Water Site Inventory) database of the U. S. Geological Survey, but it is used now by the KGS largely for recording water level data from the water level measuring program carried out each year by the KGS and the Division of Water Resources (DWR) of the Kansas Department of Agriculture. Several Kansas Ground Water Management Districts (GMDs) also contribute water level data. About 1,380 wells in 47 central and western Kansas counties are measured annually (Figure 6).

Figure 6. Map showing locations of wells used in annual water level measuring program



The program is designed to monitor changes and identify regional trends in the High Plains, Dakota, and alluvial aquifers. The water level measurements for each well are recorded on the web page in table format, and a graph provides a visual image of changes over time. A mapping tool is also available for the WIZARD database.

The WIMAS database (Water Information Management and Analysis System) is the Kansas water rights database. It was developed by the Division of Water Resources, Kansas Department of Agriculture, and has been made available to the general public using a web interface developed by the KGS. It records information about irrigation, industrial, and municipal water rights and water use in Kansas, including locations of the water rights, total acres and water quantities authorized, point-of-diversion details, and reported water use. The web user can choose to graph development trends or water use trends, download data, or create a map of water rights that is similar to the mapping applications mentioned above for the other water databases.

Adding and editing data by KGS staff is facilitated through centralized relational databases and uses the internet as the only interface to the data; thus the only software needed for retrieving or creating data is a web browser (Figure 4).

The KGS is currently working to combine the three water well databases into one and eventually will present them on the website as a single "Master List" of water wells and water rights. When in place, users will be able to go to one database to access all the water records the KGS has for a selected location.

KGS scientists and other researchers depend on these water well databases as primary data sources for determining and mapping depths to bedrock, saturated thicknesses, depletion trends, and remaining available water in the High Plains Aquifer. They are utilized to develop geologic characterizations and 3-D visualizations of subsurface aquifers, to investigate incursions of salt water into fresh water aquifers, and to calibrate aquifer models that are used to estimate future ground-water conditions. Regulatory agencies and GMDs use this information to determine water appropriations, make management decisions, and take regulatory actions. Irrigators, landowners, industrial users, and municipal water managers use the information to monitor water levels in their areas and to make decisions about drilling and water use. County officials use the data to appraise property values and levy taxes, while lenders use it to make lending decisions.

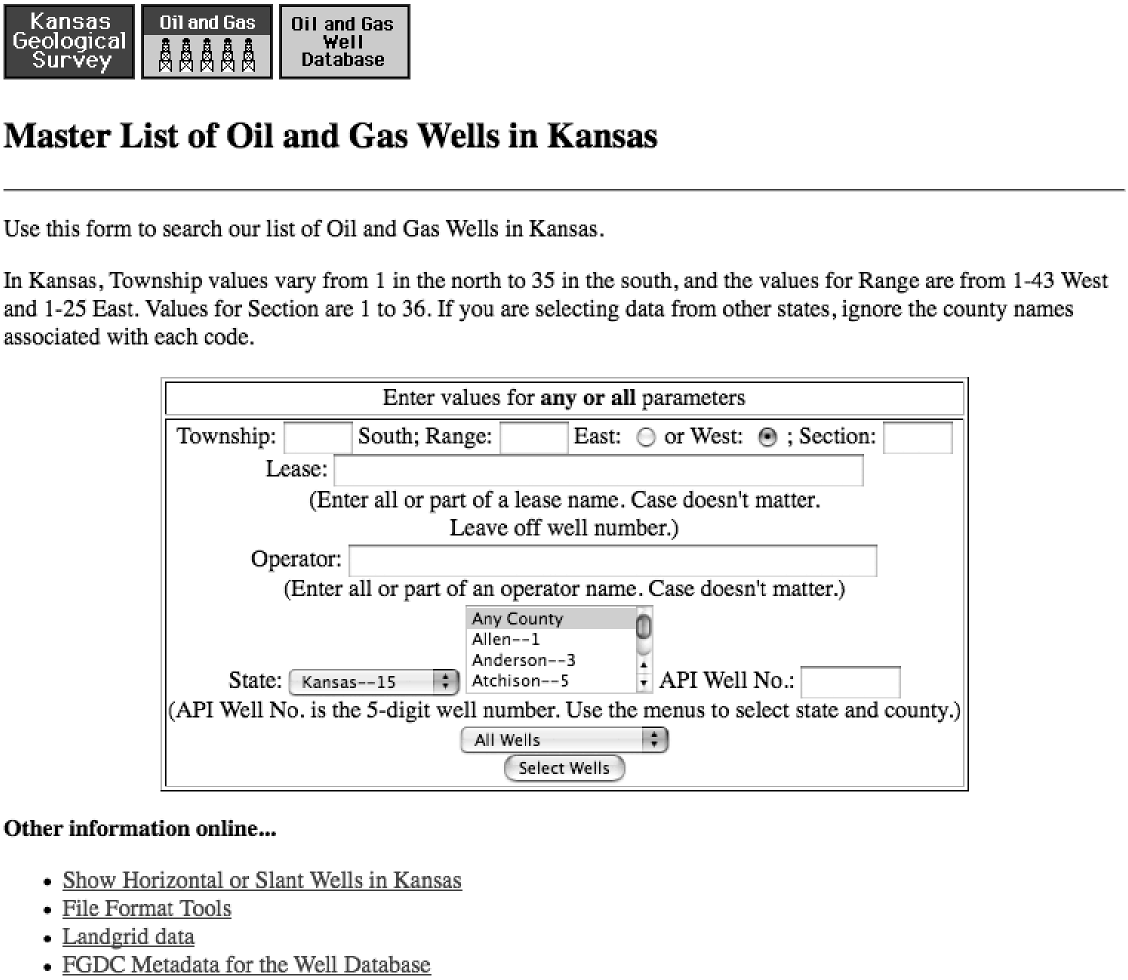
KGS information managers, in collaboration with the Kansas Corporation Commission (KCC), the state's regulatory agency for oil and gas wells, have incorporated KGS water well data into a new system, called SOLAR, that allows for electronic online submission of oil and gas records; operators can determine distances to the nearest water wells and also depths of useable ground water, thus providing crucial protections to sources of fresh water. The SOLAR project is currently being expanded to also allow online submission of water well records to the Kansas Department of Health and Environment (KDHE), the state's regulatory agency for water wells. Thus, both regulatory agencies are dependent on KGS databases to carry out their regulatory functions.

