



Reproducibility of precipitation distributions over extratropical continental regions in the CMIP5

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Reproducibility of precipitation distributions over extratropical continental regions by CMIP5 climate models in their historical runs are evaluated, in comparison with GPCP(V2.2), CMAP(V0911), daily gridded gauge data APHRODITE. Surface temperature, cloud radiative forcing, and atmospheric circulations are also compared with observations of CRU-UEA, CERES, and ERA-interim/ERA40/JRA reanalysis data.

It is shown that many CMIP5 models underestimate and overestimate summer precipitation over West and East Eurasia, respectively. These precipitation biases correspond to moisture transport associated with a cyclonic circulation bias over the whole continent of Eurasia. Meanwhile, many models underestimate cloud over the Eurasian continent, and associated shortwave cloud radiative forcing result in a significant warm bias. Evaporation feedback amplify the warm bias over West Eurasia. These processes consistently explain the precipitation biases over the Eurasian continent in summer. We also examined reproducibility of winter precipitation, but robust results are not obtained yet due to the large uncertainty in observation associated with the adjustment of snow measurement in windy condition. Better observational data sets are necessary for further model validation.

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