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THE ECONOMY AND THE MOON



E. Bruce Watson

This is my last editorial contribution as a principal editor of *Elements*, and I write it during a week that is unique in history. Americans are celebrating the election of our first African-American president—a remarkable, unifying event considered by most to have been improbable in the lifetimes of people my age. It is, however, a time of poignantly juxtaposed emotions: there is, on the one hand, the good feeling and pride in our country and our fellow citizens for having done something extraordinary, but at the same time there is widespread uneasiness about the economic future of the U.S. and the world. Closer to the immediate interests of our scientific community, there is uncertainty about how the policies of the new administration will affect (and be affected by) scientific endeavor both nationally and internationally.

Shortly after the November election, I visited the president-elect's campaign website to try to gain insight into his thinking about the role of science in society, particularly as it might affect the geoscience disciplines. It is not easy to navigate to a direct policy statement about science in general (and certainly not about geoscience), but some material can be found by following the "Energy & Environment" and "Technology" links. Understandably, the emphasis is not so much on science but on technology. Significantly, however, green technology and energy independence are prominent. There seems to be little doubt that the new American president is informed and passionate about issues of environment and sustainability: one of his stated goals, in fact, is to "make the U.S. a leader on Climate Change," which is a refreshing change in attitude.

President Obama's emphasis mainly on technology may be somewhat disheartening to the natural scientists among us, but it is important for us to recognize that to many citizens, politicians, and corporate leaders, the word *science* is synonymous with the word *technology*. And in fact many if not most of our colleagues in the other sciences (physics, chemistry, and biology in particular) are motivated primarily by technological goals—or they at least understand that the best way to market their science is by casting their efforts in terms of technological progress.

In the context of the above observations, some of us may be asking whether society can afford to invest in the "new era of lunar exploration" described so eloquently by John Delano and the group of authors he assembled for this issue of *Elements*. Perhaps history can guide us here. The expense of the Apollo program 40 years ago was

justified largely on the basis of the "spin-off" technological and military benefits. These were no doubt real, but at the time (and to this day) an equally important aspect was that a generation of scientists—especially geoscientists—was inspired by the lunar landings in a way that no other event could have done. This was true to some extent of myself: in 1971, I purchased Thomas Mutch's *Geology of the Moon: A Stratigraphic View* (which was quickly rendered largely obsolete by the Apollo missions). I also wrote my first geochemical term paper in 1972 on the topic of Moon rocks. I think it is fair to say that most of the young scientists who were inspired by the lunar missions went on to careers that have served society in a wide variety of ways, not necessarily having much to do with the Moon.

The Obama administration's stimulus package includes a significant increase in the National Science Foundation budget, and members of his team have publicly expressed the view that both science itself and education in science must be national priorities in the U.S. There has even been specific reference to the need to fund "big physics and oceanography." On the highly regarded television program *Meet the Press* (January 18), President Obama's chief of staff, Rahm Emanuel, was challenged by host David Gregory about the wisdom of budgeting for big physics and

oceanography given that projects in these areas do not create meaningful numbers of jobs in a short time. Emanuel's response was that these would constitute a longer-term investment in both jobs and the future of the country, and that they are a vehicle to and enabler of education. It was the kind of answer I would give under the circumstances if I had Mr. Emanuel's presence of mind. But a good answer doesn't erase the fact that the question was asked in the first place, and I think we all should be ready with our own answers when we are questioned about the worth of science in a time of economic stress.

I've come around to a personal view that we should use a "double-barreled" argument when speaking to the merits of the natural sciences, emphasizing not only the potential (although possibly latent) usefulness of the knowledge we seek but also the fundamental value of a scientific education regardless of how it is applied in the short term. Science is in part a body of knowledge, but it is also—perhaps more importantly—a way of looking at the world that is to some extent independent of any specific body of knowledge. We need to convey that it isn't just what we teach that is important but also the outcome of the enterprise in terms of the capabilities of our graduates. Many geoscience students are drawn to our field because they see opportunities to do science outdoors and perhaps because geology is seen as one of the last refuges of natural science.

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WELCOME TO THE SWISS SOCIETY OF MINERALOGY AND PETROLOGY

With this first issue of 2009, we welcome the 320 members of the Swiss Society of Mineralogy and Petrology, the fifteenth society to join *Elements*. Read their first news report on page 47.

FLY ME TO THE MOON

For the first time since June 2006, this issue of *Elements* takes us off the Earth for an up-to-the-minute look at our nearest neighbor in the solar system. Guest editor John Delano and his team of authors provide an exciting perspective on the Moon that addresses both old controversies and new interpretations.

INTRODUCING HAP McSWEEN



It is difficult to “let go of the reins” of a responsibility that has been exciting, enjoyable, rewarding, and challenging all at the same time—but it is the end of my third year as principal editor of *Elements* and it is time for me to step down.

I am leaving our no-longer-fledgling magazine in the very capable hands (and minds) of Pierrette Tremblay, Susan Stipp, David Vaughan, and a distinguished Advisory Board and Executive Committee, the latter of which is chaired by *Elements'* visionary founder, Rod Ewing.

