

Snow-avalanches are one of the major natural hazard in mountain areas during winter. They can cause severe damage on villages, transportation routes, ski areas. Monitoring systems become a powerful tool to ensure public safety.

SNOW-AVALANCHE MONITORING SYSTEM



The aims of snow-avalanche monitoring systems are:

- monitoring the potential release areas of snow-avalanches
- understanding the dynamical behaviour of avalanches
- activating warning devices when an avalanche occurs

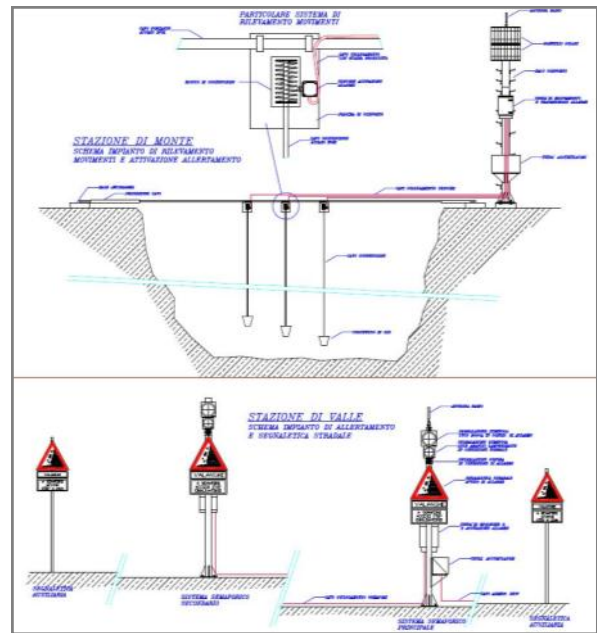
Evaluation results can be used to place, optimize and position the passive defense structures (snow barriers, fences, catchment basins, diversion dikes ...) that divert and break up the path of the avalanche.

In addition, the real-time monitoring can provide warnings to keep the population of villages and routes safe.



Many different types of snow-avalanche monitoring systems have been developed:

- **Electromechanical systems** consists of tilt switch sensors or instrumented stands (with pressure and ultrasonic sensors) and poles positioned along the avalanche path
- **Seismic measurement stations** comprised of geophones and automatic data acquisition system
- **Infrasound systems** comprised of sensors array that detects low frequency sound waves produced by avalanches and automatic station
- **Optical systems** consists of videocameras or infrared cameras, operating at very low temperature and continuously connected to an automatic system for real-time monitoring
- **Weather stations** that provide meteorological measurements on site



The systems can be used individually or in combination for better understanding of the snow-avalanches phenomena and activating local or remote alerts for public safety. These warnings include on-site traffic control signs, traffic lights, temporary closure or SMS. If the sensors are connected to an automatic data acquisition system, the datalogger can send SMS alert messages via GSM/GPRS network.

The automatic data acquisition system allows real-time transmission and visualisation on secure web pages (www.iecitalia.it).



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