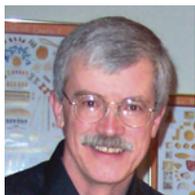


Meet the Authors



Etienne Balan is an IRD research associate at the Institut de Minéralogie, Physique des Matériaux et Cosmochimie (IMPMC, Université Pierre et Marie Curie) in Paris. After graduating in physical chemistry at the École Normale Supérieure de Cachan, he completed his PhD in 2000 at the Université Denis Diderot (Paris) on the crystal chemistry of kaolin and its relation to tropical weathering processes. His research interests are in the geochemical implications of the atomic-scale information recorded by the defect structure of minerals. His approach combines the use of experimental spectroscopic tools and the quantum-mechanical modeling of mineral properties. He is a councillor of the Société Française de Minéralogie et de Cristallographie (SFMIC).



David L. Bish is the Haydn Murray Chair of Applied Clay Mineralogy in the Department of Geological Sciences at Indiana University. His research centers on clay and zeolite mineralogy and X-ray powder diffraction. Recently he has focused on the behavior of hydrous minerals under Martian surface conditions. David is a co-investigator on the CheMin XRD instrument on the Curiosity rover, which has given him the opportunity to analyze the first X-ray diffraction data from Mars. He is the author or coauthor of more than 220 publications, is a fellow of the Mineralogical Society of America, and has been president of the Mineralogical Society of America and the Clay Minerals Society.



Georges Calas is Chair of Mineralogy at the University Institute of France and a professor at Université Pierre et Marie Curie, Paris. His research interests concern how the molecular-scale organization of minerals, glasses, and melts controls their properties and provides invaluable information on the formation conditions of geomaterials; his research combines solid-state spectroscopic and diffraction methods and numerical modeling. His current interests include environmental mineralogy, materials science, nuclear waste management, cultural heritage, and the development of mineral resources in a sustainable manner. He is a member of Academia Europaea, a Geochemical Fellow, and a fellow of the Mineralogical Society of America.



Randall T. Cygan received his PhD in geochemistry and mineralogy in 1983 from the Pennsylvania State University. He then joined Sandia National Laboratories in Albuquerque, New Mexico, where he is now a senior scientist in the Geoscience Research and Applications Group. He was also an assistant professor in the Department of Geology at the University of Illinois. His research includes kinetics, chemical diffusion, mineral dissolution, adsorption, spectroscopy, and molecular simulation. He is a Centennial Fellow of Pennsylvania State University and a fellow of the Mineralogical Society of America. He recently was the recipient of the Brindley Lecture Award by the Clay Minerals Society.



Christian Detellier is a professor of chemistry at the University of Ottawa. After his PhD at the University of Liège (Belgium) and a postdoctoral position at the University of Paris XI, he joined the University of Ottawa in 1980. He was chair of chemistry (1994–1997), dean of science (1997–2006), acting director of the Catalysis Center for Research and Innovation (2007), and associate

vice-president, research (2008–2011), and he is now vice-president, academic, and provost (2012–2015). His research focuses on the design of new types of organo-inorgano nanohybrid and nanocomposite materials from clay minerals. His laboratory is the Canadian partner in the Erasmus Mundus program “International Master in Advanced Clay Science.”



Jessica Elzea Kogel has more than 20 years of experience in the mining industry. She currently leads the geology and mining group for IMERY'S North American kaolin operations and is responsible for exploration, mineral resource development, mine planning, and reclamation. She has authored more than 30 peer-reviewed papers, book chapters, and field guides and holds four US patents. Kogel is past president of the Clay Minerals Society and served as the 2013 president of the Society for Mining, Metallurgy and Exploration. Jessica earned MS and PhD degrees in geology from Indiana University, after completing bachelor's degrees in Earth science and paleontology at UC Berkeley. She is a certified professional geologist.



Gary Erickson received his BA from Hamline University, St. Paul, Minnesota, and his MFA from the New York State College of Ceramics in Alfred, New York. His organic-abstract ceramic sculptures are in private and public collections, including the National Museum of American Art / Smithsonian Institution in Washington, D.C., the Cuban Institute of Friendship in Santiago de Cuba, and the Jingdezhen Sanbao Ceramic Art Institute in Jingdezhen, China. He has received grants from the National Endowment for the Arts, the McKnight Foundation, and the Minnesota State Arts Board. He has traveled to Jingdezhen, China, nine times for art making and cultural exchange. Gary is a visiting assistant professor of art at Macalester College in St. Paul, Minnesota.



