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Spatial variability of meteorological factors related to heat waves in EURO-CORDEX regional climate models

Ondřej Lhotka (1,2) and Jan Kyselý (1)

(1) Institute of Atmospheric Physics CAS, Prague, Czech Republic (ondrej.lhotka@ufa.cas.cz), (2) Global Change Research Institute CAS, Brno, Czech Republic

In mid-latitudes, heat waves are generally associated with warm advection, excess solar radiation and reduced latent heat flux. Effects of these individual factors are, however, spatially variable. The aim of the study is to evaluate the capability of regional climate models (RCMs) from the EURO-CORDEX project to simulate these geographical patterns over Europe. Reference data are taken from the ERA-Interim reanalysis. High temperatures are linked to the 850 hPa u- and v-wind components, net shortwave radiation and evaporative fraction anomalies. The identification of hot days is based on exceedance of the 95% quantile of daily maximum temperature in summer and they are analysed in each grid point in the European domain. In the ERA-Interim reanalysis, a reduction of the prevailing zonal flow is linked to the occurrence of high temperatures in a belt-shaped pattern roughly between 45°N and 60°N, while the increase of the u-wind component is observed in large parts of Scandinavia, Balkan Peninsula and the Mediterranean. Southerly winds are linked to these events mainly in Eastern Europe. Large positive net shortwave radiation anomalies during hot days are located over the British Isles, Scandinavia and Central Europe and the decline of evaporative fraction is most pronounced between 40°N and 55°N. These patterns are simulated with difficulties in most RCMs (as to both geographical extent and magnitude of changes), which should be taken into account when evaluating temperature extremes in climate models.