E. Bruce Watson

Risking the Future of Geoscience

Earlier this year, the University at Albany (New York) moved to terminate its undergraduate and graduate degree programs in the geological sciences. Those of us who know "UAlbany" as the former and current base of some notable Earth scientists look upon this decision with bewilderment. Before passing judgment, however, we should note that the move was initiated by academic staff in the Department of Earth and Atmospheric Sciences and does not include elimination of the UAlbany Earth sciences curricula altogether: courses and degree programs in atmospheric and environmental sciences will continue.

UAlbany is not unique. About five years ago, the University of Connecticut made a similar decision to close the Department of Geology and Geophysics and disperse the faculty to other departments.[1] George Washington University also disbanded its small but energetic Geology Department in 2003, an action that left the District of Columbia with no undergraduate program in the geosciences at any college or university.

To those of us in the field, these decisions are unsettling and seemingly counter to societal and educational needs. Geoscientists are the only scientists knowledgeable about the Earth and its key systems, many of which "serve" humankind in some manner and most of which are impacted by human activities. Knowledge of Earth systems carries with it the unique perspective of vast timescales whose record informs us about our planet's history—key for predicting Earth's short- and long-term futures. The Earth systems perspective now permeates our educational programs and much of the research we do, and this perspective is vital on college and university campuses today. Our students will make decisions in their lifetimes for which Earth systems knowledge is fundamental and essential, whether in the fields of resources (water, minerals, energy), global climate change, CO_2 sequestration, disposal of nuclear materials and other hazardous waste products, or in the area of natural hazards such as earthquakes and floods.

Perhaps we can benefit from the UAlbany example. The developments on that campus resulted from a series of administrative decisions made over a 20-year period that essentially predetermined "failure" of the geological sciences. The number of solid-Earth scientists was allowed to fall below critical mass. This led to the diminution of the graduate student population and the inability to offer competitive degree programs at any level, which had a negative feedback on enrollment. As funds from the state government diminished, deans and provosts at individual campuses in the university system sought to augment existing, academically strong programs where student interest was high, while at the same time limiting duplication of talent and expertise among the four public university research centers in the state: Stony Brook University is strong in the Earth and environmental sciences—why duplicate that strength at the Albany campus 250 kilometers away? From the standpoint of New York State taxpayers, this is a valid point. But from it follows the next question of how well a non-duplication policy fulfills the needs of the students at any given campus—not necessarily within their chosen degree field, but in terms of what they need to know for their own lives and for developing informed opinions on societal issues. The non-duplication policy also leads to specialization of campuses, which makes them vulnerable to shifts in student interest and societal needs.

Academic administrators face the challenge of balancing the budget and responding to the perceived immediate and "global" needs of their institutions. This inevitably means that institutional priorities do not coincide with those of all academic departments. Interestingly, administrative views of the Earth sciences vary enormously: some major U.S. universities see our field as central to addressing the human aspirations and challenges of the 21st century and are building vigorously. Many are taking a less aggressive approach by maintaining a viable base in the Earth sciences, appreciating the importance of stability, and leaving open the possibility of future growth. A few are taking the UAlbany route. Why is there such a disparity of attitudes toward the Earth sciences among administrators of institutions of higher education? Part of the answer may be rooted in the history, location, and culture of the institution: for example, the importance of the geosciences is taken for granted in places like Texas and Alberta, whose economies run on oil and gas. Other factors are more complex. Leading technological universities like MIT preselect for qualities in their undergraduate student populations that naturally lead to few students taking degrees in the Earth sciences. Most Earth scientists are consumers of technology—as opposed to being leaders in the development of technology—so in technological circles we are not perceived to be positioned on any research frontier. This perception misses the point, of course, but among students it is exacerbated by a lack of exposure to modern Earth science in secondary schools. If student interest is the primary measure of the importance of a discipline, some geoscience departments will remain in a weak position no matter how compelling the argument for the presence of Earth systems awareness on campus.

Another factor that unquestionably affects the attitudes of university administrators toward geoscience departments is the limited availability of external funds for research. In the present funding climate, even a strong geoscience department does not have access to the research dollars that

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[1] Interestingly, the UConn decision was reversed before it was executed, when a newly appointed administrator acted quickly to establish a Center for Integrative Geosciences.

EDITORIAL MEETING IN BRIEF

The editors met on Thursday June 28 at the Frontiers meeting in Cambridge, England. Rod Ewing, founding editor, attended part of the meeting, and we welcomed his sage input. Although we have regular conference calls throughout the year, face-to-face meetings are invaluable: nothing replaces sitting around a table and bouncing ideas back and forth. The main items on the agenda were solidifying our line-up for 2008, and indeed three new themes were confirmed: nanogeoscience, platinum-group elements, and carbon dioxide sequestration. Watch for our December issue when we will present an overview of the 2008 topics. Many proposals and ideas for thematic issues have been submitted in recent months, and these will be considered for the 2009 line-up.

DAVID VAUGHAN, PRINCIPAL EDITOR, 2008–2010

We welcomed David Vaughan, incoming principal editor for 2008, at our editorial meeting. Although David's term of office officially starts in January, when he will replace Ian Parsons who will be concluding his three-year term, David is now included in all our discussions. We will introduce David more formally in the first issue of 2008.