ENERGY

The Energy page on the KGS website, in addition to the obvious concentration on oil and gas well records and production, also includes web pages on publications and reports, application tools, tutorials and courses, and information about projects on which KGS scientists have been working. Users can find current information on oil and gas commodity prices and rig counts, and they can find links to search for "Intents to Drill."

The Oil and Gas page offers links to production records for the state, and a variety of search options for oil and gas records. A general search is available via the "Master list of oil and gas wells" that lists all of the 400,000-plus wells in the state for which the KGS has records (Figure 7).

Figure 7. Search page for Master List of Oil and Gas Wells in Kansas



Master List of Oil and Gas Wells in Kansas

Use this form to search our list of Oil and Gas Wells in Kansas.

In Kansas, Township values vary from 1 in the north to 35 in the south, and the values for Range are from 1-43 West and 1-25 East. Values for Section are 1 to 36. If you are selecting data from other states, ignore the county names associated with each code.

Enter values for **any or all** parameters

Township: ☐ South; Range: ☐ East: ○ or West: ● ; Section: ☐

Lease: ☐

(Enter all or part of a lease name. Case doesn't matter. Leave off well number.)

Operator: ☐

(Enter all or part of an operator name. Case doesn't matter.)

State: Kansas--15 County: Any County / Allen--1 / Anderson--3 / Atchison--5 API Well No.: ☐

(API Well No. is the 5-digit well number. Use the menus to select state and county.)

Other information online...

- Show Horizontal or Slant Wells in Kansas
- File Format Tools
- Landgrid data
- FGDC Metadata for the Well Database

Specialized searches also are available. For example, users can limit their searches to find only those wells for which geophysical logs are available, or LAS files, drill cores, rotary cutting samples, formation tops data, scanned drillers logs, or other limited search criteria. Searches can be done for specific locations, a certain API number, entire counties, and so forth. Similar to the process for entering water well records, the KGS enters specific pieces of information from the well records into the database and adds scanned images of all new records, including well completion forms, electric logs, and drill stem tests. Old records also are being scanned as time allows. Once the scanned forms are in the database, they can be downloaded from the website free of charge by anyone. As an example of the numbers involved, in 2009, KGS staff added 19,125 e-log scans to our database, along with the concomitant data entry from the forms.

A new online mapping application for oil and gas wells was unveiled in 2008 (Figure 8).

Figure 8. Oil and gas well mapping tool

OIL or GAS WELL

API:	15-135-30256
Lease:	REIN 'A'
Well:	4
Original Operator:	Cities Service Oil Co.
Current Operator:	
Field:	SCHABEN
Location:	T19S R21W Sec. 29 C NW NW 4620 North, 4620 West from SE corner
Longitude:	-99.674830
Latitude:	38.376750
County:	Ness
Permit Date:	
Spud Date:	Jul-29-1966
Completion Date:	Aug-19-1966
Plugging Date:	
Well Type:	OIL
Status:	Well Drilled
Total Depth:	4468
Elevation:	2316.0000 KB
Producing Formation:	
IP Oil (bbl):	
IP Water (bbl):	
IP Gas (mcf):	

Links:

- Full KGS Database Entry

1 LAS file found:

- View LAS File 1

It is a very user-friendly tool, with click and drag features and other attractive amenities. Different layers, such as the Public Land Survey System, oil and gas fields, aerial photos, or topographic maps, can be added. Individual well information can be displayed by clicking on the well symbol on the map. A variety of filtering options allows the user to show, for example, only those wells for which e-logs are available, or LAS files, or drill cores, etc. A number of labeling options also can be chosen.