Stephen Hillier is a clay mineralogist working in the Environmental and Biochemical Science Group at the James Hutton Institute in Scotland. He completed his PhD at the University of Southampton, which was followed by postdoctoral positions in Paris and Bern. He joined the Macaulay Institute in 1994. Well known for his track record in the Reynolds Cup, he has worked on all the major groups of clay minerals and is particularly interested in the use of quantitative clay mineralogical analysis to understand soil processes and properties. He is a visiting professor at the Swedish University of Agricultural Sciences, Uppsala, and the conference chair for Euroclay 2015 in Edinburgh.



Robert A. Schoonheydt is an emeritus professor at the KULeuven. His research at the Center for Surface Chemistry and Catalysis deals with transition metal ion chemistry in zeolites and the surface chemistry of clay minerals. His work is concentrated around 4 themes: (1) transition metal ion complexes in the interlayer space, (2) the organization of cationic dye molecules in interlayer space, (3) the construction and characterization of films, and (4) the adsorption of cationic proteins. He was dean of the Faculty of Bioscience Engineering from 1998 to 2004. He was secretary-general (1987–2001), president (2001–2005), and past president (2005–2009) of the AIPEA. Currently he is an associate editor of *Applied Clay Science*.

Monographs on Environment, Earth and Planets

Online ISSN: 2186-4853



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The Sea of Japan and Its Unique Chemistry Revealed by Time-Series Observations over the Last 30 Years

Toshitaka Gamo, Noriko Nakayama, Naoto Takahata, Yuji Sano, Jing Zhang, Eriko Yamazaki, Sachi Taniyasu, and Nobuyoshi Yamashita

Vol. 2 (No. 1), pp. 1-22, 2014

doi:10.5047/meep.2014.00201.0001

<http://www.terrapub.co.jp/onlinemonographs/meep/list.html>

The Sea of Japan, a semi-closed marginal sea in the northwestern corner of the Pacific Ocean, is known as “a miniature ocean” due to its unique geographical and oceanographical characteristics. This paper summarizes water column studies in the Sea of Japan over the last 30 years (between 1977 and 2010) using research vessels *Hakuho Maru* and *Tansei Maru*, in order to better understand the Sea of Japan in its water mass structure, abyssal circulation pattern and their temporal changes from geochemical points of view. Chemical tracers included are: dissolved O₂ and its δ¹⁸O, ³H, ¹⁴C, ³He/⁴He ratio, ²²²Rn, CH₄ and its δ¹³C, and man-made perfluoroalkyl substances such as PFOS (perfluorooctanesulfonate) and PFOA (perfluorooctanoate). A highlight is that the bottom water (depth > 2,000 m) of the Sea of Japan has gradually lost dissolved O₂ by as much as 8-10% per 30 years, suggesting a reduction of the abyssal circulation in scale, to interfere with the O₂ supply from the surface to the bottom water, probably associated with the recent global climatic change.



Paul A. Schroeder is a professor in the Department of Geology at the University of Georgia, USA. He received his PhD in 1992 from Yale University. He teaches clay mineralogy and Earth surface processes. His research embraces clays in near-surface and hydrothermal environments, and he is particularly interested in the interactions between biological systems and their capacity to record changes in Earth history. He employs novel isotopic, spectroscopic, and crystallographic techniques to characterize clays for discovering paleoenvironmental proxies. His field sites include the southeastern USA, Turkey, and Kamchatka. He is a past president of the Clay Minerals Society and the 2014 recipient of TÜBITAK's eminent scholar award.



Kazue Tazaki, born in Japan, became interested in geology and clay mineralogy at a young age, visiting mountains, mineral deposits, and radioactive hot springs throughout the world. She obtained a Doctor of Science degree in geology at the Tokyo Kyoiku University. She then went on to work at ISPG in Calgary, McGill University, and the University of Western Ontario in Canada as

a clay mineral scientist and electron microscopist, studying uranium mine waste and oil bioremediation using various kinds of electron microscopy. Later, she joined Shimane University as an associate professor and Kanazawa University as a full professor in Japan. She is now a professor emerita at Kanazawa University. After her retirement, she went to Lac Hong University in Viet Nam and Dodoma University in Tanzania as a visiting professor to teach environmental geology. Her current work involves the Fukushima nuclear power plant accident in Japan and decontamination methods using microorganisms.



Lynda B. Williams is a research professor in the School of Earth and Space Exploration at Arizona State University and manager of the Secondary Ion Mass Spectrometry Facility. A student of R. C. Reynolds (Dartmouth College), she began studying clay mineral chemistry in 1984. Her PhD in sedimentary geochemistry (University of Calgary, Alberta) focused on the stable isotopes

of clays in hydrocarbon basins. This led to research on the interactions of clays with fluids, organic compounds, and microbes, with applications in hydrocarbon exploration, environmental issues, the origins of life, and medical geology. She is currently funded by the National Science Foundation to study the antibacterial mechanisms of medicinal clays.

