

Regional Changes under Extreme Meteorological Events

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Abstract : The regional-scale impact of climate change over complex terrain was examined through high-resolution dynamic downscaling conducted using the Weather Research and Forecasting (WRF) model, with initial and boundary conditions from a High-Resolution Atmospheric Model (HiRAM). The analysis was conducted over the eastern Mediterranean, with a focus on the country of Lebanon, which is characterized by a challenging complex topography that magnifies the effect of orographic precipitation. Four year-long WRF simulations, selected based on HIRAM time series, were performed to generate future climate projections of extreme temperature and precipitation over the study area under the conditions of the Representative Concentration Pathway (RCP) 4.5. One past WRF simulation year, 2008, was selected as a baseline to capture dry extremes of the system. The results indicate that the study area might be exposed to a temperature increase between 1.0 and 3°C in summer mean values by 2050, in comparison to 2008. For extreme years, the decrease in average annual precipitation may exceed 50% at certain locations in comparison to 2008.

Keywords : HIRAM, regional climate modeling, WRF, Representative Concentration Pathway (RCP)

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