Abstract

Two regional climate models (RegCM2 and HIRHAM) forced by three sets of lateral boundary conditions (observation, a GCM current climate and a GCM scenario climate) form a 2x3 suite of 10-year climate simulations for the continental U.S., in addition to comparison with the GCM simulations. Simulations forced by observation servers a basis for evaluating RCM capability to produce mesoscale climate details over the U.S. while the GCM control and scenario forced runs project climate changes. The comparison between the reanalysis-driven and GCM control driven runs provides estimates of biases caused by the GCM output forcing the RCMs in lieu of observation, and finally runs from two RCMs give a preliminary view of uncertainty in regional climate simulations from using different regional models.

Several biases are computed based on the suite of simulation in contrast to climate changes. A climate confidence ratio defined by the simulated climate change divided by maximum RCM bias is evaluated for the RCMs and the forcing GCM. The simulated climate warming is consistent throughout the domain and seasons, with a temperature increase of 2-4 K as of 2050 over most parts of the continental U.S. The winter warming is stronger than summer and *Tmax* change is stronger than *Tmin*. The climate confidence is larger than 1 in several region/seasons, but show considerable inter-model differences.

The climate warming is much stronger in the western than eastern U.S. due possibly to more decreasing snow cover in the high elevation mountain regions in cold season and strengthened monsoon ridge in summer. Given common lateral boundary forcing, the two RCMs projected quite different regional climate warming magnitudes, indication of RCMs potential to enhance GCM's projection.