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## Numerical Investigation of High Impact Foehn storm in February 1925 using WRF and PALM models.

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One of the most hazardous windstorms was observed in Switzerland on February 15, 1925. The storm is categorized as a 'High-impact Foehn Storm' that affected all Foehn regions of Switzerland. All communities, stables, and houses were wholly or partially damaged in the canton of Glarus. In previous work, the Weather Research and Forecasting Model (WRF) was used for downscaling the storm from the Twentieth Century Reanalysis (20CRv2) down to a grid width of 3 km. While many storm features were realistically simulated, wind speeds in the Glarus Valley, where most damage occurred, remained well below the expected values. Here, we go one step further by using a Large-Eddy Simulation model (LES) to analyze whether high gust peaks would occur at the bottom of the valley. For this, the PARallelized Large-eddy simulation Model (PALMv6.0) is coupled to WRFv4.1.2. In the first stage, WRFv4.1.2 was downscaled to a resolution of 1x1 km<sup>2</sup> by using the "Twentieth Century Reanalysis" (20CRv3) as a boundary condition. Three nested domains with resolutions 25km, 5 km, and 1 km were set up for the simulation experiment. The second stage involves downscaling PALMv6.0 to a resolution of 20 m by using the output of WRFv4.1.2 as a boundary condition. The simulation shows strong winds between Netstal and Näfels on Earth's surface. Peak gusts of 40 m/s and more hit the valley floor south of Näfels. Strong turbulence fields reaching the ground at high velocities are observed in the central valley in the south-north direction. The simulation shows good agreement with the damage described, and the simulated peak gusts easily reach the measured maxima of extreme storms. Being able to realistically simulate the local characteristics of a Foehn storm that occurred a century back opens a new window to quantitative analyses of past extremes and their impacts.