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Observed and simulated changes in the mean and extreme wind characteristics over Hungary

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Nowadays it is widely known that changing global climate may trigger a disproportionate response in extremes. Generally, climatic extremes exert far more damage to human, economic, and natural environmental systems than changes in mean climate. Therefore, it is a key issue to understand climate variability and climate change and analyze observed extreme events that could link to changing regional climate.

The presented study, focused on observed wind speed and wind gust values, is based on 36-year-long (1975-2010) wind data set of 36 Hungarian synoptic meteorological stations. After quality control and homogenization tasks, complex analysis of wind climate was carried out, spatial and temporal (monthly and seasonal) distributions of mean and extreme wind characteristics, furthermore frequency and intensity of extreme events were estimated. Measured and ERA Interim reanalysis data were compared in order to prove the adaptability of contemporary climate simulation results in estimation of regional climate change effects. Finally, monthly and seasonal wind field projections of RegCM regional climate model (driven by the ECHAM global model) were mapped and analyzed (2021-2050 and 2071-2100) for the Carpathian Basin using the SRES A1B emission scenario. Our main results suggest that in case of mean wind speed, a decreasing trend is evident in Hungary with special temporal and territorial distribution. The largest decline is expected in spring. However, intensity of extreme wind conditions shows significant increasing trends in different seasons.