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Classifications and secular variability of Icelandic windstorms

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Windstorms are common in Iceland, and thus a classification is of interest. We use two criteria based on wind force observations at synoptic stations during the period 1949 to 2012 to identify “windstorm days”. According to the first criterion all days when the average 24-hr wind force, for all observations exceeds 11 m/s, are considered windstorm days. This sample includes 800 days, during the 64 year period. According to the second criterion, a day is considered a windstorm day, if, at least 25% of reporting stations have daily maximum 10-minute wind speed exceeding 20 m/s. This second sample includes 727 days, during the study period, whereof 456 days are common to both data sets.

Each storm is assigned a prevailing wind direction on the basis of the observations. For the data-set sampled, applying the first criterion, the northerly directions (NW, N, NE, E) include 60% of the data points, but only 44%, for the one based on the latter. We attribute this difference to the different durations of the windstorms in the samples. The first criterion favours long lasting storms, while a day with a swift-moving, but intense storm, is excluded from the first dataset, but included in the second. In fact, the northerly storms are typically longer-lasting than the southerly ones. An inspection of the upper-air (500 hPa) situation reveals that the southerly storms are indeed associated with high upper air wind speeds (jet stream storms). However, during the northerly storms, the wind aloft is typically rather weak, but associated with large low-troposphere thermal gradients (low-level jets).

There is considerable variability of the number of windstorm days on both year-to-year and decadal timescales. It is important to distinguish between the “jet-stream storms” and the “low-level-jet storms” in discussions of future storm climate changes in Iceland, as these two types show only limited temporal coherence, on the secular scale.