

## **Regional downscaling of large ensemble simulations as a tool for understanding changing hydroclimatic extremes in a warming climate**

Large ensemble climate model simulations offer a unique opportunity to explore the statistics and dynamics of extreme events that occur very infrequently (or are even absent) in the observational record. However, the GCM-class models that have historically been used in large ensemble experiments are typically not well suited to capturing the fine-scale dynamic and thermodynamic processes underlying regional and local-scale meteorological extremes. Targeted high-resolution atmospheric modeling—including non-hydrostatic simulations at horizontal resolutions under 4km—offers the potential for much more realistic simulation of regional extremes, but can be an extremely (and sometimes prohibitively) computationally expensive endeavor.

In this talk, I will discuss several examples of ongoing work that seeks to capitalize on the relative strengths of each modeling approach to better understand the changing character of extreme hydroclimate events along the Pacific Coast of the United States. Combining the large implicit sample size afforded by using all members of the CESM Large Ensemble with the improved representation of fine-scale physical processes afforded by high-resolution simulations in WRF, this portfolio of experiments may offer a framework to help bridge the gap between the recent advent of large single model ensembles (using traditional GCMs) and the eventual future emergence of global, non-hydrostatic climate modeling.