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Climate change in the Carpathian Region

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To investigate the climate of the Carpathian Region (17°-27°E; 44°-50°N), the European Commission launched in 2010 and financed the CARPATCLIM project. The CARPATCLIM consortium was made by nine country members (Austria, Croatia, Czech Republic, Hungary, Poland, Romania, Serbia, Slovakia, and Ukraine) under the scientific and technical coordination of the European Commission's Joint Research Centre (JRC). The CARPATCLIM members collected, quality-checked, homogenized, harmonized, and interpolated daily data for sixteen meteorological variables and more than thirty derived indicators related to the period 1961-2010. The principal outcome of the project is the Climate Atlas of the Carpathian Region, hosted on a dedicated website (www.carpatclim-eu.org) and made of high-resolution daily grids (0.1°x0.1°) of all variables and indicators. In order to describe the climate evolution of the Carpathian Region, we analyzed the spatial and temporal variability of ten variables: minimum, mean, and maximum temperature, daily temperature range, precipitation, cloud cover, relative sunshine duration, relative humidity, surface air pressure, and wind speed. For each variable, we performed a linear trend analysis on an annual and seasonal basis. Temperature was found to increase in every season, in particular in the last three decades, confirming the trends occurring in Europe; wind speed decreased in every season; cloud cover and relative humidity decreased in spring, summer, and winter, and increased in autumn, whilst relative sunshine duration behaved in the opposite way; precipitation and surface air pressure showed no significant trend, though they increased slightly on an annual basis. In the Carpathian region positive/negative sunshine duration anomalies are highly correlated to the corresponding temperature anomalies during the global dimming (1960s-1970s) and brightening (1990s-2000s) periods.