

Artificial release of wet snow avalanches

Graduate



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Problem: Snow avalanches are one of the major hazards in mountainous regions during the winter, endangering both people and infrastructure, such as roads and buildings. Artificial avalanche release is carried out as a pre-cautionary measure to mitigate the dangers posed by snow accumulation. However, towards the end of winter, wet snow avalanches are becoming increasingly frequent, partly due to climate change. Currently, there are only a few practical and effective methods for triggering wet snow avalanches. Current techniques, such as detonating explosives to generate shock waves and watering, tend to be unreliable, expensive or environmentally damaging.

Objective: This work aims to develop a system with the objective to create a controlled weak point and a low friction layer in the snowpack in order to trigger an avalanche. The system must be capable of operating in harsh alpine conditions, avoiding obstacles and withstanding tensile loads. The VDI 2221 guideline was used as the basis for the methodological product development process applied in this project.

Conclusion: Due to the lack of snowfall, the prototype could not be tested under real operational conditions. Nevertheless, several key functionalities were verified in a controlled school environment. The detailed experimental results and quantitative performance data obtained during these tests are reserved and therefore not disclosed in this public presentation. Overall, the prototype demonstrated compliance with its intended design concept, while highlighting the need for further validation. Several critical aspects remain untested and require verification under real snow conditions. The capability of the device to trigger an avalanche cannot yet be confirmed, further development should be supported by real-world testing or advanced numerical simulations before any practical application.

Photo of wet snow avalanche
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Subject Area

Product Development