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Impact of Boundary Conditions on Extreme Climate Simulation over South-Korea in the CORDEX-East Asia Domain Using RegCM4

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The COordinated Regional climate Downscaling Experiment (CORDEX) is a framework devoted to coordinate international efforts on regional climate simulations. National Institute of Meteorological Research of KMA organizes a domestic collaborative research project for contributing to the CORDEX East Asia. Within the evaluation framework of CORDEX, the goal of this study is to produce 20-year regional climate and also to assess the performance skills of different regional climate models (RCMs; e.g., RegCM4, RSM, WRF, and SNURCM). In this work, we will present the two sets of extreme climate simulation results of RegCM4 over South-Korea in the CORDEX-East Asia Domain driven by the two different lateral boundary conditions (LBCs) data, ERA-Interim (ERA) and NCEP/DOE reanalysis (R-2) during the 20 years (1989-2008). For the validation of RegCM4 extreme climate simulations, the climate stations daily data (precipitation, maximum/minimum temperature) from KMA were used. We consider two types definition of extremes based on the intensity and frequency, as the number of days with extreme events (four categories: frost, hot, wet, and dry days) exceeding absolute threshold values and the average of the highest/lowest 5% (percentile thresholds) values at the each station for each year. Although the RegCM4 underestimated the frequency and intensity of daily extreme climate events compared to the observation regardless of the LBC, the RegCM4 successfully simulates the inter-annual variations of the four categories and the highest (lowest) 5% mean maximum (minimum) temperature and precipitation. The highest/lowest 5% maximum/minimum temperature (precipitation) simulated by RegCM4 using ERA was systematically higher (stronger) than those by using R-2 over South-Korea during simulation period. And maximum temperature and heavy precipitation is better simulated when driven by ERA than R-2, on the other hand, minimum temperature is better simulated when driven by R-2. As a result, the RegCM4 using R-2 better simulates the total frequency and inter-annual variability of the frost days and dry days, on the other hand, using ERA better simulates the total frequency and inter-annual variations of the hot days and wet days. And the RegCM4 well simulates the inter-annual variations of extreme climates ($R > 0.78$).