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Close-range hybrid solutions for glaciers instabilities monitoring

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The dynamics that characterizes glaciers instabilities are often not well known because the study of these phenomena is done in many cases after their occurrence. A few examples of dedicated high resolution and high-frequency monitoring networks have been recently implemented to support risk assessment and management of glaciers affected by large potential instabilities.

The current climate trend and the rise of high mountain regions occupations by several anthropic activities have recently created areas affected by high potential risk due to the activation of glacial hazards, in particular during the summer season.

A few possible solutions are available: the substantial limitation of touristic exploitation of these areas or the management of the risk aimed to reduce the restrictions in accessing such high-value areas.

In this regard, it is required the implementation of high-resolution and high-frequency monitoring networks able to follow the evolution of the glacier and increase the knowledge of its dynamics.

In the Courmayeur municipality (Italy), the Planpincieux Glacier is a clear example of this critical condition: an active glacier with an unstable sector that could create a large ice avalanche that can reach the bottom of the valley, which is characterized by the presence of settlements and a famous touristic area.

For this reason, in the last decade, an innovative monitoring network has been implemented and tested in this very complex environment. The system comprises doppler radar, ground-based interferometric SAR and optical monitoring stations. The implementation of this hybrid network is a challenging task not only for the calibration of single instruments but also for the creation of network management that can acquire the dataset of different monitoring systems to obtain a precise representation of the evolution of the glacier. This is the final step that should be implemented for an effective strategy to support decision-makers.