



Impact of variable horizontal resolution of the regional WRF climate model and biases in the global climate models on precipitation simulated over the western U.S.

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Regional WRF climate simulations over the western U.S. and eastern Pacific were conducted for a “dry” year and a “wet” year over Nevada and eastern California using variable horizontal resolutions of 36, 12, and 4 km. The simulation results indicate that there is no uniform trend in improving model accuracy by increasing horizontal resolution. Moreover, the model noticeably over-estimates precipitation compared to observations. The downscaled results were then used to drive a mesoscale hydrological model. In order to further understand the components of the model overestimation of the precipitation, we did an analysis of the CCSM3 hindcast simulations, which revealed significant sea-surface temperature (SST) biases compared to the re-analysis fields. Furthermore, an analysis of 15 other global climate models has shown similar bias for most of the models. The implication of these results is quite significant, since the statistical analysis of a control run using the re-analysis SST and the CCSM3 “standard” run indicates that the biases over the eastern Pacific have an impact on simulated precipitation patterns over Nevada and California. The results indicate that the resultant precipitation patterns are related to changes in storm tracks and meridional baroclinicity zones.