



Wind speed variability over Romania since AD 1961 in connection with atmospheric circulation

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Changes in near-surface wind speed have important implications in several domains, like wind energy generation, wind erosion, wind transport of pollen and seeds, wind transport of pollutants and associated impacts on human health. Also, wind plays an important role in the evaporation process, as the amount of evaporation increases when drier air masses replace the humid ones accumulated above ground or canopy.

In the present study, mean and maximum annual, seasonal and monthly wind speed data series for the period 1961-2017 from 104 weather stations fairly distributed over Romania (both spatially and with respect to elevation) were tested for trends with the Mann-Kendall nonparametric test.

The time series consist in high quality data from the national weather station network of Meteo Romania (the Romanian National Meteorological Administration), most of them having continuous records over the 57-year study period. For the sake of spatial coverage, some stations with records with less than 10% missing data have also been included in the analysis.

Prior to conducting the trend test, we applied a state-of-the-art quality control and homogenisation procedure, called Multiple Analysis of Series for Homogenization (MASH) – developed within the Hungarian Meteorological Service by Dr. Tamas Szentimrey. MASH is a relative homogeneity test procedure that does not assume that the reference series are homogeneous. Eventual break points and shifts are detected and adjusted through mutual comparisons of series within the same climatic area.

Our study proves that the annual and seasonal mean and maximum wind speed is decreasing. The signal is consistent and statistically significant – in agreement with the vast majority of recent studies on many regions of the Northern Hemisphere, which conclude that the recent terrestrial stilling is a wide-spread phenomenon.

Connections with large-scale atmospheric circulation and with circulation types over Romania are also tackled.