Geophysical Research Abstracts
Vol. 20, EGU2018-9869, 2018
EGU General Assembly 2018

The Laseyer wind storm – case studies and a climatology

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In north-eastern Switzerland, near the village of Appenzell, the Laseyer wind storm recurrently forces the operators of the local train service to stop the service into the narrow Schwende valley. In fact, a train derailment on 19 January 2007 was attributed to the strong cross-valley winds occurring during a Laseyer event. This event further highlighted a very characteristic feature of this wind storm: the regional wind aloft (as measured at the station Ebenalp) was westerly, and thus opposing the easterly winds needed in the valley (measured at Wasserauen) to lift the coach off the railway tracks. In this study, wind observations at several sites are used to detect and characterize Laseyer events between 1998–2009. Two main conclusions are: (i) strong easterly winds at Wasserauen occur almost exclusively concurrently with strong westerly winds on Ebenalp, whereby the directional window of the westerly winds on Ebenalp is very narrow (265°–295°); (ii) the gust speeds at Wasserauen increase abruptly at the Laseyer's onset, a smoother maximum in gust speeds on Ebenalp is discernible, and, remarkably, the free-tropospheric mean wind speed measured at the nearby Säntis mountain peak exhibits a mimimum – indicating that the Laseyer wind is typically associated with a transient meso-scale flow situation. Potential mechanisms leading to the Laseyer wind storm are presented, including rotor circulations, recirculation bubbles, vortex shedding and gravity waves. No conclusive answer can be given, but it is argued that classic rotors and gravity waves play only a minor role due to the narrowness of the valley.