7th INTERNATIONAL SYMPOSIUM ON APPLIED ISOTOPE GEOCHEMISTRY

The Applied Isotope Geochemistry Working Group held its 7th International Symposium in Stellenbosch, South Africa, from 10 to 14 September 2007. The event was attended by over 110 scientists from 26 different countries in all the continents (except Antarctica!). Four days of talks were held in the university's music conservatory, and a mid-conference field trip was conducted around the Cape Peninsula, including a visit to Cape Point and the Cape of Good Hope. The talks covered a diverse range of themes, including paleoenvironments, organic biogeochemistry, marine and coastal systems, metamorphic and igneous systems, natural and anthropogenic pollution, tracers of ecosystem processes, atmospheric connections, isotope hydrogeochemistry, and novel techniques, approaches and perspectives. Ten keynote presentations complemented these sessions.

AIG7 field trip participants

Anita Andrew, Ben Mapani, Jodie Miller (AIG7 organiser) and Torsten Vennemann

After the conference, 38 delegates participated in a six-day field trip to Namibia. This whirlwind field trip focused on various geological, biogeochemical and environmental problems across west-central Namibia and as far north as the world-famous Etosha National Park, and on how isotope research has contributed to our understanding of these issues. Sites visited included the desert landscape outside of Swakopmund, the Brandberg igneous complex, the salt works on the west coast, the hydrological environments of the Swakop and Omaruru rivers, the glacial deposits of the Otavi Group and the Tsumeb Pb-Cu-Zn mine. In addition to the scientific program of the field trip, participants spent a day viewing game at Etosha National Park, where the elephants, rhinoceroses and lions stole the show.

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EMU SCHOOL – NANOSCOPIC APPROACHES IN EARTH AND PLANETARY SCIENCES

In the last decade the geoscientific community has benefited from a number of new technical developments regarding the preparation and analysis of materials on the nanoscale, which were sometimes even driven by geo- and cosmoscientific research projects. Consequently, the 9th EMU School, which took place in Munich from August 12 to 17, 2007, was dedicated to nanoscopic approaches in Earth and planetary sciences. The school was organized and held by Frank E. Brenker (U. Frankfurt, Germany) and Guntram Jordan (U. München, Germany). Additional invited lecturers were Richard Wirth (GFZ Potsdam, Germany), Ute Golla-Schindler (U. Münster, Germany), Ian Lyon (Manchester U., UK), Baerbel Winterholler (MPI for Chemistry, Mainz, Germany), Smail Mostefaoui (Museum National d'Histoire Naturelle, Paris, France), Laszlo Vincze (Ghent U., Belgium), Carlos M. Pina (U. Complutense, Madrid, Spain) and Udo Becker (U. Michigan, USA). The school focused on the methods resolving composition and structure on the nanoscale, such as secondary ion mass spectrometry (SIMS) including the new Nano-SIMS, transmission electron microscopy (TEM), the new focused ion beam thinning (FIB) technique, electron energy loss spectroscopy (EELS), energy-filtered TEM to measure and map valence states of iron and other ions, the most recent developments towards nanoscale resolution in synchrotron radiation, and methods dedicated to mineral surfaces like atomic force microscopy (AFM) and scanning probe microscopy (SPM). Related to the latter topic, theories of surface reaction kinetics and computational methods to simulate and understand properties of nanoscaled features and materials were also introduced. The lectures were in general of high quality and provided an excellent and up-to-date overview of nanoscaled analytical methods and their potential applications.

The audience was comprised of about 50 young researchers from 14 different, mostly European, countries. Poster presentations allowed the participants to show their own research fields and professional interests. The schedule provided ample time for discussions among the lecturers and participants. The scientific backgrounds of the lecturers and participants spanned the whole range of geosciences, e.g. mineral-surface science, cosmochemistry, biogeoscience, volcanology, rock physics, metamorphic petrology. These varied research interests resulted in inspiring interdisciplinary discussions, demonstrating the importance of the development of new techniques, in particular those that enable the investigation of materials with a high resolution. The contents of the lectures will be summarized in a new book in the EMU Notes series, which will be published probably during 2008. I look forward to receiving my copy of this up-to-date reference book on nanoscaled analytical methods.

