



Climatological study of extreme wind events in a coastal area

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Long-term acoustic remote sensing measurements of wind and turbulence profiles through a MFAS SCINTEC sodar with high spatial (10 m) and temporal (10 minutes with averaging time of 20 minutes) resolution of the coastal boundary layer in Bulgaria (Experimental polygon Ahtopol) provide an opportunity to define "rare" values of meteorological parameters within their statistical distributions and to identify them as extreme events according to the Intergovernmental Panel on Climate Change (IPCC). The statistical analysis of wind speed profiles measured at Ahtopol station has been performed for eight-year period (from August 2008 to October 2016) using the two-parameter Weibull distribution. The determination of the ninety-percentile of this statistical distribution (at every sodar measurement level from 30 up to 600 m) has given values ("rare" events) that have defined the theoretical extreme wind speed profile (reference profile). On this basis, the extreme profiles during the reviewed period have been determined. Analysis of the distribution of the situations with extreme weather events by months and hours for the entire period has been performed. The multiple time series with the registered extreme profiles have been then used to derive averaged parameters defining the vertical structure of the coastal boundary layer during extreme events. The climatic data processing for the wind field vertical structure in a coastal area has been initiated as a primary task of the project REPLICA (extreme Events and wind ProfiLe In a Coastal Area), funded by the National Science Fund of Bulgaria. One of the main goals of that project is to reach new knowledge about the Planetary Boundary Layer (PBL) characteristics under extreme winds conditions by averaging extreme profiles of acoustic sounding of the atmosphere at the Southeastern Bulgarian Black Sea coast.