

**Euroclay 5<sup>th</sup> to 10<sup>th</sup> July 2015, Edinburgh, Scotland - A joint meeting of the European Clay Groups Association and The Clay Minerals Society, joined by the International Natural Zeolites Association and the Geological Society**

[www.Euroclay2015.org](http://www.Euroclay2015.org)

## **Sessions and symposia at Euroclay2015- CMS-42**

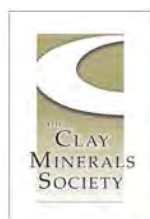
Clay and fine particle science has always been pursued across a wide variety of traditional scientific disciplines. The sessions that contribute to the programme of Euroclay 2015 reflect this broad reach of clay science and have been aligned with three cross-cutting societal research themes: [Energy](#), [Materials](#) and [Environment and Health](#).

Clay science has always had close links with Energy research such as in the discovery and recovery of hydrocarbons, more relevant than ever as we strive for ever enhanced recovery and to tap unconventional sources such as clay-rich shales; also the focus of many concepts for the safe containment of nuclear waste.

As far as Materials are concerned, clay must qualify as the oldest branch of all materials science but it continues to define some of the newest material developments and probably ranks as the most important and versatile of all of man's industrial minerals with a wealth of modern applications and uses.

Environment and Health are also key areas where clay research has much to contribute to society. Careful but innovative management of soils will be key to future food and water security as population pressures increase; and we are only beginning to make a modern exploration of the many interactions and uses of clay minerals in relation to health.

The sessions and symposia at Euroclay have been assembled with these three themes in mind and the scope of some is spread across all three. We have also endeavoured to engage related disciplines that sit around the periphery of our clay world knowing that we inevitably all profit from such interaction; layered compounds generally and zeolites in particular share many commonalities. And finally there is essentially unlimited scope for general sessions to accommodate the additional breadth and wealth of clay topics that define modern clay science.

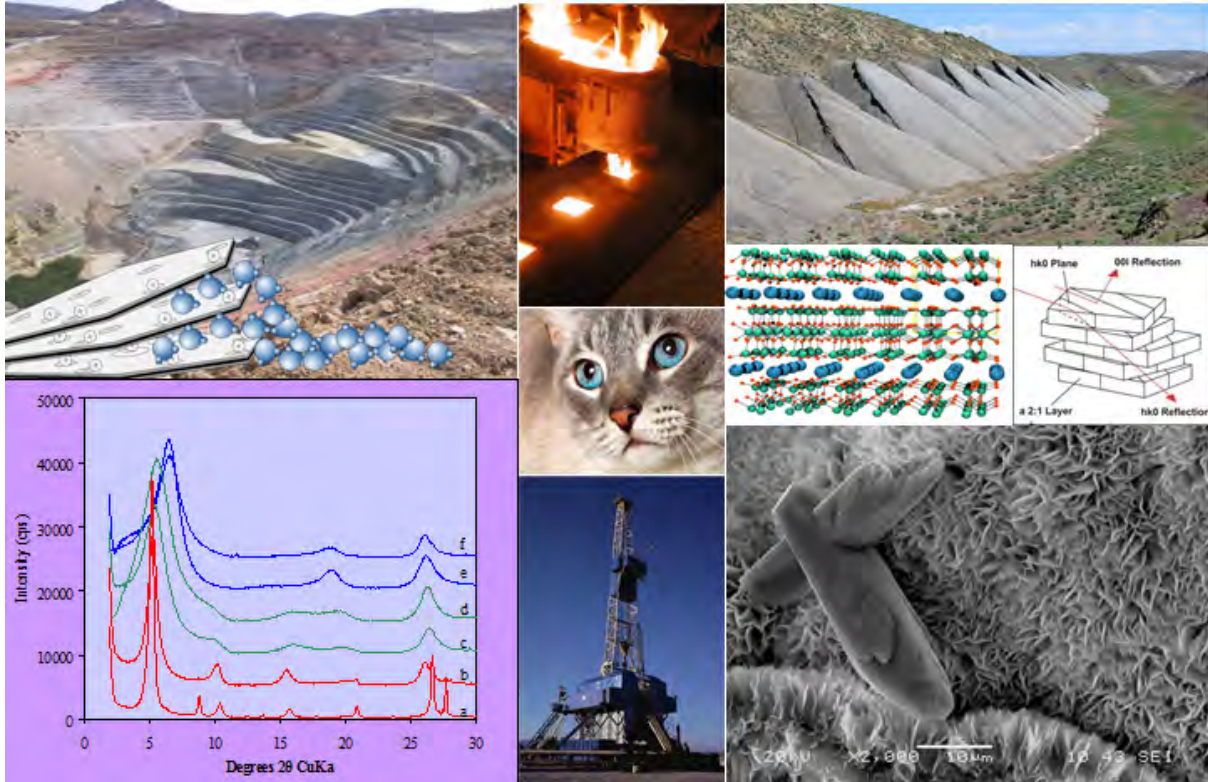


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# Bentonites: linking clay science with technology



Bentonites are very important industrial clays, which are valued by the industry due to the unique properties of smectites. This symposium invites presentations which deal with all aspects of bentonites, from the geological, mineralogical and geochemical characteristics of deposits, to the determination of physical properties, possible processing/activation routes and commercial applications. Of particular importance are the characterization of bentonite deposits consisting of dioctahedral or trioctahedral smectites, the description of mineralogical and chemical heterogeneity within bentonites, and the determination of key smectite properties, which control both conventional and novel industrial and environmental applications.

Themes:

[Materials](#)

Convenors:

[George E. Christidis, Technical University of Crete, Greece](#)

[Stephan Kaufhold, BGR, Hannover, Germany](#)

[Don Eisenhour, Mineral Technologies Inc. Illinois, USA](#)

# Industry perspectives in clay and fine-particle science



A wide-ranging session to include contributions in areas such as mineral deposits, characterisation for applications, processing of minerals, mining and bio-mining, beneficiation, remediation, applications in materials, composites, coatings, catalysis, environmental protection and agriculture, as well as legal and regulatory issues that face industry.

Themes:

[Materials](#)

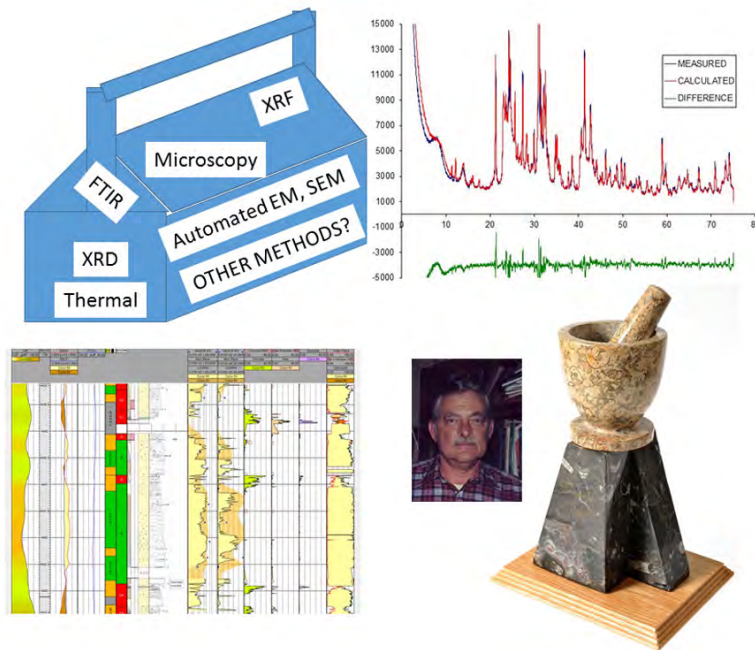
Convenors:

