

How Research can help in Avalanche Risk Management

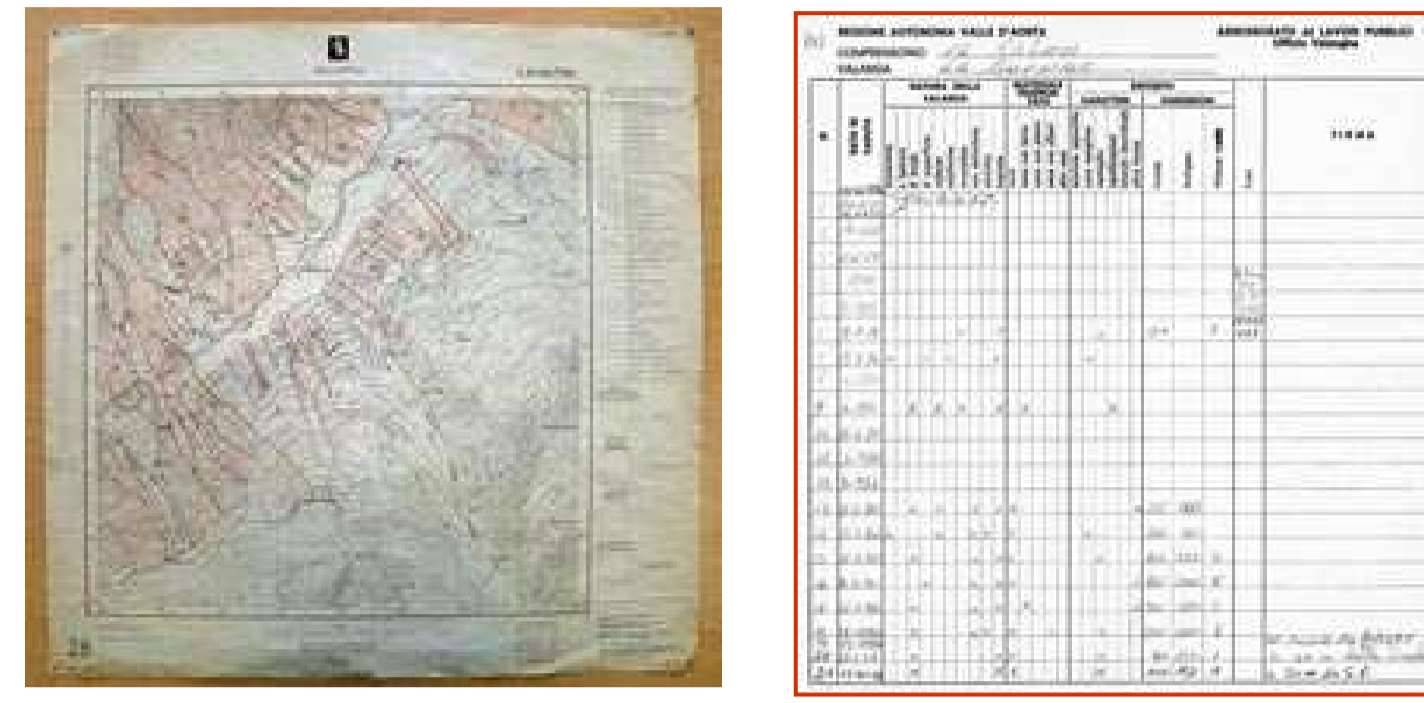
Three new experimental sites in Aosta Valley (IT)



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The Aosta Valley is the smallest Italian region (3.263 kmq) and presents 70% of its territory above 1500 m asl and 80% is potentially influenced by snow avalanches.

Main problem: the avalanche risk tends to grow due both to the greater frequentation of mountains and to the more frequent extreme meteorological events.

Big aim: reduce the avalanche risk with innovative devices.

