



Spatial extent and intensity of temperature extremes - multicomponent analysis in different scales (the example for Europe)

Agnieszka Sulikowska and Agnieszka Wypych

Jagiellonian University, Institute of Geography and Spatial Management, Department of Climatology, Krakow, Poland
(a.sulikowska@doctoral.uj.edu.pl)

Temperature extremes are considered to be one of the most dangerous weather phenomena regarding their major impacts on the natural environment and society. The beginning of the 21st century was characterized by very intensive heat and cold episodes with extreme temperatures affecting different, in terms of location and spatial extent, parts of Europe.

The aim of this study is to estimate the role of spatial component and extreme event definition in the temperature extremes analyses for Europe. The extremeness of maximum summer (TX) and minimum winter (TN) temperature events are examined using extremity index concerning jointly their spatial extent and intensity.

The analysis is conducted for widely described in literature heat episodes in the summers (JJA) of: 2003, 2006, 2012, 2015, and cold episodes in the winters (DJF) of 2009/2010 and 2011/2012 using daily temperature data from the E-OBS gridded dataset with spatial resolution of 0.25° .

Days with temperature extremes are delimited at each grid point using the 95th TX and 5th TN percentile for heat and cold events, respectively. Percentiles are computed for the period 1981-2010 using different approaches, i.e. monthly values and values calculated for each calendar day using moving window method with several window size. The intensity of an event is described by the positive (surplus) and negative (deficit) anomalies with the respect to the 95th and 5th percentiles, respectively.

Spatial extent is defined by the mean temperature surplus or deficit of the total area affected by temperature extremes. The extremeness increases with increasing temperature surplus or deficit and the enlargement of area under the temperature extremes influence. The impact of spatial information is assessed by comparing the results for different research domains, i.e. subcontinental scale, climate regions, EOF modes for extreme temperatures, circulation domains and study boxes of different spatial resolution.

Spatial extent of the area affected by the extremes gives the additional information about the extremity of the event. The obtained results enables to assess the utility of extremity index for analyses concerning diverse methodological approaches.