I am especially pleased to pass the baton to an extraordinarily distinguished scientist and author in the person of Prof. Harry Y. (Hap) McSween. Some of our readers will remember that Hap has some history with *Elements*, having served as guest editor of a popular early issue (“Water on Mars”), published in June 2006. It is fitting that the present issue is revisiting “MPG” science in an extraterrestrial setting.

Hap McSween has been a member of the faculty at the University of Tennessee at Knoxville for 31 years and served as head of the Department of Geological Sciences for 10 years. He is currently University Distinguished Professor of Science and interim head of the Department of Earth and Planetary Sciences.

EDITORIAL (Cont'd from page 3)

Attracting young people into science of any kind and educating them as generalists is a unique contribution that geoscience departments can make to the modern world. No other science or engineering discipline does this, and if exploration of the Moon expands the attraction to science in general, then lunar science has value that goes way beyond the purely aesthetic.

The above observations aside, it is clear that our science has changed dramatically since the Apollo missions of the late 1960s and early 1970s. We would truly have reason to

Hap's scientific credentials and his administrative and editorial experience are remarkably strong and diverse. His undergraduate degree (chemistry) was earned at The Citadel, his master's in geology at the University of Georgia, and his PhD in geology at Harvard. Hap is a prolific writer, having published over 250 articles in scientific journals, many of them highly cited. He has also written three books for the popular press on meteorites and planetary science, as well as a leading textbook in geochemistry (which I particularly like because of its emphasis on “pathways and processes”).

Unlike most of us, Hap McSween's attention is drawn mainly to rocks falling from the heavens rather than to those already underfoot, and his published papers focus mainly on meteorite petrology and cosmochemistry. He was one of the original proponents of the idea that a handful of unusual meteorites came from Mars, and he has worked extensively on Martian meteorites. He has served on science teams for five spacecraft missions and is currently a co-investigator for the Mars Odyssey orbiter, the Mars Exploration Rovers, and the Dawn spacecraft mission.

Beyond his leadership as a practicing scientist, Hap has served our profession in many ways, including terms as president of the Meteoritical Society, chair of the Planetary Division of the Geological Society of America, and councilor of the Geological Society of America. He is a member of numerous advisory committees for NASA and the National Research Council.

Hap McSween will infuse new energy and bring a new perspective to the editorial office. I hope all our readers will join me in welcoming him to the *Elements* editorial team!

THANKS TO OUTGOING MEMBERS OF THE ADVISORY BOARD

When the Advisory Board of *Elements* was initially formed, members were randomly given two- or three-year terms, but the three-year term stretched to four years! We thank Randy Cygan, Adrian Finch, Doug McCarty, Jim Mungall, Hugh O'Neil, Nancy Ross, Everett Shock, and John Gray for serving on the Advisory Board. We have benefited from the

worry if this were not the case, but it is especially crucial right now that we make every effort to convey the essence of our evolving field to administrators and policy-makers at all levels. The “center of mass” of many geoscience departments has shifted from solid-Earth subfields toward surface processes. I think this is a positive consequence of the more direct connection of “Earth-surface processes” to environmental issues and society. Relevance is an important driver, and the adaptability of our scientific community underscores the responsiveness of our science to the needs of society. But from the vantage point of scientific philosophy, a more compelling justification for the shift may be that

GOODBYE AND THANKS TO MINERALOGICAL ABSTRACTS

Mineralogical Abstracts has ceased to be published due to the new search tools and trends in our field. It was a great tool for my research: quick, focused and of great, great quality. I frequently felt surprised when reading abstracts of papers in which I was a co-author because I could not have described the study any better. It always seemed to me that the abstractors were very dedicated and insightful people. Thank you to those who provided this terrific tool, and I hope that the spirit in which they did it remains in our community.

Javier Cuadros
London

ELEMENTS IN POLAND

I wish to express my appreciation for sending me, since 2007, issues of *Elements*. The topics covered by this journal are of a real interest to me and my colleagues. The journal is a very valuable source of current information and is especially inspiring to me. Right now, I am working on the fourth edition of the book *Trace Elements in Soils and Plants* for Francis/Taylor/CRC Press, and I will acknowledge *Elements* for inspiration and a source of data. Accept my best wishes for further success in your activities.

Alina Kabata-Pendias
Warszawa, Poland

expertise of the outgoing members on numerous occasions, and they have provided many suggestions for potential thematic issues. Jim Mungall was guest editor for the platinum-group elements issue. We welcome the following members for the 2009–2011 term: John Brodholt, Norbert Clauer, Will Gates, George Harlow, Anhuai Lu, Robert Luth, David Mogk, Roberta Oberti, Terry Plank, Xavier Querol, and Meenakshi Wadhwa. They will be introduced more formally in a future issue.

E. Bruce Watson

Earth's near-surface is where many of the challenging and exciting questions in modern geoscience reside. As the articles in this issue make very clear, equally exciting questions are stimulated by consideration of Earth's companion in space, and these will help attract and inspire some of the next generation of the world's leading scientists.

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