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Evaluating CEOP model performance of extreme temperature and precipitation in semi-arid region of China

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Abstract Based on the station observation of daily maximum and minimum temperature and precipitation from year 2003 to 2004, the simulation capabilities of 8 CEOP models and their multi-model ensemble for extreme climate events in semi-arid region of China are evaluated systematically. By means of average intensity, frequency and typical case analysis, the results show that all CEOP models and their multi-model ensemble have remarkable instabilities in terms of extreme events simulation. In consideration of the intensity of extreme temperature, the best simulations are from JMA, NCEP and MME, while in consideration of frequency, the best simulations are from CPTEC, NCEP and JMA model. The frequencies of extreme low temperatures are generally overestimated while the frequencies of high temperatures are usually underestimated by all models and their multi-model ensembles. This disparity shows the models' stronger simulating abilities in summer rather than that in winter. The capacity of the models to simulate the intensity of extremely heavy precipitation is superior in summer as compared to winter. The frequencies of extremely heavy precipitation are overestimated in winter by all models, while highly underestimated in summer by all models except for ECPC-RII. Regarding the extreme precipitation, the best simulation models are ECPC-RII and JMA in summer and NCEP, UKMO, and the multi-model ensemble in winter. The multi-model ensemble exhibits some advantages in simulating the intensity of extreme climate events while it does not show any advantage in terms of the frequency simulations. In conclusion, there is still much room for improving simulating ability of all CEOP models over semi-arid China in the future.