

American Geosciences Institute Leadership Forum: “Media in the Geosciences: Trends and Tools for Publication, Education and Outreach”

Association of Public and Land-Grant Universities
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On September 10, 2012, the American Geosciences Institute (AGI) hosted a full-day forum on “Media in the Geosciences: Trends and Tools for Publication, Education and Outreach.” Wayne Pennington, AGI President, began by introducing the purpose of the forum and topics of discussion.

The forum was structured around four sets of talks; education, publication, big data and outreach. For each subject there were two presentations followed by a question and answer session. A lengthy final discussion of all four topics concluded the forum. The first topic was education and consisted of talks by Ann Benbow, Director of Education, Outreach and Development at AGI, and Susan Buhr, Education Program Director at the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado.

In her presentation, Benbow discussed the opportunities and challenges associated with eBooks, which are online or electronic textbooks. She outlined the opportunities eBooks offer to teachers to create customizable textbooks including rearranging the order of chapters, creating a platform for non-traditional learning methods, inserting assessments and video instructions from the teacher. She highlighted the opportunity eBooks provide for more interactive learning which presents material for different learning styles which may reach more students than a traditional textbook. She emphasized that research is still underway to assess how effective eBooks are and presented the negative side of eBooks. Unlike a textbook, students cannot write directly on or highlight an eBook, eBooks sometimes require a large amount of memory on a computer, and many are accessed by buying a license which expires, and after which students can no longer access the eBook. She concluded with a question for the forum; what do eBooks have to offer the geosciences?

The second presentation on education was titled “National Association of Geoscience Teachers (NAGT): Teaching tools and examples in Earth Sciences” by Susan Buhr. Buhr began her presentation by describing the purpose of new media in education as professional development, providing resources, teacher preparation, sustainability and a voice for teachers. She emphasized the differences in college and pre-college teachers’ needs. Pre-college teachers are often searching for credible information and activities while college teachers are more often looking for lab activities and visualizations. Buhr outlined various resources available online such as “[On the Cutting Edge](#)” which provides resources such as career management, advancing teaching and pedagogy; the NAGT peer reviewed research journal, the [Journal of Geoscience Education](#); the Climate Literacy and Energy Awareness Network Pathway ([CLEAN](#)) which provides resources for climate and energy awareness to help teachers understand what

is current and credible as well as provides approaches to teaching controversial topics; and the Interdisciplinary Teaching of Geoscience for a Sustainable Future ([InTeGrate](#)) which provides material development. She concluded her presentation encouraging collaboration through sharing information and resources, as advancing teaching is best accomplished through community.

During the question and answer period Benbow and Buhr fielded questions about the differences between eBooks and traditional textbooks, how different textbook formats change a student's learning, how other disciplines are implementing new media, and how eBooks may help close the content-related learning gap.

The second set of presentations on publication began with "Journal Publishing in a Networked Age" by Stewart Wills, the Editorial Director of Web and New Media for *Science* Magazine. Wills assists in shaping the online strategic direction of *Science* and manages a team that works on additional web features tied to *Science* content and has participated in developing the content for the webpage of *Science*. In his presentation, Wills described the challenges and opportunities of new media to publishers and how publishers must now take on new roles of multimedia producers, data managers, social media users, and technology developers. He introduced the advantages of new media. New media serves authors and users, is a new source of data, and feeds into multiple devices and channels as well as viral and external networks. He described the new media used at *Science* which include podcasts, video and social media in the form of Twitter and Facebook. Wills described social media as "word of mouth" on a much larger scale. He described this new media explosion as a challenge for publishers to manage the cost of developing and experimenting with new media platforms. He brought up the challenge that new media brings to the traditional journal system to adapt to new media and the advantage it provides by offering the opportunity to measure the scientific impact of articles.