[Jon Phipps Imerys Minerals Limited, Cornwall, UK](#)

[Prakash Malla Thiele Kaolin Company, Georgia USA](#)

[Ian Wilson Consultant, Cornwall, UK](#)

# Developments and applications of quantitative analysis to clay-bearing materials, incorporating ‘The Reynolds Cup School’



Because of their effects on the physical and chemical properties of rocks, soils, clays, and industrial materials, and because of the genesis and history information they record, knowledge of the types and relative amounts of clay minerals and other poorly ordered minerals is essential in many academic and industrial endeavours. Methods of quantitative phase analysis (QPA) represent, therefore, important tools e.g. in mineral exploration and processing, in clay science, and material science to name a few. This session invites contributions on QPA by any available method such as diffraction, spectroscopy, chemical analysis, or microscopy or combination of methods and approaches. Papers on methods and procedures as well as applications of QPA procedures, in soil, geological and materials science are encouraged. The session will conclude with ‘The Reynolds Cup School’, a series of invited presentations and extended discussion outlining best practice in procedures and strategies to obtain QPA of ‘state of the art’ quality with today’s most widely available tools and to discuss ways to address the many challenges that still remain.

Themes:

[Materials](#)

Convenors:

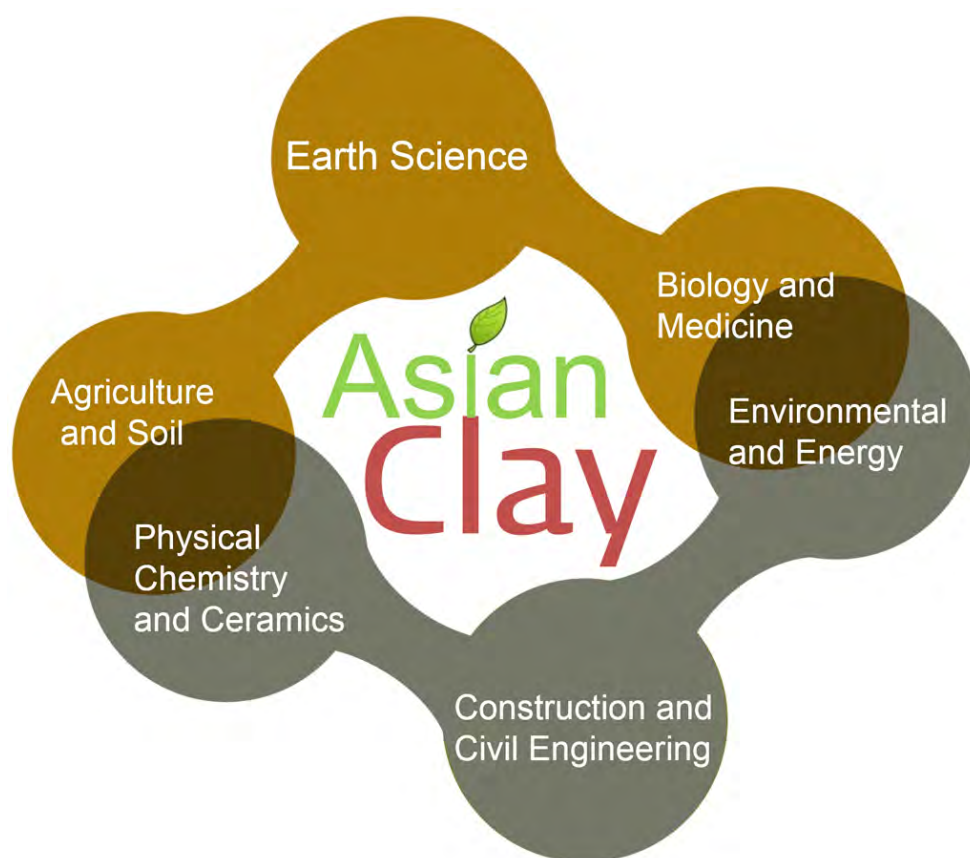
[Michael Plöetz ClayLab Zurich, Switzerland](#)

[Reinhard Kleeberg TU Bergakademie Freiberg, German](#)

[Mark Raven CSIRO, Urrbrae, Australia](#)

[Helen Pendrowski The James Hutton Institute, Aberdeen, Scotland](#)

# Asian Clay Minerals Group Research in Progress (II) (part of Euroclay2015)



The Asian Clay Research Group was organized through the Nagoya and Seoul meeting in 2010 and 2012. We plan to hold the 3rd meeting in Guangzhou in 2016. Our first participation in The CMS meeting in College Station, Texas, USA (2014) was successful in terms of communicating/collaborating with other clay minerals groups. The purpose of this session, held as part of the Euroclay2015 meeting, is to bring active Asian clay scientists together and promote scientific communication and interaction with the international clay minerals community. We invite papers on, but not limited to, biotic and abiotic reactions in natural environments that impact a number of geological and environmental process, such as sediment diagenesis, colloid transport, and the mobility and the ultimate fate of organic and inorganic contaminants. Topics also include the science and technologies of industrial clays, including exploration and clay resource development, particle engineering from macro to nano, and chemical and physical modification.

Themes:

[Energy](#)

[Environment and Health](#)

[Materials](#)

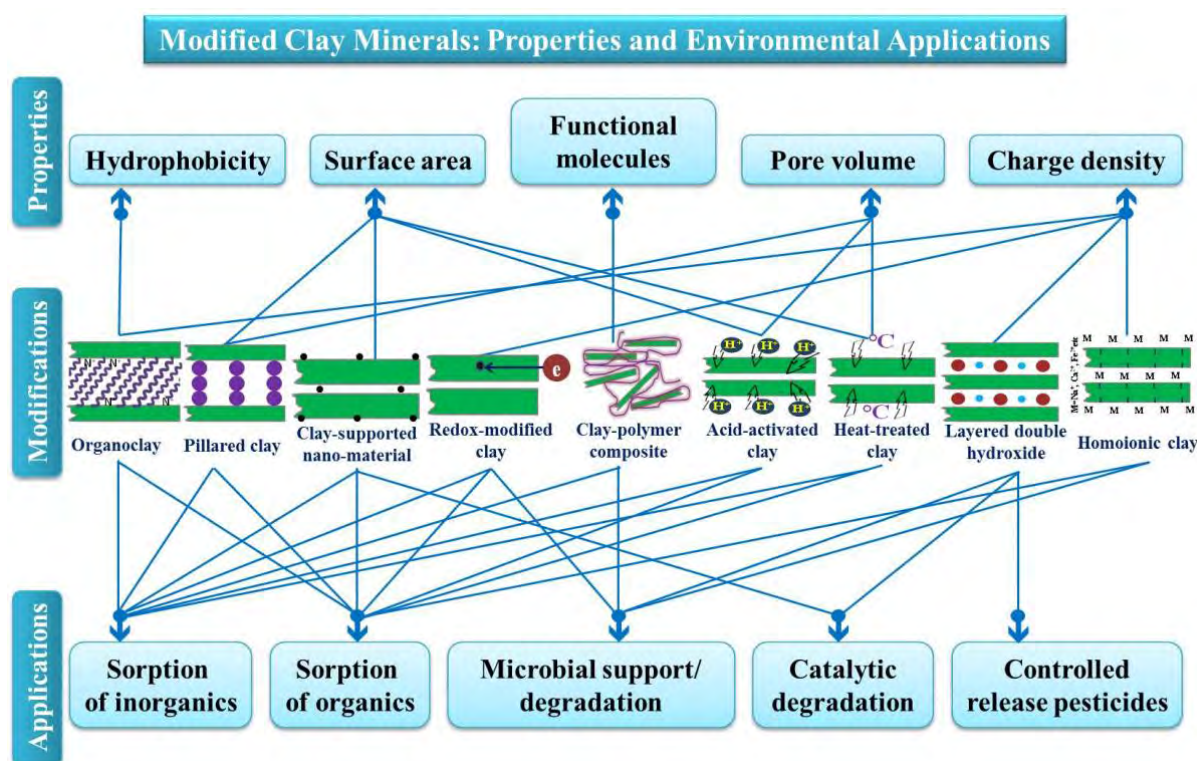
Convenors:

