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Performance of RegCM3 in simulating climate over a mountainous region

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Various climate conditions of Turkey due to complex topography, elevation differences, and geographical position make its climate interesting. A model performance evaluation over such that region contributes to understanding of the model behavior and ability. The ability of RegCM3 to simulate general climate characteristics of Turkey was investigated in this study. A 30-year (1961-1990) simulation was performed with a 27 km spatial resolution. Initial and boundary conditions provided by NCEP/NCAR Reanalysis data available at 6-h intervals with a resolution of 2.5 x 2.5. To assess how the model has the ability to simulate general climate characteristics of Turkey, the simulation results were then compared with both the driving fields and meteorological stations of Turkey. Overall, the RegCM3 is capable of reproducing the climate variability of Turkey. Large scale climatology of the Turkey is reasonably reproduced by the model. The results of simulated mean precipitation in Turkey for each season reveal that the model reproduces realistically spatial structure of rainfall. However, the model still suffers from some persistent biases such as overestimation of precipitation in the southeast Black Sea coasts and interior of the coasts especially in spring. The model overestimates the monthly mean precipitation except the months from September to December. In terms of temperature, the model generally captures spatial distribution of monthly mean surface maximum and minimum temperatures. It overestimates the mean surface minimum temperature for NDJFM months while a cold bias takes place in the mean surface maximum temperature for SON months. To take a closer look at the model performance and to obtain more meaningful results, we also used several objective statistics including monthly bias, spatial pattern correlation and spatial standard deviation for different climate regions of Turkey.