

# **Report on the 17<sup>th</sup> Annual V.M. Goldschmidt Conference 19<sup>th</sup> – 24<sup>th</sup> August 2007, Cologne, Germany**

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The 17<sup>th</sup> Goldschmidt Conference was held in Cologne, and I was given the opportunity to visit the largest and most important conference for geochemistry, cosmochemistry, and mineralogy. More than 2000 scientists met in Cologne, which made this conference the largest Goldschmidt Conference so far. Accordingly, the number of participations was also very impressive: The organisers received a total number of 2360 abstracts, thereof 1270 oral presentations and 1090 posters, covering a wide variety of very interesting topics.

Due to the fact that the large number of oral presentations had to be run in 15 parallel sessions each day, there were always at least two talks of interest being given simultaneously. There was also only little time to discuss the posters, as the posters did not remain up all week but were presented in three enormous poster sessions in the late afternoon.

Nevertheless, this conference has been an excellent opportunity for me to get an overview of the range of research in geosciences. The sessions that I attended had a good balance of topics and an excellent standard of presentation from all the speakers. The poster sessions were an ideal complement to the oral sessions giving time for lots of fruitful discussions.

The organisers did a great job in handling the large number of delegates. Due to the many markers, it was very easy to find the different lecture rooms and to quickly change from one session to another. Refreshments and lunch were provided throughout the whole time of oral presentations at different locations. During the icebreaker party and the poster sessions, beer and brezels were served.

Each day, the scientific program started with a plenary lecture of the topic 'Making the Earth in Five Days'.

In his talk, Alessandro Morbidelli showed how geochemical data derived by dynamical modelling of the accretion of terrestrial planets can be used to extrapolate the properties of planetary disks and giant planets in foreign solar systems. This information can also be used to search for Earth-like planets.

Paul Asimow gave a brief review of the times and depths in Earth history where magmatic differentiation has determined planetary evolution. He also gave an overview about thermodynamic tools which, together with experiments, can help to construct appropriate phase diagrams for interpreting these magmatic processes.

John Valley reviewed the observation of zircons in more than 4 billion year old rocks from Australia which can give us a picture of the surface temperatures of the earliest crust and the first oceans that could have been hosts for early life on Earth.

James Kirchner showed how physical erosion and chemical weathering may shape our living environment and, thus, the Earth's climate. He listed a number of geochemical techniques, in particular cosmogenic nuclide methods, which can be used to explore the changing of the Earth's surface.

Finally, Jochen Brocks gave an insight in early ecosystems on Earth, which can be reconstructed by the investigation of molecular fossils in billion year old sedimentary rocks. He pointed out, that still many of these biomarkers are yet unknown, so a lot of work still has to be done.

Of particular interest for the work for my own Ph.D. thesis were the sessions dealing with hydrothermal fluids and melts. The aim of this project is the elucidation of cationic and anionic ordering in the mineral phlogopite and the incorporation of fluorine into this structure. This mineral is formed in late stages of the magmatic progression, when fluids are present and the melt is enriched in incompatible elements. Thus, it is important for me, to get a general idea of the latest results concerning this subject as well as the different techniques to study such systems.

On Monday afternoon, the oral part of the symposium 'S04: Experimental Techniques for the Study of Hydrothermal Fluids and Silicate Melts' took place. The first keynote lecture was given by Stephen R. Sutton who reviewed the wide field of experimental techniques for the investigation of the properties of fluids and melts. Later on, a second keynote lecture given by Christian Schmidt followed. He showed the usefulness of hydrothermal diamond anvil cells (DACs) for the study of fluids and melts by giving examples of combining DAC experiments with in-situ optical microscopy, X-ray methods like EXAFS, XRF, and XAS, laser-induced phonon spectroscopy, Brillouin spectroscopy, and IR spectroscopy.