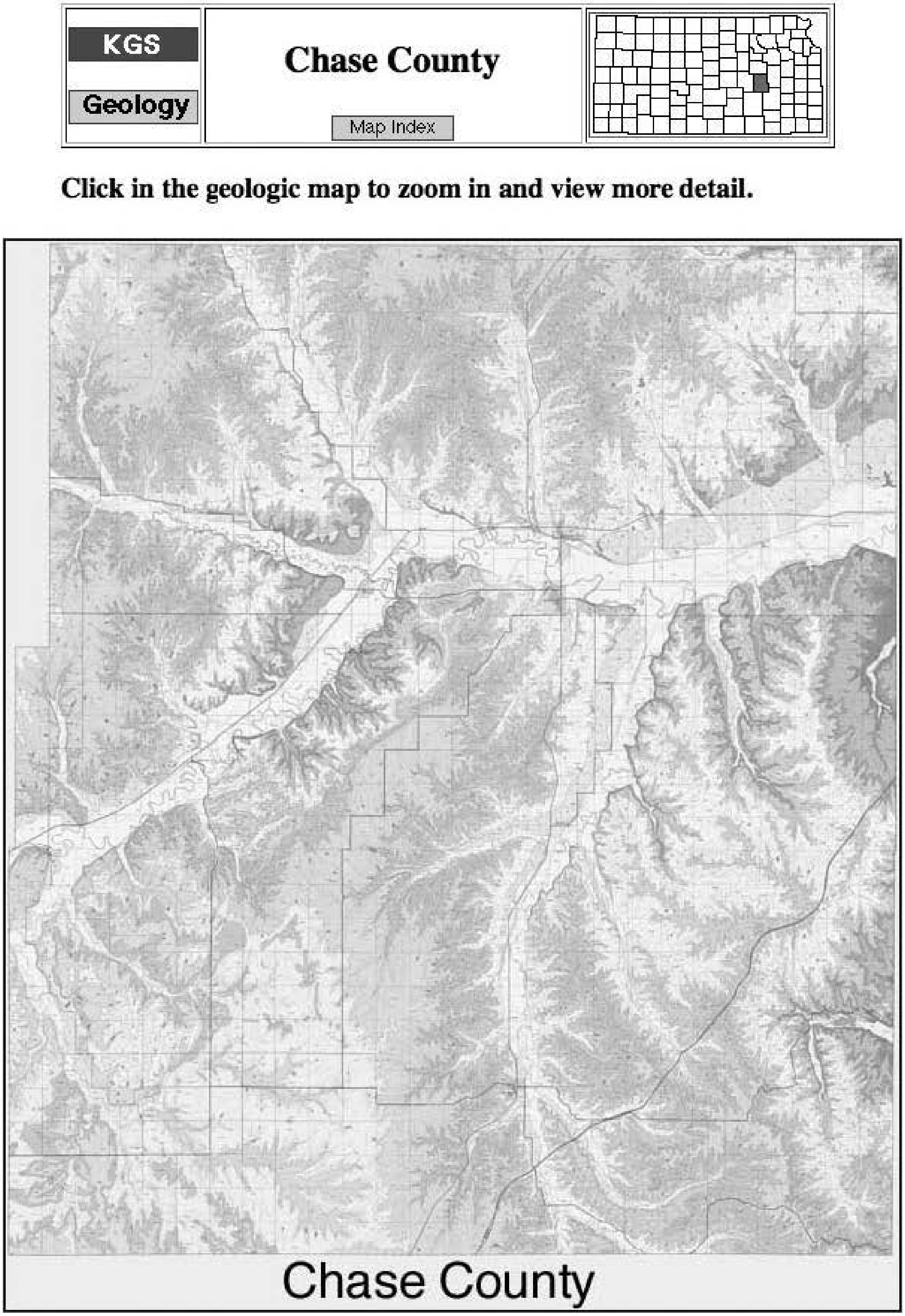
Web-based application tools are continually being developed by KGS staff and placed onto the website, including a gridding and mapping module, a cross-section viewer, LAS file viewer, synthetic seismogram, and others. Tutorials and courses are available for such things as well-log analyses and reservoir modeling. Reports on a number of KGS projects and initiatives also are posted to the website.

The newly developed KGS/KCC system mentioned above, called SOLAR (Simplified On-Line Automated Reporting), whereby oil and gas records can be submitted electronically online by operators, conveys considerable advantages to all concerned. It simplifies and speeds up the submittal and approval process for both the operators and the KCC. Well data and forms feed directly into databases maintained by the KGS, which eliminates intermediate paper shuffling and secondary data entry. Human error is reduced not only because this secondary data entry step is eliminated, but also because checks are built into the system to prevent erroneous data entry by the operators, and some data fields are filled in automatically, depending on the specific location of the well.

GENERAL GEOLOGY

General Geology topics on the KGS website include geologic maps and charts, measured sections, county bulletins, publications, information on industrial minerals, and an online bibliography of publications related to Kansas geology. Many of the county geologic maps are new or newly revised (Figure 9),

Figure 9. Chase County geologic map online



Chase County

Click in the geologic map to zoom in and view more detail.

Chase County

reflecting KGS participation in the ongoing USGS STATEMAP program. The newer maps are available online as JPEG (or GIF) and PDF files. Construction material inventories are available for a few counties.

County geologic bulletins have been published for most counties in the state. They give information about geology, geography, stratigraphy, ground water, and hydrogeology. For many of the older ones, the online versions have been created because the published versions are out of print.

An online Bibliography of publications on Kansas geology can be searched by topics, author's name, or by county. The web page on stratigraphic nomenclature in Kansas contains publications and reports that cover the stratigraphic succession in Kansas and any changes that have come about in regard to the nomenclature. A Directory of Kansas Industrial Mineral Producers can be searched by location, type of product, or by county.

