Seasonal and spatial distribution of wind field in Hungary

K. Radics (1) and J. Bartholy (2)

(1) Meteorological Service of the Hungarian Defence Forces, (2) Department of Meteorology, Eötvös Loránd University

Hungary had not been the subject of extensive wind resource studies in the last century although, several studies were carried out analysing the surface and upper-air wind records spanning several decades. Hungary is not one among countries with windy climate, however, in response to the need for a new statistical analysis of wind field a research started on clarifying the wind resources of the country.

The study was based on wind speed time series with fine temporal resolution. Using the latest ten-year-long data sets of 30 Hungarian climate stations time series analysis and complex wind climate research were carried out, basic and supplementary wind characteristics were calculated applying a methodology corresponding to the European Wind Atlas. Then, wind atlas of the region has been compiled. Wind profile measurements were evaluated for station Hegyhátsál, where multilevel wind speed time series are available for the 1995-2005 period. The structure of the vertical wind profile, and the relationships between atmospheric stability and different errors of empirical wind profile formulas were analysed using the data of different observation levels. In order to analyse the most important characteristics of wind field modification effects of topography and roughness were evaluated, horizontal and vertical extrapolation of measured wind data was carried out in several case studies for different regions of the country. Wind speed map of Hungary has been simulated for different levels using a mesoscale wind model corresponding to the European recommendations. Furthermore, interannual variability of wind energy production has been estimated.