[Jinwook Kim Yonsei University, Seoul, Korea](#)

[Jae-Min Oh Yonsei University, Wonju, Korea](#)

[Hyen-Goo Cho Gyeongsang National University, JinJu, Korea](#)

# Clay and fine particle-based materials for environmental technologies and clean up



Environmental pollution is a growing public concern worldwide as society industrialises and citizens become more aware of the associated risks. Despite many resources being channelled towards the development of technologies for cleaning up contaminated environments, millions of contaminated sites still exist in sensitive locations because of the prohibitive cost of remediation or the lack of an effective technology to clean up sites to a level required by regulators. As a result, much scientific effort is being directed at developing new technologies which are both efficient and inexpensive. Natural materials such as clay minerals, which are inexpensive, highly adsorptive and available ubiquitously in all continents, hold great potential as environmental materials, both with and without modification. This symposium will highlight recent research advances in clay minerals-based remediation and remediation technologies including modified and non-modified clay minerals, redox active clay minerals, layered double hydroxides, bacteria supported clay minerals, and other novel fine particle based materials.

Themes:

[Environment and Health](#)

[Materials](#)

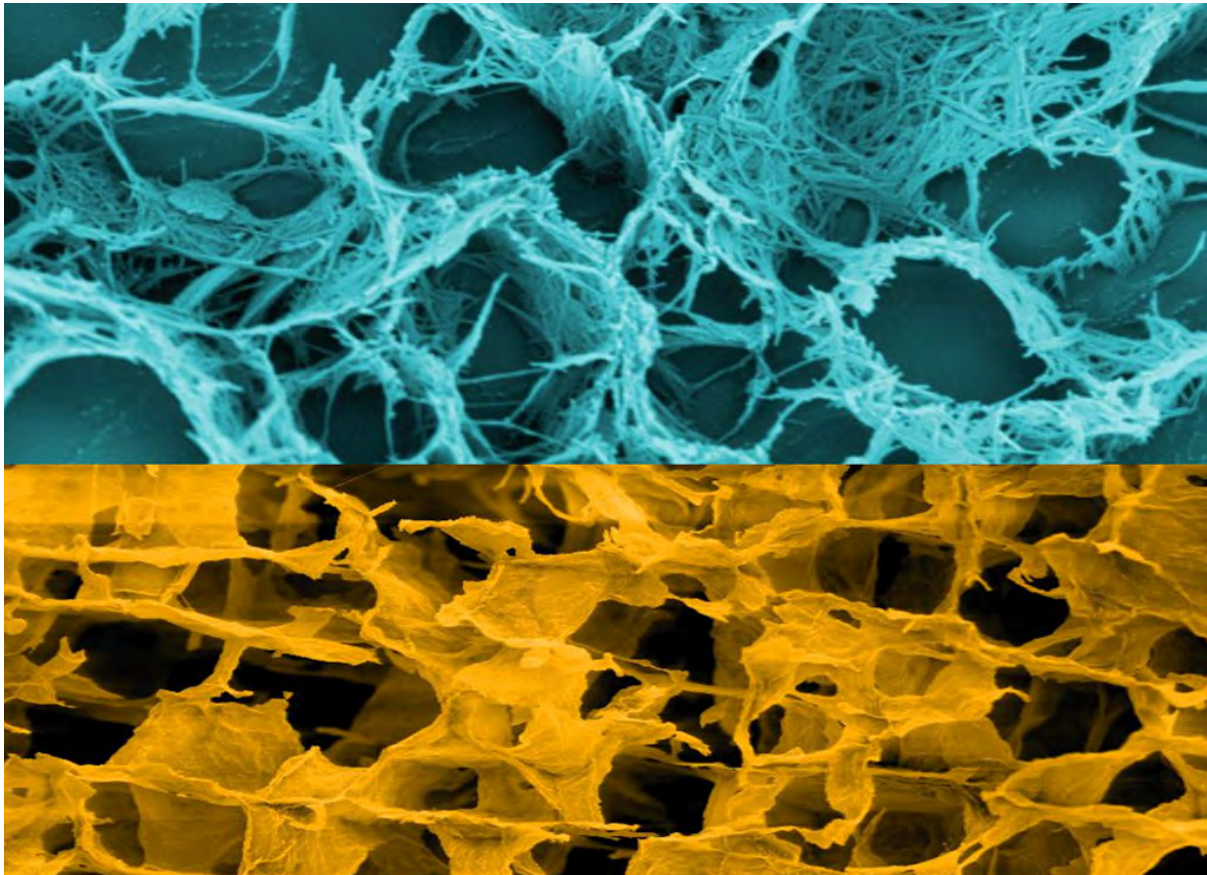
Convenors:

[Binoy Sarkar, University of South Australia, and CRC CARE, Australia](#)

[Ravi Naidu, CRC CARE, Australia](#)

[Anke Neumann, University of Newcastle, UK](#)

# Beyond smectite-based nanocomposites



Nowadays, investigation on polymer-clay nanocomposites is already a well-established area of research that attracts scientists from both basic and applied research fields. For many years, smectites were the chosen clay for the preparation of those nanocomposites but now other types of clays minerals, such as kaolinite, nanotubular halloysite or microfibrillar sepiolite and palygorskite are increasingly used in the preparation of polymer-clay nanocomposites. Additionally, polymers of natural origin are more and more employed in the development of the so-called bionanocomposites or green nanocomposites. In this way, the use of special clays and/or biopolymers make possible the incorporation of new properties and functionalities in the resulting nanocomposites. This session intends to be a forum for the latest research on nanocomposites focusing on innovative advances related to materials based not only on smectites but also on other types of clay minerals from kaolinite to fibrous clays, as well as related materials (e.g., layered double hydroxides), involving both synthetic and natural polymers.