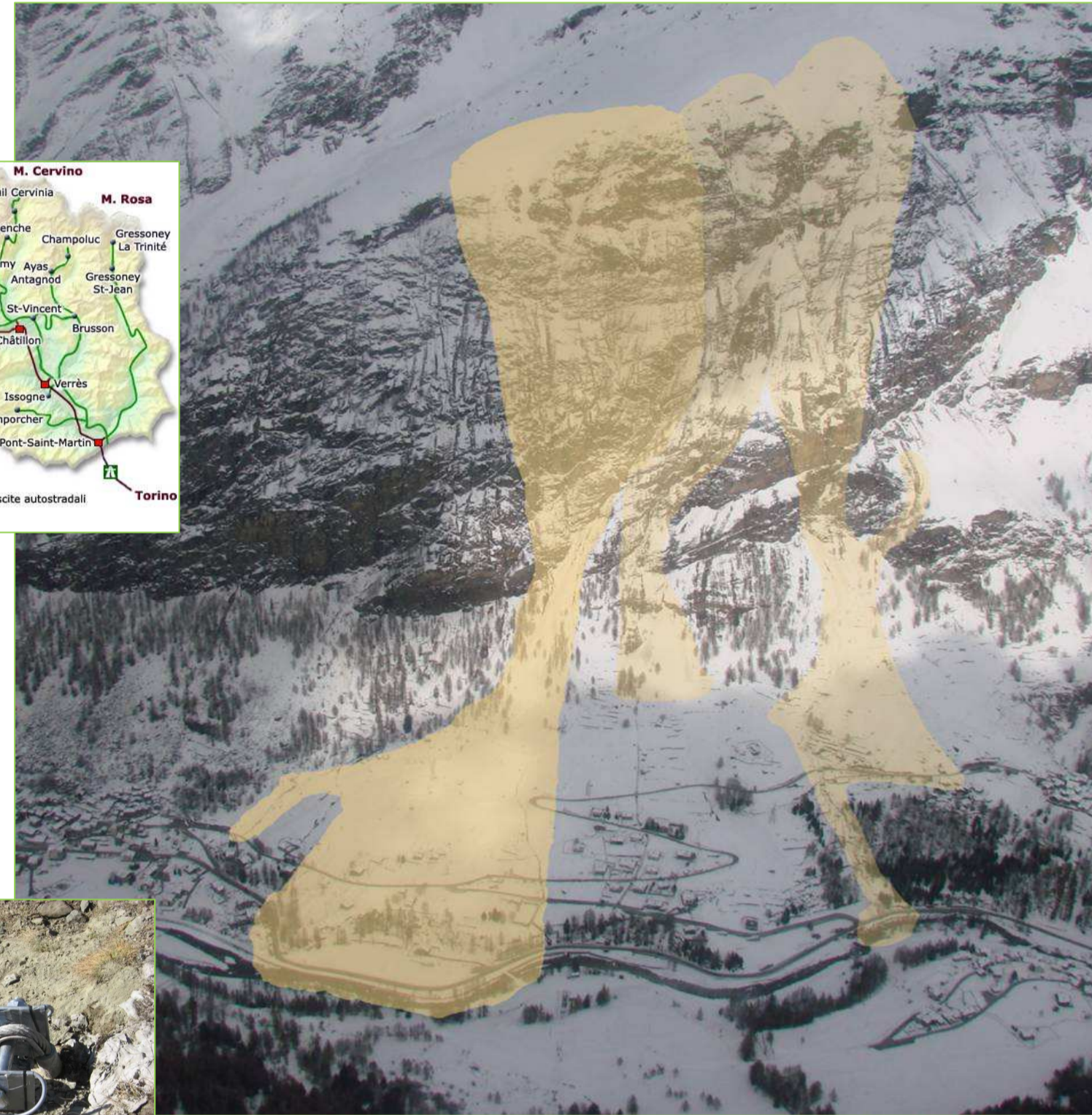
Instruments: experimental sites to improve the knowledge of the snowpack characteristics, of the avalanche release process, of the avalanche dynamics and of the avalanche effects on buildings, forest and infrastructures.



PLAN de La TOUR – Gran Paradiso National Park (AO)

Goal: to measure and understand the snow gliding process and the snowpack overload on umbrellas defence structures

Location: Valsavarenche (AO)
Altitude: 2550 m asl



Eight strain transducer installed along the transverse umbrella beam. From the strain field, curvature is computed and thus the forces on the element are found.

