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# MEETING

## Advancing the Emerging Field of Hydropedology

**First International Conference on Hydropedology;  
University Park, Pennsylvania, 28–31 July 2008**

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Both soil science and hydrology are at a critical threshold of exploring breakthroughs. Synergies are expected by bridging classical pedology with soil physics, hydrology, geomorphology, and other related bio- and geo-sciences to address complex soil and water interactions across spatiotemporal scales. Holistic study of the Earth's critical zone (i.e., the critical interface between the surficial solid Earth and its fluid envelopes, which ranges from the top of vegetation to the bottom of aquifers) demands interdisciplinary systems approaches to tackle a wide array of environmental, ecological, agricultural, geological, and natural resource issues of societal importance.

In this spirit, and aiming to advance the emerging field of hydropedology, the first international conference on hydropedology was held at Pennsylvania State University (Penn State) with the theme "Water and Soil: Key to Sustaining the Earth's Critical Zone." The International Union of Soil Sciences'

Working Group on Hydropedology organized this meeting, with main sponsorships from the U.S. Department of Agriculture's National Research Initiative and Penn State.

The conference attracted 145 participants from 20 countries. A number of leading scientists from diverse fields presented their perspectives on various hydropedologic issues. The conference began with five invited keynote presentations that summed up overarching goals. The subsequent presentations were grouped into (1) emerging concepts and theories; (2) frontiers of integrated and multiscale models; (3) advanced monitoring, sensing, mapping, and visualization of the subsurface; (4) integrated studies of the critical zone; and (5) cutting-edge applications. Poster sessions, breakout discussions, and evening specials were also included. The fourth-day field trip included a visit to the Shale Hills Critical Zone Observatory, a visit to Kepler Farm to see precision agriculture practices in relation to hydropedology, a look at Penn State's long-operating

"living filter" (which uses natural soils for filtering treated wastewater), and a tour of a site that shows the impacts of exposed geological pyrite on water quality.

Through presentations and discussion, it became clear that the main goal of hydropedology is to understand interactive hydrologic and pedologic processes across scales and their impacts on biogeochemical cycling and ecological functioning. Two fundamental questions are (1) How do soil architecture and the distribution of soils over the landscape exert a first-order control on hydrologic processes and the associated biogeochemical and ecological dynamics? (2) How does landscape water, and the associated transport of energy, chemicals, and sediment by flowing water, influence soil genesis, evolution, variability, and functions?

An initiative to foster a global alliance for monitoring, mapping, and modeling the critical zone was proposed, calling for a networked long-term recording of our land's "blood pressure," temperature, respiration, and other vital signs of global land change. While often hidden underfoot, soils are fundamental to the Earth's ecosystems and the sustainability of human society. Therefore, serious efforts must be taken to monitor soil change and its diverse functions over space and time.

The conference contributed to the International Year of Planet Earth celebration. A book and a special issue of two journals will publish selected papers. A DVD containing the conference presentations,

posters, videotapes, and photos will be produced. The second such conference is planned for 2012 in Germany. Between now and then, a dedicated Web site (<http://hydropedology.psu.edu/>) will be used to maintain communications to the community.

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

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