Themes:

[Materials](#)

Convenors:

[Pilar Aranda Instituto de Ciencia de Materiales, CSIC, Spain](#)

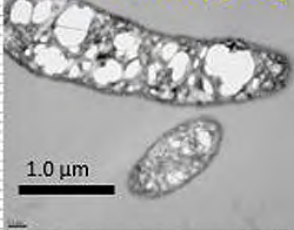
[Christian Detellier University of Ottawa, Canada](#)

# Bioreactive clay minerals: impacts on environmental and human health

## Clays that damage



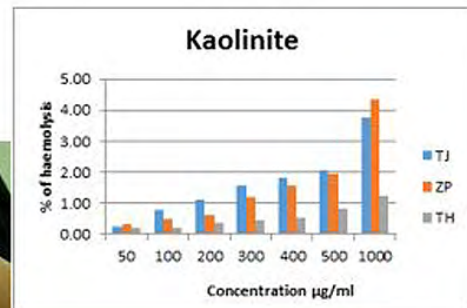
*E. Coli* die after 24 hrs with Fe (II) clay



## BIOREACTIVE CLAYS



## Clays that heal



Humans and animals have historically used clays to aid in digestion, protect skin, heal wounds and soothe musculoskeletal ailments. Pharmacopeias from the 17th century highlight medicinal uses of clay minerals, yet the mechanisms by which clays can be healthful or detrimental remain largely unknown today. Nano-technological advances in the last decade have revitalized research on the interactions of clays in mammalian systems. In this session we invite research that highlights new insights on the roles of bioreactive clays affecting human health. In particular we encourage research on medical or veterinary applications of clays and the mechanisms by which clays are beneficial or detrimental. Topics may include uses of clays in drug delivery, pelotherapy, hemostatic wound dressings, geophagy, antibacterial clays and clay toxicology. An important focus is the application of novel solutions to promote environmental and human health.

Themes:

[Environment and Health](#)

Convenors:

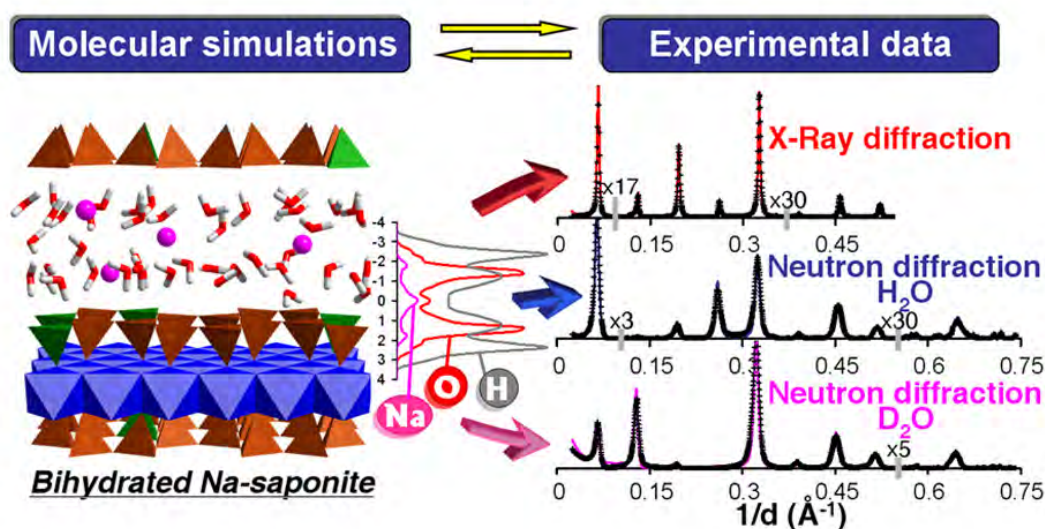
[Lynda B. Williams Arizona State University, USA](#)

[Timothy P. Jones Cardiff University, UK](#)

[Fernando Rocha Universidade de Aveiro, Portugal](#)



# Structural characterization of lamellar compounds



Over the last decade or so, structural characterization of layered compounds has benefited from the intrinsic evolution of the commonly used techniques (TEM, XAS, XRD, etc), and especially from improvements in quantitative methods of data analysis. In particular, the collation of experimental and computational results allowed reciprocal improvements of both approaches. Significant progress has come also from the combination of experimental approaches allowing for a thorough characterization of complex and/or very defective lamellar structures, including natural materials and mixed-layered materials. This session will be devoted to the recent advances of individual techniques, and to new possibilities offered by their combination. New structural interpretations, dynamical properties, and insights into the formation and evolution of such materials in natural environments are also relevant. Materials of interest include, but are not limited to, phyllosilicates, layered oxides, layer double hydroxides, and layered compounds in general.

Themes:

[Materials](#)

Convenors:

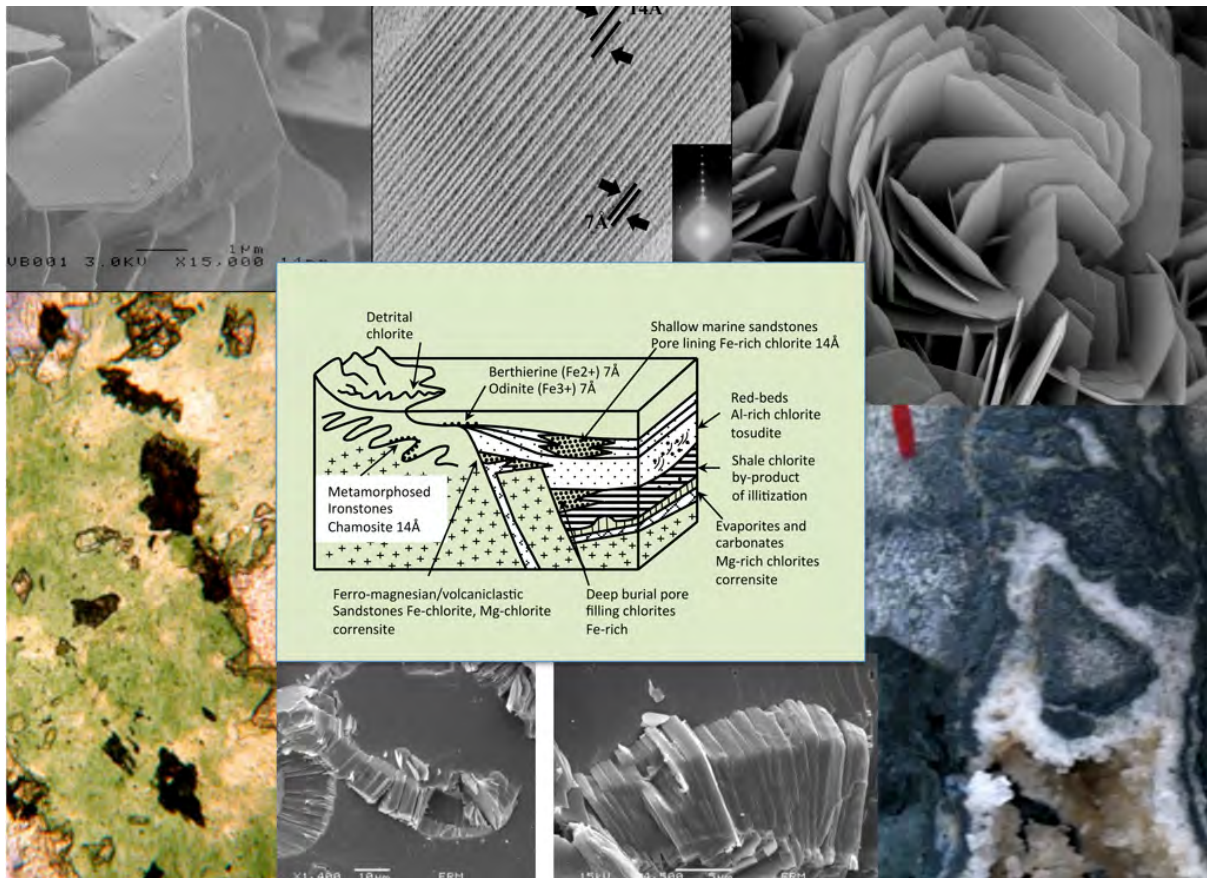
[Douglas McCarty Chevron ETC, Houston, USA](#)

[Eric Ferrage Université de Poitiers, France](#)

[Vanessa Prevot Université Blaise Pascal, France](#)

[Vicente Rives Universidad de Salamanca, Spain](#)

# The many faces of chlorite



This session focuses on the many geological occurrences of chlorite: from soils to detrital sediments, to sedimentary and diagenetic systems, to hydrothermal alterations and to low- and medium-grade metamorphic rocks, chlorite is everywhere. It forms as pure grains, or as interlayers with phyllosilicates such as smectite, serpentine, and vermiculite. The aim of this session is to bring together those with an interest in chlorite in any of its many forms, to present data from a wide variety of different analytical techniques, and to promote awareness of the complexity of chlorite and above all the potential for it to provide new and useful information on many geologic processes from the surface of the earth to deep in the crust.

