



## Observed changes in daily climate extremes of temperature and precipitation in the Carpathian Region

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Climate indices are used in several projects on climate change as prevailing indicators of changes in extremes. The spatio-temporal changes of extreme indices can be implemented through the analysis of observations with high quality and representative in time and in space alike. The spatial interpolation of indices values for station locations is a difficult task as the distribution functions of the several derived values are unknown. However, the basic variables, such as temperature and precipitation can be gridded by the knowledge of their statistical properties, thus higher quality gridded datasets can be constructed for further analysis by interpolation of the basic variables. The daily grid for period 1961-2010 in 0.1° spatial resolution for several basic meteorological variables and climate indicators were created in CARPATCLIM (Climate of Carpathian Region) project. It is a relevant climate database for studying extremes in the Carpathian Region.

The focus of the CARPATCLIM was the spatial and temporal examination the climate of the Carpathian Region using harmonized data and standard methodology. In the frame of the project the digital climate atlas of the region was produced. The gridded atlas can be the basis of regional climate change studies and other climatological researches: <http://www.carpatclim-eu.org/pages/home/>. The common used methods and software in the project was the method MASH (Multiple Analysis of Series for Homogenization; Szentimrey) for homogenization, quality control, completion of the observed daily data series; and the method MISH (Meteorological Interpolation based on Surface Homogenized Data Basis; Szentimrey and Bihari) for gridding of homogenized daily data series. A set of climate change indices derived from daily temperature and precipitation

data, focus on extreme events, were computed and analysed in this study. The harmonized data has enabled the presentation of the most comprehensive picture of trends in extreme temperature and precipitation indices in the Carpathian Region. Seasonal and annual indices for the period 1961–2010 were computed. Trends in the gridded fields were calculated, mapped and tested for statistical significance. Results showed significant changes mainly in temperature extremes associated with warming. The large part of the region showed a significant decrease in the annual occurrence of cold nights and an obvious increase in the annual occurrence of warm nights. Precipitation changes showed a more variable picture, the changes are much less spatially coherent compared with temperature change.

The investigated climate extremes and observed trends, changes in frequency and intensity could contribute to the establishment of the adaptation strategies in the Carpathian Region.