GEOPHYSICS

The KGS Exploration Services section develops and uses innovative methods of high resolution shallow seismic reflection to explore and provide images of the shallow subsurface. Information from that program can be found on the KGS Geophysics web page. The user can find reports and data from various projects, including 4-D seismic monitoring of the KGS CO2 Injection project near Russell, Kansas, seismic-reflection imaging of sinkholes and salt jugs, and characterizations of levees. Seismic processing software available for ordering from the KGS is described, and ordering information is provided. Gravity and magnetic maps for the entire state can be viewed online in PDF or JPEG versions, or the data itself can be ordered on CD from the KGS.

PUBLICATIONS

The KGS Publications web page contains a wealth of information, including online publications. KGS' *Current Research in Earth Sciences* is an annual, peer-reviewed publication that is available only online. It contains short articles about earth-science research in the mid-continent. As stated on its web page, the flexibility of an online publication makes it ideal for papers that "have numerous figures, require color illustrations, use animation, or contain lots of tables or other supporting data." The Bibliography and County Bulletins, mentioned above in the General Geology section, can also be accessed via the Publications page.

The Publications Catalog allows users to search for paper publications, maps, books, and software available for purchase from the KGS. Examples include KGS Bulletins, Educational Series, Maps, Technical Series, and topographic maps. Patrons can search for publications by type of publication, by county, subject, or author.

Open-file Reports, some online, some only in paper format, are non-peer-reviewed reports, maps, data tables, etc. that result from projects on which KGS scientists have worked. They can be searched by date, county, index terms, or author names.

Small, four- to six-page, Public Information Circulars are available both online and in paper format. They cover geologic topics of general interest and are written with the general public in mind. Examples of titles include Geologic Sequestration of Carbon Dioxide in Kansas, Meteorites in Kansas, Glaciers in Kansas, Drilling a Water Well on Your Land: What You Should Know, and The High Plains Aquifer, to name a few.

The Maps/GIS page gives a link to the website of the Kansas Data Access and Support Center (DASC), housed at the KGS, which is the state's official agency to collect and disseminate GIS data. Also available for downloading is a JAVA application that converts Kansas Public Land Survey System legal land descriptions (section, township, range) to latitude and longitude, and vice versa. Maps available include topographic maps, geologic maps, gravity and magnetic maps, oil and gas maps, and topographic maps of Kansas lakes and reservoirs. The site also has links to the KGS online interactive maps.

Software is available, some free, some for purchase, for such things as seismic processing and interactive well-log analysis.

EDUCATION

The KGS Educational Resources page gives links and information appropriate for educational use. For example, the GeoKansas web page covers such topics as geologic regions in the state, common fossils, and descriptions of various rocks and minerals found in the state. It also describes sites of geologic interest that groups or individuals may want to visit. Online guidebooks, descriptions, and photos from KGS public field trips can serve as guides when planning geologic field trips. There is also a section that covers interesting "Geo Topics," such as age of the Earth, the Burgess Shale, geologic time, coal mining and lead and zinc mining in Kansas, mass extinctions, and a mineral identification table.

The Photo Library is a database of photos of different subjects from around the state that were taken by KGS staff over the years. The photos can be downloaded for any non-commercial purpose.

The interactive site Plume Busters allows students to "take on the role of an environmental consultant to solve a contamination problem."

Various reports and books available on the Educational Resources web page offer resources to explore such things as physiographic regions in Kansas, earthquakes, ancient life, petroleum, evolution, and ground water. Maps cover the geology of Kansas, oil and gas fields, shaded relief, ground water availability, and other topics. Links to other related organizations can also be found here.

CONCLUSION

Scientists, government agencies, policy makers, private industry, and the public have come to rely heavily on the geologic information available on the KGS website, which typically averages 490,000 visits per month. Of those visits, an average of 390,000 are hits on the KGS Oracle database. The vast majority of those visitors access the petroleum and water well databases, including visits to the interactive mapping tools for both. This is a service that clearly is being well received and well used.

PRESERVING INSTITUTIONAL MEMORY: CREATING A DIGITAL PICKLE JAR?

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Abstract - State geological surveys accumulate large quantities of physical samples and related data. The information – documented, stored, and accessible – supports resource-related decisions made by individuals, private or public organizations, and government agencies responding to scientific, technical, and societal questions and issues. Researchers collect, organize, and analyze data in a variety of formats with data and interpretations typically made available in different media. However, as researchers come and go due to retirements or job changes or layoffs, they take with them their memories, insights, and knowledge about the geologic information with which they have worked. Short of placing their brains in pickle jars, attaching electrodes and recording devices, and hoping for a good connection, what can be done to preserve their knowledge?

At WGNHS, we developed the Data Catalog as a digital means for researchers to describe data collections with which they are familiar or which they have created. Collections are documented not only by the title, general description, and location, but also by the title and description of each distinct element of the collection, such as physical samples, paper documentation, and digital forms of the collection. Each element is also described according to the media they occur in, as many elements may be available in multiple forms, such as digital (databases, spreadsheets, shapefiles) and paper (reports, field notes, driller's logs). The use of keywords, names of collectors, collaborating organizations, and so forth, as well as robust search functionality allow different users to access the collections from their diverse perspectives.

Populating the Data Catalog and updating data entries are encouraged monthly at staff meetings, where questions regarding the use of the application or recent modifications to it can be shared. Educating staff on the use of the Data Catalog and the importance of capturing their knowledge about data collections as they are created is critical to maintaining institutional memory. Data preservation activity and using the Data Catalog are integral parts of each staff person's annual review, as the key to preserving institutional memory is to demonstrate that the institution truly values the memories in the first place.

