



Goldschmidt 07



## Goldschmidt 2007 Conference - *"atoms to planets"*

Cologne, Germany, 19-24 August 2007

<http://www.goldschmidt2007.org>

The Goldschmidt Conference is the premier annual meeting in geochemistry, and the Goldschmidt 2007 Conference will be the largest geochemistry conference ever. It will cover the full range of geochemical research, from the formation of the solar system to environmental research, and from biogeochemistry to mineralogy.

### List of Themes

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#### **Theme 01: New Approaches in Geochemistry**

Coordinators: Carsten Münker (muenker@uni-bonn.de); Trevor Ireland (trevor.ireland@anu.edu.au)

#### **Theme 02: Exploiting and Preserving Natural Resources**

Coordinators: Michael Meyer (m.meyer@rwth-aachen.de); Torsten Vennemann (Torsten.Vennemann@unil.ch); Robert J. Bodnar (rjb@vt.edu); Volker Lüders (volue@gfz-potsdam.de)

#### **Theme 03: From Dust to Planets**

Coordinators: Mario Trieloff, (trieloff@min.uni-heidelberg.de ); Andreas Pack (a.pack@mineralogie.uni-hannover.de); Martin Bizzarro (bizzarro@geol.ku.dk)

#### **Theme 04: Early Earth**

Coordinators: K. Mezger (klaush@nwz.uni-muenster.de); R. Frei (robertf@geol.ku.dk)

#### **Theme 05: Earth's Mantle**

Coordinators: A.W. Hofmann (hofmann@mpch-mainz.mpg.de); W.M. McDonough (mcdonough@geol.umd.edu)

#### **Theme 06: Earth's Crust**

Coordinators: F. Holtz (F.Holtz@mineralogie.uni-hannover.de); R. Rudnick (rudnick@geol.umd.edu)

#### **Theme 07: Subduction Processes**

Coordinators: Stephen Foley (foley@uni-mainz.de); Thomas Zack (tzack@min.uni-heidelberg.de); Richard Arculus (rarculus@ems.anu.edu.au)

#### **Theme 08: Geochemical Constraints on Duration of Geologic Processes**

Coordinators: S. Chakraborty (Sumit.Chakraborty@rub.de); S. Mukhopadhyay (Sujoy@eps.harvard.edu)

#### **Theme 09: Biogeochemistry and the Origin and Evolution of Life**

Coordinators: L. Schwark (lorenz.schwark@uni-koeln.de); J.S.S. Damste (damste@nioz.nl)

### **Theme 10: Water in Planetary Systems**

Coordinators: H. Keppler (hans.keppler@uni-bayreuth.de); Bernard Marty (bmarty@crpg.cnrs-nancy.fr)

### **Theme 11: Geochemistry of Surface Processes**

Coordinators: F. v. Blanckenburg (fvb@mineralogie.uni-hannover.de); R.E. Blake (ruth.blake@yale.edu)

### **Theme 12: Atmospheres and Oceans**

Coordinators: A. Eisenhauer (aeisenhauer@ifm-geomar.de); P. Swart (pswart@rsmas.miami.edu); G. Camoin (gcamoin@cerege.fr)

### **Theme 13: Environmental Geochemistry and Mineralogy**

Coordinators: Stephan Weinbruch (dh6d@hrzpub.tu-darmstadt.de); Jörg Matschullat (joerg.matschullat@ioez.tu-freiberg.de); David Vaughan (david.vaughan@manchester.ac.uk)

### **Theme 14: Mechanisms of Geochemical Processes in Nature and Experiment.**

Coordinators: Andrew Putnis (putnis@nwz.uni-muenster.de); Lukas Baumgartner (Lukas.Baumgartner@unil.ch)

### **Theme 15: Applied Mineralogy and Archeometry**

Coordinators: Hans-Joachim Kleebe (kleebe@geo.tu-darmstadt.de); Tom Sharp (tom.sharp@asu.edu)