On the anchorage plates strain gages were stuck. The total force acting on the foundation is thus computed via the measured strain in the element.



SNOW SHOES

Two couples (within and outside the area covered by snow umbrellas) of snow-shoes connected to related specific snow-gliding sensors were placed to measure the snow-gliding.

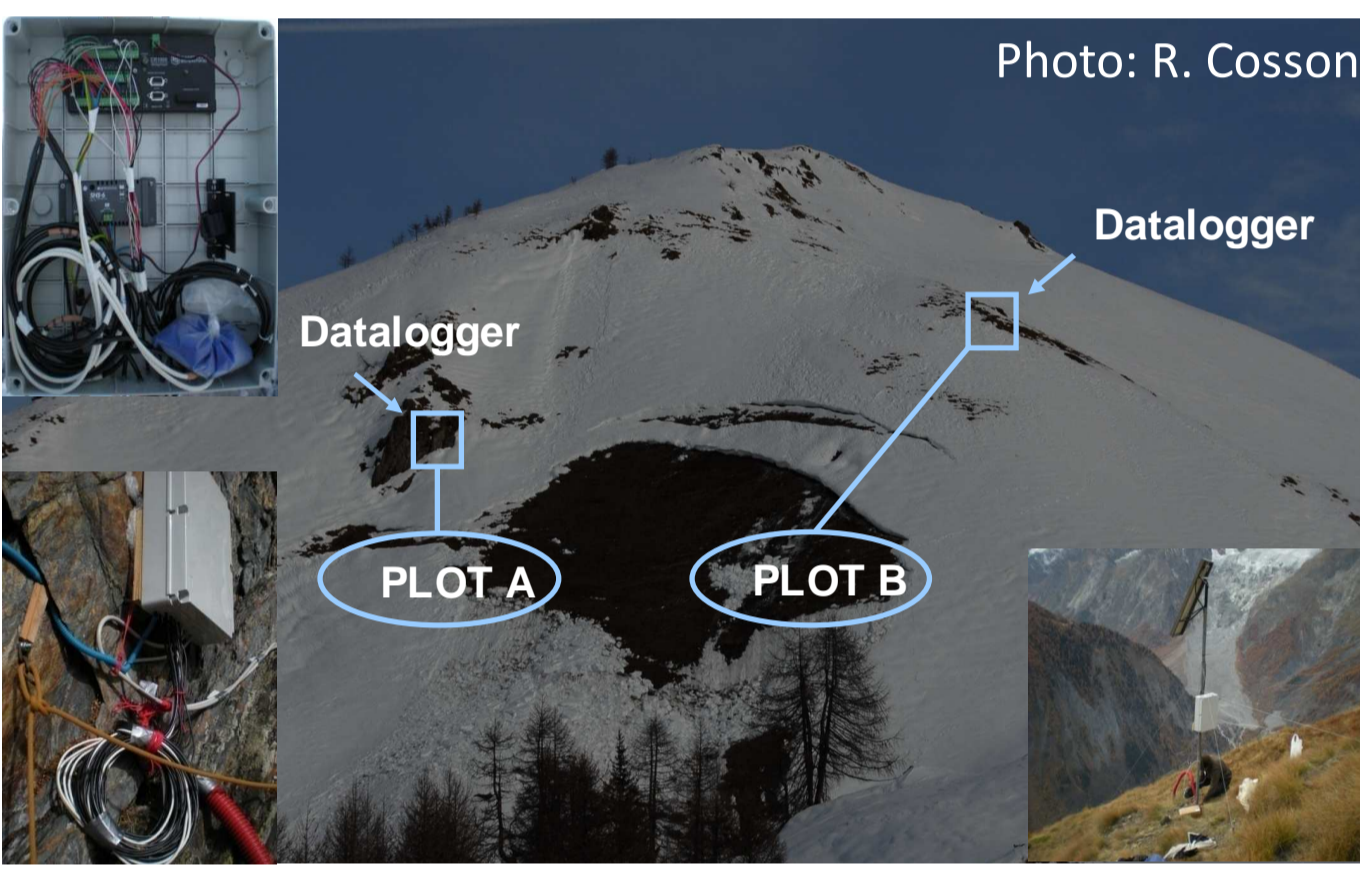
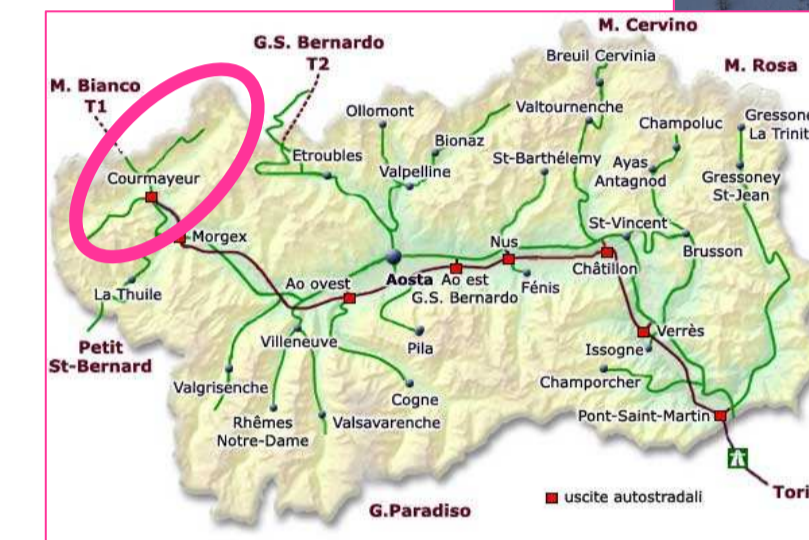
TEMPERATURE SENSORS