Alex Speer, the Executive Director of the Mineralogical Society (MSA), followed with a presentation on open access journals titled "The Many Flavors of Open Access for the Geosciences; their Future Depends on who Treats." MSA is in the process of making all past and current publications available in print and electronic forms and deciding on how best they can be made available to anyone on a sustainable basis. Speer defined public access as the "free and unrestricted online access to scholarly journal articles." He described open access as highly variable in what is posted, when and where it is posted, who is the publisher, if there is peer review or a copyright, who the users are, who pays for the articles and how much. Speer brought up the types of articles that can be posted ranging from manuscripts to peer-reviewed, edited and published papers. These articles can be posted on an open access web site for immediate access or can go through an embargo period which allows for a period of paid access. As to where articles can be published, Speer explained that they could be published on an author's personal page, discussion forums, a journal web site, an institutional repository or archive, or a central repository such as [PubMed](#). He noted that there are differences in credibility between platforms such as a discussion forum compared to a journal website. As to who publishes the article, Speer suggested the author, traditional publishers, new open access publishers such as the Public Library of Science ([PLOS](#)) and [eLife](#), and "bulk publishers' where

peer-review is considered less rigorous such as the Public Library of Science community journals ([PLOS One](#)). He emphasized that there are differences in the rigor of the peer review among publishers and differences in copyrights as well. Speer described different business models for open access including models where the author pays, the journal is a hybrid journal including both paid and open access models, volunteer payments are made, mandates from the government such as grants pay for the publication, or the publisher pays. He stated that the obstacles to open access include the difficulty of finding funding, the minimal cost savings from switching to open access, and the quality may be more variable. In his concluding remarks, Speer stated that the successful future of open access will be from a business model which is sustainable and provides quality articles.

Speer and Wills answered questions on the effects of open access on researchers, the role of librarians in an open access society, how commercial journals continue to profit in an increasingly open access industry, and the readership of open access journals.

Lee Allison, State Geologist and Director of the Arizona State Geological Survey, began the third session on big data with his presentation titled “Big Data.” In addition to his responsibilities as state geologist, Allison serves on the Advisory Council to the Geosciences Directorate of the National Science Foundation (NSF) and chairs the Governance Steering Committee for the NSF EarthCube (geoscience cyberinfrastructure) initiative.

Big data refers to datasets which have grown so large that they become difficult to manage using traditional methods. Allison describes big data as the “next frontier for innovation, competition and productivity” as it offers the opportunity to integrate data sets and make this data available for users. Allison described big data in the geosciences as the opportunity for web and standards-based, open source data which are interoperable, and community-based. He used [EarthServer](#) as an example of an emerging server which is establishing open access ad hoc analytics based on big data in the earth sciences. The idea is for scientists to be able to access and compile multiple datasets form a database query interface, Allison explained. Allison introduced the forum to [EarthCube](#) by describing it as an infrastructure meant to “transform the conduct of research in the geosciences by supporting community-based cyberinfrastructure to integrate data and information for knowledge management across the geosciences.” He pointed out that the geoscientists are ready for this technology as they are sophisticated cyberinfrastructure users and that NSF, as well as other agencies, supports the necessary infrastructure and research that will form the foundation of EarthCube. Allison proposed a decentralized government of EarthCube and pointed out that this is the model for the internet. He suggested a framework for ensuring the quality of the data, such as defining standards which allow the user to see where various data is from and how it was obtained (metadata), should be put in place. Allison discussed that while it could take 40-50 years for the infrastructure to reach 80-90 percent of the population, big data offers big opportunities for the geosciences.

Sharon Tahirkheli, Director of Information Systems at the American Geosciences Institute concluded the big data session with her presentation “GeoRef and Beyond.” Tahirkheli

introduced the forum to GeoRef and mentioned that GeoRef covers the geological literature for the geosciences worldwide and has distributed print bibliographies as far back as 1918. Tahirkheli discussed the transition from print to CD-ROM to internet and listed the internet versions of GeoRef which are; Proquest, Ebsco, Ovid, Elsevier, GeoScienceWorld, Dialog and STN on the Web. Tahirkheli pointed out that the main benefits of this transition to internet is the ability to link and share articles information using social media or many other media sharing platforms. She discussed the future of linking, which would allow users to access relevant datasets and study location maps for the article they are viewing. She explained that tagging allows users to attach words or phrases to references and share these tags with other users. Tahirkheli raised the idea of making GeoRef available on mobile devices.

Tahirkheli and Allison responded to questions about data quality and data management.

