

WATER AND ENERGY CYCLES COUPLING DIAGNOSED FROM REMOTELY SENSED GLOBAL OBSERVATIONS

PRODUCTS

- Science Team Leader: SMAP - Soil Moisture Active/Passive satellite mission, NASA, Phase E, January 31, 2015 launch.
- Science Team Member: AirMOSS – Airborne Microwave Observatory of Subcanopy and Subsurface, NASA, Phase E, 2012-2018.
- International Science Team Member: WCOM - Water Cycle Observation Mission, China Academy of Science, Phase A, 2017 Launch.
- Principal Investigator: HYDROS — The Hydrosphere State satellite mission, NASA Earth System Science Pathfinder program, 2000-2005.

COMMITTEE MEMBERSHIP - SERVICE

- AMS 8th Conference on Hydrometeorology, Session Chair
- AGU Precipitation Committee, Member
- AMS Hydrology Committee, Member
- AGU Water Resources Research, Associate Editor
- NRC Nat. Weather Serv. Modernization Committee, Member
- IEEE Remote Sensing Conference, Technical Committee
- AGU Reviews of Geophysics, Associate Editor
- AMS Hydrology Committee, Committee Chair
- AMS 12th Conference on Hydrology, Organizer
- AMS Committee on Membership Diversification, Member
- AMS 13th Conference on Hydrology, Organizer
- AMS Journal of Hydrometeorology, Editor
- NRC Committee on the Hydrologic Sciences, Chair
- NRC Committee on the Hydrologic Sciences, Member
- NRC Committee on Advanced Hydrologic Prediction, Member
- NRC Water Science and Technology Board, Member
- NRC Space Studies Board, Earth Observations Committee, Member
- AGU Water Resources Research, Associate Editor
- NRC Water Implications of Biofuels Production, Member
- IEEE Geoscience and Remote Sensing Symposium Technical Program Committee, Member

HYDROLOGY DAYS AWARD LECTURE

COLORADO STATE UNIVERSITY

MARCH 22, 2016

DARA ENTEKHABI

Bacardi and Stockholm Water Foundations Professor
Department of Civil and Environmental Engineering &
Department of Earth, Atmospheric and Planetary Sciences
Massachusetts Institute of Technology

In recognition of outstanding contributions to hydrologic science and engineering in the fields of land-atmosphere interactions, hillslope hydrology, remote sensing of Earth, and data assimilation.



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Abstract: The water and energy cycles - the two principal cycles of the Earth system – are coupled together over land through evaporation (latent heat flux). Evaporation – (transpiration where it occurs through vegetation) transitions from water-limited to energy-limited regimes depending on environmental conditions. The representation of transitions between these regimes and its dependence on soil moisture and other factors determines how the water and energy balance couple and vary at the land surface. This representation is the closure equation between the water and energy balance over terrestrial surfaces. The simulation of current weather and climate and model-based projections of future climate are highly dependent on the form of this closure equation. Important as this closure function is to Earth system science understanding and models for it, the function is mostly unknown. Most models currently use empirical relations for this important coupling and hence their representations of the terrestrial branch of the hydrologic cycle vary widely among the models. The focus of this talk is the observation-driven estimation of this closure relationship. In order to characterize this function across diverse climates and landscapes, remote sensing measurements are used. Multiple types of measurements from several different space-borne platforms are combined to constrain the estimation problem.

EDUCATION

- Ph.D., Department of Civil Engineering, MIT, 1990
- M.A., School of Geography, Clark University, 1987
- M.A., School of Geography, Clark University, 1984
- B.A., School of Geography, Clark University, 1983

POSITIONS HELD

- MIT, Professor, 2000 - Present
- MIT, Associate Professor, 1995 - 2000
- MIT, Assistant Professor, 1991 - 1995
- University of Arizona, Assistant Professor, 1990 - 1991

RESEARCH INTERESTS

- Earth remote sensing
- Land-atmosphere interaction and boundary layer processes
- Dynamics of winter-time extra-tropical atmosphere and its predictability
- Data Assimilation: Techniques development and applications
- Land evaporation retrieval using multi-platform remotely sensed data
- Sensor network model-integration closed-loop control
- Surface water-groundwater interaction and hillslope hydrology

RECOGNITION AND AWARDS

- National Science Foundation (NSF), Presidential Young Investigator, 1991
- Istituto Veneto di Scienze, Lettere ed Arti, Cav. Arturo Parisatti Prize, 1994
- American Geophysical Union (AGU), Macelwane Young Scientist Medal, 1996
- American Geophysical Union (AGU), Fellow, 1996
- American Meteorological Society (AMS), Fellow, 2003
- Institute of Electrical and Electronics Engineers (IEEE), Fellow, 2004
- Robert E. Horton Lecture (AMS), 2012
- Boussinesq Lecture (Boussinesq Center for Hydrology, The Netherlands), 2014
- Hydrologic Sciences Award (AGU), 2015
- Hydrology Days Award (CSU and AGU), 2016

AUTHORSHIP

- Author/co-author of more than 175 publications in refereed journals.