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Impact of boundary conditions on RegCM4 20-year-long precipitation simulations over CORDEX-East Asia domain

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National Institute of Meteorological Research (NIMR) of KMA organizes a domestic collaborative research project for contributing CORDEX-East Asia. Within the evaluation framework of CORDEX, the preliminary goal of the project is to produce 20-year-long regional climate and to analyse the simulation results from four RCMs including RegCM4 driven by two boundary conditions. The final goal of this project is to predict the future climate over this region using multiple RCMs based on the new scenario, RCPs. The number of grid points for north-south and east-west directions is 197 x 233 and horizontal resolution is 50 km. In this work, the simulation results of 20-year (1989-2008) regional climate over CORDEX-East Asia by RegCM4 will be presented with focus on the precipitation and impacts of lateral boundary conditions, the ERA-Interim (ERA) and NCEP/DOE (R2). For the validation of RegCM4 simulations, global dataset (GPCP) and climate stations data (precipitation) from KMA were used. The RegCM4 adequately captures the seasonal evolution of precipitation associated to the seasonal march of East Asia monsoon. The RegCM4 well simulates spatial and temporal (inter-annual, seasonal and diurnal) variations of precipitation over CORDEX-East Asia. In general, RegCM4 overestimates precipitation over western South Pacific Sea and southern area of China. On the other hand, summer precipitation over the Korean peninsula is significantly underestimated, especially when driven by R2. In spatial distribution, the RegCM4 driven by ERA simulated more precipitation than that by R2 especially over land. On the other hand, precipitation over the ocean is underestimated when driven by ERA compared to that by R2. Although the performance skill of RegCM4 for precipitation is clearly different with location and season, it well simulates seasonal variation of precipitation over East Asia. However, it fails to capture the inter-annual variation of precipitation. In addition, RegCM4 fails to capture the strong diurnal variation of precipitation over South Korea. In general, the performance skills of RegCM4 driven by ERA are higher correlation (smaller bias) than that using R2 over the entire domain regardless of the season. Similar results are found in the frequency distribution of precipitation according to the intensity although RegCM4 overestimates weak precipitation below 25mm/day and underestimates heavy precipitation above 25mm/day. The impacts of BCs on the simulated precipitation are underway.