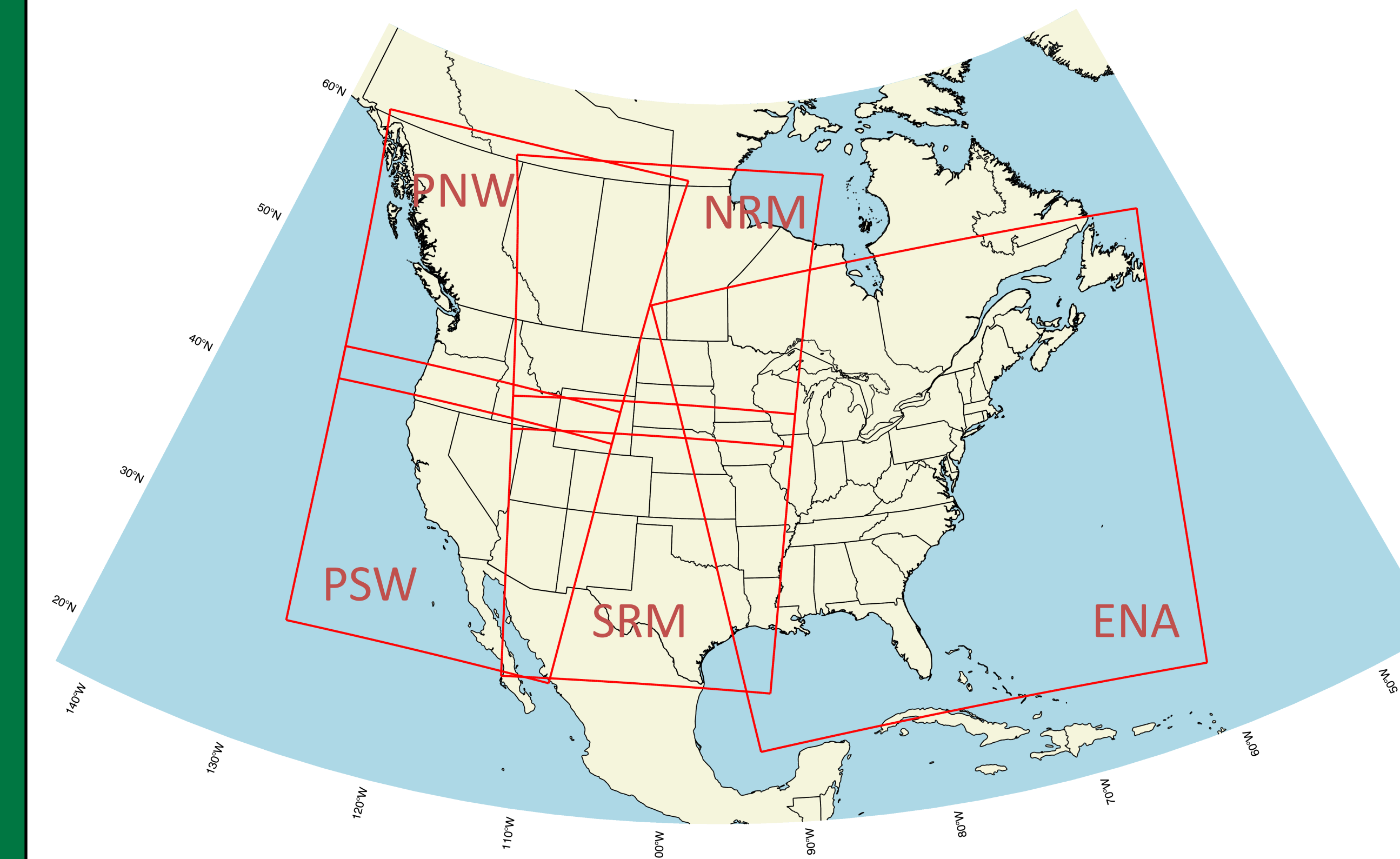


Abstract

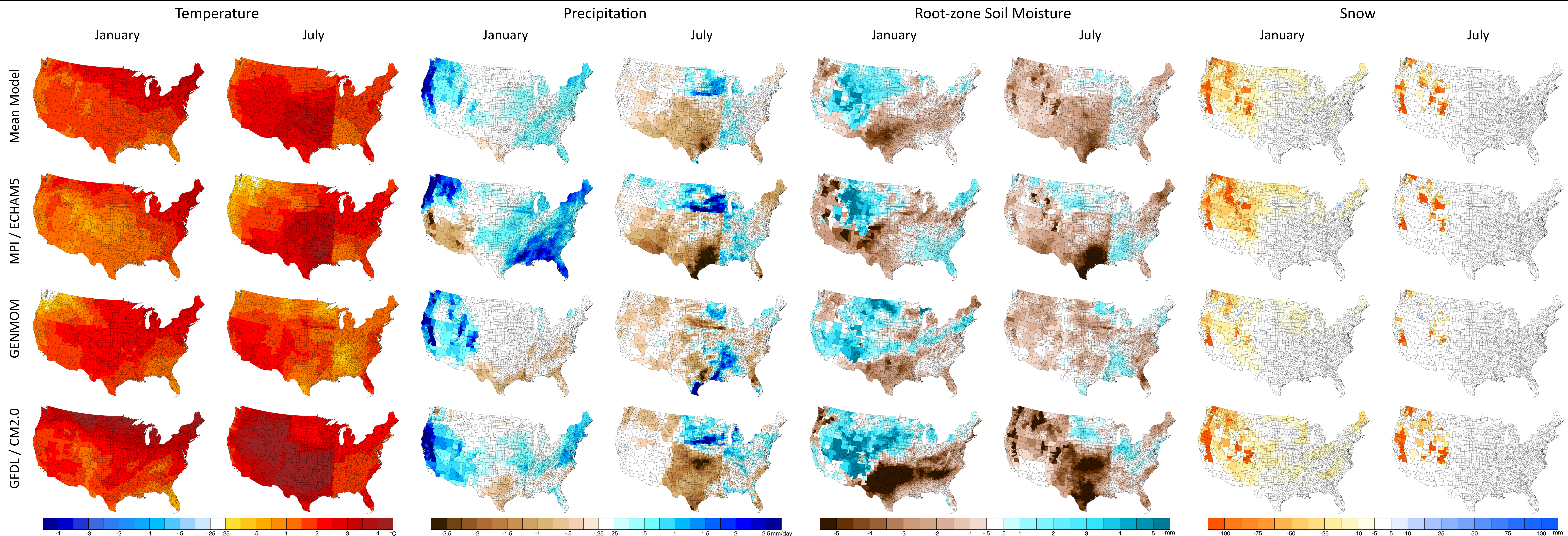
We have completed an array of high-resolution simulations of present and future climate over Western North America and Eastern North America by dynamically downscaling global climate simulations using a regional climate model, RegCM3. The simulations are intended to provide long time series of internally consistent surface and atmospheric variables for use in climate-related research. Our simulations were run over 15-kilometer model grids in an attempt to capture more of the climatic detail associated with processes such as topographic forcing than can be captured by general circulation models (GCMs). The simulations were run using output from four GCMs. All simulations span the present (for example, 1968–1999), common periods of the future (2040–2069), and two simulations continuously cover 2010–2099. The trace-gas concentrations in our simulations were the same as those of the GCMs: the IPCC 20th century time series for 1968–1999 and the A2 time series for simulations of the future. The simulations provide a potential range of future climate change for selected decades and display common patterns of the direction and magnitude of changes. As expected, there are some model-to-model differences that limit interpretability and give rise to uncertainties.

Full documentation of the model simulations, instructions to access the dataset and interactive web applications to visualize the model output can all be found on the project web page: <http://regclim.coas.oregonstate.edu>



Model Domains and Driving GCMs

Our climate simulations include five regions or model domains with a horizontal grid spacing of 15 km. The domains (*left*) are Pacific Northwest (PNW), Pacific Southwest (PSW), Northern Rocky Mountains (NRM), Southern Rocky Mountains (SRM) and Eastern North America (ENA). We found that it was necessary to divide the West into four overlapping domains in order to achieve the necessary balance between boundary forcing, regional dynamics and the quality of the simulations over the complex topography of the region. We downscaled four GCMs: NCEP-NCAR Reanalysis, MPI ECHAM5, GENMOM and GFDL CM 2.0.



Future Climate Anomalies: Climate anomalies for the period of 2050–2059 vs 1980–1999 are shown for each county in the continental U.S. for temperature, precipitation, root-zone soil moisture and snow as simulated by RegCM3. Since the five model domains overlap, we stack the model output (PNW, PSW, NRM, SRM, ENA order) when creating county wide averages. Unfortunately, the process of stacking the domains creates hard seams at the domain edges.