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Impact of horizontal resolution on the tropical cyclone activity over the western North Pacific in CORDEX-East Asia phase I and II experiments

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This study evaluated tropical cyclone (TC) activity simulated by two regional climate models (RCMs) incorporated in the Coordinated Regional Climate Downscaling Experiment (CORDEX) framework with two different horizontal resolutions. Evaluation experiments with two RCMs (RegCM4 and MM5) forced by reanalysis data were conducted over the CORDEX-East Asia domain with 25 km and 50 km horizontal resolutions. The 20-year (1989–2008) mean performances of the experiments were investigated in terms of TC genesis, track, intensity, and TC-induced precipitation. In general, the simulated TC activities over the western North Pacific (WNP) varied depending on the model type and horizontal resolution. The MM5 tended to simulate more reasonable TC activity compared with the RegCM4. For both models, higher horizontal resolution improved the simulation of TC tracks near the coastal regions of East Asia, whereas the coarse horizontal resolution led to underestimated TC genesis compared with the best track data because of greater convective precipitation and enhanced atmospheric stabilization. In addition, the increased horizontal resolution prominently improved the simulation of TCs landfalling in East Asia and associated precipitation around coastal regions. This finding implies that high-resolution RCMs can produce added value in improving the simulation of TCs over the WNP; thus, they have an advantage in climate change assessment studies.