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Convection permitting simulation of summer precipitation over the Tibetan Plateau

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The Tibetan Plateau (TP), known as the "Third Pole" and "Water Tower of Asia", plays an essential role in the regional water cycle and global climate change through its unique topography and abundant water resources. Precipitation is an important part of the hydrological process, but realistically simulating precipitation over the TP is still a major challenge for most models, which hinders our understanding of the strength of the land-atmosphere interaction and its influences on regional, or even global climate and water cycle. In order to better depict precipitation spatial and temporal distributions over the TP, a 4-km convection permitting modelling (CPM) and a 28-km dynamical downscale modelling (DDM) using the weather Research and Forecasting model (WRF) were conducted for a summer (from June to August 2014). WRF simulations are evaluated against CMA in-situ observations, the Asian Precipitation Highly Resolved Observational Data Integration Towards Evaluation of water resources (APHRODITE), the Global Precipitation Measurement (GPM), as well as two reanalysis datasets ERA-Interim and ERA5. We focus on the added values of the CPM in summer precipitation simulations, in terms of the spatial seasonal mean precipitation amounts, spatial distributions, and diurnal cycles. We found the six datasets (CPM, DDM, APHRODITE, GPM, ERA-Interim and ERA5) showed great differences in summer precipitation over the TP. The great advantages of CPM and DDM over reanalyses are observed. Slight improvements are found in CPM over DDM as well. Mechanisms for these differences will be explored.