Callan Bentley, an Assistant Professor of Geology at Northern Virginia Community College opened the Outreach session with his presentation titled, “Why bother blogging geoscience?”. Bentley introduced the forum to the AGU blogosphere, to his blog, [Mountain Beltway](#), and to why he blogs, stating that “I see blogging as the modern equivalent of the person who tacks magazine and newspaper articles outside their office, but with a much larger and wider audience.” He mentioned that the upsides of blogging include receiving messages from students across the country letting him know that something on his blog helped them understand something for class as well as from other people who used the information and graphics he provided. The visibility of the information on a blog ensures that unlike a classroom, there are more experts who view the content and let the blogger know if he/she is providing less than up-to-date information. Bentley shared an example of collaboration as a result of his blog and a contract revising Tarbuck and Lutgens’ introductory Earth science textbook. He shared the page view data of his blog, showing the peaks in page views associated with events like the 2011 Mineral, Virginia magnitude 5.8 earthquake. Bentley discussed the data from his students in regards to how they felt about his blog, if it was helpful and if they kept following it after his class. He showed that the students’ feedback was not only predominantly positive, but showed that the students continued to follow the blog after the class was over and sparked their interest in taking more geology classes.

Tim Herzog, an Open Data Specialist at the World Bank concluded the day’s presentations with “Using Apps for Open Data.” Herzog began his presentation by praising the transition the World Bank has undergone to providing open source data on information about world economic policy and external debt, health, education and environment as well as provide transparency regarding the Bank’s transactions. Herzog introduced the forum to various open data resources such as [data.gov](#) and [data.gov.uk](#) which now promotes government transparency through open data, the United Nations Development Programme ([UNDP](#)) which supports developing nations, and [Kenya Open Data](#) which makes public government data accessible to everyone. Herzog introduced the forum to the Apps for Development competition which challenges people to create innovative tools for using the data available through the World Bank’s Open Data Initiative and the most recent competition he worked on, Apps for Climate. Apps for Climate

was a similar competition which created apps that raised awareness, measured progress, identified solutions and promoted open data and innovation for climate change.

Herzog and Bentley answered questions on how to find and follow blogs and apps; how the World Bank benefits from being a source of open data; and how societies can use these tools to increase student enrollment in geoscience departments.

The concluding remarks were led by Wayne Pennington. Below are some of the questions and comments made during the session.

- We must convince our legislators and administrators to increase the size of our geoscience departments because when the classes are too big due to fewer faculty, the quality of education goes down.
- We can push for larger geoscience departments and more respect for the geosciences by calling attention to the issues the geosciences are uniquely qualified to address. The use of social media can help this.
- How do we mobilize to visit more campuses to inform students about which jobs will be available in the geosciences? Students want to hear that there is something out there for them.
- The Association of Environmental and Engineering Geologists (AEG) has been doing campus visits for a long time. To keep young scientists involved, you have to use social media because it is the main source of their information.
- For smaller societies it might be helpful to partner with a larger society to develop social media for your society and introduce young scientists to other institutions.
- Using new media to show students what types of jobs they could have, what classes they need to take to train them and inform them of the choices they need to take in terms of registration is an important role for member societies because this is not information that the student will receive in school.
- Maybe AGI could start a geology podcast using expertise the in various fields from their member societies.
- It would be useful to have a factsheet that describe “a day in the life of” for different geoscience careers.
- Just bringing on one individual at GSA who specializes in new and social media has made a huge difference in reaching more people.

- Scientists need to be working in their community to overturn the reputation of Earth science as less rigorous. This is especially true for high school students because this is when students decide what their major is going to be in college.
- American Geophysical Union (AGU) is now partnering with Wiley for their publication. This allows AGU to focus their resources on scientific excellence instead of handling the changing technologies and spending more time on sales and marketing. As a result, they think they will have a greater reach in readers and attracting authors but will have to downsize their publications department.
- Libraries are now a center of activity instead of a center where people go to check out print resources. It is conceivable that in the future, an author will go to a library to pay for publication.
- None of us have deep enough pockets or enough resources, even if all geoscience societies came together, to fund and run open access journals. It is more likely have to partner with a larger publication that does have resources, like Wiley.
- There are other options such as large nonprofits. When small societies partner with larger publications, the societies may see their profits go down.
- It seems that it will be a challenge to keep up with media that is rapidly changing and where “every flower is allowed to bloom.” How do you keep up with so many different media platforms?