Compound and Cascading Hazards: Modeling and Risk Assessment

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Ground-based observations and model simulations show substantial increases in extreme events including rainfall events, droughts, wildfires, hot spells and heatwaves. The first step toward improving our societal resilience is to identify the new patterns of climate extremes and natural hazards. This requires a better understanding of tempo-spatial characteristics of natural hazards and also the interactions between different hazards in a changing climate. A combination of climate events (e.g., high temperatures and high humidity, or low precipitation and high temperatures) may cause a significant impact on the ecosystem and society, although individual events involved may not be severe extremes themselves – a notion known as compound event (e.g., extreme rain over burned areas, combined ocean and terrestrial flooding). Numerous studies have focused on how different types of extremes have changed or might change in the future. However, very few studies have investigated the changing risk of compound and cascading events. This presentation focuses on three different types of compound and cascading events including drought-heatwaves, sea level rise-terrestrial flooding, and meteorological-anthropogenic drought. We present different methodological frameworks and perspectives for detecting, modeling and risk assessment of compound and cascading events.

Bio: AghaKouchak received his B.S. and Master's degrees in civil engineering from the K.N. Toosi University of Technology, Tehran, Iran, in 2003 and 2005, respectively. In 2010, after completing his Ph.D. in civil and environmental engineering at the University of Stuttgart, Germany, he came to UC Irvine as a postdoctoral fellow with the Center for Hydrometeorology and Remote Sensing (CHRS). He was named an assistant professor in Fall 2011. AghaKouchak's research is interdisciplinary and crosses the boundaries between hydrology, climatology, statistics and remote sensing to address critical global water resource issues. His long-term research objective is to utilize continuously growing satellite data along with ground-based observations to develop/improve integrated drought, flood and landslide modeling, prediction and decision support systems. His focus in the area of hydrologic extremes (flood/landslide/draught) has the potential for cross-over into other hazards that are of interest to CEE, including those of a structural and geotechnical nature. He received the prestigious Mcalwane Medal from American Geophysical Union and became a Fellow in 2019