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Comparison of seismic and infrasonic avalanche detection systems: first results from the Dischma valley above Davos, Switzerland

Alec van Herwijnen (1), Jürg Schweizer (1), Emanuele Marchetti (2), and Maurizio Ripepe (2)

(1) WSL Institute for Snow and Avalanche Research SLF, Davos, Switzerland, (2) The Department of Earth Sciences, University of Florence, Florence, Italy

The reliable detection of snow avalanches is of crucial importance to better understand triggering mechanisms, identify possible precursors, or improve avalanche forecasting. An avalanche flowing down a mountain is a moving source well coupled with the ground and the atmosphere, which generates seismic and infrasonic waves. Seismic signals are produced by the impact of the dense flowing snow mass on the ground or on obstacles. Infrasonic signals are generated by rapidly accelerating snow particles in the turbulent snow-air flow (powder cloud) of the avalanche. Seismic and infrasound are therefore used as monitoring systems for the remote detection of snow avalanches. However, while it is well known that large avalanches can be detected by both systems over considerable distances, for smaller avalanches the threshold in terms of detection resolution is still unclear. During the winter of 2015-2016 we therefore installed a seismic and an infrasound array in the Dischma valley above Davos, Switzerland. Both arrays were deployed within a distance of 500 m to each other. Several automatic cameras were also installed to provide additional information on the location, type (dry or wet) and size of the avalanches released. The overall goal is to assess the limits of both monitoring systems in terms of avalanche type and size and to assess their resolution to locate avalanches in real-time. We present preliminary results that allow us to define detection capabilities of both methods depending on source-receiver distance as well as the type of the avalanche.