



## **PRELIMINARY EVIDENCE FOR A WARMING "HOLE" OVER THE CENTRAL UNITED STATES IN CLIMATE CHANGE SIMULATIONS**

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Climate projections for the mid-21st century over the continental U.S. by two regional climate models (RegCM2 and HIRHAM) show an unexpected summertime local minimum or "hole" in warming for the Central U.S. The warming hole appears to be attributable to enhanced moisture convergence at the northern terminus of the Great Plains low-level jet (LLJ). The increased moisture convergence sets off a sequence of events including increased mesoscale rainfall and an increase in cloud fraction over the hole region, which reduces solar radiation reaching the ground. Enhanced precipitation leads in turn to greater soil moisture, prolonging the period of reduced temperatures into August and September. The result is persistent cooler near-surface temperatures in the scenario climate at a time when, in the current climate, dry soil leads to high daytime temperature. The driving global model (HadCM2) accurately simulates the LLJ but does not produce the warming hole, because its coarse resolution precludes it from properly linking the LLJ with regional cloudiness and precipitation. This result highlights the importance of dynamical downscaling for resolving critical feedback processes in the hydrological cycle and for creating regional scenarios for climate change impacts assessments. Monotonic extrapolations of past, current, and near-future regional conditions cannot account for feedback processes that may have important effects on surface temperature in the U.S. Great Plains.