

CSIRO R+ Cutting Edge Science Symposium "Natural hydrogen: A new sustainable geo-source of energy for Australia?"

(To be confirmed)



Dr. Barbara Sherwood Lollar

Barbara Sherwood Lollar CC, FRS, NAS, NAE, FRSC, FRCGS - University Professor in Earth Sciences, University of Toronto is also a Fellow of the American Geophysical Union (2015), the Geochemical Society (2019) and European Association of Geochemistry (2019). She is Co-Director of the Canadian Institute for Advanced Studies (CIFAR) program Earth 4D – Subsurface Science and Exploration. She is currently a member of the Eni Prize Commission (2013-2021), the American Geophysical Union Honors and Recognition Committee, the United States National Academy of Sciences Space Studies Board, the U.S. National Academy Decadal Survey Steering Committee for Planetary Sciences, and the Fellows Selection Committee for the Royal Society London UK, among others. Some of her pioneering work includes coupling investigations of the deep subsurface carbon, hydrogen, and sulfur cycles with noble gas isotopic tracers, to elucidate water-rock reactions producing hydrogen and methane rich environments in the terrestrial subsurface.



Dr. Brian Horsfield

Natural H₂ from sedimentary organic matter

Brian Horsfield is an elected member of acatech, the German Academy of Science and Technology. He is Emeritus Professor of Organic Geochemistry and Hydrocarbon Systems at the Technical University of Berlin, Germany, and is Senior Scientific Advisor to the GFZ German Research Centre for Geosciences, Potsdam, Germany. Brian is co-founder and CEO of GEOS4 GmbH, a research and service provider for the global energy sector. His research interests include quantifying fractionation which occurs during migration and production, the coupling of the deep biosphere with abiotic diagenetic reactions and most recently quantifying natural organic hydrogen formation in time and space. He has about 300 publications to his name.

Quantifying native H₂ emissions within Precambrian basement rocks: a multiscale petrology study on fayalite-bearing gabbros from the North-American Midcontinent Rift System



Dr. Olivier Sissmann

Olivier Sissmann is a geochemist who obtained a BSc in Geology from the University of Queensland, Australia, before travelling back to France to obtain a PhD on CO2 mineral storage from Institut de Physique du Globe de Paris and Ecole Normale Supérieure. He then joined IFP Energies Nouvelles as a research scientist, where he has been working on native H2 emissions ever since, collecting associated rock and gas samples around the globe whenever the opportunity arose. He specializes in stable isotope analysis, HP/HT experiments, and fluid rock interactions modelling. He's on a quest to discover which processes control the formation of abiotic organic compounds and the appearance of the building blocks of life. When he's not doing that, he loves to play a good game of Go or delve into sci-fi.

How to quantify the initial and remaining potential of a H₂ source rock?



Dr. Isabelle Moretti

Natural hydrogen generation in granitic geothermal reservoirs of the Upper Rhine Graben, France



Dr. Jesica Murray

Jesica Murray is a geologist interested in geochemistry of water-rock interactions in surface and deep environments of the Earth, with focus on redox sensitive elements. Her research methodologies are based on field work, laboratory work, and geochemical modeling. She obtained her degree in 2009 and her PhD in 2015 in Argentina. During her PhD she performed research on the mobility of metals in mining wastes and its impact in the environment in the Central Andes. As a postdoc she performed an internship on geochemistry of waters at the Redox Chemistry Laboratory of the USGS Boulder, Colorado, USA, and on reactive transport and natural hydrogen generation at the University of Strasbourg in France. In 2019 she obtained a CONICET position as a researcher at the National University of Salta, Argentina, where she performed research on geochemistry of arsenic and its impact on human health and biodiversity in the Altiplano-Puna region. Her research was supported by the International Geoscience Programme of UNESCO and strong collaborations with researchers from Chile, Bolivia, and United States. Since 2022, motivated by her interests in geothermal systems and natural hydrogen, she continues to collaborate with researchers at the University of Strasbourg as a visiting researcher. One main current research interest is natural hydrogen generation in the deep geothermal systems of the Upper Rhine Graben.

