THE RHYTHM OF *ELEMENTS*

As we close the last issue for 2005, we are now into the rhythm of publishing issue after issue. The beat will pick up considerably, however, as we move to publishing six issues a year in 2006. We are pleased with the 2006 lineup and offer you a sneak preview starting on the next page. And we always enjoy hearing from you. Several of our features depend in part on your involvement. Has a colleague been recognized for his or her work?—Consider submitting a short note for People in the News. Have you read an amazing paper?—Drop us a note so we can consider it for the Editors' Pick. Let us know if there is a topic you would like to read about in a future issue of *Elements* or even better, consider submitting a proposal.

EDITORIAL MEETING

Elements editors met in Ann Arbor, Michigan, on October 13. Revisiting the site of our first editorial meeting brought back memories and gave us a measure of the road we have travelled. Our friendship has grown with the numerous e-mail messages we have exchanged. Feelings of pride, a sense of accomplishment, and confidence have replaced the gnawing doubts of the beginning—none of us had created and run a magazine before; could we really do it? We are not resting on our laurels, however, and we discussed several ideas to improve *Elements*.

From left to right, Ian Parsons, Mike Hochella, Bruce Watson, Pierrette Tremblay, and Rod Ewing in Ann Arbor, Michigan, USA

At the meeting, Bruce Watson was formally introduced to the editorial team. We welcomed his input and thoughtful suggestions. Bruce will be the editor in charge of the October and December 2006 issues. We will introduce him to readers in the first issue of 2006.

We also turned our attention to lining up thematic issues for 2007. We decided to book two issues at this point—one on energy and another on geomedicine. Several other proposals are being considered.

A FEW NUMBERS

Some 51 authors (including the six guest editors) contributed to the first year lineup of five issues: 33 were from the US, 7 from the UK, and 11 from 8 other countries (Australia, Canada, France, Germany, Italy, Japan, Mexico, and Switzerland). Of the 31 papers published, 19 were from US authors; 6 from UK authors, and 6 from authors from 8 other countries. Our 2006 lineup promises to be even more international.

RECOGNITION FOR *ELEMENTS*

At the recent meeting of the Association of Earth Science Editors (www.aese.org), in Sheperstown, West Virginia, the Awards Committee announced that Rod Ewing was this year's recipient of the Award for Outstanding Editorial or Publishing Contributions. The purpose of the award, given since 1972, is to recognize truly outstanding contributions and achievements in editing or publishing that stimulate new or greatly improved accomplishments in teaching, research, and applications in the field of Earth science. We are thrilled that Rod's efforts in launching *Elements* are recognized outside our own community.

In addition, the AESE Award for Outstanding Publication (book/magazine) was given to *Elements*. Granted for the first time in 1993, this award is designed to recognize a recent, outstanding Earth science publication, whether it be a book, map, journal, or other individual publication, including those produced electronically. This award recognizes *Elements* for the quality of its editing, design, illustration, writing, production cost per copy, and overall effectiveness in achieving its publication goal.

The managing editor had also been invited to give a talk on *Elements* at the AESE meeting. The Powerpoint presentation has been placed on *Elements*' website.

WHOLE-EARTH *ELEMENTS*

With this final issue in our inaugural year, we take a moment to reflect on the ground we have covered. We have dealt with mighty topics like water in the solar system and the origin of life, and thoroughly practical ones like the industrial applications of diamond and pollution caused by mining. In the present issue we travel effortlessly from the Earth's core, at the edge of which mantle plumes are widely believed to originate, to the Earth's surface and its history of mass extinctions of living things. Our planet is a highly complex, truly interactive system on a vast range of temporal and spatial scales. As the issues of *Elements* accumulate on your bookshelves, we intend that appreciation for Earth's scientific grandeur will spread well beyond the memberships of the societies that brought our magazine into being.

Rod Ewing, Mike Hochella, Ian Parsons, Bruce Watson, and Pierrette Tremblay

Check our website www.elementsmagazine.org

Did you know that a PDF file of every issue of *Elements* is posted on our website, with a one-issue delay (for example, a PDF file of issue 4 will be posted by the time you receive your printed copy of issue 5).

