Meet the Authors

Gray E. Bebout is a professor in the Department of Earth and Environmental Sciences at Lehigh University, USA. He received his PhD in 1989 from the University of California, Los Angeles. His primary research involves the use of nitrogen isotopes as tracers of biogeochemical cycling, and the use of field relations and geochemistry of high- and ultrahigh-pressure metamorphic rocks to understand subduction zone chemical cycling. His other recent stable isotope work has been aimed at tracing fluid flow in foreland fold-and-thrust belts and reconstructing the Holocene paleoclimate through analysis of tree rings and lake sediments.

Vincent Busigny is an associate professor of geochemistry at Université Paris Diderot and the Institut de Physique du Globe de Paris. His research emphasizes the use of stable isotopes (N, Fe, C, H, O, S) as tracers of mineral–fluid–life interactions. Applications range from the behavior of fluid-mobile elements during alteration and subduction of oceanic lithosphere to the reconstruction of Precambrian environments and ecosystems. After completing his PhD in 2004 in Paris under the supervision of Marc Javoy, Pascal Philippot, and Pierre Cartigny, he worked with Nicolas Dauphas at the University of Chicago before returning to France.

Pierre Cartigny joined the Institut de Physique du Globe de Paris in 2000 as a CNRS research scientist. He completed his PhD in geochemistry from Université Paris Diderot in 1997, after which he moved to the University of Göttingen (Germany) as a postdoctoral fellow. Using stable isotope geochemistry, he explores the internal cycle of volatile elements (nitrogen, carbon, sulfur, water) and aims at identifying processes leading to volatile-element heterogeneities in the mantle. His recent interests include the application of multiple isotope compositions of sulfur and oxygen to mantle and Earth-surface problems.

Karen L. Casciotti is an assistant professor in the Department of Environmental Earth System Science at Stanford University. She received a BS in environmental engineering science at Caltech, an MS in oceanography from the Scripps Institution of Oceanography, and a PhD in geosciences from Princeton University. Her current research focuses on marine nitrogen cycle biogeochemistry, with an emphasis on using nitrogen and oxygen stable isotopes to understand how nitrogen is cycled in the ocean. She has participated in 10 research cruises in the Pacific, Indian, and Southern oceans.

Emily M. Elliott is an assistant professor in the Department of Geology and Planetary Science at the University of Pittsburgh. Her research program examines the tight coupling between human activities and reactive nitrogen distributions in atmospheric, terrestrial, and aquatic systems using stable isotope geochemistry. She is the director of the Regional Stable Isotope Laboratory for Earth and Environmental Science Research. Prior to joining the Pitt faculty, she received her PhD at Johns Hopkins University (geography and environmental engineering) and was a postdoctoral research associate at the U.S. Geological Survey.

Marilyn L. Fogel is a biogeochemist who uses stable isotopes to trace geochemical processes. She obtained her PhD from the University of Texas Marine Science Institute. She worked at the Geophysical Laboratory until January 2013, when she became a professor at the University of California, Merced. Fogel has worked on ecosystems in modern and ancient environments using stable isotopes in organic and inorganic materials, including meteorites. She was a member of the Space Studies Board and participates in NASA's Astrobiology Institute. She served as program director in geobiology at NSF, is the 2013 recipient of the Alfred Treibs Medal in Organic Geochemistry, and is a fellow of the Geochemical Society.

Meredith G. Hastings is an assistant professor at Brown University. Her research interests span biogeochemistry, atmospheric chemistry, and climate. Her recent studies have emphasized using the isotopic composition of nitrate to investigate variations in the sources, chemistry, and transport of nitrogen oxides, both in the modern environment and through time using ice cores. Prior to joining the faculty at Brown in 2008, Meredith was a postdoctoral fellow at the Joint Institute for Study of the Atmosphere and Ocean (JISAO) at the University of Washington. She completed her PhD at Princeton University, working with researchers in the Department of Geosciences and at the National Oceanic and Atmospheric Administration's Geophysical Fluid Dynamics Laboratory.

Bernard Marty is professor of geochemistry at the École Nationale Supérieure de Géologie (Nancy, France) and at the Institut Universitaire de France, and is a staff scientist at the Centre de Recherches Pétrographiques et Géochimiques (CRPG-CNRS), where he had previously been the director (2002–2008). Marty holds a PhD in physics (Toulouse, 1979), and a Doctorat d'État in geochemistry (Université Pierre et Marie Curie, Paris, 1987). His research interests encompass the isotope geochemistry of volatile elements, including stable isotopes and noble gases, with application to the origin of isotopic anomalies in the Solar System, early-Earth geodynamics and environments, mantle geodynamics, and the geological carbon cycle.