### **Theme 16: General Symposia**

G01: Analytical geochemistry

G02: Atmospheric geochemistry

G03: Biogeochemistry

G04: Computational geochemistry

G05: Cosmochemistry

G06: Crystallography

G07: Environmental geochemistry/mineralogy

Conveners: Stephan Weinbruch (dh6d@hrzpub.tu-darmstadt.de); Dieter Rammlmair (rammlmair@bgr.de); Hans Ruppert (hrupper@gwdg.de)

G08: Experimental geochemistry

G09: Geochronology

Conveners: Albrecht von Quadt (vonquadt@erdw.ethz.ch); Jan Kosler

G10: Hydrology/Hydrogeochemistry

G11: Hydrothermal geochemistry

G12: Igneous geochemistry

G13: Isotope geochemistry

G14: Marine geochemistry

G15: Metamorphic geochemistry

G16: Mineral deposits



## Sessions relevant to the EuroMinSci community in the Goldschmidt 2007 Conference - *"atoms to planets"*

The Goldschmidt Conference is the premier annual meeting in geochemistry, and the Goldschmidt 2007 Conference will be the largest geochemistry conference ever. It will cover the full range of geochemical research, from the formation of the solar system to environmental research, and from biogeochemistry to mineralogy. Among others, the following symposia are of relevance to the EuroMinSci community:

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### **S23: Deep Earth mineralogy**

Conveners: R. Boehler (boe@mpch-mainz.mpg.de)  
Dan Frost (Dan.Frost@Uni-Bayreuth.de)

Keynote: Renata Wentzcovitch (University of Minnesota)

The physical and chemical properties of the D" layer at the core-mantle boundary govern heat transfer between the core and mantle, which ultimately drives mantle convection. In addition, any chemical reaction between the outer core and D" may influence the chemical evolution of the mantle. This symposium will focus on recent advances in the study of phase behavior, density, melting, and chemical partitioning of deep-earth minerals relevant to the lowermost mantle and metal-alloys relevant to the outer core. Of particular and continuing interest is the origin of the D" layer and related questions of the role of thermal gradients, the post-perovskite phase, partial melting, and core-mantle reactions.

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### **S25: Mantle processes and properties on multiple scales: Observation, experiment, modeling**

Conveners: Gerd Steinle-Neumann (G.Steinle-Neumann@uni-bayreuth.de)

Taras Gerya (taras.gerya@erdw.ethz.ch)  
Chris Ballentine (chris.ballentine@manchester.ac.uk)  
Paul Tackley (paul.tackley@erdw.ethz.ch)

Keynotes: Steve Parman (Durham, UK) *Houtermans Medal, 2007 EAG*  
Jeannot Trampert (Utrecht)

In recent years laboratory experiments and computer modeling on the one hand and geophysical and geochemical observations on the other have crucially contributed to our understanding of Earth's mantle composition, structure and dynamics. Further progress will clearly depend on cross-disciplinary efforts combining approaches from different fields. Therefore the goal of our session is to bring together experimentalists, modelers and "observers" in order to discuss most recent developments concerning mantle processes and to point out directions where different methods can complement each other.

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### **S33: Fluid-fluid equilibria in the crust**

Conveners: Axel Liebscher (axel.liebscher@tu-berlin.de)

Christoph Heinrich (heinrich@erdw.ethz.ch)

Keynote: Andreas Audétat (Bayreuth) *Victor-Moritz-Goldschmidt-Preis 2006, DMG*

Fluids play a fundamental role in the geochemical and geophysical evolution of the Earth. Submarine hydrothermal systems link the chemistry of the oceans with that of the mantle and the oceanic crust. In volcanic systems magmatic fluids affect degassing and eruption style and transport volatile constituents like CO<sub>2</sub>, sulfur and nitrogen species and halogens into the atmosphere. Fluid convection cells in volcanic systems that are fed by meteoric and/or oceanic water efficiently cool the systems and may result in economically important geothermal systems. Within the crust fluids may trigger partial melting, dehydration or alter and metasomatise pre-existing rocks. Around intrusions fluids are important constituents of contact metamorphism. Finally, hydrothermal fluids, which form in a variety of geologic environments, formed most of the Earth's ore deposits.

