IMOG Short Courses

The short courses will all be held in the **Ball-Saal** from **13:00-14:30**. No pre-registration is required.

Monday 19th September 2011
Advances in geochemical proxies for methane cycling in the past

Thomas Wagner (University of Newcastle, UK)
Richard Pancost (University of Bristol, UK)
Helen Talbot (University of Newcastle, UK)

This workshop recognizes that we have a quite a range of proxies for temperature and pCO2 but fewer that address biogeochemical processes, including methane cycling. To narrow this gap the workshop will introduce three main aspects:

* Established and novel molecular proxies (BHPs, 13C-depleted hopanoids, ether lipids)
* Case studies from the geological past
* Modelling efforts to quantify pCH4 in the past

With this broad scope we aim to attract a broad paleoclimate community and highlight the challenges and opportunities arising from recent developments in organic geochemistry and other disciplines, especially modeling, building on a brief but solid overview on more technical aspects related to advances in analytical facilities.

Tuesday 20th September 2011
Shale gas

Brian Horsfield (GFZ, Potsdam, Germany)
Ger van Graas (Statoil, Norway)

In the short space of 5-years shale gas has transformed the global energy outlook completely. Risked global shale gas resources have recently been revised upwards to 25,300 Tcf (EIA, 2011) significantly outstripping conventional resource estimates. No shale gas has been produced in Europe yet, but a great many companies are conducting extensive tests in Sweden, Germany, Poland, the UK and elsewhere to assess flow characteristics. Whether this activity signals a bonanza or not will undoubtedly unfold over the next ten years. And while scientific and technological innovations will play key roles in defining that path, it is environmental issues and the level of acceptance by the general public that will make or break shale gas in Europe. This one-hour course is designed for students and teachers alike – the basics of shale gas geochemistry, mineralogy and petrophysics, an overview of prospective shale gas formations in Europe and a look at drilling and fracking methods.

Brian Horsfield is Professor of Organic Geochemistry and Hydrocarbon Systems at the Technical University of Berlin, Germany and research department director at GFZ German Research Centre for Geosciences. He is a member of acatech, the German Academy of Science and Technology. Historical notes - he gained his Ph.D from Newcastle in the late Holocene, worked 9 years with Conoco and Arco in Oklahoma and Texas, fifteen years at KFA in Germany and has been at GFZ since 2001. He is director of the research project Gas Shales in Europe (GASH).

Ger van Graas is a Senior Specialist in Petroleum Systems Analysis at Statoil, Norway. He is currently working in the Unconventional Hydrocarbons group in Statoil's exploration department and involved in

global exploration for new shale resource plays. He has a PhD in Organic Geochemistry from Delft University of Technology and close to 30 years of industry experience in applying organic geochemistry to exploration and production projects. He is Chairman of EAOG.

Wednesday 21st September 2011
Using ToF-SIMS to study biomarkers

Volker Thiel (University of Göttingen)
Sandra Siljeström (SP Technical Research Institute of Sweden, Borås)

Time-of-flight secondary ion mass spectrometry (ToF-SIMS) is a technique designed to analyze the composition and lateral distribution of molecules and chemical structures on surfaces.
A beam of high-energy ions (primary ions) bombards the sample surface, resulting in the emission of secondary ions from the outermost molecular layers of the sample. During the measurement, the primary ion beam is scanned over a selected analysis area and individual mass spectra are recorded from each raster point within this area. The acquired data can then be used to produce (i) ion images, which show the signal intensity of selected secondary ions across the analysis area, and (ii) mass spectra from selected regions of interest on the sample surface.

These capabilities have generated much interest in the use of ToF-SIMS for the characterization of lipids and other molecules at the microscopic (µm-) level. This workshop introduces, from the perspective of an organic geochemist, static ToF-SIMS imaging mass spectrometry as a tool for biomarker analyses. After a description of the ToF-SIMS analysis principles and instrumentation, the quality and evaluation of spectral data is demonstrated using the instrument software. Sample types relevant in geobiology and organic geochemistry encompass soft (cell matter, sediments), hard (microbialites), and liquid (petroleum) materials. The lecture aims to show the potential of ToF-SIMS for organic geochemical applications, considering not only the strengths, but also current drawbacks and limitations for which further development would be beneficial for the field.

Thursday 22nd September 2011
Flow assurance

John Ratulowski (Schlumberger DRB Technology Center Edmonton, Canada)

Flow assurance addresses all the issues that impact our ability to flow reservoir fluids from the reservoir to the refinery. Solids formation and deposition, hydrodynamic problems associated with complex multiphase flow, erosion, corrosion and separation are just some of the challenges commonly assigned to the flow assurance team. The behavior of fluids in wellbores, flow lines, facilities and export lines involve a complex interdependence between thermodynamics, heat and mass transfer and hydrodynamics. It is impacted by fluid composition, pressure, temperature, geometry and flow rate. All of these key parameters with the exception of composition can be addressed largely through design and operation of the system. Therefore, it is produced fluid composition over the life of the project that drives all flow assurance decisions. It is becoming increasingly recognized in the industry the key role that geochemistry plays in determining the range of expected compositions required for optimal flow assurance design. In this short course, we will focus on the most common flow assurance issues: wax, asphaltene, inorganic scales and hydrates. The chemistry and phase behavior, production problems and methods for prevention and remediation with an emphasis on compositional controls will be discussed.

John Ratulowski received his B.Sc. degree in Chemical Engineering from Purdue University and his PhD also in Chemical Engineering from the University of Houston. He has worked for 14 years in the reservoir and facilities engineering departments of the Bellaire and Westhollow Shell Technology Laboratories in Houston. During this time John was involved in thermal recovery projects, equation of state development, physical property and phase behaviour measurement and organic solids measurement and modelling. In 1999, John assumed the role of Vice President – Research for DB Robinson where he continued to work in the areas of phase behavior and flow assurance. Currently, he is research director at Schlumberger's DBR Technology Center in Edmonton Alberta Canada (jratulowski@slb.com).