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How well do regional climate models reproduce mean seasonal precipitation over Europe?

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We analyse the ability of 15 different Regional Climate Models (RCMs) from the ENSEMBLES project to reproduce mean seasonal precipitation anomalies in the 40-year period (1961-2000) over the European area. All RCMs were forced by ERA40 and their outputs were compared with CRU and ERA40 precipitation. The agreement between seasonal climatological values of various data sources is determined by the magnitude of spatial anomaly correlation coefficients. Also, EOF analysis is used to estimate spatial variability of precipitation. The impact of the main large-scale modes of climate variability (NAO, ENSO) on the European winter precipitation has been assessed by constructing composites of precipitation anomalies over the European area for all data sources.
It is shown that the RCMs ensemble mean (ENS) reproduces the pattern and often the amplitude of precipitation anomalies that correspond well to observations (CRU). Compared to the driving data, RCM simulations improve representation of precipitation during the whole year over the southern Europe where topography is rather complex. On the other hand, over the northern Europe with more uniform topography, the simulated precipitation is closer to the observations only in warm season. The spatial variability of precipitation anomalies during the winter, as described by the first EOF, projects onto a dominant NAO mode. Many details in the ensemble mean EOF1 pattern are reproduced realistically by RCMs with interannual variability of the ENS precipitation anomalies that generally agrees with that for CRU. The results indicate that RCMs are able to reproduce quite well mean seasonal precipitation anomalies and their spatial and temporal variability over Europe.