Geofluids are, however, usually not pure H<sub>2</sub>O but contain significant quantities of dissolved components. Of these, dissolved salts like NaCl and KCl and volatile components like CO<sub>2</sub>, CH<sub>4</sub> and different nitrogen, sulfur and hydrocarbon species are the most important ones. Depending on quality and quantity of the additional components, fluid immiscibility may prevail over large portions of crustal pressure and temperature conditions. Such fluid immiscibility or fluid phase separation is a very efficient way to fractionate and concentrate certain elements. Knowledge of the properties of fluid immiscibility is therefore necessary for any geochemical and geophysical study on the role of fluids in the diverse geological settings. This interdisciplinary session intends to bring together scientists from the diverse geological subdisciplines that work on the various aspects of immiscibility of geofluids in crustal environments. It will draw the bow from low P-T hydrocarbon systems to high P-T metamorphic/magmatic environments, from field to experimental studies, and from basic to applied/economic geoscience. The session is predated by an MSA/GS Short Course on "Fluid-fluid equilibria in the crust - petrology, geochemistry, economy".

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### **S40: From field observation to experimental petrology and back in memory of Werner Schreyer**

Conveners: Walter Maresch (walter.maresch@rub.de)

Friedrich Seifert (fritze.seifert@web.de)

Ed Grew (esgrew@maine.edu)

Keynote: Barbara L. Dutrow (University of Louisiana, USA)

Werner Schreyer combined astute observations in the field with precisely planned laboratory experiments, and thereby opened new avenues of research. His experimental work in the 1950's and 1960's in the MgO-Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub>-H<sub>2</sub>O system led him and his coworkers to lay the foundations for our modern understanding of the metamorphism of pelitic rocks at high and ultrahigh pressures. However, Werner's oeuvre spanned the whole spectrum from classical field work in structural geology to theoretical and experimental metamorphic petrology to detailed crystal chemistry and mineral physics of a wide range of minerals and their synthetic analogs. This symposium is keyed to Werner's seminal achievements in high-pressure and ultra-high-pressure metamorphism. Nevertheless, we welcome all contributions that will help to highlight the singular contributions of this respected scientist to petrology and mineralogy overall.

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### **S62: Geochemistry of biominerals**

Conveners: Dorrit E. Jacob (jacobd@uni-mainz.de)

Anne L. Cohen (acohen@whoi.edu)

Keynote: Thomas Tütken (University of Mainz)

Much of what we know about Earth's climate history comes from information stored within biogenic skeletons. While nucleation and growth of biogenic minerals are ultimately governed by the same physical controls as inorganic mineralization, they occur within a space and medium that is created, maintained and separated from the external environment by the organism. In addition, organic materials play an important role in the nucleation and growth of many biologically produced minerals. For these reasons, the morphology, crystallography and composition of crystals produced within biological systems may be quite different from those produced abiotically. Through advances in nanotechnology, molecular biology, and geochemistry, scientists across many disciplines are discovering and quantifying the factors that initiate and control nucleation, concentrations of constituent ions, regulation of growth, chemical composition, and shaping of complex morphologies. Advancing knowledge of these processes is paramount to the understanding of the geochemistry of biominerals and is the basis for using them as precise witnesses of the climate of the past. We invite papers from field, laboratory, and theoretical studies related to this rapidly developing research arena. The session is not restricted to biological systems. Papers reporting studies of abiogenic systems that are pertinent to understanding biomineralization processes are also encouraged.

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#### **S64: Earth's deep water cycle**

Conveners: Erik Hauri (hauri@dtm.ciw.edu)

Hans Keppler (Hans.Keppler@Uni-Bayreuth.De)

Keynote: Erik Hauri (Washington)

The Earth's mantle is a major water reservoir in dynamic exchange with the surface of the planet over geologic time. We invite contributions from field and laboratory studies aiming at quantifying the distribution of water in the mantle, the rate of water subduction and degassing, as well as studies on the influence of water on mantle dynamics and melt generation. Presentations of numerical models that aim to integrate several of these aspects are particularly welcome.

