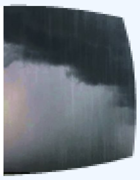

UCI Samueli School of Engineering | Department of Civil and Environmental Engineering

**Presented By:**

**Daniel Wright, Ph.D.**

***Assistant Professor***

**University of Wisconsin-Madison**

**Civil & Environmental Engineering**

# Environmental Engineering

## *Seminar Series*

***Monday, October 16th, 2017***

***Engineering Hall 2430 (Colloquia Room)***

***1:30PM to 2:30PM***

### *Modern Precipitation Data & Its Applications:*
### *Errors, Insights, & Flood Frequency Analysis In A Changing World*

Robert Horton's "Rule of Hydrologic Data" (*EOS*, 1931): "[hydrologic analysis] is nearly always determined by the nature and extent of the data available. The best possible use should be made of all the available data... tempered according to the necessities of economy of labor." Nonstationarity, and the wealth of new hydrologically-relevant data, suggest that we can and should revisit Horton's rule. I first show recent work in quantifying and reducing errors in precipitation remote sensing data using a modeling framework based on censored shifted gamma distributions, an alternative formulation to the conventional Gamma distribution that can describe both precipitation occurrence and magnitude. I demonstrate that merging satellite- and numerically-based precipitation estimates using this framework can leverage the complementarity in these two data sources to reduce random errors beyond what can be achieved using standard error modeling. This merging can also be used to create probabilistic estimates of precipitation that are more accurate than either data source individually. I also argue that modern rainfall data, whether from radar, satellites, numerical models, or rain gage networks, give us new ways of exploring important and often overlooked spatiotemporal aspects of rainfall extremes and their impacts. Despite the obvious role that rainfall (and its complex variability in space and time) plays in floods, most flood frequency analyses do not make use of rainfall information at all. Trends in rainfall and flooding due to climate or land use change place further limits on existing techniques. I show how we can couple modern rainfall data with a probabilistic framework known as stochastic storm transposition (SST) to perform rainfall and flood frequency analysis at multiple scales. SST "lengthens" the rainfall record by resampling observed storms and extracting space-time information from rainfall data. I have codified the approach in RainyDay©, a platform for quickly generating large numbers of realistic probabilistic extreme rainfall scenarios. I highlight some advantages of SST and discuss the implications for understanding the nature of flood risk in a changing environment.

Dr. Wright holds a Bachelors and Masters degrees in Civil and Environmental Engineering from the University of Michigan with a focus in hydrology and hydraulics. He then served as a Regional Sanitation Engineer with the Peace Corps in Bolivia from 2006-2008 and worked as a consulting hydropower engineer in Chile from 2008-2009 before earning his Ph.D. in Environmental Engineering and Water Resources from Princeton University, where he studied urban rainfall and flood hydrometeorology with Dr. James Smith from 2009 to 2013. He worked as a disaster risk management consultant at the World Bank from 2013-2014, focusing on flood and landslide risk management in Latin America and the Caribbean. Before joining the CEE faculty at the University of Wisconsin-Madison in 2016, Dr. Wright was a NASA Postdoctoral Program fellow in the Hydrological Sciences Lab at Goddard Space Flight Center in Greenbelt, Maryland. His research interests include hydrometeorology and hydroclimatology, the role of rainfall space-time variability in floods and other hydrologic and environmental phenomena, and applications of satellite and ground-based remote sensing.

Questions? - cee@uci.edu - (949) 824-5333