Dominic Papineau obtained his BSc in physics and biochemistry from McGill University in his home town of Montréal, Québec, Canada. He received his PhD in geological sciences and astrobiology from the University of Colorado at Boulder. As a postdoc, he was trained in and helped develop a correlated microanalytical approach at the Carnegie Institution of Washington. His interests include Precambrian biogeochemical evolution, biosignatures and microanalyses to search for life on other planets, world politics and social justice; he enjoys sailing and exploring geobiology in far away places. He is currently a lecturer in the London Centre for Nanotechnology and the Department of Earth Sciences at the University College London.

Andrew Steele, an astrobiologist who combines his expertise in microbiology with nanoscale chemical imaging, obtained his PhD from the University of Portsmouth. He is a senior scientist at the Geophysical Laboratory and is actively engaged in NASA's Mars Science Laboratory mission as a co-investigator on the Sample Analysis at Mars (SAM) instrument. He is an active member of the Mars Exploration Program Analysis Group and a member of the NASA Advisory Committee on Planetary Protection. He has published on the characterization and chemistry of organic carbon and nitrogen compounds in Martian meteorites.

Christophe Thomazo is an associate professor of geochemistry in the Department of Biogeosciences of the Université de Bourgogne, Dijon, France. He received a PhD from the Institut de Physique du Globe de Paris, France, and carried out postdoctoral research at the Westfälische Wilhelms-Universität, Münster, Germany. His research focuses on using the stable isotope geochemistry of elements related to metabolic processes (C, N, S, and Fe) and the mass-independent fractionation of sulfur isotopes to explore the evolution of biogeochemical cycles during ocean oxygenation changes, including the Precambrian Great Oxidation Event and the Cretaceous oceanic anoxic events.

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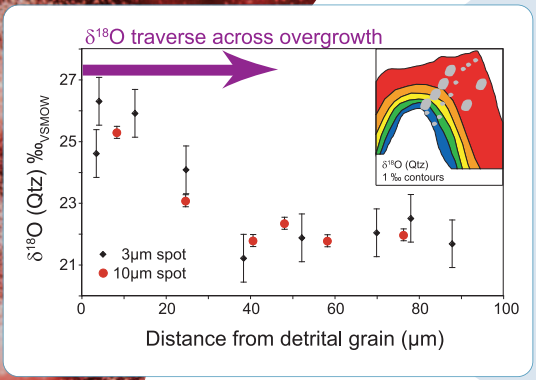

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In-situ oxygen isotope analyses in quartz (3µm and 10µm spots). Data obtained on a CAMECA IMS 1280. Courtesy of A.D. Pollington et al., Geology (2011).

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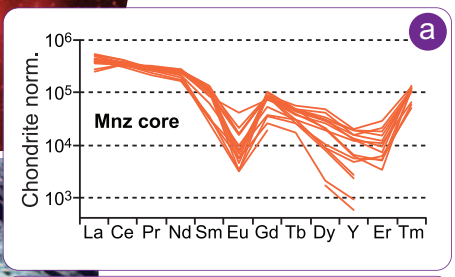

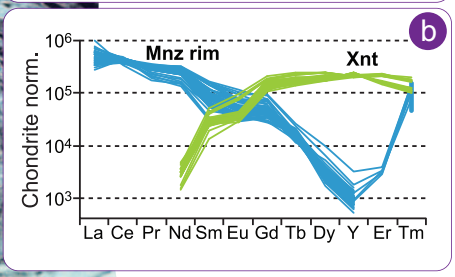

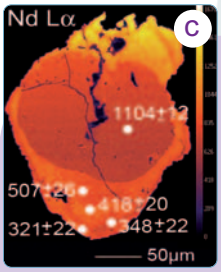

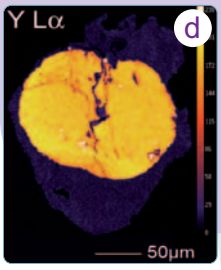

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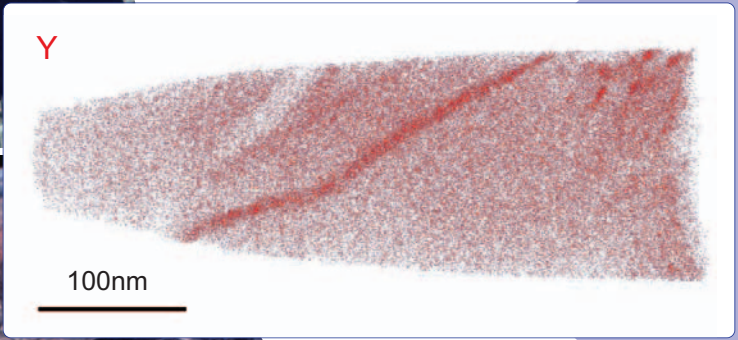
a&b: *Chondrite-normalized REE profiles as determined by EPMA. Monazite cores contrast with monazite rims and associated xenotime.*
c&d: *WDS maps of Nd and Y distributions. Points marked on the Nd map show EPMA age determinations in Ma, 2σ Data acquired on the SX Ultrachron model, courtesy of Dr. Julien Allaz, Univ. of Colorado and Dr. Michael Jercinovic, Univ. of Massachusetts.*

