

Special Issue of *Vadose Zone Journal* (A unique international publication outlet for interdisciplinary research and the assessment of the biosphere, with a focus on the vadose zone. Recognized as a Rising Star in the field of Geosciences by Thomson Reuters' Essential Science Indicators)

Interdisciplinary Science in Critical Zone Observatories

Guest Editors: Henry Lin, Jan Hopmans, and Dan Richter

Scope and Objective

The Critical Zone, defined by the National Research Council as “*a heterogeneous, near surface environment in which complex interactions involving rock, soil, water, air and living organisms regulate the natural habitat and determine availability of life sustaining resources,*” provides a unifying framework for integrated studies of the near-surface terrestrial environment. This most heterogeneous and complex region of the Earth (ranging from the vegetation top down to the aquifer bottom) provides a fertile ground for interdisciplinary research.

In recognition of the integrated study of the Critical Zone as one of the most compelling research areas in Earth sciences in the 21st century, the National Science Foundation funded three Critical Zone Observatories (CZOs) in 2007 “*that will operate at the watershed scale and that will significantly advance our understanding of the integration and coupling of Earth surface processes as mediated by the presence and flux of fresh water.*” In 2009, three additional CZOs are funded. Meanwhile, similar efforts are being pursued in other countries, such as German Helmholtz Association’s TERrestrial ENvironmental Observatories (TERENO) and the EU’s recently-funded CZOs. Interests have also emerged in the community to forge independently conceived observatories into a network from which broader understanding—larger spatial scales, cross-site comparisons, and deeper insights—may be gained. The value of long-term monitoring is also clearly recognized, as in this time of accelerating global change, continuous observations of the Critical Zone are essential to sustainable terrestrial environment.

Water-related research requires enhanced understanding of processes at environmental interfaces, approaches for integrating across scales, and improved coupling of biological and physical processes. Collectively, an integrated, interdisciplinary, and multiscale effort will advance our ability to forecast and plan for changes and to address critical societal issues. The CZOs, intended to be community resources, accommodate interdisciplinary research interests, including the hydrologic cycle, the geochemical cycle, the carbon cycle, the nutrient cycle, gas exchange, erosion and deposition, weathering, pedogenesis, life processes (macro- and microbial communities, including plants and animals), and human impacts (land use and management).

Given the growing interests in Critical Zone science and the need to demonstrate exciting science that can be generated from the CZOs, this Special Issue of *Vadose Zone Journal* intends to stimulate research and discussions from the CZO community and beyond to showcase novel experimental and modeling efforts, improved ideas of cross-cutting science, and the real-world observations or predictions of Critical Zone structure and functions across scales. Key approaches or steps that need to be taken or strengthened in order to achieve significant advancements in our understanding and prediction of the Critical Zone will also be considered.

Procedures

The Special Issue will be open for contributions by international researchers from within and outside the CZOs. Special hard copies of the issue will be published in addition to the on-line publication. The guest editorial team will handle the peer-review process for each paper submitted to the special issue, and the manuscripts will be reviewed using the normal VZJ procedures (3 reviews for each manuscript).

Time Line

- **March 31, 2010:** deadline for indicating intention to submit a manuscript to the Special Issue by sending an email to Henry Lin at henrylin@psu.edu. More guidelines will then be provided for manuscript submission.
- **August 30, 2010:** deadline for online manuscript submission to VZJ at www.vadosezonejournal.org. This targeted deadline may be adjusted according to the responses from the community.
- **Dec. 31, 2010:** targeted completion of peer-review for all manuscripts and selection of accepted papers to be included in the special issue. This targeted deadline may also be adjusted according to the progress in peer-review process.
- **Early to mid 2011:** the special issue published (a single hard-bound copy of the SI will be distributed to NSF).

Affiliations

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