EMS Annual Meeting Abstracts,
Vol. 6, EMS2009-62, 2009
9th EMS / 9th ECAM
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9th EMS Annual Meeting
9th European Conference on Applications of Meteorology
High resolution meteorology
- applications and services

Interannual Variability of the Key Elements of Hydrological Cycle over Europe during Summer Season

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A gridded monthly precipitation from the Global Precipitation Climatology Project (GPCP) dataset, and air temperature (AT) and precipitable water (PW) from the NCEP/NCAR Reanalysis for 1979-2006 were used to investigate interannual summertime variability of the elements of hydrological cycle over Europe and its links to regional atmospheric circulation and other climate variables. The first Empirical Orthogonal Functions mode (EOF-1) of European precipitation is stable during the summer season and is associated with the North Atlantic Oscillation (NAO). On the contrary, EOF-1 of PW and AT is not stable and demonstrates significant structural month-to-month changes during summer season. This mode is not associated with the NAO (and with other known teleconnections). Interannual variations of AT and PW over Europe are strongly linked to each other during summer season. However, they are generally not linked to the interannual variability of precipitation. The EOF-2 of summer precipitation demonstrates a rather strong link to the Scandinavian teleconnection. Analysis of links between leading EOF modes of regional precipitation and evaporation has revealed a strong link between precipitation and evaporation from the European land surface, indicating an important role of the local processes in summertime precipitation variability over Europe. Weaker, but statistically significant links have been found for evaporation from the surface of the Mediterranean and Baltic Seas. In contrast to winter, no significant links have been revealed between European precipitation and evaporation in the North Atlantic during the summer season.