

MEETINGS

Building Critical Zone Research Cyberinfrastructure

Critical Zone Exploration Network Data and Information Systems Workshop; State College, Pennsylvania, 17–18 September 2007

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Biological, physical, and chemical processes transform bedrock and sediments into soil at the Earth's surface. All terrestrial life on Earth is supported in the aptly named "critical zone" (CZ), where air, water, rock materials, and biota interact. The CZ is bounded at the top by the vegetative canopy and at the bottom by the lower limits of groundwater. Processes within this zone regulate the transformation of minerals, solubilize nutrients for biota, buffer toxins, create water pathways, and ultimately sculpt the landscape on which we live. Forty scientists from many disciplines attended a workshop recently at Pennsylvania State University to discuss needs for data and information systems to investigate the CZ.

This workshop grew from an international initiative for scientists interested in the CZ (Critical Zone Exploration Network, or CZEN). The U.S. National Science Foundation (NSF) has recognized the importance of CZ research with support for eight

seed sites within CZEN (www.czen.org) and three proposed critical zone observatories (CZO).

Workshop attendees included representatives of the CZOs recommended for NSF funding, CZEN seed sites, the CZEN steering committee, NSF, cyberinfrastructure specialists, and CZEN students funded by NSF to work abroad. Workshop attendees primarily addressed the question, What measurements should be made at all CZ sites to allow cross-site comparison and better understanding of the CZ? In particular, the group considered measurements to address questions identified in earlier CZEN workshops:

1. How do processes in the critical zone control fluxes of carbon, particulates, and trace gases between land and atmosphere?
2. How do biogeochemical processes at critical zone interfaces govern long-term sustainability of soil and water resources?
3. How do processes in the critical zone that support and nourish ecosystems change over geologic and human time-scales?

4. How do weathering processes affect the establishment of the critical zone, and how is this weathering engine perturbed by global environmental change?

Working groups each considered data needs for one of the science questions assuming a hypothetical site network receiving generous funding. The groups converged on a list of ~50 measurements spanning from chemical to meteorological to hydrological to biological (see list at http://www.agu.org/eos_elec or http://www.czen.org/17Sep07_results). Conducting all measurements at all sites is beyond the capabilities of the NSF CZO and the CZEN seed sites. It remains for the community to prioritize and focus these measurements. Significantly, however, the measurement "wish lists" from the working groups that addressed different science questions showed substantial overlap.

The workshop was promoted by CZEN, a growing network of people, sites, tools, and ideas investigating dynamics of the critical zone. CZEN is developing an ontology for a consistent metadata and cyberinfrastructure system. Further information concerning CZEN and this workshop can be found at www.czen.org.

The full text of this meeting report can be found in the electronic supplement to this *Eos* issue (http://www.agu.org/eos_elec/).

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Attracting, Retaining, and Engaging Early Career Scientists

Young Scientists Event, IUGG XXIV General Assembly; Perugia, Italy, 10 July 2007

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This young scientists event was organized to engage younger scientists with the International Union of Geodesy and Geophysics (IUGG) and to provide a specific forum to express their views at the General Assembly. It comprised a panel discussion chaired by Kate Heal and with three young geosciences panelists (Masaki Hayashi, University of Calgary, Canada; Kalachand Sain, National Geophysical Research Institute, Hyderabad, India; and Simona Stefanescu, National Meteorological Administration, Bucharest). The group, which had identified several topics relevant to young geoscientists, presented their views in open discussion session. Thirty IUGG conference attendees were present.

The first topic discussed was a concern that geoscience research is not attracting and retaining the most talented young people. The panelists and audience identified several causes of this problem, including

limited exposure to geosciences in primary and secondary education, lack of suitable role models, low awareness of the societal relevance of geosciences, and higher salaries in industry. While individual geoscientists should take every opportunity to raise awareness of the value and interest of geosciences, it was suggested that existing conferences should include sessions to support educators and the dissemination of geoscience teaching tools.

With the increasing interdisciplinary nature of much geoscience research, the second topic addressed was how to best prepare young scientists for this. Strong arguments were made for first becoming an expert in one area but developing flexibility and awareness for interdisciplinary group work as auxiliary skills. A good grounding in mathematics was considered important to assist communication between different scientific disciplines, but it is probably also important that mathematics be taught

within an applied context so that its relevance is clear.

The benefits of studying abroad were also noted. Symposia focusing on big topics, such as climate change, that can be addressed only by multiple disciplines could also foster interdisciplinary research.

The final discussion topic was proposed by IUGG president Uri Shamir and addressed what IUGG and young scientists can do for each other. Initially this appeared to be a call to involve younger researchers to ensure the ongoing operation of IUGG, but passionate comments from Shamir made it clear that the issue is far broader. Many of the senior scientists present cared very strongly about fostering the careers of younger scientists for the good of the individual and the geoscience community, although this is perhaps not realized by younger geoscientists. An important first step for IUGG (and other geo-organizations) to increase interaction with young scientists is more engagement from younger researchers themselves. However, judging from the low turnout of younger scientists at this meeting (only 20% of the audience), this is a challenge in itself.

The event concluded by identifying actions to increase the engagement of younger