



Understanding extreme winds in Iceland

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Iceland is a fairly windy country, due to its location adjacent the North Atlantic storm track. The orography of the island is rugged, mountains are steep and fjords and valleys narrow, and this impacts local winds. Thus, mountain wind phenomena such as low level jets, gap winds, down-slope wind storms, mountain waves and wind wakes are common.

To increase our knowledge of the behaviour of wind in Iceland an extreme value analysis was conducted based on observations from 61 automatic weather stations, applying the Peak Over Threshold technique on maximum daily wind speed and maximum daily wind gust at each site. The time series included at least 10 years of data and the threshold was chosen as the 0.9 quantile of maximum mean wind speed/maximum wind gust at each location. Among the results is the larger impact the local orography has on the extreme wind gusts compared to the mean wind. With extreme value models in place, a few significant weather events were selected from recent years and the observed wind speeds compared to the models in order to evaluate how extreme the events were and how large area they impacted. Actually, in most of these events the observed wind speed only turned out to be extreme at a few stations, emphasising the local effects. However, in an event from December 2007, when the observed maximum wind speed exceeded 23 m/s in most of western Iceland, the event was estimated as rare at a number of weather stations. Clearly this gives indication for further studying this particular weather event.

An automatic system has been set up, running once an hour, comparing observed wind measurements to the extreme value models and producing maps of the return periods for all sites. This system gives us the possibility to, on a daily basis, evaluate the extremeness of each situation and simultaneously increase our knowledge of extreme wind behaviour in Iceland. This work is a foundation for studying changes in extreme winds in Iceland.