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Eversource Energy Center

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COLLOQUIUM Presented by

Viviana Maggioni

George Mason University

"*Downscaling techniques for improving hyper-resolution hydrology*"

Friday - April 20, 2018

12:15-1:15 p.m.

CASTLEMAN Rm 212

Seminars will be broadcasted LIVE at:

https://uconnvtc.webex.com/join/EversourceEnergyCenter

Bio: Viviana Maggioni, PhD. is Assistant Professor of Environmental and Water Resources Engineering at George Mason University. Dr. Maggioni received her B.S. and M.S. degrees in Environmental Engineering from the Politecnico of Milan, Italy, in 2003 and 2006, respectively, and her Ph.D. degree in Environmental Engineering from the University of Connecticut, Storrs, in 2012. Her research interests lie at the intersection of hydrology and remote sensing. In particular, she is interested in the application of remote sensing techniques to estimate and monitor hydrological variables. Her work has direct applications in water resources management, weather and climate prediction, as well as agriculture and irrigation practices. She currently serves as Deputy Chair of the AGU Precipitation Committee and as Associate Editor of the Journal of Hydrometeorology and Journal of Hydrology.

Abstract

Developing a predictive capability for terrestrial hydrology across landscapes, with water, energy and nutrients as the drivers of these dynamic systems, faces the challenge of scaling meter-scale process understanding to practical modeling scales. Hyper-resolution land surface modeling can provide a framework for addressing science questions that we are not able to answer with coarse modeling scales. This seminar will focus on introducing physically-based downscaling techniques to study surface flux, storage, and water balance changes and investigate the causality of these changes at the regional to local scale. To this end, a hyper-resolution Land Data Assimilation System (LDAS) is developed using a land surface model forced by physically downscaled surface meteorology, parameterized by remotely sensed topography and vegetation, and constrained by remotely sensed observations.

A proof-of-concept has been implemented over the Oklahoma domain, where high-resolution ground-based observations are available for validation purposes. Hourly NLDAS (North America Land Data Assimilation System) forcing data (i.e., near-surface air temperature, pressure, humidity, wind speed and direction, incident longwave and shortwave radiation, pressure, and precipitation) have been downscaled to 500-m resolution over the study area. Results are encouraging, showing that correlation coefficients between the downscaled dataset and ground observations are consistently higher than the ones between the NLDAS data at their native resolution and the benchmark. The same techniques have been then applied to the more complex High Mountain Asia region, where ground validation is still a challenge.