



## European summer heat of 2015 in a long-term perspective and atmospheric circulation peculiarities

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The European summer of 2015 was characterized by a number of very intensive heat episodes with extraordinary hot temperatures, particularly in central-eastern Europe. We provide an ad-hoc evaluation of the observed climatological extremes in a secular context, by using a collective of long station time series primarily originating from the ECA&D data set. Our data set comprises 42 temperature records in daily resolution, predominantly starting already in the 19th century. The study area covers Europe's central latitudes ( $44^{\circ}$  to  $52^{\circ}$  N), extending from England and the Atlantic coast line in the west to areas north-west of the Black Sea in the east.

The 2015 major heat episodes can be linked to a frequent advection of very hot subtropical air masses, triggered by reoccurring supporting atmospheric circulation conditions. In a decadal perspective, long-term variations of atmospheric circulation types and indices, as well as the Atlantic Multidecadal Oscillation (AMO), shape the European temperature regime. We analyse the performance of several approaches representing atmospheric circulation peculiarities, by using a range of (extreme) heat indices based on minimum and maximum temperatures. We find that the accumulation of very hot summers since the millennium is related to a pronounced positive phase of the East Atlantic pattern and the AMO, and negative phases of both the East Atlantic-Western Russian Pattern and the West Pacific Pattern.