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Changes in monthly wind speed in Romania from observational data (1961–2018)

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Mean and maximum monthly wind speed data series from 104 meteorological stations, covering the period 1961–2018, and fairly distributed over Romania (both spatially and elevation-wise) were analized for trends with the Mann-Kendall nonparametric test.
The Mann-Kendall test is a rank-based method, particularly suitable for non-normally distributed data, time series containing outliers and non-linear trends. Beyond its robustness, the Mann-Kendall test has become extremely popular in assessing trends in environmental data, therefore allowing a fair comparison of trend results between regions. In the present analysis we chose the significance level of 10% (two-tail 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 58-year study period. In order to obtain a better spatial coverage, some stations with records having less than 10% missing data were also included in the analysis.
Prior to the trend analysis, we applied a state-of-the-art quality control and homogenisation procedure – Multiple Analysis of Series for Homogenization (MASH), developed within the Hungarian Meteorological Service by Dr. Tamas Szentimrey. The MASH method is a relative homogeneity test procedure that does not assume that the reference series are homogeneous. Possible break points and shifts are detected and adjusted through mutual comparisons of series within the same climatic area.
The results show statistically significant decreasing trends in wind speed at about half of the locations. Our findings are in agreement with the vast majority of recent studies on many regions of the Northern Hemisphere, which leads to the conclusion that the terrestrial stilling that occurred during the last decades is a widely spread phenomenon.
Connections with large-scale atmospheric circulation indices and with circulation types over Romania are discussed, too.