Placed within the ground (depth 1cm) they record every 30 minutes the temperature at the snow/soil interface.

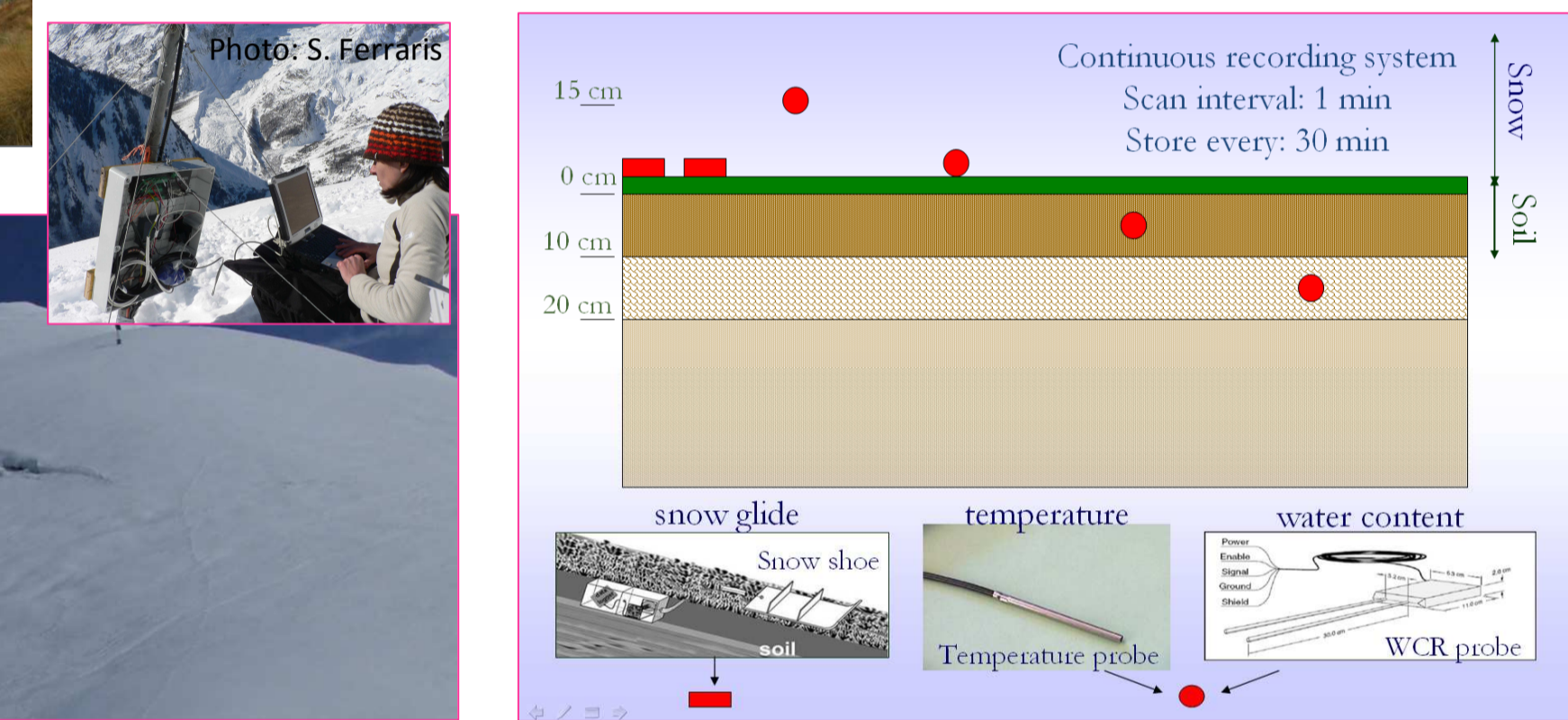
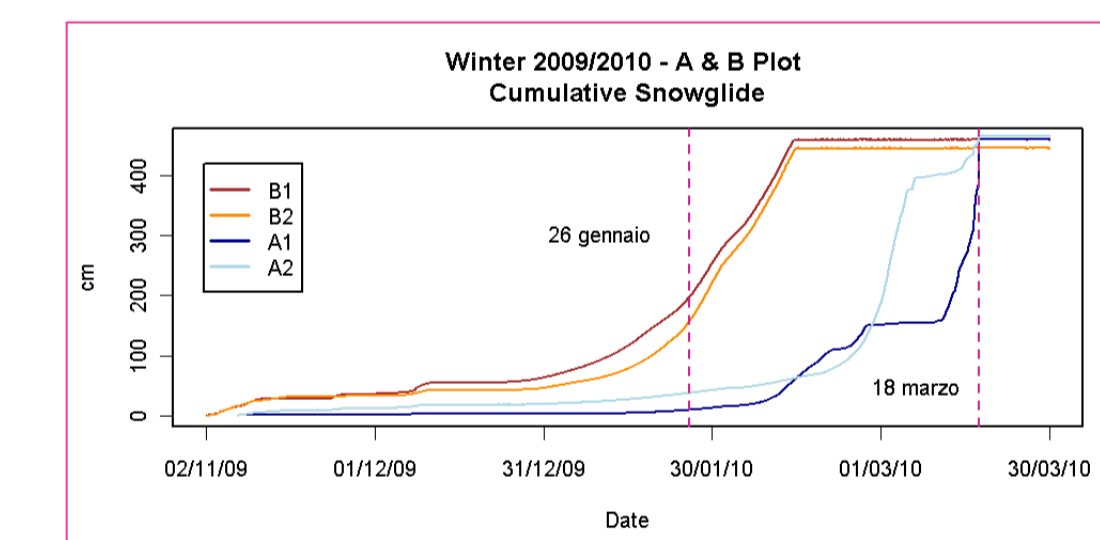
MONT de La SAXE – Mont Blanc Massif (AO)

Goal: to investigate the snowpack movements, focusing to the processes at the snow/soil interface which contribute to full-depth avalanche release.

