COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

FLORIDA ATLANTIC UNIVERSITY

Distinguished Lecture Series


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## A VISION FOR AN ULTRA-HIGH RESOLUTION INTEGRATED WATER CYCLE OBSERVATION AND PREDICTION SYSTEM

**Fri., March 16**

**Meet & Greet: 10 to 11 a.m., Lecture: 11 a.m. to 12 p.m.**

**777 Glades Rd., EE 303, FAU Boca Raton Campus**

Videoconferenced to the Dania Beach, SeaTech Site, ST 259


### Abstract

Society's welfare, progress, and sustainable economic growth - and life itself - depend on the abundance and vigorous cycling and replenishing of water throughout the global environment. The water cycle operates on a continuum of time and space scales and exchanges large amounts of energy as water undergoes phase changes and is moved from one part of the Earth system to another. We must move toward an integrated observation and prediction paradigm that addresses broad local-to-global science and application issues by realizing synergies associated with multiple, coordinated observations and prediction systems.

A central challenge of a future water and energy cycle observation strategy is to progress from single variable water-cycle instruments to multivariable integrated instruments in electromagnetic-band families. The microwave range in the electromagnetic spectrum is ideally suited for sensing the state and abundance of water because of water's dielectric properties. Eventually, a dedicated high-resolution water-cycle microwave-based satellite mission may be possible based on large-aperture antenna technology that can harvest the synergy that would be afforded by simultaneous multichannel active and passive microwave measurements. A partial demonstration of these ideas can even be realized with existing microwave satellite observations to support advanced multivariate retrieval methods that can exploit the totality of the microwave spectral information. The simultaneous multichannel active and passive microwave retrieval would allow improved-accuracy retrievals that are not possible with isolated measurements. Furthermore, the simultaneous monitoring of several of the land, atmospheric, oceanic, and cryospheric states brings synergies that will substantially enhance understanding of the global water and energy cycle as a system. The multichannel approach also affords advantages to some constituent retrievals-for instance, simultaneous retrieval of vegetation biomass would improve soil-moisture retrieval by avoiding the need for auxiliary vegetation information.

This multivariable water-cycle observation system must be integrated with high-resolution, application-relevant prediction systems to optimize their information content and utility is addressing critical water cycle issues. One such vision is a real-time ultra-high resolution locally-mosaiced global land modeling and assimilation system, that overlays regional high-fidelity information over a baseline global land prediction system. To realize such a vision, large issues must be addressed, such as international data sharing policy, model-observation integration approaches that maintain local extremes while achieving global consistency, and methods for establishing error estimates and uncertainty.


### Biography

Prof. Houser is a professor at George Mason University's Department of Geography and Geoinformation Science, where he is the co-director of the Center for Energy Science and Policy. He is an expert in local to global land surface-atmospheric remote sensing, in-situ observation and numerical simulation, development and application of data assimilation methods, and global water and energy cycling. Houser received his B.S. and Ph.D. degrees in Hydrology and Water Resources from the University of Arizona in 1992 and 1996 respectively. His research focuses on integrating energy and water research across traditional disciplines, (e.g. nexuses) that transition theoretical research to academic/public education and real-world application.

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