EXECUTIVE COMMITTEE MEETING

Every participating society appoints a representative to sit on the executive committee overseeing *Elements*. Eleven societies were represented at the executive committee meeting, convened and chaired by Peter Treloar. Members of the executive committee joined the editors at the end of the day for a fruitful exchange of ideas and sharing of information.

ELEMENTS ON GEOSCIENCEWORLD

Elements is joining GeoScienceWorld, an aggregation of peer-reviewed journals that are indexed, linked, and inter-operable with GeoRef (see *Elements* vol. 1 no. 5, p. 313 and www.geoscienceworld.org). This will provide a high-quality online access to *Elements* articles.

ELEMENTS' IMPACT FACTOR

Elements received its first impact factor from the Institute of Scientific Information: 1.562 for 2006, its second year of publication. The 2006 impact factor of a journal is calculated as the number of citations received in 2006 for papers published in that journal in 2004 and 2005, divided by the number of articles published in those two years. As *Elements* just started publication in 2005, our impact factor was based on citations we received for 2005 papers. Thus, we are very pleased that our impact factor is as high as it is already. Papers that have cited *Elements* were published in the standard mineralogy and petrology journals but also in a wide range of journals on the fringe of our community, meaning we are reaching a wider audience.

Ian Parsons, Bruce Watson, Susan Stipp and **Pierrette Tremblay**

LETTER TO THE EDITORS

Congratulations to *Elements*, lead editor Michael Hochella, and guest editor David Mogk for organizing the April issue dealing with teaching mineralogy, petrology, and geochemistry, especially in the undergraduate curriculum. The online bibliography and resources through Carleton is a great addition. As in other matters, the "Triple Point" piece by Peter Heaney adds usefully to the discussion.

For what it is worth, I am an "end-user," working in an industry (mining) that needs people well trained in and enthusiastic about mineralogy and petrology. There is an expression in an unrelated field that seems *à propos*: we are never more than one generation from extinction. From this it follows that a prudent person would regard the teaching of the next generation as one of his or her responsibilities. I am of an age at which many of the great teachers with whom I was lucky enough to work have left us, so it is refreshing to see that there are still serious people committed to and involved in great teaching. As Professor Hochella points out and as the articles in the April issue illustrate, great teachers are, like great researchers, the product of intention, effort, and openness to improvements and to new ideas that challenge old beliefs; above all they are committed individuals. I can think of many wonderful people who were both great teachers and great researchers. Surely, that is an honorable, even exemplary, combination to which many of us can aspire.

Keep up the good work, teachers. And keep up the good work of maintaining balance in the range of interesting and important matters you bring us, *Elements*.

Mark J. Logsdon
Geochimica, Inc., California

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are available to, for example, a bioscience department of equivalent standing. At resource-limited institutions, this funding reality affects decisions about faculty appointments. It is not easy to argue against the view that a biologist who has access to, say, $1M/year in research funding is more valuable than a geologist who has access to only a fraction of that. Over a career, the difference in research income is substantial, and this is a powerful fact in the minds of those responsible for fiscal planning.

Most administrators are unaware of the remarkable evolution of the Earth sciences in recent decades. Although driven partly by advances in instrumentation, this change is due mainly to our heightened sensitivity to the interconnectedness of atmosphere, oceans, land, and life and the redesign of departments and curricula that has followed from this new perspective. The shift toward an Earth systems view has led many of us to see the environment as a unifying theme in the Earth sciences. It is natural to blame administrators for their failure to appreciate the significance of this change, but such a reaction isn't likely to improve the standing of geoscience departments. As difficult as it might be, we need to acknowledge that the blame lies partly with us. With some exceptions, the geoscience community has not been aggressive or articulate in conveying the essence and importance of what we do and what we know, and this failure has allowed our image problems to persist in some academic circles. In his address to AGU members in San Francisco last December, Al Gore lauded us for having developed the methods and acquiring the data to understand global climate—but he also reprimanded us for not communicating our knowledge effectively. We need to work on communicating with administrators and thus help them understand the role of geoscience departments in education, research, and society. This is the best way to sustain the vitality of our field in universities worldwide.

We also need to recognize that the nature of our field is difficult for other scientists to appreciate. On the one hand, we are applied scientists, in the sense that we use the tools of chemistry, physics, biology, and mathematics to study the systems of interest to us. On the other hand, our interests cover the spectrum from the very applied (resources, hazards, environmental remediation) to the purest and most fundamental of natural sciences, that is, simply wanting to understand how our planet works at all scales. The applied and the basic scientists among us make good partners within single departments, but this only renders us more enigmatic to those viewing us from other disciplines.

An important goal of the *Elements* editorial team is to make the essence of what we do more transparent to those outside the geosciences and, in so doing, to further the interests of our field. The guest editors and contributing authors are the vehicles through which *Elements* aims to do this, but you, our readers, can help keep us on track by sending us your views!

Bruce Watson[2]
Principal Editor

[2] Bruce Watson was the principal editor in charge of this issue.