Grand Research Questions in the Solid-Earth Sciences

Committee

Donald J. DePaolo

Chair

Donald J. DePaolo, Chair, is a professor of geochemistry at the University of California, Berkeley, director of the Center for Isotope Geochemistry, and head of the Geochemistry Department at the Lawrence Berkeley National Laboratory Earth Sciences Division. He received his Ph.D. in geology from the California Institute of Technology. Dr. DePaolo's research interests are in the application of radiogenic isotope geochemistry and principles of physics and chemistry to problems in geology, geophysics and environmental science. He has served on several advisory committees concerned with the geosciences, including the NRC Board on Earth Sciences and Resources and its Geodynamics Committee, and has chaired numerous professional society, advisory, and university visiting committees. Dr. DePaolo is the recipient of many awards for his contributions to the geochemical and geophysical sciences, including the American Geophysical Union MacElwane Award, the Geochemical Society F.W. Clark Medal, the Geological Society of America Arthur L. Day Medal, and the European Association of Geochemistry Harold Urey Medal. He is a member of the National Academy of Sciences.

Thure E. Cerling

Member

Thure E. Cerling is Distinguished Professor of Geology and Geophysics and Distinguished Professor of Biology at the University of Utah. He received his Ph.D. in geology from the University of California, Berkeley. His research concerns near-surface processes and the geological record of ecological change. Of particular interest are isotope physiology and paleodiets of mammals, soils as indicators of climatological and ecological change over geologic time scales, and landscape evolution over the last several million years. Dr. Cerling has served on several NRC solid-earth committees, including the Board on Earth Sciences and Resources, the Geodynamics Committee, and the U.S. National Committee for the International Union for Quaternary Research. He is member of the U.S. Nuclear Waste Technical Review Board. He is a fellow of the American Association for the Advancement of Science and of the Geological Society of America, and a member of the National Academy of Sciences.

Sidney R. Hemming

Member

Sidney R. Hemming is an associate professor in the Department of Earth and Environmental Sciences at Columbia University. Dr. Hemming earned her Ph.D. in geology from the State University of New York, Stony Brook. Her research focuses on paleoceanography, paleoclimate, tracer studies, and geochemistry of sedimentary rocks. Several of her current projects deal with reconstructing ocean circulation patterns at different times, including periods of abrupt climate change. Other projects aim to understand the role of ice sheets in regional and global climate change, including studies of the North Atlantic and circum-Antarctic Oceans and Mono Lake. Dr. Hemming is deputy director (the education liaison) of the Cooperative Institute for Climate Applications and Research, a research partnership on climate variability and change sponsored by NOAA and Columbia. She is a member of the American Geophysical Union and the Geochemical Society, and is on the editorial board of the journal “Chemical Geology.”

Andrew H. Knoll

Member

Andrew H. Knoll is Fisher Professor of Natural History and Curator of the Paleobotanical Collections, Botanical Museum, at Harvard University. His geology Ph.D. was also from Harvard University. His research interests are in Precambrian biologic and geologic evolution, early animal diversification, vascular plant evolution, and the relationship between evolution and environmental change in Earth history. He also has an interest in astrobiology, and was a member of the rover science team in NASA's 2003 mission to Mars. Dr. Knoll has received several awards for his scientific achievements, including the Paleontological Society Medal and Charles Schuchert Award, and the Society for Sedimentary Geology Raymond C. Moore Medal. He has served on Earth and space science advisory groups, including the NRC Space Studies Board and the Board on Earth Sciences and Resources. He is a member of the National Academy of Sciences.

Frank M. Richter

Member

Frank M. Richter is Sewell Avery Distinguished Service Professor in the Department of Geophysical Sciences at the University of Chicago. He received his Ph.D. from the University of Chicago. Dr. Richter's research spans both geophysics and geochemistry, and includes investigations of mantle convection, thermal evolution of the Earth, isotopic dating, pore-water chemistry in sediments, and melt segregation and chemical diffusion in molten rock systems. Both lines of research have led to professional society awards, including the American Geophysical Union's Bowen Award and the Geological Society of America's Wollard Award. Dr. Richter has served on numerous solid-earth science committees, including the Board on Earth Sciences and Resources, Geodynamics Committee (chair), Committee on Seismology, and Committee on Basic Research Opportunities in the Earth Sciences. He is a member of the National Academy of Sciences.

Leigh H. Royden

Member

Leigh H. Royden is Professor of Geology and Geophysics and chair of the Program in Geology and Geochemistry at the Massachusetts Institute of Technology. She received her Ph.D. from the same institution. Dr. Royden's research interests include regional geology and geophysics, and the mechanics of large-scale continental deformation. She was the recipient of the Geological Society of America Donath Medal and a Presidential Young Investigator Award. She has served on the Council of the Geological Society of America and is former member of the NRC Geodynamics Committee and Committee on Basic Research Opportunities in the Earth Sciences. She is a fellow of both the Geological Society of America and the American Geophysical Union.

Roberta L. Rudnick

Member

Roberta L. Rudnick is a professor in the Department of Geology at the University of Maryland. Prior to joining the faculty in 2000, she spent six years as a professor at Harvard University, and several years as a research scientist at the Max-Planck Inst. für Chemie in Mainz, Germany. Dr. Rudnick received her Ph.D. from the Research School of Earth Sciences at Australian National University. Her research focuses on the origin and evolution of the continents, particularly the lower continental crust and the underlying mantle lithosphere. In addition to her research, she is a councilor for the Mineralogical Society of America and an Editor-in-Chief of Chemical Geology. She is a fellow of the American Geophysical Union, the Geological Society of America, the Mineralogical Society of America, and has been a distinguished lecturer for the latter society.

Lars Stixrude

Member

Lars Stixrude is a professor of geophysics and mineral physics at the University of Michigan. He received his Ph.D. in geophysics at the University of California, Berkeley. Dr. Stixrude investigates the physics of the Earth at an atomic level. Predictions of material physics at conditions of the Earth's interior, based on theoretical and laboratory investigations, provide insight into magma generation and transport, the seismic structure of the mantle and core, and the state of water in the deep interior. He is a member of the steering committee for the Cooperative Institute for Deep Earth Research, which is developing an intellectual framework to improve communication among scientists in different disciplines studying the dynamics of the Earth's interior. He is a recipient of the American Geophysical Union James B. Macelwane Medal, and a fellow of both the Mineralogical Society of America and the American Geophysical Union.

James S. Trefil

Member

James S. Trefil is Clarence J. Robinson Professor of Physics at George Mason University. He earned his Ph.D. in theoretical physics from Stanford University. In addition to his research on particle physics, field theory, astrophysics, and cosmology, he has strong interests in teaching science to nonscientists. His course and textbook series on achieving scientific literacy is used in approximately 200 colleges and universities, and he has written numerous articles and books for general audiences. His “Ask Mr. Science” column ran in USA Today from 1996 to 1999. He has also served as a science commentator and member of the Science Advisory Board for National Public Radio. Dr. Trefil is a fellow of the American Physical Society (APS), the American Association for the Advancement of Science, and the World Economic Forum. He is a recipient of American Institute of Physics Andrew Gemant Award for sustained contributions in bridging the gap between science and society.