Thematic Topics in 2006

A PREVIEW

During the past year, we have periodically evaluated proposals for thematic issues. We are pleased with the exciting and widely ranging lineup for 2006. If you are interested in proposing a topic, you can download a proposal form from our website and submit it to one of the editors. We are already reviewing proposals for 2007.

February 2006

USER RESEARCH FACILITIES IN THE EARTH SCIENCES

GUEST EDITOR: **Stephen R. Sutton** (University of Chicago)

Earth scientists rely on effective access to user research facilities that provide state-of-the-art analytical instrumentation. This thematic issue will focus on some of these facilities and how to use them. Aspects covered include scientific impact, types of facilities and analytical techniques currently available, procedures for gaining access to perform experiments, factors that enable effective usage, and future prospects, particularly in terms of how Earth scientists can best take advantage of new research facilities currently under design and construction.

An overview of user research facilities in the Earth sciences
Stephen R. Sutton (University of Chicago)

User facilities around the world
Gordon E. Brown Jr. (Stanford University and Stanford Synchrotron Radiation Laboratory), Stephen R. Sutton (University of Chicago), and Georges Calas (Université de Paris 6 et 7)

The Advanced Photon Source at Argonne National Laboratory, a third-generation synchrotron user facility operated by the US Department of Energy. PHOTO ARGONNE NATIONAL LABORATORY

X-ray, neutron and mass spectrometry techniques at user facilities
Stephen R. Sutton (University of Chicago), Marc W. Caffee (Purdue University), and Martin T. Dove (University of Cambridge)

Scientific advances made possible by user facilities
Gordon E. Brown Jr. (Stanford University and Stanford Synchrotron Radiation Laboratory), Georges Calas (Université de Paris 6 et 7), and Russell J. Hemley (Carnegie Institution of Washington)

Accessing facilities and making your research experience successful
Richard J. Reeder (Stony Brook University) and Antonio Lanzirotti (University of Chicago)

New opportunities at Emerging Facilities
John B. Parise (Stony Brook University) and Gordon E. Brown Jr. (Stanford University and Stanford Synchrotron Radiation Laboratory)

April 2006

ARSENIC

GUEST EDITOR: **David J. Vaughan** (University of Manchester)

Arsenic is an element known throughout history as a classic poison. Currently, very small but highly significant concentrations of this element in drinking water supplies are causing massive health problems to many millions of people in some of the world's poorest nations, and more localised sources related to mining and processing are also a concern. This issue of *Elements* will present background information on arsenic chemistry, occurrence in the Earth, production and uses, and its toxic properties.

Arsenic: An introduction
David J. Vaughan (University of Manchester)

The chemistry and mineralogy of arsenic
Peggy O'Day (University of California, Merced)

Microbial transformations of arsenic in the environment
Ron Oremland (USGS, Menlo Park) and Jon R. Lloyd (University of Manchester)

Crystals of orpiment, an arsenic sulfide

Arsenic in drinking waters: Case studies
Laurent Charlet (Université de Grenoble) and David A. Polya (University of Manchester)

Arsenic in soils, mine tailings and former industrial sites
Georges Calas and Guillaume Morin (Université Paris 6 et 7)

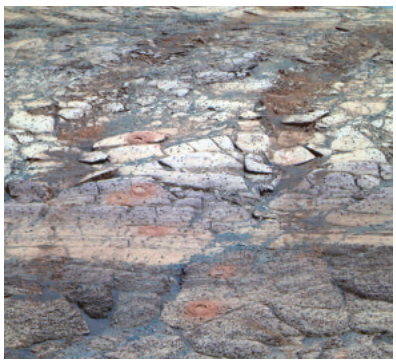
Arsenic and human health: Toxicology, epidemiology, and regulation
Claudia Hopenhayn (University of Kentucky)

June 2006

WATER ON MARS

GUEST EDITOR: **Harry Y. McSween** (University of Tennessee)

During the past several decades, spacecraft data have transformed the planets from astronomical objects into geologic worlds. Mars is the current focus of planetary exploration, and NASA's objectives for this effort are based on the theme, "follow the water." This issue will address new discoveries from spacecraft and from Martian meteorites about where water or ice was (or is) located and about the role of water in determining the mineralogy, petrology, and geochemistry of the Martian surface.