GEOCHEMICAL JOURNAL

Online ISSN 1880-5973 Print ISSN 0016-7002

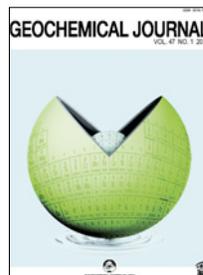
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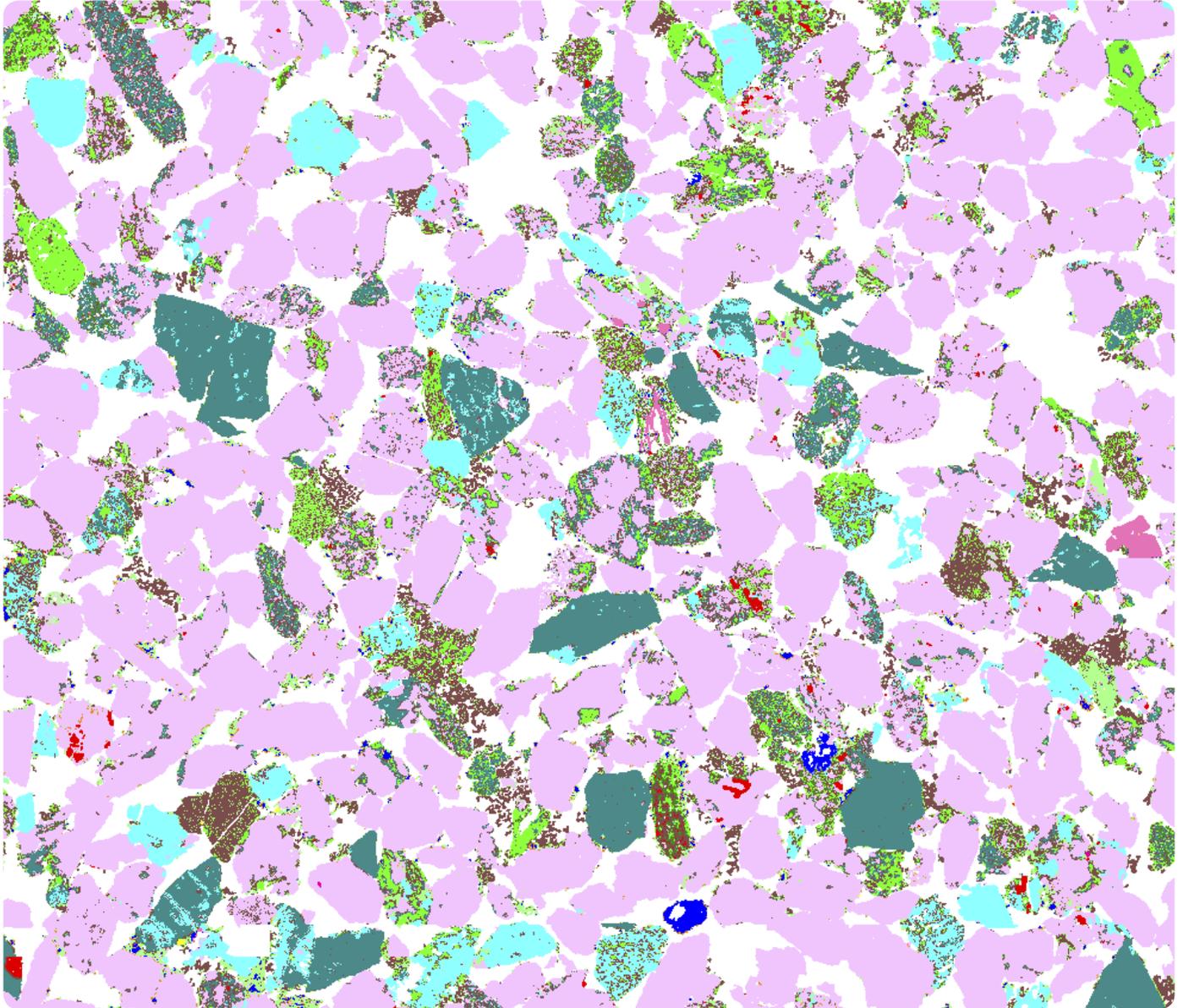


Image courtesy of the ANU and Digitalcore. Color legend: Kaolinite, brown; Quartz, pink; Feldspar, blues; Other Clays, greens; Rutile, red; Purple, apatite; Porosity, white.

Quantify the Micro-Textures of Kaolinite

Some sedimentary rocks are ideal for storing hydrocarbons, which under favorable geological conditions, can make them reservoirs for subsurface oil & gas accumulations. This siltstone contains kaolinite in many different forms including: pore-filling and pore-bridging structures, and as a replacement of detrital feldspar grains. Such knowledge is valuable when accessing a rock's suitability for hydrocarbon production.

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