Transdisciplinary Contributions and Opportunities in Soil Physical Hydrology

Guest Editors:
Ole Wendroth, University of Kentucky, Lexington, owendroth@uky.edu
Scott Bradford, US Salinity Lab., Riverside, CA, scott.bradford@ars.usda.gov
Thomas Harter, University of California, Davis, Thharter@ucdavis.edu

Knowledge of the physics and hydrology of soils has rapidly increased in recent decades. Research accomplishments and outputs have contributed to better understanding the storage and transport of energy, water, and dissolved and solid materials in soils, their impact on soil genesis, landscape formation, short-term volume dynamics of the solid phase, and process dynamics manifested from pore to global scales. The most significant advancement in soil physics and hydrology research has been inspired by contributions to other disciplines. Integrating soil hydrology and plant growth has helped us to more precisely compute plant water uptake dynamics, improve irrigation systems and management, and produce high yields for securing food, oil, and fiber production. Understanding the interaction between soil microbial and physical processes at and close to the land–atmosphere interface is the key to water infiltration even under extreme weather and climate conditions. Furthermore, the dynamics of nutrients in the vadose zone and their migration to groundwater and release to the atmosphere, faunal impact on water and gas exchange, root growth and plant establishment, advancing eco-hydrology, groundwater hydrology and quality, understanding the many ways in which soils and their vegetation regulate the climate on our earth—these relationships and their critical role in supporting life on Earth can only be explored if there is a vibrant interaction between researchers from different disciplines. Aristotle’s concept of synergy, “the whole is greater than the sum of its parts,” manifests the need for scientists in soil physics and hydrology to reach out to their counterparts in other disciplines and vice versa in order to sustain our ecosystem, planet, and humankind.

One of its most outstanding pioneers and a successful advocate for integrating various disciplines in earth and biological sciences has been Dr. Jan Hopmans, professor emeritus at the University of California, Davis. This special section in Vadose Zone Journal on “Transdisciplinary Contributions and Opportunities in Soil Physical Hydrology” has been initiated not only to honor the career accomplishments of Jan Hopmans but also to contribute to and maintain the rapid progress in establishing and enhancing transdisciplinary interactions among scientists in this field.

We invite papers that demonstrate the state of the art and stimulate new explorations of soil physics and hydrology with related disciplines. This special section not only welcomes contributions based on presentations in the related symposium and sessions “Transdisciplinary Contributions and Opportunities in Soil Physical Hydrology” at the annual Tri-Society meetings in San Antonio, 2019, but also invites papers beyond that event.

Submissions open: 1 Nov. 2019

Deadline for submission of papers: 30 Apr. 2020