Location: Courmayeur (AO)
Altitude: 2000 m asl



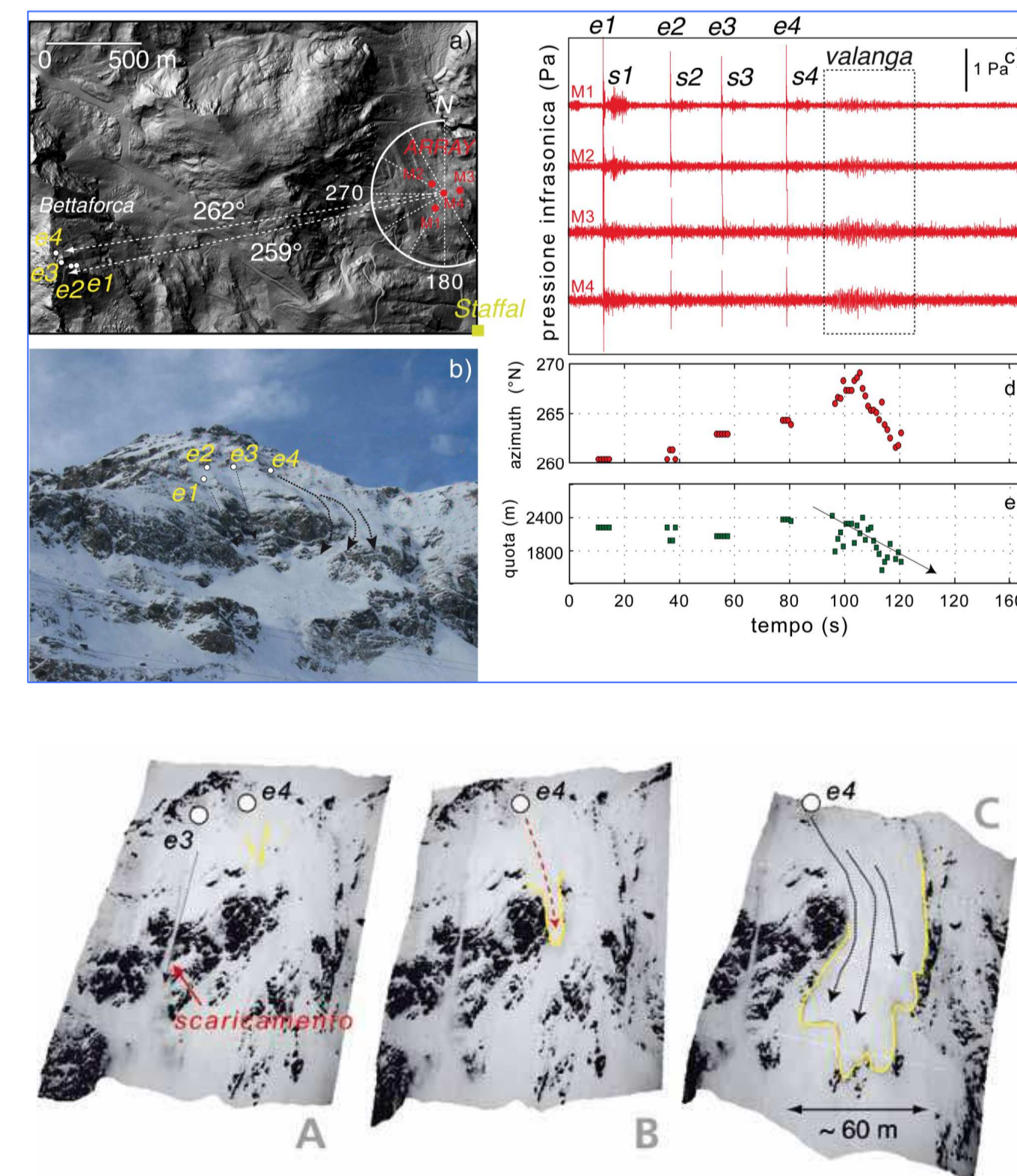
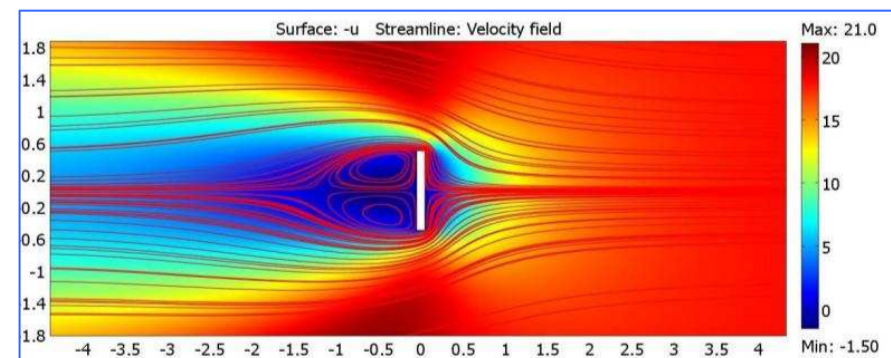
26th January 2010 glide crack became visible