Reassessing the role of magnetite during natural H₂ generation



Mr. Ugo Geymond

Ugo Geymond obtained his Master's degree in Geology at Université Paris Cité (UPC). He is currently conducting his PhD at Institut de physique de globe de Paris (IPGP) and Institut français du pétrole et des énergies nouvelles (IFPen). His main research goal is to understand the generation of natural H2 related to Fe oxidation during water-rock interactions. He is interested in defining the potential of specific lithologies to source H2 in the scope of future exploration programs. He focuses on Banded Iron Formations (BIF) that host vast amounts of reduced Fe (i.e. Western Australian BIF (Archean to Paleoproterozoic) and Namibian BIF (Neoproterozoic)) using the following tools: (1) water-rock experiments and thermodynamic modelling, in order to constrain the reactivity of Fe-rich minerals and rocks at a fundamental scale; (2) Petrography on core samples, that allows to extrapolate the theory of lab results to natural environments; (3) In-field gas measurements and structural geology at suspected H2 occurrences, to validate conceptual models of H2 generation at depth and further trapping and gas migration pathways.

Geoscience Australia's Exploring for the Future program: an overview of case studies on natural hydrogen



Christopher J. Boreham is a Principal Organic Geochemist at Geoscience Australia working in the Minerals, Energy and Groundwater Division. He obtained a Ph.D. in Chemistry at the Australian National University. Chris applies his skills to understand the evolution of petroleum and abiogenic gas in Australia. Chris is a member of PESA and AAPG.

Dr. Christopher Boreham

Potential reservoir and origin of native hydrogen in the Korean peninsula



Dr. Hyeong Soo Kim

Hyeong Soo Kim is a Professor in the department of Earth and Environmental Sciences, at Korea University. He obtained his Ph.D. in Townsville Australia and currently investigates the potential reservoir and origin of native hydrogen in the Korean peninsula.

Historic hydrogen occurrences in Western Australian petroleum wells: natural hydrogen or an artefact?



Dr. Peter Haines

Peter Haines graduated with Honours (1982) and PhD (1987) degrees in geology from the University of Adelaide, specialising in sedimentology and palaeontology. He has previously held positions at the Northern Territory Geological Survey and Universities of South Australia, Adelaide and Tasmania. He joined the Geological Survey of Western Australia in 2003, currently holding title of Basins Custodian within the Energy Geoscience and Carbon Strategy Branch. His current research interests include the geology of the Amadeus, Officer and Canning basins, and petroleum, hydrogen and helium potential across the state. He is a member of PESA and the Geological Society of Australia.

Natural hydrogen reserve assessment, basic concepts and perspectives



Dr. Eric Gaucher

Eric C. Gaucher is a geochemist expert. His work focuses on water–rock–gas interactions at the laboratory scale up to basin scale using experimental, field and numerical modelling methods. He is committed in all geo-energy sectors (e.g. nuclear waste management, CO2 & H2 storage, geothermy, lithium extraction from brines, evolution of porous medium in carbonate reservoirs, environmental concerns related to oil & gas shale). After 19 years in academic research (CEA, BRGM in France and the University of Bern in Switzerland) and 10 years in industry (TotalEnergies), he is now building bridges between the worlds of research and industry having created a consulting start-up focused on natural hydrogen exploration Lavoisier H2 Geoconsult. Eric graduated with two master's degrees in 1993. The first was a Master of Earth Sciences from Lyon I University & École Normale Supérieure. The second was a Master of Hydrology from the Paris Orsay University. He also completed his water-rock interaction PhD with CEA and the Paris VII University in 1998. Focused on solving industrial problems using the most advanced scientific methods, he has solved problems linked to the stability of clays and cements, CO2 control by rocks, and carbonate diagenesis. Since 2016, he has been developing exploration methods for natural hydrogen gas (H2) and assessing the reserves of this new geo-energy. He is also the task leader for Natural Hydrogen for the International Energy Agency.

(To be confirmed)



Dr. Chris Ballantine

Reactivated faults as a new guide for natural hydrogen surface exploration



Alain Prinzhofer is an expert in Geochemistry and Geology. He is the Scientific Director of GEO4U (Rio de Janeiro, Brazil) and a Professor at UFRJ (Universidade Federal do Rio de Janeiro). With over 60 scientific papers, 8 patents, about 150 communications in international meetings, his fields of expertise include: mantle and sedimentary basins geology/geochemistry, isotopes, natural gas geochemistry, petroleum systems, and natural hydrogen. Academic history: Polytechnic engineer from the National School of Mines of Paris (1974), Docteur Ingénieur (Ph.D.) from the National School of Mines of Paris (1981), Structural geology and petrology Docteur ès Sciences (Docteur d'État, Ph.D.) from the Paris VI University (1987).

