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Assessment of Regional Climate Model (RegCM) Simulations for High and Low Resolutions over Turkey between 1971-2000: Temperature and Precipitation

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In this study, regional climate over Turkey is simulated by using Regional Climate Model (RegCM4) with different resolutions and different land use models. The time period of the simulations is chosen between September 1970 and January 2001. Here, the performance of RegCM4 is investigated for two different Land Surface Models - CLM and BATS - and for two different model resolutions - 10x10 km and 50x50 km - over Turkey. The projection origins of this study domain is 39.43°E and 36.58°N for 50x50 km resolutions and 39.14°E and 34.16°N for 10x10 km resolutions. The required initial boundary conditions were produced by using the 2.5° resolution reanalysis data of ERA-40 which have taken from ECMWF (European Centre for Medium-Range Weather Forecasts). The verification of the simulations is accomplished by using two sets of data: 2.5 degree resolution CRU data and observations measured at 223 stations which have relatively even distributions over Turkey. The 2 meter air temperature simulations and precipitations were compared by the average, minimum and maximum temperatures data sets and precipitation data set obtained from CRU (Climate Research Unit), in order to examine the consistency of model by the observed data. Additionally, the seasonal biases between station observations and model simulations are calculated for 223 points over Turkey by subtracting the observations from the model simulations. Nevertheless, the calculated biases are redundantly sided and so inconsistent since there is a discrepancy between model topography and real topography. In order to reduce the elevation effects on biases, global average lapse rate of 6.5°C/km is used to interpolate the temperature from model altitude to station altitude. Precipitation biases show seasonal dependence and generally higher around high topography regions. All the 10x10 km and 50x50 km resolution simulations show that RegCM4 produce consistent results but with the distinctive sensitivities.