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#### **S66: Fluid properties at high pressure and temperature**

Convener: Craig Manning (manning@ess.ucla.edu)

Keynote: Thomas Driesner (ETH Zürich)

Water-rich fluids play a fundamental role in the physical and chemical evolution of planetary bodies. In the solid Earth, aqueous solutions mediate geochemical cycling and tectonic processes. High P and/or T fluids have also participated in the physical and chemical evolution of Mars, the icy satellites of Jupiter and Saturn, and asteroid parent bodies. This session will focus on experimental and theoretical constraints on aqueous geochemistry at high P and/or T relevant to a wide range of planetary problems. We welcome contributions involving fluid equations of state, speciation, isotope geochemistry, kinetics and thermodynamic and physical properties.

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#### **S80: Biomineralization in the marine realm: Processes and signatures in natural and model systems**

Conveners: J. Erez (erez@vms.huji.ac.il)

M. Dietzel (dietzel@egam.tu-graz.ac.at)

C. Rollion-Bard (rollion@crpg.cnrs-nancy.fr)

Keynote: Howard Spero (Davis, CA)

Biominerals are abundant throughout the ancient rock record, as well as modern sediments, and water columns, and are major components of global biogeochemical cycles. Chemical and isotopic signatures within biominerals are chemical and physical indicators for the environments from which they formed; however, interpreting these signatures is difficult because the

physiological environment of the organism may differ from extracellular conditions. Unravelling these vital effects requires an understanding of fundamental pathways and processes of biomineralization. Analysis of natural systems continues to yield valuable information about biomineralization processes. Complementary insights into how mineral formation occurs within living organisms can be gained by laboratory culturing and model systems that are investigated by experimental and theoretical means. With this approach, the physical basis of biomineralization may be elucidated and the superimposed effects of biological processes on environmental proxies may be quantified. We encourage contributions from field, laboratory, and theoretical studies related to this rapidly developing research area.

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### **S87: Microbial mineralization: from environmental processes to new technologies**

Conveners: Terry Beveridge (tjb@uoguelph.ca)

Jon Lloyd (jon.lloyd@manchester.ac.uk)

David Vaughan (david.vaughan@manchester.ac.uk)

Keynote: Lynne Macaskie (Birmingham)

The activities of micro-organisms can have a dramatic effect on geochemical processes and much can be learnt from our attempts to understand the natural systems. Increasingly, such studies are being directed towards potential applications in new technologies concerned not only with environmental cleanup but also with energy generation, industrial processing, and fabrication of new materials.

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### **S91: Nano-scale investigations of mineral-water interface processes**

Conveners: Guntram Jordan (guntram.jordan@lrz.uni-muenchen.de)

Andrew Stack (andrew.stack@eas.gatech.edu)

Keynote : William H. Casey (University of California, Davis)

Processes at mineral-water interfaces impact a huge range of length scales. To name just a few, global cycling of chemical elements is affected by mineral weathering or precipitation, local environmental conditions are influenced by the sorption onto mineral surfaces, and properties of composite materials are influenced by the growth morphology of crystals. However, despite this huge range of impact, all these processes take place at mineral-water interfaces at the molecular scale. Recent advances in experimental techniques allow direct access to these interfacial processes with a nano-scale resolution. First principles computational methods can now be used in direct comparison to these experimental observations. Therefore, this session aims at exploring new and exciting work done at, or relevant to, the mineral-water interface from both computational and experimental perspectives.

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### **G06: Crystallography**

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### **G07: Environmental geochemistry/mineralogy**

Conveners: Stephan Weinbruch (dh6d@hrzpub.tu-darmstadt.de)

Dieter Rammlmair (rammlmair@bgr.de)

Hans Ruppert (hrupper@gwdg.de)

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### **G15: Metamorphic geochemistry**