Goal: to better understand the dynamics of small and medium size avalanches and their impact on obstacles.

Location: Gressoney-La-Trinité (AO)
Altitude: 2300-2570 m asl

PUNTA SEEHORE – Monte Rosa Massif (AO)



Goal: to detect the avalanche activity combined with weather and snow data for the prevision and the prevention of avalanche risk.

Location: Staffal (AO)
Altitude: 2000 m asl

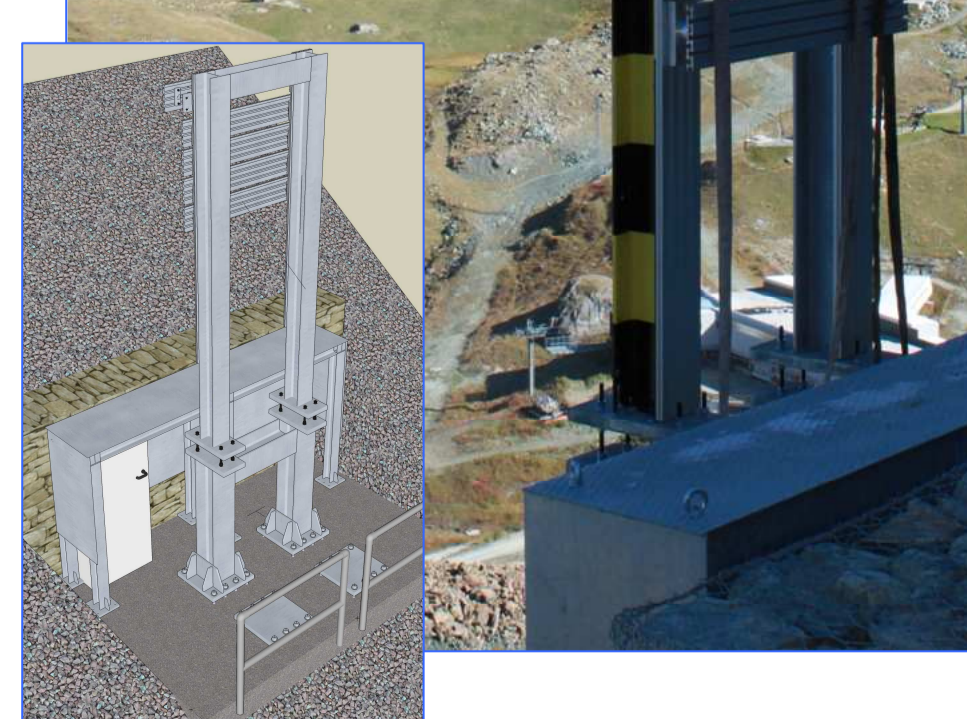


A 4-elements small aperture (150m) infrasound array, with a triangular geometry, have been developed to detect infrasonic waves in the band 0.5-10Hz, as expected for avalanches.



The site is instrumented with a steel obstacle composed by two masts of about 4 m of height supporting 5 instrumented horizontal plates that measure the effects of the avalanche impacting on it.

Different kind of activities are made before, during and after each artificial release: physical and mechanical properties of the snow in the release, track and deposition zones of the avalanche are recorded, front velocity, erosion and deposition mass are estimated by field surveys or by multi-pictures analysis and laser-scan measurements.



PRACTICAL PRODUCTS OF RESEARCH