GEOLOGIC RESOURCES INVENTORY OF OUR NATIONAL PARKS

Ronald D. Karpilo, Stephanie A. O'Meara, Trista L. Thornberry-Ehrlich,
Heather I. Stanton, and James R. Chappell
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Abstract - The Geologic Resources Inventory (GRI) is a component of the National Park Service (NPS) Inventory and Monitoring Program, administered by the NPS Geologic Resources Division. The GRI is one of 12 natural resource inventories advancing science-based park management in the NPS. Working with Colorado State University and other partners, the GRI provides parks with a scoping meeting and a summary report, a digital geologic-GIS map, and a report that highlights park-specific geologic issues, features and processes. Participants at scoping meetings include local geologic experts and park staff. Scoping meeting summaries list the geologic issues, features and processes identified at specific park meetings and outlines a digital geologic mapping plan. The dedicated digital geologic map for each park incorporates existing digital GIS data or paper maps into a single GIS product tailored to the needs of park resource management staff. GRI digital geologic data are delivered in ESRI geodatabase and shapefile format and follow a consistent data model that meets rigorous standards for spatial and attribute quality. Final geologic reports contain a geologic setting; a discussion of the geologic issues, features, and processes occurring in the park; a map unit properties table summarizing characteristics of geologic units in the park; and a brief regional geologic history. The scoping summary, digital geologic-GIS map and geologic report provide essential information and tools for park resource management. NPS resource managers have used GRI products to 1) track glacial response to climate change, 2) find areas of cave formation, 3) identify rockfall hazards, and 4) correlate plant and animal habitats with geology. When combined with the other natural resource inventories, the GRI provides an invaluable tool that park resource managers can use to help preserve and protect the scenic beauty, safety, and natural environments that the public has come to expect from National Parks.

BEST AVAILABLE DATA: THE DANGER OF USING UNQUALIFIED NEAR REAL-TIME HYDROLOGIC DATA FOR SCIENCE

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Abstract - Computer applications developed in the last 2 decades have simplified surface-water analysis techniques so that anyone with a computer and the right software can process large quantities of streamflow data in a short period of time. Often these data are immediately posted to websites so they can be used for such diverse purposes as managing irrigation systems, regulating hydro-electric projects, and providing forecasters and early responders with flood warnings. Unfortunately, far too often the hydrologic data derived from such analyses are never subsequently reviewed for quality; instead, they are accepted as the best available data and find their way into analyses and publications for many water-related studies and projects.

This presentation will include a brief overview of the science of hydrographics and the importance of using established, accepted protocol for data collection and processing. Examples of several common problems with near real-time hydrologic data will also be discussed so users will be aware of errors associated with hydrologic data that have not been quality assured.

Helpful references:

Pelletier, P.M., 1988, Uncertainties in the single determination of river discharge: a literature review: Can. J. Civ. Eng. 15(5): 834-850.

Rantz, S.E. et al. 1982. Measurement and Computation of Streamflow: U.S.Geological Survey Water-Supply Paper 2175, 631 pp.

GEOSCIML DEVELOPMENT STATUS REPORT

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Abstract - GeoSciML v2 was released in 2008 as a data transfer standard for geoscience information. It is an XML markup language utilizing the Open Geospatial Consortium (OGC) Geography Markup Language (GML) for spatial information, and Observations and Measurements markup schema (O&M) for field and lab observations, including boreholes. GeoSciML has been tested in an OGC web services compliant testbed comprising services from 10 geological surveys worldwide. Testbed services and products include Web Mapping Services (WMS) and Web Feature Services (WFS) serving data in GeoSciML v2 form. Resources for learning more about GeoSciML are available through http://geosciml.org. Project-based extensions for encoding groundwater information (Canada) and mineral resource information (Australia) have been developed and are in use. GeoSciML has been adopted for OneGeology Europe (http://www.onegeology-europe.org/) and INSPIRE data services. Various implementation approaches have been developed using free, open-source software from Deegree and Cocoon (http://www.geosciml.org/geosciml/2.0/cookbook/). A new release from the Geoserver project (v.2, now in beta, http://geoserver.org/display/GEOS/Latest) has added functionality for schema mapping to facilitate complex feature WFS implementation. Client software is still rudimentary, but as more data is published via WFS, more resources will be devoted to client-side development. There are still significant challenges to interoperable GeoSciML services that need to be addressed through development of application profiles and engineering of vocabulary services to improve integration of controlled vocabularies. Upgrades to the data model, and issues with service architecture and controlled vocabulary functionality will be addressed at a workgroup meeting in Quebec, Canada in September, 2009.

CATALOG SERVICE FOR THE WEB, DEVELOPMENT OF INTEROPERABLE SERVICE FOR DISCOVERING GEOSCIENCE RESOURCES

Wolfgang Grunberg, Stephen M. Richard, and Ryan C. Clark
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Abstract - Formal metadata was invented to allow managing and searching for information resources based on domain and content specific criteria, to more efficiently locate and evaluate scientific or technical content that does not index effectively using automated text and http-link-based algorithms. There are compelling business reasons for standardized metadata content, format, and services: Improve efficiency searching for data and information; avoid use of incomplete, inaccurate, or superseded versions of content; avoid duplication of effort in searching multiple catalogs or developing software to interact with different catalogs.

