and mission ended in 2015 and significantly advanced our understanding of the deep structure of the planet as well as our comprehension of Mercury's volcanic history and crust formation. The European Space Agency (ESA) is now ready for the launch of the BepiColombo mission that will take place at the end of 2018. The “Planet Mercury” issue will summarize the latest developments in light of MESSENGER data and perspectives for the BepiColombo mission on internal structures and surface processes, based on insights from geophysics, geochemistry, igneous and experimental petrology and volcanology.

- Origin and Differentiation of Planet Mercury Bernard Charlier (University of Liège, Belgium) and Olivier Namur (KU Leuven, Belgium)
- Exploration of Mercury: From MESSENGER to BepiColombo Sean Solomon (Columbia University, USA) and Johannes Benkhoff (ESA/ESTEC, The Netherlands)
- Mercury: Inside the Iron Planet Steven A. Hauck II (Case Western Reserve University, USA) and Catherine Johnson (University of British Columbia, Canada)
- Volcanism on Mercury Rebecca J. Thomas (University of Colorado, USA) and David A. Rothey (The Open University, UK)
- The Surface Composition of Mercury Larry R. Nittler (Carnegie Institution of Washington, USA) and Shoshana Z. Weider (Carnegie Institution of Washington, USA)
- Mercury: Differentiation under Reducing Conditions Camille Cartier (Université de Lorraine, France) and Bernard J. Wood (University of Oxford, UK)

REACTIVE TRANSPORT MODELING

Guest Editors: Kate Maher (Stanford University, USA) and K. Ulrich Mayer (University of British Columbia, Canada)

Reactive transport modeling, or computer simulations of the transfer of mass and energy through the subsurface, has become a central tool for understanding how Earth’s unique chemical environments are formed, how they function today, and how they might behave in the future. This process-based approach has enabled us to gain a new understanding of a diverse array of Earth processes, from biogeochemical cycles in marine sediments and the factors that control soil formation, to the evolution of contaminated groundwater systems and the engineered containment of nuclear waste. The diverse contributions in this issue will highlight the unique role that reactive transport models have played in advancing our understanding of Earth’s shallow crustal environments and our human interactions with them.

- Tracking Diverse Minerals, Hungry Organisms and Dangerous Contaminants Using Reactive Transport Models Kate Maher (Stanford University, USA) and K. Ulrich Mayer (University of British Columbia, Canada)
- Reactive Transport Modeling of Microbial Dynamics in Soils and Sediments Christof Meile (University of Georgia, USA) and Timothy Scheibe (Pacific Northwest National Laboratory, USA)
- Reactive Transport of Stable Isotopes Jennifer L. Druhan (University of Illinois, Urbana Champaign, USA) and Matthew J. Winnick (University of Massachusetts, Amherst, USA)
- Modeling Continental Weathering Processes Across Spatial and Temporal Scales Yves Goddéris and Jacques Schott (CNRS, France), Susan Brantley (Pennsylvania State University, USA)
- Using Reactive Transport Models for Understanding, Quantifying and Predicting Groundwater Quality Changes Henning Prommer (University of Western Australia; CSIRO; National Centre for Groundwater Research and Training, Australia) Jing Sun (University of Western Australia and CSIRO, Australia) and Benjamin D. Kocar (Massachusetts Institute of Technology, USA)
- Modeling the Fate of Carbon Dioxide in the Subsurface Anna Harrison (University College London, UK), Benjamin M. Tutolo (University of Calgary, Canada), Donald J. DePaolo (University of California, Berkeley; the Lawrence Berkeley National Laboratory, USA)
- Reactive Transport Models for Long-Term Safety Assessment of Nuclear Waste Disposal Laurent De Windt (MINES ParisTech, France) and Nicolas Spycher (Lawrence Berkeley National Laboratory, USA)
WEATHERING

**Guest Editors:** Patrick J. Frings (GFZ German Research Centre for Geosciences, Germany) and Heather Buss (University of Bristol, UK)

This issue will highlight the integral role of weathering processes across a range of geoscience fields. Chemical weathering – the loss of mass by mineral dissolution and export – is key to understanding how Earth’s skin functions. Weathering is the starting point for the biogeochemical cycles of most elements.