Themes:

[Energy](#)

[Environment and Health](#)

[Materials](#)

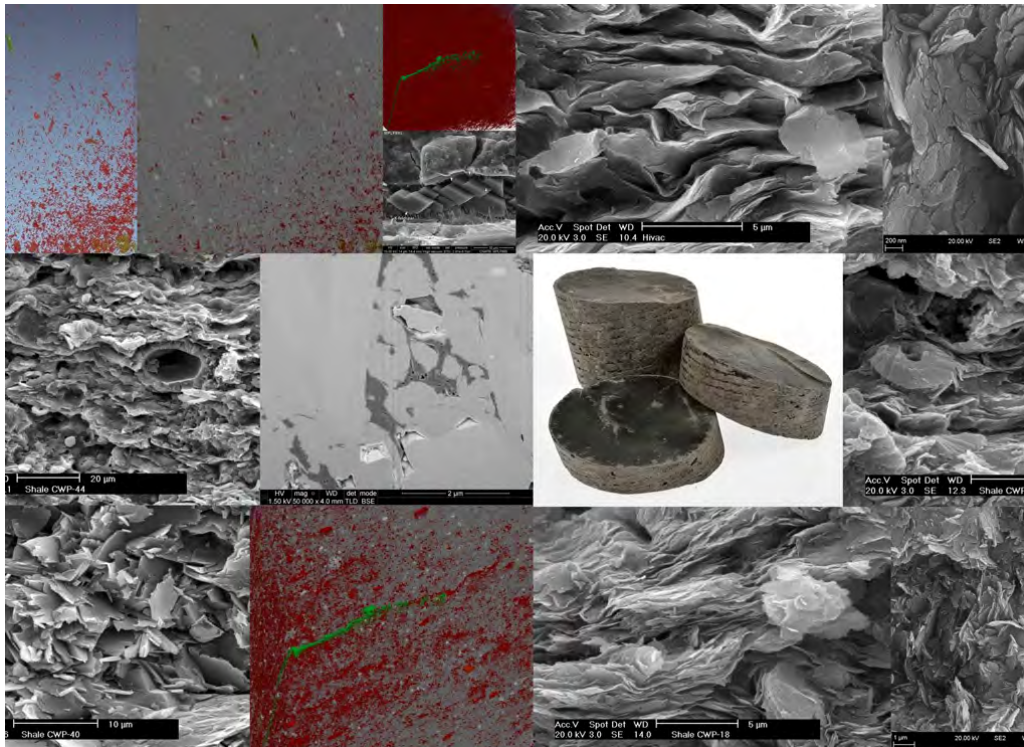
Convenors:

[Jeff Walker Vassar College, Poughkeepsie, New York, USA](#)

[Daniel Beaufort Université de Poitiers, France](#)

[Atsuyuki Inoue Chiba University, Japan](#)

# From microscopic pore structures to transport properties in shales (workshop follow-on session)



Argillaceous media are being considered as potential host rocks for the final, safe disposal of radio-active waste, and/or as major constituent of repository systems in which wastes will be emplaced. In this context clay radwaste scientists examine various argillaceous rocks that are being considered for the underground disposal of radioactive waste, ranging from soft clays to indurated shales. In addition, the shale gas and oil community is interested in the characterization of sediments and black shales from the core- to nano-scale, focusing on clay/brine/organic interfaces and understanding how pore space evolves and affects the transport and production potential of the shale system. Through characterizing fundamental properties such as nano-/micropore connectivity, all the way up to understanding transport and mechanical fracture properties of whole-rock units, both communities are studying the geological materials with a shared set of tools, from quantum mechanics computer simulations, through advanced microscopy and diffraction methods, up to triaxial mechanical tests and large-scale transport models.

Themes:

[Energy](#)

Convenors:

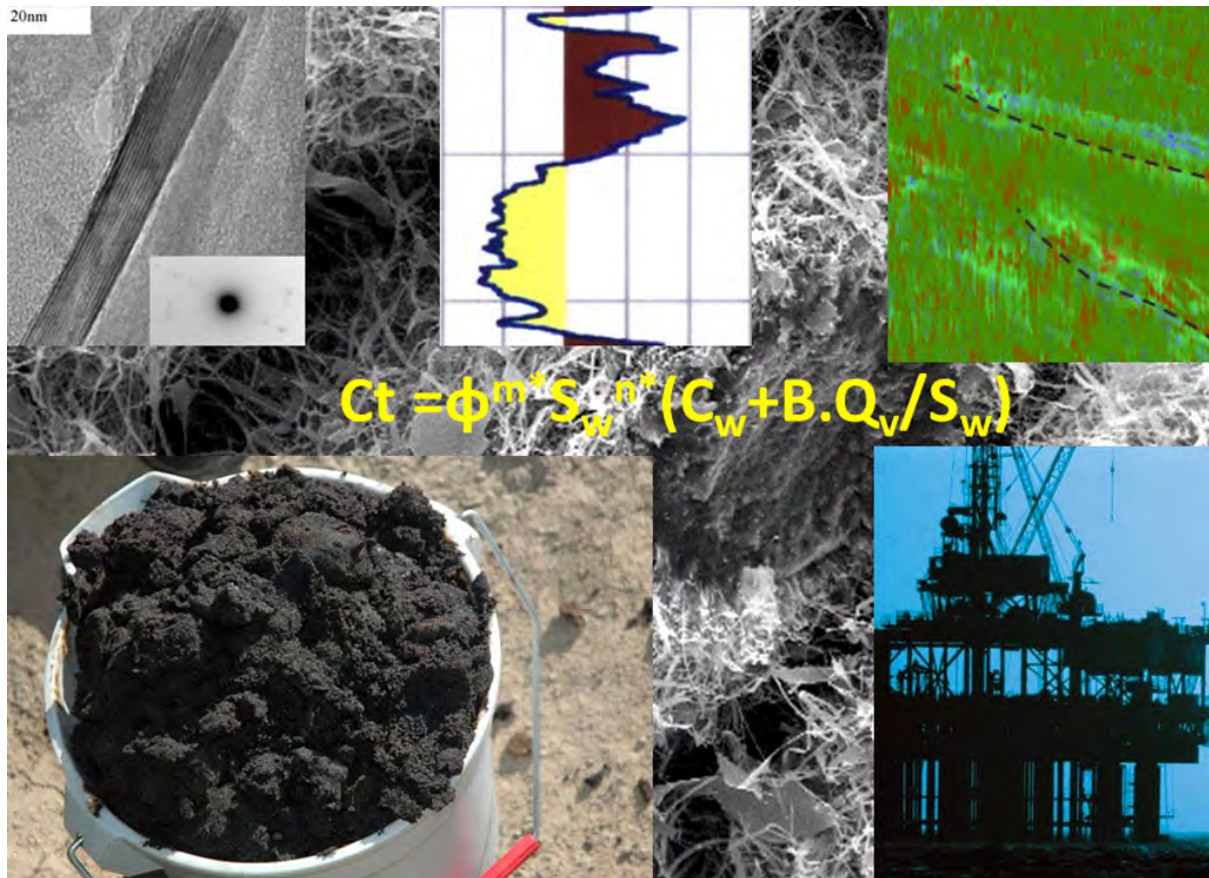
[Reiner Dohrmann BGR, Hannover, Germany](#)

