



MONITORING SYSTEM FOR NATURAL HAZARDS



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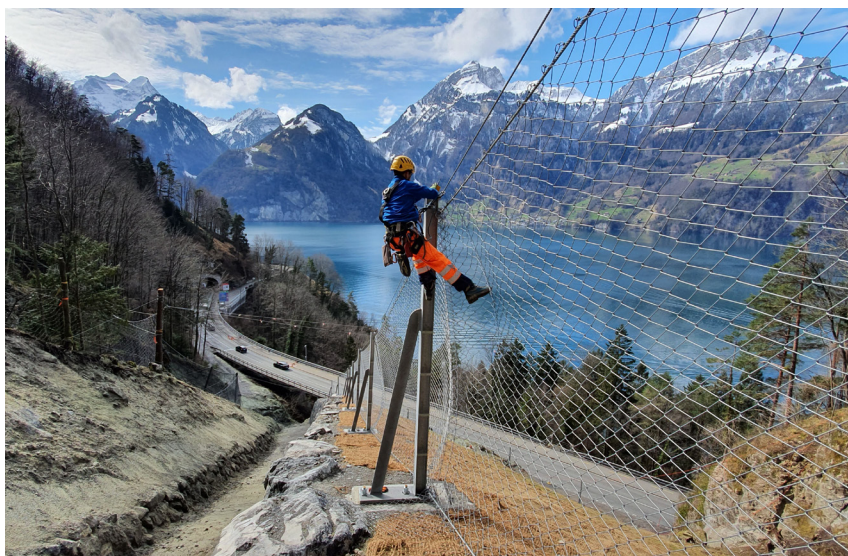
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WHY ELECTRONIC ALARM AND MONITORING SYSTEMS?

Rockfall, landslides, debris flows, floods, avalanches and glacial lakes can threaten roads, inhabited areas or regions frequented by tourists. In such situations, electronic monitoring systems can often complement or even replace structural protection measures – usually at lower costs and certainly with a weaker impact on the alpine scenery. In addition, they are easy to install, are flexible in their use and adjustable at any time.

GEOPREVENT develops, installs and operates electronic alarm and monitoring systems for all natural hazards. We are also dedicated to solving your outdoor measurement problems:

Be it a demanding level measurement, the monitoring of permafrost, critical structures or areas where people need to be detected in all weathers.



NATURAL HAZARDS

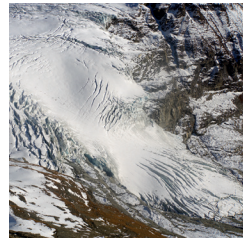
In general, there are two types of system for monitoring natural hazards: a warning system and an alarm system. If an event is imminent, the signs are monitored by the warning system and action is taken if the urgency increases. If it is a rapid process without measurable precursors, the event is detected by an alarm system and immediate measures are initiated automatically.