To achieve interoperable catalog services, a community of practice must agree on a metadata content model, vocabularies to use as keywords to index content, and the protocol for searching catalogs and obtaining metadata. The ISO 19115 and 19119 specifications are becoming widely accepted as content models for metadata, but for application in a particular community, more specific profiles of these specifications are necessary. The U.S. Geoscience Information Network (USGIN) project a collaboration with State Geological Surveys, U.S. Geological Survey, an Energy Industry Consortium, and other academic and industry partners in the geoscience community to develop metadata profile for indexing geoscience resources. Various keyword thesauri are in use for indexing geoscience resources (e.g. GeoRef), but these have mostly been used in traditional library type systems, and must be adapted to operation in a distributed system linked by web services. Considerable work is also necessary to harmonize the various vocabularies and to develop standard encodings, service interfaces and semantic relationships. The USGIN project is implementing catalog services using the Open GeoSpatial Consortium (OGC) Catalog Service for the Web (CSW), testing free, open-source implementations by the Deegree and GeoNetwork projects. Currently, variations in interpretation or ambiguity in the specifications interfere with actual catalog interoperability, but problems are being identified, and the project will document 'best practices' to utilize the existing software to link multiple clients and servers.

USGIN: INTEROPERABLE GEOSCIENCE DATA SERVICES ON THE WEB – HOW DO WE GET THERE?

Stephen M. Richard, M. Lee Allison, Ryan C. Clark, and Wolfgang Grunberg
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Abstract - The Geoscience Information Network (USGIN) is defined by a collection of service specifications, best practices, registered resources, and reference implementations to enable interoperable web services for geoscience information. Our goal is to provide a framework that will enable applications constructed to accept data input using standard web service interfaces to work with any server that provides data using a known interface. Data providers (e.g. geological surveys) can then publish information by implementing web services without having to simultaneously devote resources to developing client applications to utilize the information. Once a service implementation is in place, addition of content provided by the service is straightforward. Key components of the network are the service specifications, servers and clients implementing the specifications to provide and utilize content, and catalog services that enable users to locate and utilize network resources. The USGIN project is working on implementing reference server implementations for Open GeoSpatial Consortium (OGC) Catalog Service for the Web (CSW), georeferenced map-image delivery using OGC Web Map Service (WMS), and GeoSciML-encoded geologic map data using Web Feature Service (WFS). Wherever possible, we are using existing free-open source projects to avoid duplicating development effort, and to keep the cost of implementation as low as possible. The idea is that the reference implementations may be used as templates for other data providers. At the same time we are developing or working with collaborators on CSW clients (USGS Science Base client, GEON portal client, CatalogConnector, ArcGIS client) to provide access to catalog services. Most GIS software packages already function well as WMS clients. An ArcGIS client for GeoSciML WFS will load data into an NCGMP09 geodatabase (see Haugarud et al. and Thom et al., in this volume) for client-side utilization. As the reference implementations and client software mature, our focus for these services will shift to development of tutorials and workshops to assist others to bring new data online.

PART 3: GSIS Meeting Supplemental Materials

2009 Annual Meeting, Portland, Oregon

October 18-21, 2009

GEOSCIENCE INFORMATION SOCIETY

SCHEDULE OF EVENTS

Note: GSIS Committees meet separately as arranged by committee chairs

		Location
Saturday, October 17		
10:15 a.m.–5:30 p.m.	Geosciences Librarianship 101	Portland State University Millar Library
6:00-9:00 p.m.	GSIS Executive Board Meeting	Hilton Forum Suite
Sunday, October 18		
9:00 a.m.–6:00 p.m.	Session No. 30 Geoscience Information/ Communication (Posters): New Horizons on the Digital Information Landscape (10 poster sessions) Authors present from 4:00-6:00 p.m.	Oregon Convention Ctr. Exhibit Hall A
9:30 a.m.-12:30 p.m.	GSIS Business Meeting	Hilton Galleria II
Monday, October 19		
2:00-5:00 p.m.	GSIS Information Resources Forum	Hilton Pavilion West
Tuesday, October 20		
9:30-10:00 a.m.	GSIS Field Trip: Powell's City of Books	Powell's City of Books
12:00 noon-1:30 p.m.	GSIS Luncheon (ticketed event)	Hilton Forum Suite
6:00-8:00 p.m.	GSIS Reception	Hilton Galleria II
Wednesday, October 21		
8:00 a.m.-12:00 noon	Session No. 238 T118. Navigating the Geoscience Information Landscape: Pathways to Success	Oregon Convention Ctr. D137/138

Geoscience Librarianship 101: A Seminar Presented by the Geoscience Information Society

Saturday, October 17, 2009
Portland State University, Branford P. Millar Library, (Room 160)
Phone: (503) 725-5874

Workshop overview

10:15-10:20 AM	Check in/Introductions: Clara P. McLeod, Washington University in St. Louis
10:20 – 10:30 AM	Welcome: Jan Heagy, Geoscience Information Society (GSIS) President-Elect, ExxonMobil Upstream Research Information Center
10:30-11:30 AM	Reference and Instruction: Lura Joseph, University of Illinois, Champaign-Urbana
11:30-11:45 AM	Break
11:45-12:45 PM	Collection Development: Lisa Dunn, Colorado School of Mines
12:45-2:00 PM	Lunch and networking
2:00-3:25 PM	Maps and Geographic Information Systems (GIS) Linda Zellmer, Western Illinois University
3:25-3:40 PM	Break
3:40-5:10 PM	Maps and Geographic Information Systems (GIS) Linda Zellmer
5:10-5:30 PM	Feedback and Wrap-up: Clara P. McLeod

*Participants received all workshop materials on a cd-rom.