[Chris Greenwell University of Durham, UK](#)

[Thorsten Schaefer Karlsruhe Institute of Technology, Germany](#)

[Russell Alexander Bedrock Geosciences, Auenstein, Switzerland](#)

# Clay minerals in the oil and gas industry



Clay minerals are present in hydrocarbon source, reservoir and seal rocks and therefore characterizing their presence and properties plays an important role in understanding petroleum systems. For this session, we call, in particular, on papers that bridge the gap between research and everyday 'Exploration and Production' applications and issues - for both conventional and unconventional hydrocarbon accumulations – related to: rock characterization, log response calibration, drilling, diagenesis, reservoir performance, seal integrity, provenance, shale brittleness, fracture properties, organic-matter interaction, palaeo-thermometry, basin modelling, seismic response, rock physics modelling, oil sands bitumen recovery, oil-sands tailings processing, and enhanced oil recovery processes *etc.*

Themes:

[Energy](#)

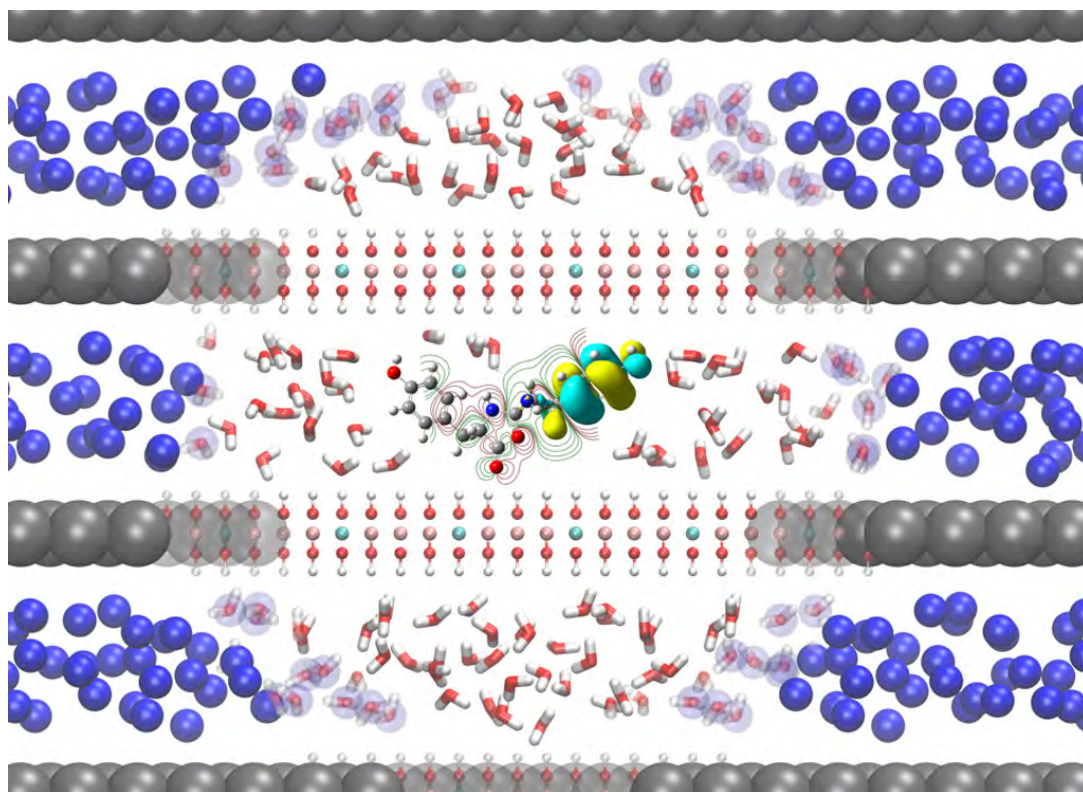
Convenors:

[Edwin Zeelmaekers Shell, The Hague, The Netherlands](#)

[Heather Kaminsky Suncor, Calgary, Canada](#)

[Andy Thomas Chevron Energy Technology Company, Perth, Australia](#)

# Computational chemistry studies of clay minerals - bridging length and time-scales



As analytical methods such as atomic force and scanning electron microscopy increasingly provide nanoscale information about processes occurring in layered minerals, the atomic resolution of computer simulation methods has become a natural adjunct to understand processes and structure at clay surfaces. Electronic structure simulations provide insight into redox processes, chemical reactivity at surfaces, and allow comparison with spectroscopic methods. Molecular mechanics approaches, where electrons are not included, are allowing the study of increasingly large systems and longer timescales. As well as structural properties, phenomena such as adsorption, ion effects and thermodynamic properties are increasingly extracted from such simulations. In recent years, these methods have been coupled together, along with coarse-grained molecular dynamics (where groups of atoms are coalesced) and phenomena such as intercalation or exfoliation may be studied. This session will provide an up-to-date overview of computer simulations applied to layered mineral science.

Themes:

[Materials](#)

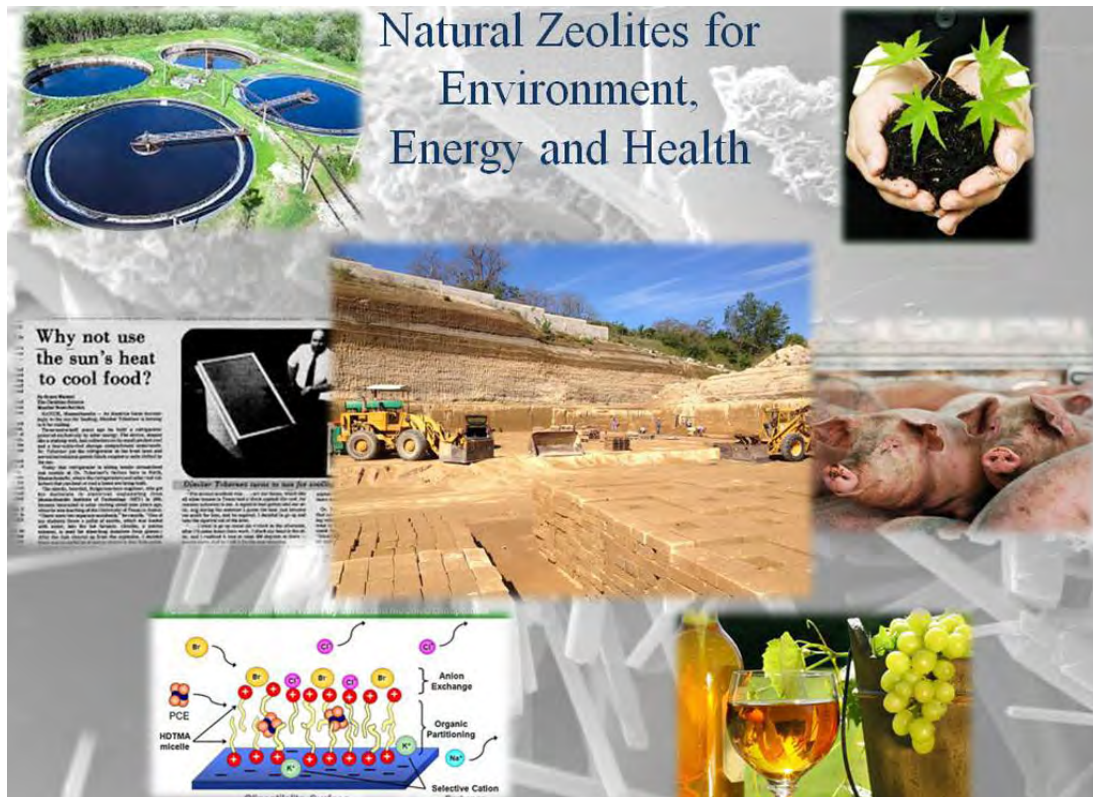
Convenors:

