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Forecasting the weather
- ensemble techniques
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Characteristics of extreme winds in the Czech Republic

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Extreme wind events belong to the most damaging weather-related hazards in the Czech Republic. Therefore a complex survey is performed to exploit the wind data available over the period of industrial measurements in Czech Republic for extreme wind analysis. The object of the survey is to find the limitations of wind data available, to analyze the conditions for extreme wind events and to try to enhance the knowledge about the statistical behavior of extreme wind.
The data quality presents itself as a major issue. The homogeneity of extreme wind data is broken in many cases as the extreme wind values are highly dependent on the measuring instrumentation and changes in neighborhood. It may also be difficult to distinguish between correct high wind speed data and erroneous values. The individual analysis and quality assessment of wind data used in extremal analysis is therefore essential.
There are generally two basic groups of extreme wind events typical in the Czech Republic and over the mid-latitudes in general: The “convective” events (can be also called as “squalls”) are primarily initiated by deep convection, whereas the primary cause for “non-convective” (synoptic) events is large-scale pressure gradient. The subject is, however, a bit more complex, as the pressure gradient inducing high wind in higher atmospheric levels or wind shear can be a significant factor in convective events; on the other hand, convection may increase wind speeds in otherwise “non-convective” synoptic-scale windstorms. In addition, there are some special phenomena that should be treated individually: the physical principle and climatological behavior (frequency, magnitude and area affected) of tornadoes make them very different from common convective straight winds; this is in lesser scale also the case of “foehn” or “bora” effects belonging to non-convective events. These effects, however, do not play major role over the Czech Republic.
In Czech Republic, the overall impact of convective and non-convective extreme wind events is roughly at the same order. The convective events usually occur from April to August, whereas the non-convective events are typical for cold months from October to March. In mountainous regions, the non-convective events are most important, however, the impact of convective storms is high in lowlands, partially because of the seasonal foliage. The convective events are usually connected with squall lines or frontal waves. The non-convective events are mostly caused by strong southwest to northwest flow; a smaller specific group of these events, typical for some regions, is connected with south to southeast flow and stable atmospheric conditions.