THIS ISSUE

Guest editors Richet, Henderson, and Neuville take us from the atmosphere to the deep Earth with the seven papers they have assembled for this issue. In each of the illustrated Earth systems, thermodynamic principles can be applied to get a better understanding of the processes shaping them. Thermodynamics is more needed than ever: as is eloquently demonstrated, it can give insight into real global problems. As for me, I gained a new respect for clouds and raindrops after reading Andreas Bott's paper. I wish you all some interesting discoveries.

Two new features make their debut in this issue. **The Elements Toolkit** (page 277) will present new technological developments of interest to our readers. The plan is to publish it every other issue. You can send your ideas and suggestions for coverage to Michael Wiedenbeck (michawi@gfz-postdam.de), the feature editor.

David Mogk will coordinate our new **Teaching MGP** feature. In it, he or an invited contributor will present resources that are available for teaching the topic of the issue. In his first contribution, David illustrates the wealth of information available to teachers of thermodynamics (page 326).

Readers can contribute to many other features:

Letters to the Editors: Has an editorial spurred some thoughts? Have you a short news item of interest to the membership of *Elements*? Consider submitting a letter to the editor (tremblpi@ete.inrs.ca).

Triple Point raises issues of broad interest. Since volume 1, this feature has explored different aspects of our science (teaching, publishing, historical aspects, etc.), our societies, funding, policy, and political issues. Contact Bruce Yardley (B.W.D. Yardley@leeds.ac.uk) or Marty Goldhaber (mgold@usgs.gov) if you have an idea for a future topic.

People in the News highlights the accomplishments of members of our communities: awards they have received or exciting new projects in which they are engaged.

Travelogue: Have you done field work in or traveled to an exotic location? Consider writing an account of your experiences (send ideas to tremblpi@ete.inrs.ca).

Parting Shots: Ian Parsons has provided many fascinating contributions, but he would welcome other contributors. Beautiful, unusual rock and mineral textures are welcome.

ELEMENTS' IMPACT FACTOR CLIMBS TO 3.569

We are pleased to report that *Elements*' impact factor is continuing the climb it started in 2006. *Elements*, launched in 2005, received its first impact factor from the Institute of Scientific Information for 2006 (1.562). The following year, its impact factor rose to 2.23. And from 3.069 in 2008, it climbed to 3.569 in 2009.

The 10 most cited articles from the time of publication to July 2010 were:

- Harley SL, Kelly NM, Moller A (2007) Zircon behaviour and the thermal histories of mountain chains. Elements 3: 25-30 (*49 citations*)
- Charlet L, Polya DA (2006) Arsenic in shallow, reducing groundwaters in southern Asia: An environmental health disaster. Elements 2: 91-96 (*49*)
- Geisler T, Schaltegger U, Tomaschek (2007) Re-equilibration of zircon in aqueous fluids and melts. Elements 3: 43-50 (*48*)
- Cartigny P (2005) Stable isotopes and the origin of diamond. Elements 1: 79-84 (*38*)
- Morin G, Calas G (2006) Arsenic in soils, mine tailings, and former industrial sites. Elements 2: 97-101 (*29*)
- Self S, Thordarson T, Widdowson M (2005) Gas fluxes from flood basalt eruptions. Elements 1: 283-287 (*28*)
- Vaughan DJ (2006) Arsenic. Elements 2: 71-75 (*27*)
- Ohtani E (2005) Water in the mantle. Elements 1: 25-30 (*26*)
- O'Day PA (2006) Chemistry and mineralogy of arsenic. Elements 2: 77-83 (*24*)
- Rubatto D, Hermann J (2007) Zircon behaviour in deeply subducted rocks. Elements 3: 31-36 (*23*)

The issues that have garnered the most citations are: Zircon (2007, v3n1, *174 citations*); Arsenic (2006, v2n2, *163*); Large Igneous Provinces (2005, v1n5, *105*); Diamonds (2005, v1n2, *90*); The Nuclear Fuel Cycle (2006, v2n6, *84*); and Supervolcanoes (2008, v4n1, *65*).

Pierrette Tremblay
Managing Editor

THE OTHER SIDE OF THE COIN: BASIC RESEARCH IN U.S. UNIVERSITIES

Passionate identification with basic research is often expressed in the U.S. scientific community. Peer-reviewed publications in basic-research disciplines dominate criteria for academic appointment, promotion, and tenure in American academic science departments. The U.S. National Science Foundation, whose policies since its founding in 1950 have largely excluded applied research, received an additional $3 billion through the Obama Admistration's Recovery Act budget in 2009.

Thus, I did a double take when I read in Susan Stipp's parting editorial (*Elements*, June 2010) that "in the last 20 years basic research has become unpopular." The contradiction was clarified when background research revealed that Stipp is head of the University of Copenhagen's NanoGeoScience Centre, whose purpose is to foster applied research and train students whose employment would largely be in private industry. Denmark's strong emphasis on applied research is mirrored in all other leading EU nations except the UK.

My recent comparisons between American and German institutions for chemistry and engineering offered wake-up calls. Distinguished American chemistry departments' websites call attention to cutting-edge research and lists of peer-reviewed publications by faculty. Their German counterparts cite no publications (although they certainly have them). Instead, they emphasize research and curricula that relate to the needs of society and prepare students to take up meaningful and challenging work.

The Technical University of Munich's main divisions resemble those of the Georgia Institute of Technology (highly rated by NSF). But there the similarity stops. Georgia Tech's schools have a strong independent research focus, and half the buildings on campus are devoted to languages, arts, humanities, sports facilities, and other functions. In contrast TUM is focused on research and teaching that directly serves German social needs and industry. Specialized master's programs, including administration and management, as well as doctoral programs, are closely coordinated with internship programs sponsored by German engineering and industrial firms. This system allows graduates to move smoothly into industrial jobs upon graduation.

These and other purposeful features let me understand why the U.S. has only 13% of its university students majoring in science and engineering, while Germany has 30–40%. And those graduates have rewarding and more stable futures ahead of them. In 2007 Germany had a trade surplus of $250 billion, whereas the U.S. had a deficit of nearly $900 billion. Germany's rebound is now bringing it closer to precrash conditions. The U.S. anticipates no foreseeable break in the ongoing retrenchment of its research universities.

Germany's industries are now world leaders in both renewable energy development and conventional manufacturing. Relegating applied research in U.S. universities to second-class status has helped create a stigma on American industry (including the minerals industry). Now there is no longer the "Golden Age of Research" that blossomed in the 1960s and 1970s.

There is much more to this story, the history of which I trace in a chapter of a book published in my new specialty of public policy research* (in my former career I concentrated on marine geochemistry and hydrochemistry). I suggest that if the U.S. scientific community takes voluntary initiatives and broadens its goals, it will be in a better position to aid economic recovery and retain the independence it now enjoys. If, on the other hand, the economy continues to sour, at some point Congress may discover that other nations are making better use of their scientific talent than the U.S., and then changes may be drastic.

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* *The Conflict over Environmental Regulation in the United States: Origins, Outcomes and Comparison with the EU*, Springer 2009, 321 pp