Panoramic Camera image from the Mars Exploration Rover Opportunity showing the interior wall of Endurance Crater. These layered rocks are rich in salts formed by evaporation of brines. The image shows the tracks of the rover as it descended into the crater, as well as a number of holes exposing fresh rock produced by the Rock Abrasion Tool. PHOTO JET PROPULSION LABORATORY, PASADENA, CA

Geomorphological evidence for water on Mars
Victor R. Baker (University of Arizona)

The orbital search for aqueous alteration on Mars
Michael B. Wyatt (Arizona State University) and Harry Y. McSween (University of Tennessee)

Water in the poles and permafrost regions of Mars
Philip R. Christensen (Arizona State University)

Aqueous processes recorded by Martian meteorites: Analyzing Martian water on Earth
Laurie A. Leshin (NASA Goddard Space Flight Center) and Edward Vicenzi (Smithsonian Institution)

Evidence for water at Meridiani
Bradley L. Jolliff (Washington University) and Scott M. McLennan (Stony Brook University)

Water on Mars and the prospect of Martian life
Andrew H. Knoll (Harvard University) and John Grotzinger (Caltech)

August 2006

EARLY EARTH

GUEST EDITOR: **John W. Valley** (University of Wisconsin–Madison)

The earliest Earth was a strange inhospitable world, yet transitions occurred culminating in the evolution of life within the first billion years. The preservation of a sparse and ambiguous rock record has encouraged debate. Recent studies have greatly refined the nature and timing of key events. This volume will review current knowledge of the age of the Earth, massive meteorite impacts, the atmosphere and hydrosphere, the rock record, and the emergence of life.

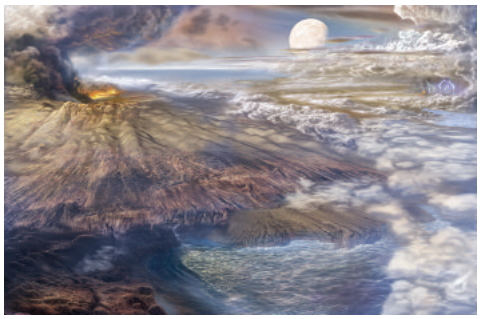
The age of Earth and early accretion events
Alex Halliday (Oxford University)

Meteorite impacts on Earth
Christian Koberl (University of Austria)

Early atmosphere and hydrosphere
Kevin Zahnle (NASA–Ames)

Seeking the birth of the oceans, life, and continents from the oldest rocks and minerals
Alan Nutman (Australian National University)

When did life emerge?
Bill Schopf (UCLA)



Recent research has suggested that the surface of Earth cooled more rapidly than many had imagined. Surface temperatures within the stability of liquid water are necessary for life. PHOTO REPRINTED WITH PERMISSION OF THE ARTIST, DON DIXON

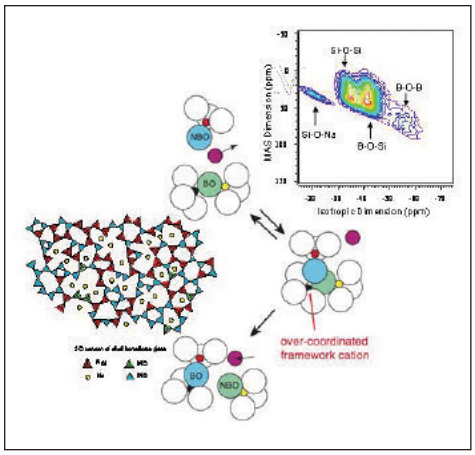
October 2006

GLASSES AND MELTS: LINKING GEOCHEMISTRY AND MATERIALS SCIENCE

GUEST EDITORS: **Grant S. Henderson** (University of Toronto), **Georges Calas** (IMPMC and Université Paris 6 et 7), **Jonathan F. Stebbins** (Stanford University)