Experimental and analytical approaches to study the role of deep fluid-rock systems involving hydrogen



Dr. Elena Bazarkina

Elena F. Bazarkina is a geochemist who explores hydrothermal processes and their influence on the characteristics of the deep crust. She obtained a BSc degree in geology from the Russian State Geological Prospecting University of S. Ordzhonikidze and an MSc degree in geochemistry from Moscow State University in Russia. She completed her Ph.D. at the University of Toulouse (France) and the Russian Academy of Sciences (Russia), followed by several postdoctoral fellowships at the GeoResources Laboratory in Nancy, the Néel Institute in Grenoble, and the Institute of Geology of Ore Deposits, Petrography, Mineralogy, and Geochemistry in Moscow. Since 2021, she has been working as a scientist at the Helmholtz-Zentrum Dresden-Rossendorf (HZDR) in Dresden, Germany, and conducts research at the ROBL beamline at the European Synchrotron Facility ESRF. Her research focuses on studying the state and properties of trace metals, actinides, and gases in fluids and minerals under conditions found in the crust and upper mantle.



Dr. Laurent Truche

Defining pathfinders for hydrogen exploration

Laurent Truche is a professor of geochemistry and geo-resources at University Grenoble Alps and ISTerre Institute (France). He works on fluid-rock-gas interactions at elevated temperature and pressure. His research aims to understand redox processes occurring in the Earth's crust (genesis of ore deposits, sulfur cycle, hydrogen reactivity), and in deep underground engineered structures (nuclear waste repository, hydrogen and CO2 storage). He is particularly interested in hydrogen behaviour in deep geological environments. He leads several H2 exploration projects and manages a research group fully dedicated to this endeavour. He uses a multidisciplinary approach that combines field investigations, hydrothermal experiments, in-situ spectroscopy (Raman and XAS), and thermodynamic modelling.



Some geochemical constraints on natural hydrogen fluxes in the subsurface

Christian Ostertag-Henning is a geologist based at the Federal Institute for Geosciences and Natural Resources in Germany. His group is studying geochemical reactions at elevated temperatures and pressures in laboratory experiments to test hypotheses about processes and reactions in nature, and derive kinetic data on selected reactions (mostly redox reactions involving carbon, hydrogen, oxygen, sulfur and iron). For hydrogen, he is working on mineral surface reactions during subsurface hydrogen storage, the formation and oxidation by carbon, sulfur and iron species in the context of natural hydrogen, as well as the radiolysis mostly related to subsurface storage of high-level nuclear waste. He has also participated in research expeditions to study reactions producing and oxidizing hydrogen in mid-ocean ridge systems.

Dr. Christian Ostertag-Henning

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Dr. Krystian Czado

The art of geologic hydrogen exploration & discovery

Krystian Czado is a geoscientist at the Geological Survey of NSW. He completed his MSc in Petroleum Geology and GeoEnergy at the University of Science and Technology in Cracow, Poland. Krystian's area of expertise centers around leveraging data acquired by oil and gas companies to aid in mineral exploration. He is actively involved in the advancement of soil gas surveying techniques to explore for ore bodies beneath sedimentary covers. Krystian has made significant contributions to the development of global models for Helium Exploration, showcasing his diverse skillset and dedication to advancing the field of geoscience.

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Dr. Geoffrey Ellis

Salt formations and their potential sealing capacities in naturally occurring H₂ systems: risks and opportunities



Lorena Moscardelli is a Research Scientist and leader of the State of Texas Advanced Resource Recovery (STARR) program at the Bureau of Economic Geology at UT Austin. She received a degree in Geological Engineering from Central University of Venezuela and a PhD in Geological Sciences from The University of Texas at Austin. She started her career as an exploration geologist working for PDVSA. Prior to her current position at STARR, Dr. Moscardelli was a Principal Researcher at Equinor where she performed a wide range of activities from research and exploration in the Americas to field development in the Norwegian Continental Shelf. Dr. Moscardelli has taken a strong interest in understanding the role of geoscience research as part of the ongoing energy transition.

Dr. Lorena Moscardelli



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The high-pressure adsorption of molecular hydrogen (H₂) on clay minerals: application to natural H₂ reservoirs and their cap rocks.



Arkadiusz (Arek) Derkowski is a full professor of clay mineralogy and a head of the Clay Minerals Research Group at the Institute of Geological Sciences of the Polish Academy of Sciences. After receiving PhD in Earth Sciences in 2003 from the Jagiellonian University of Krakow (Poland), he was a postdoctoral researcher at the University of California at Riverside (USA) and the University of Alberta (Canada). His academic experience covers a visiting professor position at the University of Tokyo and numerous short stays and internships in Greece, Germany, Russia, United Kingdom, and USA. Dr. Derkowski has 15+ years of work experience as a senior researcher and consultant for North American energy industry companies, working on shales and mineralogical applications in petrophysics

Dr. Arkadiusz Derkowski