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Regional climate projections for Saudi Arabia

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In this paper, the impact of climate change in Saudi Arabia at the end of the 21st century has been investigated using a regional climate model called PRECIS ("Providing Regional Climates for Impacts Studies"), which was developed by the Hadley Center of British Met Office. The Intergovernmental Panel on Climate Change (IPCC), designed several emission scenarios from which two (A2 and B2) were adopted to determine the impacts of climate change at the end of the 21st century on runoff in Saudi Arabia. PRECIS was used to downscale four types of boundary data; (1) 31-years (1960-1990) integration of HadAM3P, a 150 km resolution Hadley Center's global atmospheric model. (2) 31-years (2070-2100) integration of HadAM3P consistent with the IPCC SRES A2 emissions scenario. (3) 31-years (2070-2100) integration of HadAM3P consistent with the IPCC SRES B2 emissions scenario. (4) 31 year (1960- 1990) of {ERA-40 (1957-2001)} reanalysis data derived from ECMWF (European Center for Medium-Range Weather Forecasting. Meteorological parameters considered in this study were surface temperature at 1.5 m, precipitation; evaporation, wind speeds at 10 m, and surface runoff in order to determine the impacts of climate change particularly on water resources of Saudi Arabia. The differences of surface evaporation from precipitation were calculated to identify the sensitive locations affected by the climatic change with respect to water resources. Six regions and thirty seven locations in Saudi Arabia were analyzed. The model results showed there is an increase of more than 4 degrees Celsius of the daily mean temperature over Saudi Arabia. The results also indicated that precipitation, winds, and evaporation varied. Substantial percentages increases in runoff are detected from 100 to 350 percents.