Thanks to our host Portland State University - Branford P. Millar Library and ESRI-GIS and Mapping Software for their support of Geoscience Librarianship 101.

Business Meeting

Sunday, October 18, 2009, 9:30 a.m. – 12:30 p.m., Hilton Galleria II

Agenda

I. Call to order (Rusty Kimball)

Introductions

- a. New officers
  Janet Dombrowski, Newsletter Editor
  Angelique Jenks-Brown, Treasurer
  Kay Johnson, President-Elect
- b. Committee Chairs
- c. Member Introductions

II. Approvals

- a. Approval of the Agenda
- b. Approval of Business Meeting minutes 2008 (October 5, 2008)

III. Reports

- a. GSIS general (Rusty Kimball)
- b. Financial (Designated reporter for Renee Davis)
- c. 2009 conference (Jan Heagy)
- d. Archives
- e. Exhibits
- f. Membership (Sarah Ziegler Hodkinson)
- g. Best Paper Award
- h. Guidebooks
- i. Nominating
- j. Best Reference Work Award
- k. Information Resources
- l. Preservation
- m. Distinguished Service Award
- n. International Initiatives
- o. Website
- p. Auditor Margy Walsh 2008-2009
- q. Geonet Moderator Carolyn Laffoon 2007-2009
- r. GSIS Newsletter Editor Adonna Fleming 2006-2009
- s. GSIS Newsletter Reviews Editor Carol La Russa 2009-
- t. Publications Manager Ellie Clement
- u. Publicity Officer Shaun Hardy 2007-2009
- v. Webmaster Janet Dombrowski 2009-2010
- w. GSA Topical Session Convener Jody Foote 2009
- x. Geoscience Librarianship 101 Clara McLeod

IV. Old Business

- a. Committee structure (Rusty Kimball)
- b. Information Resources Committee (combined Collection Development and E-Resources Committees). Trial year evaluation.
- c. Newsletter distribution challenges
- d. Auditor
- e. Geoscience 101 Coordinator and Task Force Members

V. New Business

- a. Conference sponsorships
- b. Geoscience Librarianship 101

        - i. Student membership drawing (GSIS funded – Pooled Sponsorship fund; Professional Development fund)
        - ii. Online access to course materials
    - c. Officer candidates
    - d. Enhanced member participation opportunities
        - i.Electronic options
        - ii.Revitalizing Professional Development Fund usage
    - e. Marketing GSIS
        - i.Internal
        - ii.External

VI. Other Items

VII. Adjourn

GSIS: Information Resources Forum

Monday, October 19, 2009
2 – 5 PM
Hilton Pavilion West

1:30PM	Room open and available for speaker presentation uploading and readiness
2:00PM	***Welcome***
2:05 PM	**Keith Neumeyer**, Ovid
2:10 PM	**Linda Zellmer**, Western Illinois University Libraries: **GeoRef: A Vendor Comparison**
2:40 PM	**A. K. Srivastav**, Oil and Natural Gas Corporation Limited: **Information navigation behavior of geoscientists in Indian Petroleum Industry** Presented by Jan Heagy, GSIS Vice President
3:10 PM	**Richard Huffine**, USGS Libraries:
3:30 PM	***Break***
3:35 PM	**Neal Marriott**, The Geological Society: **The Geological Society of London's Lyell Collection: progress and update.**
3:55 PM	**Don Hemenway**: GeoScienceWorld:
4:15 PM	**Panel Discussion on Electronic Journal Usage in the GeoSciences** The panel discussion will center around issues related to electronic journal use in the geosciences, including patron electronic access usage, archiving and perpetual access, aggregator databases, and image quality. Panelists include: Angelique Jenks-Brown from Binghamton University, Jan Heagy from ExxonMobil Upstream Research Company, Michael Noga from MIT, and two of the authors of an article featured in College & Research Libraries Eileen Brady and Betty Galbraith from Washington State University.

Thanks to The Geological Society and OVID for Sponsoring this year's Information Resources Forum

GEOSCIENCE INFORMATION SOCIETY AWARD WINNERS 2009

Presented at the GSIS Reception, Awards, and Silent Auction
Tuesday, October 20, 2009, 6-8 p.m.
Hilton Galleria II
Portland, Oregon

Summary report by Shaun Hardy
Originally Published in *GSIS Newsletter* No. 240, December 2009

Mary B. Ansari Distinguished Service Award

Sharon Tahirkheli
Director of Information Systems, American Geological Institute

Sharon Tahirkheli, Director of Information Systems at the American Geological Institute, was honored with the 2009 Mary B. Ansari Distinguished Service Award at a ceremony in Portland, Oregon during the GSA. The award is given by the Geoscience Information Society in recognition of significant contributions to the geoscience information profession.

Tahirkheli has worked in the field of geoscience information for more than thirty years. She started as an indexer for GeoRef – the world's leading bibliographic database for the Earth sciences – and now oversees production of that database as well as other AGI information projects such as the Cold Regions Bibliography Project. Under her leadership AGI's information services have been broadened and deepened to reflect the increasingly interdisciplinary nature of the geosciences.