[Chris Greenwell Durham University, UK](#)

[Richard Anderson Hartree Centre, STFC, UK](#)

[Randy Cygan Sandia National Laboratories, New Mexico, USA](#)

# Natural zeolites – environmental, biomedical and industrial applications



Natural zeolites are microporous hydrated aluminosilicate minerals having countless technological applications due to their unique physicochemical features such as cation exchange, selective adsorption, molecular sieving, catalysis, etc. As far as cation exchange is concerned, natural zeolites have been largely investigated for ammonia and heavy-metal removal, although modification of these minerals with long-chain cationic surfactants enhances their adsorption properties towards anions and low polar organic contaminants. In addition, they have also recently been considered as carriers of pharmaceutical-active ingredients. This session is designed to promote discussions on these topics but also on other interesting technological applications including water and wastewater treatment, soil remediation, treatment of radioactive waste, as well as application in the veterinarian, pharmaceutical and industrial sectors.

Themes:

[Energy](#)

[Environment and Health](#)

[Materials](#)

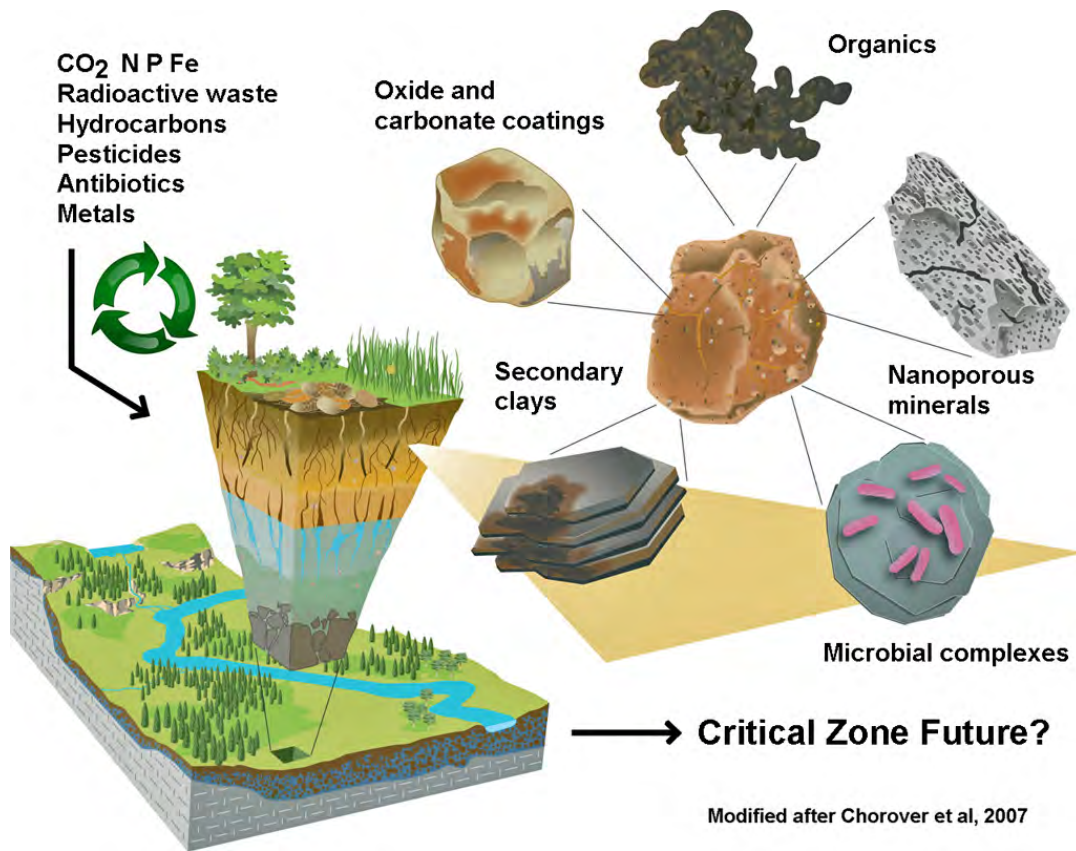
Convenors:

[Aleksandra Dakovic ITNMS, Physico-Chemical Laboratory, Belgrade, Serbia](#)

[Alessio Langella Sannio University, Italy](#)

[Linda Campbell The University of Manchester, UK](#)

# Clays in the Critical Zone: soils, weathering and elemental cycling



The “Critical zone” or CZ, includes the porous places extending from treetops to the bedrock, and more especially soils where organisms interact and shape the Earth’s surface over timescales from seconds to eons. Clay minerals and finely divided oxides are significant players within the CZ. In particular, they are known to be key in the fate of elements (both nutrients - including carbon - and pollutants) and molecules (e.g. pesticides but also drugs such as antibiotics). This session seeks contributions regarding chemical and structural characterization of clay sorption properties, sorption mechanisms of these species on clays, and structural modifications induced by the interactions of clays with these elements and molecules. The session will also welcome contributions that examine, at a more global scale, clays and their role in life-sustaining matters, such as water quality, land use, carbon cycling, soil quality, contaminant transport, weathering and climate change. In essence, ‘How do clays help us to understand CZ functions and how will the CZ change into the future?’.

