P20 High-resolution future climate change simulation in Alaska using a pseudo-global warming Scenario.

Newman, Andrew J., *National Center for Atmospheric Research (NCAR)*, Andrew J. Monaghan, *University of Colorado*, Martyn P. Clark, Kyoko Ikeda, Lulin Xue, *NCAR*, and Jeff. R. Arnold, *United States Army Corps of Engineers*

Alaska has warmed during the recent observational record and is projected to keep warming through the end of the 21st century in nearly every future emissions scenario and global climate model. This will drive continued thawing of permafrost-rich soils and alter the partitioning of rain versus snow events, and may have potentially large impacts for the water cycle and land-surface processes across the state. However, previous analyses of these impacts using dynamical models have relied on global climate model output or relatively coarse regional climate model simulations. Projections of changes to the water cycle and land-surface processes in areas of complex orography and high land-surface heterogeneity, which are characteristic of Alaska, may thus be limited. Here we present a 14-year future climate simulation for Alaska at 4-km grid spacing using the Weather Research and Forecasting (WRF) mesoscale atmospheric model. A grid spacing of 4 km is sufficient to resolve orography across Alaska's mountain ranges and the chosen model configuration yields a realistic representation of the seasonal and spatial evolution of precipitation, temperature, and snowpack compared to previous studies across Alaska and the contiguous US.

The future climate simulation uses the Pseudo-Global Warming (PGW) approach, where the end of century ensemble mean monthly climate perturbations (CMIP5 RCP8.5) are used to incorporate the thermodynamic effects of future warming into the present-day climate as represented by ERA-Interim reanalysis data. We will discuss how some of the major components of the water cycle (e.g. precipitation, snowpack, ET) are projected to change in this future scenario, and implications for future hydrologic response across the major watersheds in Alaska.