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Reduction of Future Monsoon Precipitation over China: Comparison between a High Resolution RCM Simulation and the Driving GCM

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Multi-decadal high resolution climate change simulations over East Asia are performed using the Abdus Salam International Centre for Theoretical Physics (ICTP) Regional Climate Model, RegCM3, nested within the NASA/NCAR global model FvGCM. Two sets of simulations are conducted at 20-km grid spacing for present day and future climate (IPCC A2 scenario). The mean precipitation change during the monsoon season (May to September) over China is analyzed and intercompared between the RegCM and FvGCM. Simulation of the present climate by the RegCM shows a better performance than that of the driving FvGCM in terms of both spatial pattern and amounts. The FvGCM simulates a predominant increase of precipitation over the region, whereas the RegCM3 shows extended areas of decrease. The causes of these differences are investigated and explained in terms of the different topographical forcing on circulation and moisture flux in the two models. We also find that the RegCM-simulated changes are in better agreement with observed precipitation trends over East Asia. It is suggested that high resolution models are needed to better investigate future climate projections over China and East Asia.