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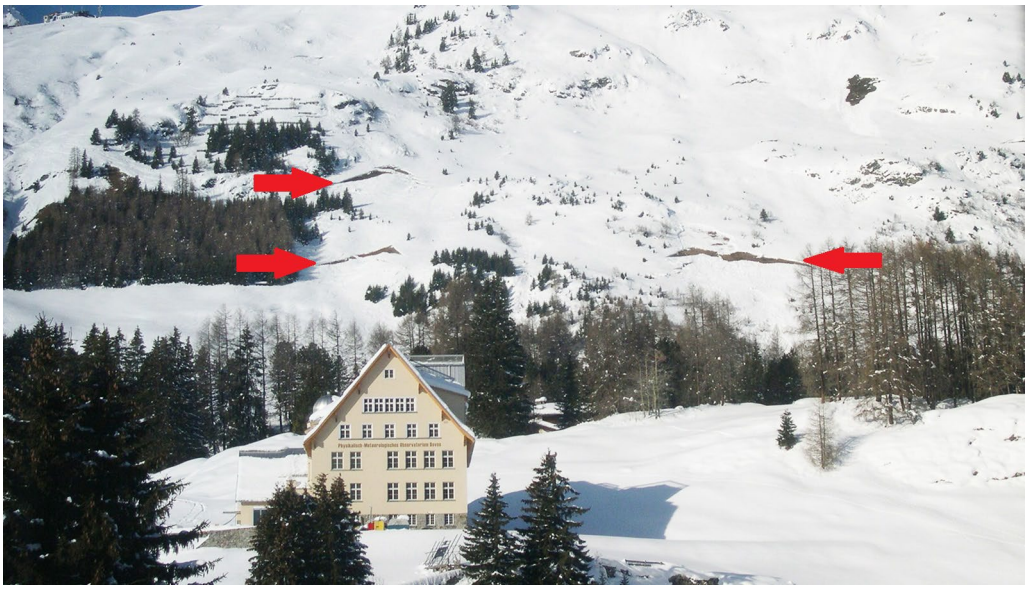
Research in the Grisons

Filling knowledge gaps about avalanches

Why and when do glide-snow avalanches release?

The Academia Raetica, the association for the promotion of science, research and education in the canton of Graubünden and its surroundings, is organizing the eighth conference "Graubünden forscht" (www.gr-forscht.ch) in Davos on September 21 and 22, 2022. The conference brings together young scientists from a wide range of research fields that are of social importance for Graubünden and the Alpine region. "Graubünden forscht 2022" wants to give everyone an opportunity to get an insight into the diverse research in Graubünden. Until September, we will give you a monthly preview of an exciting project.



It is not possible to predict whether glide-snow cracks (here on Dorfberg, Davos) will result in avalanches. Image: SLF

With a Master's degree in Biomedical Engineering, with a focus on Medical Physics, an application to the WSL Institute for Snow and Avalanche Research SLF may not seem obvious at first glance. And yet Amelie Fees has been researching the topic of glide-snow avalanches in Davos since fall 2020. The young PhD student explains: "Medical Physics is the overall term for two main areas, radiology and imaging methods such as magnetic resonance or computer tomography. After completing my studies at ETH Zurich, I was looking for a versatile, creative project where I could apply the methods I had learned during my studies. At the SLF I found what I was looking for. My knowledge of imaging methods also benefits me in researching glide-snow avalanches."

Due to the fact that glide-snow avalanches go off directly on the ground, a huge volume of snow is often involved. Glide-snow avalanches can endanger ski slopes or roads. According to Fees, glide-snow avalanches are difficult to control. You can't blast them like you would a snow slab avalanche.

From experience, it is known quite well where glide-snow avalanches go off, so that endangered areas can be closed if necessary. A slope inclination of more than 30 degrees, a smooth surface, as well as solar radiation and melt water in spring are known factors that favor glide-snow avalanches. Nevertheless, the processes that take place around a glide-snow avalanche have not yet been sufficiently researched, Fees says.

Fees wants to study the interaction between the soil and the snow more closely with the aim of being able to better predict the time of release of glide-snow avalanches. In summer 2021, she buried 22 water content sensors at a depth of five centimeters over an area of thirty by seventy meters on the Dorfberg in Davos, where glide-snow avalanches regularly occur. The data from the measurements will be recorded automatically. During winter, Fees also manually logs different snow parameters (e.g., water content, grain shape and size) in the test area once a week. By collecting this data, she hopes to better understand the physical processes that lead to friction loss between soil and snow. At the same time, she is using a self-written algorithm to evaluate an image dataset of around 800 glide-snow events documented by an SLF camera over a ten-year period in the Dorfberg test area. Among other things, the algorithm automatically tracks the opening of glide-snow cracks to find out more about their dynamics. Thus, Fees was able to observe that most of the recorded glide-snow avalanches went off without a previously visible crack. Fees is only at the beginning of her research and is excited to see what the data will reveal.

The SLF conducts research on snow, avalanches, other alpine natural hazards, permafrost and mountain ecosystems. Its best-known service is the avalanche bulletin. At the CERC, the SLF investigates the effects of climate change on extreme events and natural hazards. www.slf.ch. www.slf.ch

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