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• Experimental constraints on the formation of silicic magmas
  Bruno Scaillet (University of Orleans), Francois Holtz (University of Hannover, and Michel Pichavant (University of Orleans)

• Plutonic and volcanic rocks
  The enigmatic relationship between silicic plutonic and volcanic rocks

GUEST EDITORS: Craig C. Lundstrom (University of Illinois, USA) and Allen F. Glazner (University of North Carolina, USA)

The relationship between silicic volcanic and plutonic rocks has long puzzled geologists. Although the compositional evolution for volcanic and plutonic rock suites are virtually identical, there is much debate whether rhyolites form as melt extracted from granite plutons or whether the two rock types reflect wholly separate origins. This issue discusses the broad set of observations from petrology, geochronology, thermal modeling, geophysical techniques, and geochemistry that lead to contradictory interpretations and no simple description for the relationship. Discerning how silicic volcanic and plutonic rocks are connected will affect important Earth science questions such as “how is continental crust formed?” and “can we predict supereruptions?”

Volume 12, Number 2 (April)

EARTH SCIENCES FOR CULTURAL HERITAGE

GUEST EDITORS: Gilberto Artioli (University of Padova, Italy) and Simona Quartieri (University of Messina, Italy)

Archaeometry and conservation science are connected to the geosciences in three ways. Earth scientists can perceive the complexity of natural materials and of the artifacts produced by human activities, they understand the geological and physico-chemical processes acting on them, and they have a mastery of the techniques used to investigate heritage materials at different scales. Many techniques can be applied non-invasively, preserving the integrity of art/archaeological objects that are often characterized by uniqueness, fragility, high complexity, and heterogeneity. The goal is to understand the fine interplay between human activities, georesources, and natural processes: in short, the history of mankind and human societies on Earth. This issue uses selected examples to demonstrate how the geosciences offer a way to better understand, interpret, and preserve our past.

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Volume 12, Number 3 (June)

COSMIC DUST

GUEST EDITORS: Susan Taylor (Cold Regions Research and Engineering Laboratory, USA), Donald E. Brownlee (University of Washington, USA), and George Flynn (SUNY–Plattsburg, USA)

Cosmic dust is submillimeter debris shed by comets, asteroids, moons, and planets. In the Solar System, this dust scatters sunlight (the zodiacal light), and it is detected around other stars by its infrared emission. Cosmic dust enters Earth’s atmosphere at high speeds and at a rate of 100 tons a day. These small particles are the largest source of extraterrestrial material accreting on the present-day Earth and include interplanetary dust particles and micrometeorites. Although atmospheric entry heating and terrestrial weathering have modified many, some particles are pristine primitive extraterrestrial materials that contain high abundances of isotopically anomalous presolar grains and primitive carbon compounds that have not been altered since their formation. Cosmic dust analysis provides invaluable information on initial planetary building materials.

• Cosmic dust: building blocks of planets – falling in our backyard
  Donald Brownlee (University of Washington)

• Dust in the cosmos
  Diane Wooden (NASA Ames Research Center), John Bradley (University of Hawaii), and Hope Ishii (University of Hawaii)

• Collecting cosmic dust: finding a needle in a haystack
  Susan Taylor (Cold Regions Research and Engineering Laboratory), Luigi Folco (University of Pisa), and Scott Messenger (NASA Johnson Space Center)

• Cosmic dust: sources, compositions and implications for the early solar system
  George Flynn (SUNY-Plattsburg), Cecil Engrand (CNRS/Université Paris), and Larry R. Nittler (Carnegie Institution)

• Carbon, nitrogen and water in cosmic dust: astrobiological implications
  Scott Sandford (NASA Ames Research Center), Cecil Engrand (CNRS/Université Paris), and Alessandra Rotundi (Parthenope University of Naples)

• Geochemical tracers of extraterrestrial matter in sediments
  Bernhard Peucker-Ehrenbrink (Woods Hole Oceanographic Institution), Gregory Ravizza (University of Hawaii), Gisela Winckler (Lamont-Doherty Earth Observatory)

Volume 12, Number 1 (February)

ELEMENTS

DECEMBER 2015

PREVIEW

THEMATIC TOPICS IN 2016
The construction of geological disposal facilities for radioactive waste has been a long time in the discussion and planning, but will become a major focus of geological, mineralogical, and geochemical effort in coming years. Underground laboratories have been operating for many years in a variety of rock types. A number of national projects that will dispose of heat-producing waste are nearing the licensing stage: sites have been selected, and planning is moving forward in many countries. Geological disposal raises complex technical issues, but it is also at the centre of social and political controversy.

Different countries have very different waste inventories and quantities of waste; they may also have different geological settings available to host a repository. The issue of Elements will present case studies of the concepts for repositories hosted in the range of possible host rocks that have been considered worldwide. The varied approaches to selecting a site that is acceptable to local communities will be reviewed.

- **Introduction to radioactive waste and geological disposal**
  Rod Ewing (Stanford University), Bruce Yardley (RWM), Rob Whittleston (Hitachi Europe)

- **Geological disposal in clay**
  Bernd Grambow (SUBATECH, Université de Nantes, France)

- **A Repository for spent nuclear fuel in crystalline rock**
  Allan Hedlin, Olle Olsson (SKB, Sweden)

- **Geologic repository in salt**
  Thilo v Berlepsch, Bernt Haverkamp (DBE Technology, Germany)

- **Geological disposal in tuff: Yucca Mountain**
  Peter N. Swift, Evaristo J. Bonano (Sandia National Laboratories)

- **Selecting a site for a radioactive waste repository**
  Daniel S. Metlay (US Nuclear Waste Technical Review Board)