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Centennial climatic changes in Romania from observational data

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Detailed regional studies of long-term seasonal climate change are essential for the assessment of the impacts of climate variability and change in a given area, and are also necessary for planning adaptation strategies.

With an area of 238'391 km^2, Romania is the largest country in south-eastern Europe. It has a transitional climate between temperate and continental with four distinct seasons, and with various climatic influences (i.e. oceanic in the West, Mediterranean in South-West, Baltic in the North, semi-arid in the eastern areas and Pontic in the South-East). Climatic variations are modulated by geographical elements, the position of the main mountain chain, elevation, the location of the Black Sea, etc.

The purpose of this study is to present a unified and up-to-date country-wide study of seasonal trends in air temperature, precipitation, sunshine hours, relative humidity and snow cover, using good quality data series (i.e. following the standards recommended by the World Meteorological Organization concerning both the data measurement and the weather station conditions) from all available stations with continuous record over the last 100 years (1918–2017), and which were subject to an additional quality control by means of statistical tests. Changes in annual precipitation and thermal extremes are also investigated by means of 15 indices recommended by the Expert Team on Climate Change Detection and Indices (ETCCDI).

The non-parametric Mann-Kendall test is used for trend detection, while the magnitude of slope is computed using the Kendall-Theil robust line (also known as the Theil-Sen slope estimator). Correlations with large-scale atmospheric circulation are examined by means of several teleconnection indices, like the Atlantic Multidecadal Oscillation (AMO), East Atlantic (EA) pattern, East Atlantic/West Russia (EAWR), North Atlantic Oscillation (NAO) Index.