It determines river and groundwater chemistry and provides nutrients to ecosystems. Weathering alters rock structure and susceptibility to erosion; soil and landscape evolution cannot be understood without considering the role of chemical weathering. Weathering of silicate rocks is a long-term sink for atmospheric CO₂, and has been crucial in maintaining our planet’s habitability over billions of years...

- **The Central Role of Weathering in the Geosciences** Heather Buss (University of Bristol, UK) and Patrick Frings (GFZ German Research Centre for Geosciences, Germany)
- **The Goldilocks Planet? How Silicate Weathering Maintains Earth ‘Just Right’** James Kasting (Pennsylvania State University, USA)
- **How Plants Enhance Weathering and How Weathering is Important to Plants** Stephen Porder (Brown University, USA)
- **Sculpting Earth’s Surface: The Interaction of Mechanical and Chemical Weathering** Suzanne Anderson (University of Colorado, Boulder, USA)
- **Enhanced Weathering and Carbon Sequestration Potential** M. Grace Andrews (Southampton University, UK) and Lyla L. Taylor (University of Sheffield, UK)
- **Paleoweathering: Inferring Climate–Weathering Coupling from the Sedimentary Record** Patrick Frings (GFZ German Research Centre for Geosciences, Germany)

KIMBERLITES: FROM DEEP EARTH TO DIAMOND MINES

**Guest Editors:** Andrea Giuliani (University of Melbourne, Macquarie University, Australia) and D. Graham Pearson (University of Alberta, Canada)

Kimberlites are the most deeply derived of all volcanic rocks, as well as the host rock for most of the world’s diamond mines. Kimberlites, therefore, provide unique snap-shots of magma genesis and mantle evolution in the deep Earth well into the diamond stability field (~150 km and, potentially, >700 km). Despite over 100 years of study, the origin of this complex rock-type remains the subject of intense debate. This thematic issue will summarize current knowledge and controversies on kimberlite formation, including key aspects of the petrology, geochemistry and volcanology of these unique rocks. It will show how kimberlites can be successfully dated, and explore links between the temporal and spatial distribution of kimberlites and known geological events. Diamond exploration and resource evaluation methods will be reviewed to demonstrate the inextricable link between an accurate understanding of the characteristics of kimberlites, their entrained mantle cargo, and diamonds.

- **Kimberlites: From Deep Earth to Diamond Mines. An Introduction** Andrea Giuliani (University of Melbourne, Macquarie University, Australia) and D. Graham Pearson (University of Alberta, Canada)
- **What is Kimberlite? Petrology and Mineralogy** Roger H. Mitchell (Lakehead University, Canada), Andrea Giuliani (University of Melbourne, Macquarie University, Australia) and Hugh O’Brien (Geological Survey of Finland)
- **Source Regions of Kimberlites: A Geochemical Perspective** D. Graham Pearson (University of Alberta, Canada), Jon D. Woodhead (University of Melbourne, Australia) and Phillip E. Janney (University of Cape Town, South Africa)
- **Kimberlites Through Time** Larry M. Heaman (University of Alberta, Canada), David Phillips (University of Melbourne, Australia) and Graham D. Pearson (University of Alberta, Canada)
- **Kimberlites as Volcanic Rocks: Transport, Ascent and Emplacement** J. Kelly Russell (University of British Columbia, Canada), R. Stephen J. Sparks (University of Bristol, UK) and Janine Kavanagh (University of Liverpool, UK)
- **Kimberlites: From Source to Surface. Insights from Experiments** Stephen F. Foley (Macquarie University, Australia), Bruce A. Kjarsgaard (Geological Survey of Canada) and Gregory M. Yaxley (Australian National University)
- **Diamond Exploration and Resource Evaluation of Kimberlites** Bruce A. Kjarsgaard (Geological Survey of Canada), Nicole Januszczak (De Beers Exploration Canada Inc.) and Johann Stiefenhofer (Anglo-American Operations Ltd., South Africa)