EPMA



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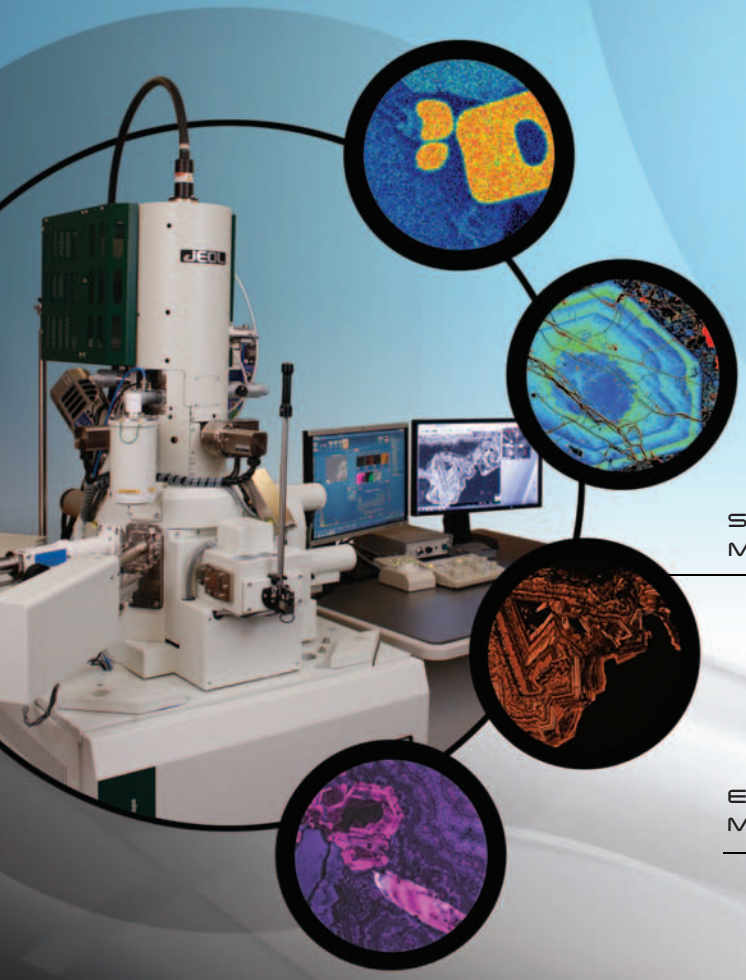

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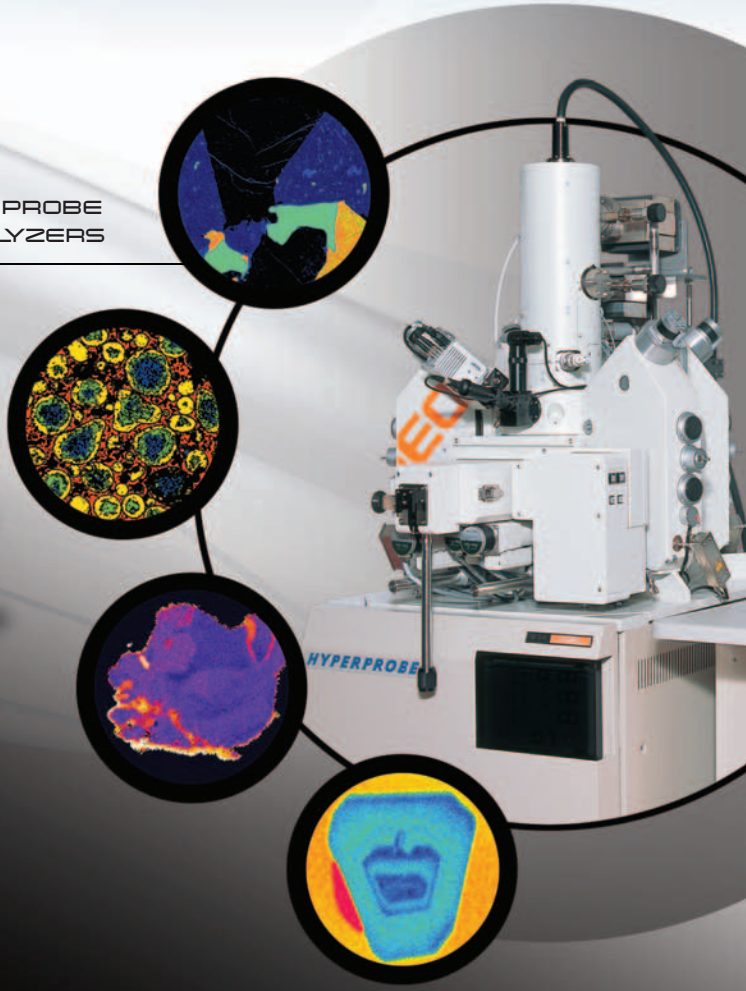

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