

RAL SEMINAR SERIES

Improving Seasonal Prediction and Future Projection of Western U.S. Precipitation

CHRISTINA PATRICOLA
IOWA STATE UNIVERSITY



Wednesday, December 1, 2021

1:00 PM 2:00PM

<https://operations.ucar.edu/live-ral> | Virtual

Reliable seasonal predictions and future projections of western U.S. precipitation are needed for decision makers to prepare for water shortages and hazards from water excess. The first half of this talk revisits the connection between western U.S. precipitation and the El Niño–Southern Oscillation (ENSO), and major source of seasonal precipitation predictability. We demonstrate that winter precipitation variability is better explained by the ENSO Longitude Index (ELI), which captures the diversity of ENSO’s spatial patterns in a single metric, compared to the traditional Niño 3.4 index, which measures SST anomalies in a fixed region and fails to capture ENSO diversity. The physically-based ELI better explains western U.S. precipitation because it tracks the zonal shifts in tropical Pacific deep convection that drive teleconnections through an extratropical wave-train response. The second half of this talk covers future changes in precipitation over the San Francisco Bay Area, research conducted with input from City and County of San Francisco stakeholders. We performed ensembles of convection-permitting regional climate model simulations to investigate how historically impactful extreme precipitation events could change if similar events occurred in future climates. We found that storm-total precipitation changes and precipitation scaling with temperature depend on storm type (atmospheric rivers with or without an extratropical cyclone). Altogether, this research uses our physical understanding of the climate system and state-of-the-art climate modeling to attempt to improve seasonal prediction and future projection of western U.S. precipitation.