ROCKFALL



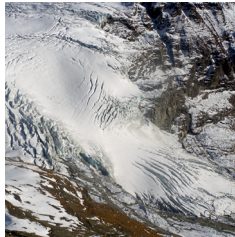
FLOODS



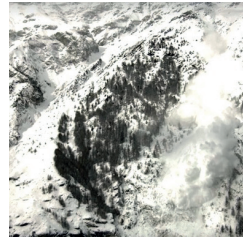
GLACIERS



LANDSLIDES



GLACIAL LAKES



AVALANCHES



DEBRIS FLOWS



SAFETY NETS

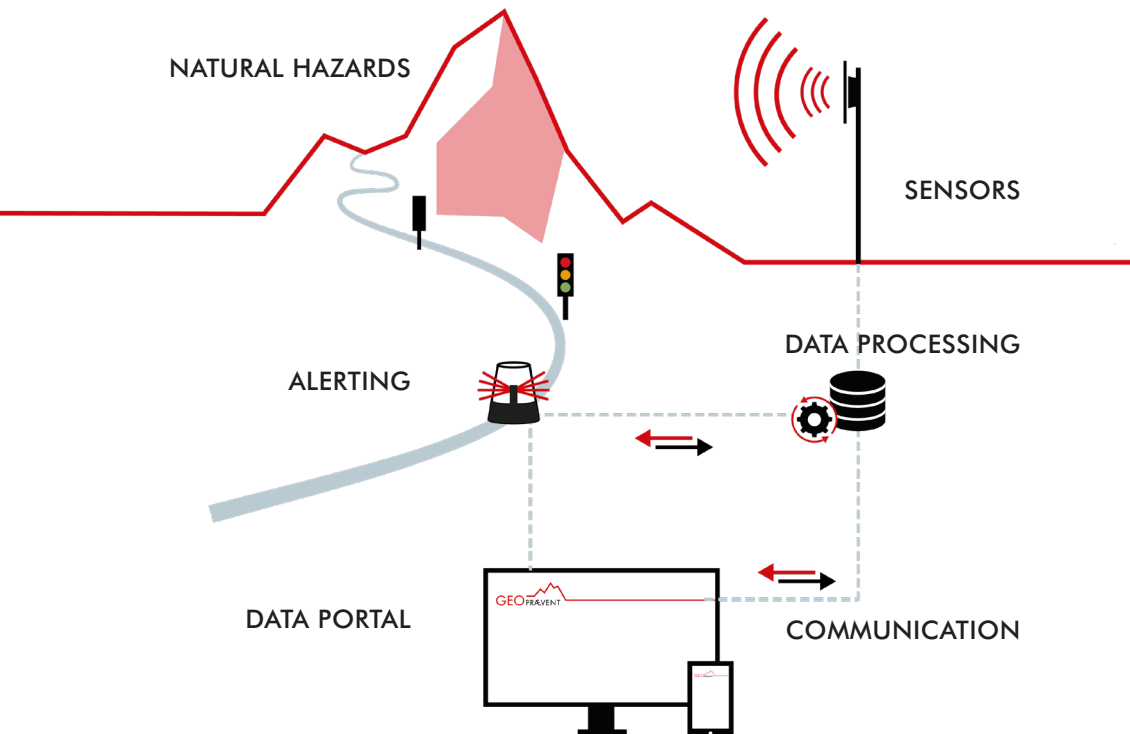


PEOPLE

HOW DOES IT WORK?

A monitoring system is always a system solution and consists of different components. GEOPREVENT sensors detect a wide variety of natural hazards, algorithms evaluate the sensor data and visualize it in the GRAVX® online data portal.

In case of an incident, an alarm is triggered automatically – affected people are informed and roads and railways are closed within seconds. For the permanent and reliable monitoring of natural hazards, the individual components must also withstand the harsh conditions in the high mountains, pass stringent system tests and be equipped with several levels of redundancy (especially for alarm systems).





ALERTING

Reliable detection of natural hazards is one thing, reliable alerting in the event of an incident is another. An alarm system only fulfills its purpose if the linked alarm technologies are also activated automatically and often in real time after a rockfall or avalanche.

LOCAL ALERTING

If traffic routes, construction sites or other objects frequented by people are affected by a hazard, the area must be informed and evacuated as quickly as possible when an event is detected. For alerting, we use local systems with direct alarm transmission that function independently of our evaluation servers, such as traffic lights, sirens or radios.

ALERTING THE AUTHORITIES

Alerting the relevant authorities and natural hazard experts is a high priority. It is important to be informed as quickly as possible in order to take any necessary measures and prevent further damage. In cooperation with telecommunications companies, we offer the sending of prioritized text messages or calls via high-availability telephone lines, as well as integration into third-party systems of emergency services.

SENSORS & TECHNOLOGIES

The detection and measurement of natural events requires a wide variety of sensors and measurement technologies. We select the right sensors for each situation and combine them into a complete system to ensure optimum safety, reliability and availability.



AVALANCHE RADAR

The avalanche radar detects avalanches in real time in all visibility conditions (day/night, fog, rain, snow) and is used to measure activity, verify triggered avalanches or as an alarm system.



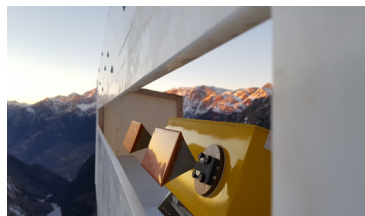
ROCKFALL RADAR

Le radar de détection des éboulements est utilisé pour détecter les éboulements à distance et alerter les routes et les chantiers en temps réel.



