

Comparison of rapid increases in surface wind speed between Iceland and Germany

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Rapid increases of wind speed can cause severe impacts, but at the same time pose a challenge to weather prediction. In order to better understand the processes leading to such events, hourly observations from about 200 weather stations in Iceland as well as about 200 weather stations in Germany within the period from 1993 until 2018 are explored. The climatological patterns and associated dynamical process in the atmosphere are compared to show differences between the causes of such rapid increases between the two regions. In Iceland, rapid increases occur mainly during the winter season. In summer, the frequency of rapid increases is very low with a slight maximum during the night. Additionally, westerly winds cause higher frequencies of rapid increases than, e.g., easterly winds, which can be explained by typical tracks of cyclones. Rapid increases are very frequent in northern Iceland due to southern winds blowing over the central highlands in stably stratified conditions. An analysis of rapid increases at individual stations reveals a large impact of the local topography and the wind direction. A very important contributor is the downslope flow. In Germany, rapid increases occur mainly during the afternoon and night in the summer season, which indicates a larger impact of convective gusts and a smaller impact of cyclones compared to Iceland. Additionally, the influence of topography on rapid increases in Germany is much weaker than in Iceland, except for the Alpine regions in southern Germany.