Themes:

[Environment and Health](#)

Convenors:

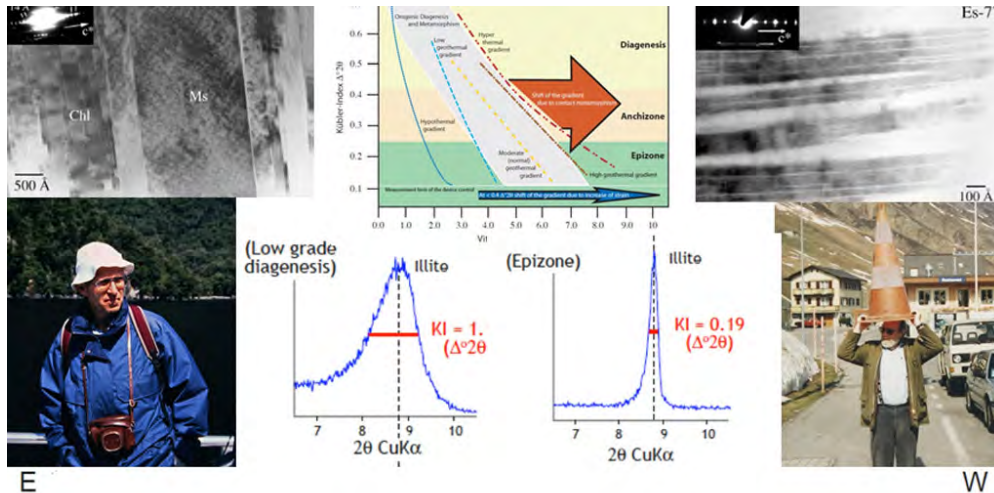
[Paul A. Schroeder University of Georgia, Athens, USA](#)

[Jason Austin University of Georgia, Athens, USA](#)

[Bruno Lanson Univ. Grenoble Alpes, France](#)

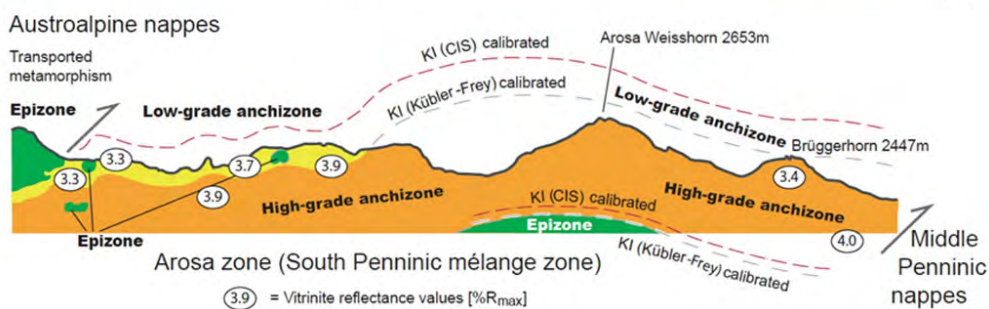
[Steve A Banwart University of Sheffield, UK](#)

# Clay mineral indices in palaeo-geothermal studies, hydrocarbon and geothermal prospection - third Frey-Kübler symposium



E

W



During syn-depositional processes, early and late diagenesis to very-low grade metamorphism (VLGM), alteration and reaction progress with increasing temperature and pressure causes changes in clay-mineral order and clay-mineral association (paragenesis) in sedimentary and volcanic rocks. The evolution of clay minerals with depth during burial and tectonic loading is the principal focus of the symposium. The large volume of fluid involved during diagenesis leads also to drastic changes in rock porosity and to scaling in important geothermal, hydrothermal and hydrocarbon reservoirs rocks or to changes in maturity of hydrocarbons. Recently, VLGM indicators are applied in hydrothermal and geothermal renewable energy resource prospection. All these aspects require a deeper understanding of clay-mineral alteration and reaction progress to predict palaeo- or recent geothermal gradient or reservoir characteristics.

Themes:

[Energy](#)

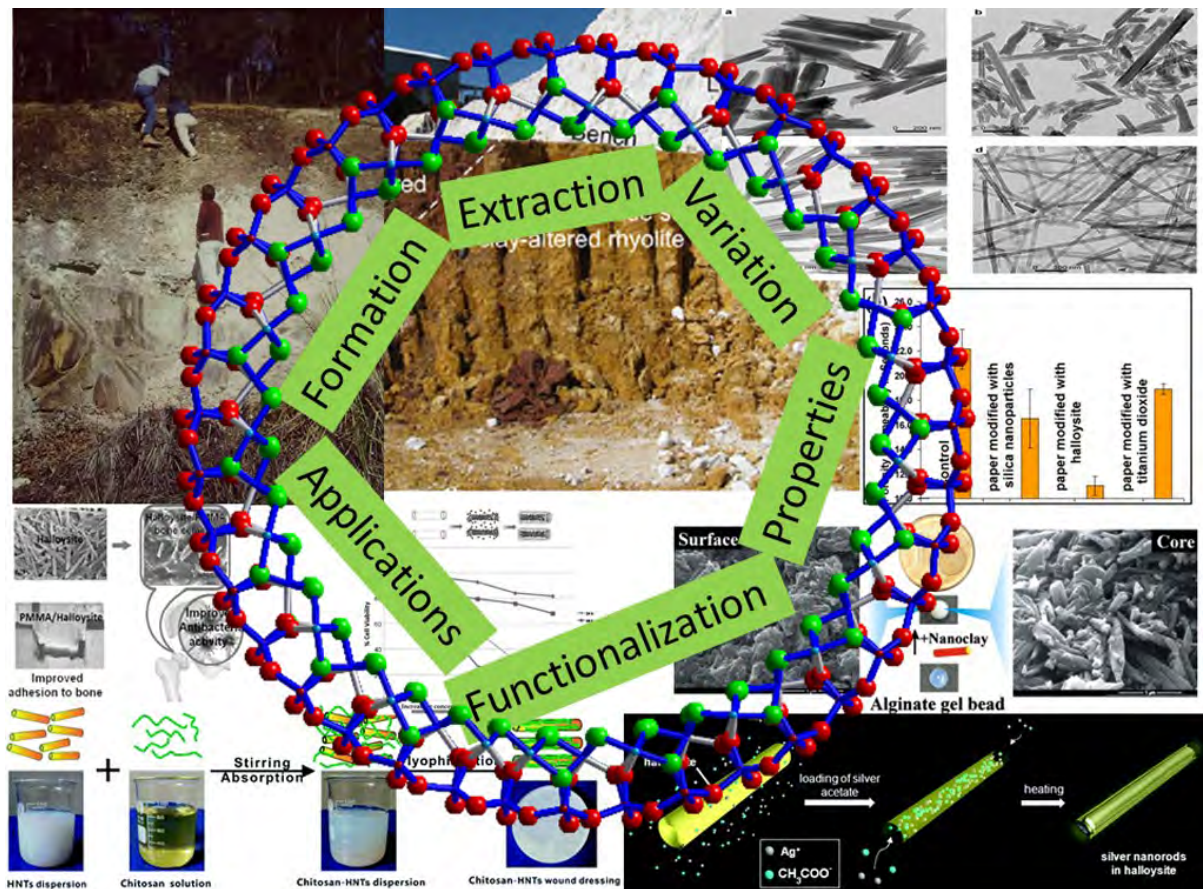
Convenors:

[Rafael Ferreiro Mählmann, Technische Universität Darmstadt, Germany](#)

[Hans Albert Gilg, Technische Universität München, Germany](#)



# Halloysite: a unique, diverse and widely useful natural nanomaterial



Halloysite is a clay mineral whose time has arrived. Until 2006, few papers were published on this mineral. Its main use was as a raw material for ceramics, in place of kaolinite. The approximately 800 papers published since then reflect its recognition as a nanomaterial, especially in nanotubes. These have proved widely useful, including as reinforcing fillers in plastics, as carriers for the controlled internal release of medicines – and of pesticides, and also for immobilizing catalysts. Nonetheless, it remains “a very strange mineral” as was once written. This symposium will discuss its proliferating uses and applications, its mineralogy and occurrence, to bring together scientists involved with all aspects of halloysite.

Themes:

[Environment and Health](#)

[Materials](#)

Convenors:

[Jock Churchman University of Adelaide, Australia](#)

[Pooria Pasbakhsh Monash University Sunway, Malaysia](#)