



High-resolution simulation of seasonal snowfall over the Colorado Headwaters region and some impacts of climate change

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Snowpack is the most important water source in the western U.S., and thus it is critical that water managers be provided with as accurate as possible estimate of the likely changes expected of this resource in the future. Previous climate studies have shown that the head waters region of the Colorado river seems to be a particularly difficult area for climate model to handle, with inconsistent snowpack trends in this region from both the 3rd and 4th IPCC reports (2001, 2007), despite consistent prediction of temperature increases in this region from all climate models. In this study WRF regional model simulations of snowfall between 1 November and 1 May were performed over the Colorado Headwaters region for: (1) retrospective years (2001-02, 2003-04, 2005-06, and 2007-8) at a horizontal grid resolution of 2 km using North American Regional Re-analysis (NARR) data, (2) 2007-08 season at coarser resolution of 6, 18, and 36 km using NARR data, and (3) future climate scenario at 2 km grid resolution using NARR data for the retrospective years perturbed with the CCSM3 model output for an A1B simulation to initialize the simulation using a Pseudo Global Warming approach (temperature and moisture perturbation, but no change in storm tracks). Key questions explored in this study are, (1) how well can we simulate seasonal snowfall in the Colorado Headwaters region (comparison to SNOTEL data), (2) how will snowfall in the Colorado Headwaters region be impacted by a warmer and moisture climate, (3) how well do we simulate snowpack in the Colorado Headwaters region (comparison to SNOTEL data), (4) how will snowpack amount and timing change in a warmer and moister climate, and (5) how high a resolution of the regional climate model do we need to answer these questions. Results from on-going analyses will be presented.