The session 'Earth's Deep Water Cycle' ran parallel to the session mentioned above. Here, the nominally anhydrous minerals (NAMs) were subject of many talks. In the final talk of the session, Simon Kohn introduced the issue of investigating nominally fluorine-free minerals (NFFMs) similar to the NAMs. He pointed out, that this was an important issue, as only 4-6 % of the subducted fluorine returns to the surface. Due to the lack of knowledge about the incorporation of fluorine in mantle minerals up to now, it is not clear, what kind of effects this could have on the chemical and physical properties of the mantle.

As a mineralogist, I was also very interested in sessions concerning the composition and mineralogy of the deep earth. One of these sessions was 'Earth's Energy Equation – Radioactive Elements and Heat Flow in the Core and Mantle'. At the moment there seem to be two major issues being discussed in this field. The first one is the role of potassium as a potential heat source in the core. The speaker's results were highly contradictory, so that the question, whether there could be enough potassium in the core to explain the large present day heat flow or not, could not be answered. Concerning the second major topic, most of the scientists agreed that there should be a layer of higher buoyancy in the mantle, just above the core-mantle-boundary. However, it is not clear whether this is due to element partitioning into the core at the "D"-layer or due to partial melting in this region.

A similar topic was covered by the session 'Deep Earth Mineralogy' on Tuesday morning. Some of the very interesting subjects dealt with, were the effect of iron spin transition in magnesiowüstite and perovskite on the properties of the lower mantle (e.g. electrical conduction), the evidence respectively the lack of evidence for iron partitioning and self-oxidation of the lower mantle, as well as the crystalchemical aspects and high-pressure behaviour of different compounds with perovskite or post-perovskite structures.

A highlight for me was the session 'From Field Observation to Experimental Petrology and Back in Memory of Werner Schreyer'. From 1966 to 2006, Werner

Schreyer has been a substantial part of the university in Bochum, where I am working now. Moreover, as an undergraduate student in Heidelberg, I have been working in Prof. Lattard's working group, who once was one of Schreyer's students. Thus, I already heard a lot about this outstanding scientist without having met him personally. Unsurprisingly, many of the speakers have been students of Werner Schreyer.

At first, Walter Maresch, who is now professor for petrology in Bochum, gave the audience an insight in Schreyer's personality. Maresch got to know Schreyer as a 'hard task-master' who has been 'hardest on himself' but, nevertheless, knew how to enjoy life. Barbara L. Dutrow talked about the outstanding lab that Werner Schreyer built up in Bochum and the magnificent working conditions he offered for many young American scientists he invited to Germany. Both agreed that the field trips Schreyer organised are most memorable, because they were not only scientific field trips but also cultural events.

The following speakers gave a brief review of Werner Schreyer's most important achievements and the different issues that he has worked on, especially the stability of the mineral cordierite as well as all the minerals that can occur with respectively instead of cordierite.

The last day I got the opportunity to listen to sessions with completely different, but nevertheless very interesting topics as the ones listed above and went to the sessions 'Space Missions: Probing Comets, Asteroids, Planets & Moons' and 'Geochemistry of Biominerals'.

Last, but not least, I was given the possibility to present the first results of my own work as a poster presentation with the title 'Ordering of the Al cation distribution in the octahedral sheets related to the ordering of Al in the tetrahedral sheets of phlogopite studied by  $\{^1\text{H}\} \text{ }^{29}\text{Si}$  CP MAS NMR spectroscopy', which has been well received. As it has been half a year now that I have been working in this project, this was the perfect time to discuss the first results and to get new impulses for further investigations. I also had the opportunity to talk to scientists who have been working on similar topics in other mineral systems and to learn from their experience.

To sum up, I can say, that attending my second international conference was an extremely beneficial time for me. I was able to establish new scientific contacts and learn more about the world of geochemical research by highly appreciated discussions with many scientists from all kinds of scientific fields. I am very grateful to the European Science Foundation (ESF) for their substantial financial support to attend this conference.