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WORLD'S LONG-TERM SOILS RESEARCH BASE SUPPORTED BY WORKSHOP

To promote and expand the world's long-term soil-research base, a workshop was convened in December 2007 at Duke University and the Center for Environmental Farming Systems in North Carolina, USA. The workshop formally established a global network of long-term soil-research studies, several of which have been in continuous operation since the 19th century. Workshop participants study soil and ecosystem change in Africa, Asia, Australia, Europe, and the Americas.

The workshop featured the proposition that soil studies spanning decades are key to answering some of the most significant questions faced by humanity today:

- Can soils more than double food production in the next few decades?
- How is soil interacting with the global carbon cycle and climate?
- How can land management minimize its adverse effects on the environment and improve soil's processing of carbon, nutrients, wastes, toxic elements, and water?

Comprehensive research from long-term experiments provides direct observations of soil processes and change that are evident only after years and decades. The data from these decadal experiments are invaluable for improving the quality of human life and that of the environment.

An advanced-format website supports the newly established network of long-term soils research and connects more than 150 long-term studies with researchers, teachers, and students from around the world. The advanced website originated in a graduate class at Duke University, and it encourages scientists to work together more closely and in ways unknown even in the recent past (http://ltse.env.duke.edu). Workshop participants are enthusiastic about the future of cross-site research that this new networking promises.

At the workshop, new results were presented from long-term studies of soil fertility, chemical contamination, crop production increases and declines, greenhouse gas emissions, and water quality, all demonstrating and quantifying soils' susceptibility to change.

Dr. David Powlson of Rothamsted Research, England, and a pioneer in research that uses data from multiple long-term soil experiments, challenged participants with the notion that there is great short-term potential for cross-site studies to advance the science of sustainability. Dr. Henry Janzen of the long-running Lethbridge field studies in southern Alberta, Canada, vigorously argued that new long-term studies are needed to meet the growing economic and environmental demands being placed on soils now and in the next few decades.

Participants were particularly concerned about crop declines observed in several long-term experiments. Research on intensively managed rice (an agro-ecosystem that currently feeds more than two billion persons) indicates yield declines in several locations, declines attributed to a variety of causes, some of which involve unexpected changes in the soil. More-recent studies suggest that adverse climatic changes, such as an increase in night temperature, could be responsible for declining rice and wheat yields.

Graduate students and scientists from Duke University, University of Georgia, and the U.S. Forest Service sample long-cultivated plots to explore effects of management on the biota that drive soil decomposer systems, from macroinvertebrates such as earthworms, to microinvertebrates such as mites, and microorganisms such as fungi and bacteria.

Some of the longest-running soil experiments in the world are at Rothamsted Research in southern England. For example the Park Grass experiment tests soil and plant changes since the 1850s in response to hay harvest-treatments and a variety of organic and inorganic chemical amendments. Drs. Nico Van Breemen and Jo Smith are shown examining upper layers of soil in a high N-addition plot. PHOTO: DANIEL RICHTER

Participants also had grave concerns about the poor funding support for long-term soil studies. Not a few long-term studies operate without stable institutional support and remain productive only by the persistence of individual scientists. Several highly productive long-term experiments have even been abandoned in recent years, including important studies in Africa and South America.

Coincident with the Duke workshop on long-term soil studies, *Nature* magazine of 6 December featured papers that emphasize the importance of long-running measurements of the Earth's environment. In a quote repeated several times during the soils workshop, the *Nature* editorial proclaimed, "Data sets encapsulating the behavior of the Earth system are one of the greatest technological achievements of our age – and one of the most deserving of future investment."

According to workshop organizer Dr. Daniel Richter, a professor of soils and ecology at Duke, "Long-term records are key to predicting the weather, air pollution, river floods, and wildlife populations. Similarly, long-term soil observatories need explicit and much greater support not only to improve our rapidly intensifying management of land and water, but also to better manage environmental change."

The workshop concluded that in the short-term, researchers and students should make the most of results from ongoing long-term experiments. In the words of Dr. Ishaku Amapu, a professor of soil fertility from northern Nigeria who studies a continuous cropping experiment that began in 1950, "We need to make our long-term experiments work harder."

Such long-term research requires long-range planning, and workshop organizers invite interested scientists, students, and the public to join this international effort. Organizers have funding support from the USA's National Science Foundation's Research Coordination Network Program and Critical Zone Exploration Network, the United States Department of Agriculture, and Duke University for five yearly meetings.

Daniel deB. Richter
on behalf of 2007 Global Soil Change Workshop Participants