Tahirkheli's professional record includes involvement in numerous committees and information projects in the US and abroad. She was instrumental in establishing GeoScienceWorld, an aggregate of linked and interoperable Earth science journals, and served both on the GSW Board of Directors and as the organization's treasurer. As a member of the Management Council of the Digital Library for Earth System Education (DLESE), she led cataloging efforts that provided metadata for the DLESE Community Collection. Her service in the international arena includes the Working Group for the Multilingual Thesaurus of Geosciences – an initiative of the IUGS Commission for the Management and Application of Geoscience Information. She is a past president (2001) of the Geoscience Information Society.

Writing on behalf of the selection committee, chair Patricia Yocum stated "Sharon's people skills, technical savvy, business acumen, international awareness, and wide knowledge of the geosciences continue to serve the community with exceptional skill, competence and dedication. Gracious, fully focused, and effective, Sharon provides noteworthy service to geoscientists, librarians, and information specialists."

Tahirkheli holds an MSLS from the Catholic University of America. Her research interests include the development and maintenance of controlled vocabularies and the applications of geographic metadata for information retrieval.

The Ansari Distinguished Service Award was established in 2005 through the generous support of Mary B. Ansari, Director Emerita for Branch Libraries and Administrative Services, University of Nevada-Reno and past president of the Geoscience Information Society.

Mary B. Ansari Best Reference Work Award

O. Richard Norton and Lawrence A. Chitwood
For their book *Field Guide to Meteors and Meteorites*, Springer, 2008

This book is both a guide to observing meteors and a practical handbook for meteorite hunters. Abundant information on locating, preparing, and analyzing meteorites is presented.

The work's comprehensive treatment, fine color illustrations, and accessibility to a wide audience were winning points in the selection committee's decision. "Meteorite information has been scattered, hard to find and difficult to interpret – sort of like meteorites themselves," commented committee member Dennis Trombatore. "The *Field Guide* is a powerful reference tool. It will inspire, enlighten and inform everyone who uses it." The book was published by Springer in 2008.

Families and friends of the authors, both of whom are deceased, were present at the October 20 award ceremony. The Ansari Award has been presented annually since 1988 and honors an outstanding reference work in the field of geoscience information published during the previous three years.

Best Website Award

Two awards were given in 2009:

Royal Geographical Society, British Antarctic Survey, and UK Foreign and Commonwealth Office
Simon Scoones, Rinku Mitra, Judith Mansell, Jonathan Wolton, Jamie Oliver, and Jane Rumble

For their website: *Discovering Antarctica*
www.discoveringantarctica.org.uk

This website is a production of the Royal Geographical Society in partnership with the British Antarctic Survey and the UK Foreign and Commonwealth Office. Using an effective mixture of multimedia and interactive activities, the site engages visitors in exploring the physical, biological and human story of the Antarctic continent. Topics are organized in non-traditional but logical ways that are easy to navigate. "*Discovering Antarctica* has a pleasing, well-organized visual display," commented selection committee member Robert Tolliver. "It's a great fit for its audience and purpose." The site's contents were written by Simon Scoones. The project development team consisted of Rinku Mitra, Judith Mansell, and Jonathan Wolton (RGS-IGB), Jamie Oliver (BAS), and Jane Rumble (UK FCO).

National Association of Geoscience Teachers, and Carleton College Science Education Resource Center
Heather Macdonald, Carol Ormand, and Cathryn Manduca

For their website: *On the Cutting Edge*
serc.carleton.edu/NAGTWorkshops

This website is a website aimed at helping geoscience faculty stay up to date with both Earth science research and teaching methods. The site is a project of the National Association of Geoscience Teachers and the Science Education Resource Center at Carleton College, with support from the National Science Foundation's Division of Undergraduate Education. Heather Macdonald, Chancellor Professor of Geology at the College of William and Mary, heads up the website team. Citing *On the Cutting Edge* as "an interesting thematic collection of instruction related resources," the award committee praised its clear navigation, use of multimedia, and useful content. Member John Kawula observed, “there are a lot of instruction guides out there, but this one focuses on taking new discoveries and research and working them fairly quickly into classroom settings.”

The Best Website Award has been presented by the Geoscience Information Society annually since 2002 to a site which exemplifies outstanding standards of content, design, organization, and overall site effectiveness.

Best Paper Award

Kathryn Lage

For her paper “Zoom! Remote Sensing Imagery in the Geosciences” in *Proceedings of the Geoscience Information Society* vol. 38

Kathryn Lage is map librarian at the Jerry Crail Johnson Earth Sciences and Map Library at the University of Colorado at Boulder. In presenting the award, committee chair Carol La Russa praised Lage’s work as, “a very useful, general overview of an important topic, with helpful links to resources.” The paper appears in volume 38 of *Proceedings of the Geoscience Information Society*.

Best Guidebook Award

Patrick T. Pringle

For his guidebook *Roadside Geology of Mount Rainier National Park and Vicinity*, Washington Division of Geology and Earth Resources, Information Circular 107, 2008

The work was issued as Information Circular 107 by the Washington Division of Geology and Earth Resources in June 2008. Numerous color and historical photos and an easy-to-follow layout with clearly identified location stops distinguish the 191-page guide. The award subcommittee noted that of all of this year’s nominees, Pringle’s book best met the criteria established by the GSIS “Guidelines for Authors, Editors, and Publishers of Geologic Field Trip Guidebooks” (http://www.geoinfo.org/GuidebookGuidelines.pdf).

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