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Infrasonic monitoring of snow avalanches in the Alps

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Risk assessment of snow avalanches is mostly related to weather conditions and snow cover. However a robust risk validation requires to identify all avalanches occurring, in order to compare predictions to real effects. For this purpose on December 2010 we installed a permanent 4-element, small aperture (100 m), infrasound array in the Alps, after a pilot experiment carried out in Gressonay during the 2009-2010 winter season. The array has been deployed in the Ayas Valley, at an elevation of 2000 m a.s.l., where natural avalanches are expected and controlled events are regularly performed.

The array consists into 4 Optimic 2180 infrasonic microphones, with a sensitivity of 10-3 Pa in the 0.5-50 Hz frequency band and a 4 channel Guralp CMG-DM24 A/D converter, sampling at 100 Hz. Timing is achieved with a GPS receiver. Data are transmitted to the Department of Earth Sciences of the University of Firenze, where data is recorded and processed in real-time. A multi-channel semblance is carried out on the continuous data set as a function of slowness, back-azimuth and frequency of recorded infrasound in order to detect all avalanches occurring from the back-ground signal, strongly affected by microbarom and mountain induced gravity waves.

This permanent installation in Italy will allow to verify the efficiency of the system in short-to–medium range (2-8 km) avalanche detection, and might represent an important validation to model avalanches activity during this winter season. Moreover, the real-time processing of infrasonic array data, might strongly contribute to avalanche risk assessments providing an up-to-description of ongoing events.