Geological interest in studying melts stems from early recognition that melts play a fundamental role in determining the physical and chemical behaviour of magmas and magmatic processes. However, due to the inherent difficulties associated with working at high temperatures, much of the geological research over the last 30 years has used quenched melts or glasses as proxies for melts themselves. The assumption that the structure of the glass resembles that of the melt has been found to be good, at least at the temperature where the melt transforms to a glass. We will review how glass research has contributed to our understanding of melt structure and the behaviour of magmas. Emphasis is placed on elucidating the links between our knowledge of the atomic structure of melts and the macroscopic behaviour of magmas such as rheology, diffusion, trace element partitioning and redox behaviour.

The structure of glasses and melts
Grant S. Henderson (University of Toronto), Georges Calas (IMPMC and Université Paris 6 et 7), Jonathan F. Stebbins (Stanford University).



Two-dimensional diagram (left) of a glass (borosilicate) network. The coordination and oxygen connections between "network forming" cations such as Si^{4+} and B^{3+} (triangles), as well as the proportions of different types of O's are critical in thermodynamic and transport models of melts (centre). Oxygen sites can be identified and quantified by spectroscopic techniques such as triple-quantum, magic-angle spinning, O_{17} NMR (right). DIAGRAMS BY JONATHAN STEBBINS, COMPILED BY GRANT HENDERSON

Geochemical aspects of melts: Volatile and redox behaviour
Harald Behren (University of Hannover)

Transport properties of magmas: Diffusion and rheology
Donald B. Dingwell (University of Munich)

The dynamics of magmatic systems
Bruce D. Marsh (Johns Hopkins University)

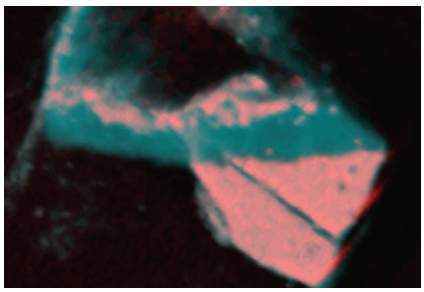
Geological glasses as Earth and industrial materials
Laurence Galoisy (Institut de minéralogie et de physique des milieux condensés and Université Paris 6 et 7)

December 2006

ENVIRONMENTAL IMPACT OF THE NUCLEAR FUEL CYCLE

GUEST EDITOR: **Rodney C. Ewing** (University of Michigan)

Increasing concerns for the effects of global warming that result from rising greenhouse gas concentrations in the atmosphere have led to a reexamination, even enthusiasm, for nuclear power. Of all the current alternatives to fossil fuels, nuclear fission is the most important source of energy, accounting for 17 percent of the world's electricity. In the United States, and indeed worldwide, Generation IV reactors and an Advanced Fuel Cycle Initiative are actively promoted, but major issues of nuclear waste management and disposal remain unanswered. This issue will focus on the impact of the nuclear fuel cycle on the environment, particularly in terms of the materials that may be part of the waste streams.



Composite X-ray fluorescence map of the spent nuclear fuel with alteration rind, with uranium mapped in blue, and plutonium (times ~100) in red. The uranium and plutonium images were obtained simultaneously by using diffractive optics to resolve the actinide L-3 absorption edges at the MR-CAT beam line at Sector 10 of the Advanced Photon Source synchrotron at Argonne National Lab. Note the overlap of plutonium with uranium in the fuel fragment and grains, with the absence of significant plutonium in the silicate layer. PHOTO © ARGONNE NATIONAL LABORATORY. REPRINTED WITH PERMISSION

The nuclear fuel cycle
Rodney C. Ewing (University of Michigan)

Spent nuclear fuel
Jordi Bruno (Enviros, Barcelona)

Nuclear waste glass
Bernd Grambow (Subatech Laboratory, Nantes)

Ceramic waste forms for actinides
Gregory Lumpkin (University of Cambridge)

Uranium mine and mill tailings
Abdesselam Abdelouas (Subatech Laboratory, Nantes)