INTERFEROMETRIC RADAR

With interferometric radar, large areas can be monitored areas can be monitored and the smallest movements in rock and ice can be detected regardless of visibility conditions.



DEFORMATION CAMERA

The deformation camera is used for large-scale, long-term monitoring of landslide areas, rock instabilities and glaciers.





WEBCAMS

A picture is worth a thousand words. Webcams help to quickly assess the situation in the hazard zone from a distance and automatically create event images.



LEVEL MEASUREMENTS

Radars, laser measurements and pressure probes provide useful data about the flow for floods, glacial lakes or tidal waves.



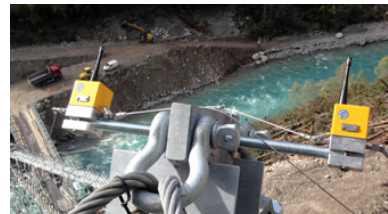
PEOPLE RADAR

The personal radar detects people in a large area and informs those responsible of their presence in all weather conditions, day and night. This is particularly important when avalanches are triggered artificially.



MOTION SENSORS

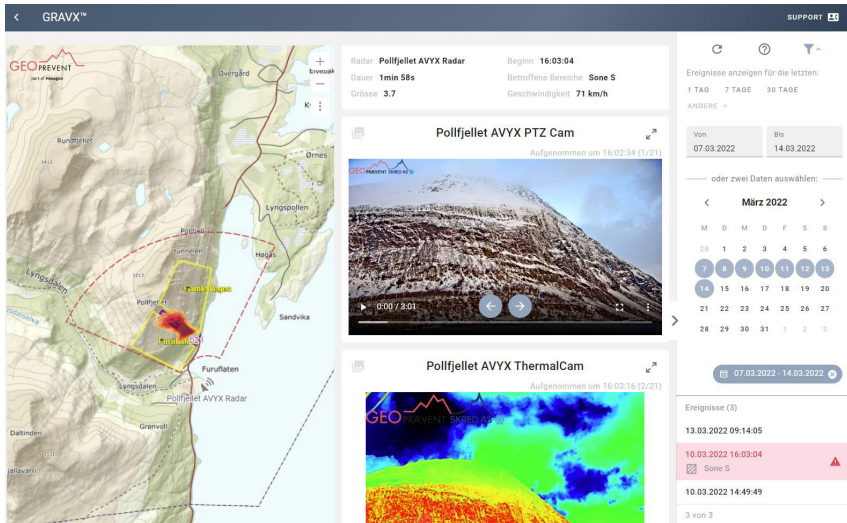
Combination sensors monitor safety nets or individual blocks and provide valuable status information and alert in the event of an impact or breakage of a ripcord.



CLEFT MEASUREMENTS

Extensometers and telejointmeters reliably measure rock fissures in the sub-millimeter range and are used for point monitoring of defined rock instabilities.





GRAVX® ONLINE DATA PORTAL

Do you want to know what is happening in your natural hazard zone at all times? Our stations measure gravitational natural hazards worldwide and upload the data to our servers for processing and visualization. The GRAVX® online data portal combines, visualizes and archives measurement and status data and provides you with up-to-date and convenient access to the relevant information via your preferred devices, such as smartphone, tablet or PC.

- Representation of the event on a map
- Interactive graphics of the events
- Images at any time
- Project-related communication within the portal
- Live tracking of events
- Control barriers and traffic lights online
- Accessible on all devices

ALPINE INSTALLATIONS

High mountain environments are our area of expertise. There are innumerable instruments and methods of data acquisition – but which installation ensures a reliable functionality in the harshest of environments and throughout many years?

Accessing our stations is hardly ever easy. All our staff are experienced mountaineers that bring along the necessary know-how to install gauging stations wherever they are needed. Additionally, most of us have been trained at rope access work in courses offered by the Swiss Mountain Guides Association.



CUSTOMER PROJECTS

Our customer include federal and local authorities, railways or private infrastructure operators such as hydroelectric power plants.



AVALANCHE RADAR, ZERMATT (CH)

The avalanche radar system in Zermatt consists of two avalanche radars for complete coverage of the two notorious avalanche tracks at the entrance to the village. The radar detection of an avalanche triggers the automatic closure of two road sections and notifies the avalanche commission. The experts check the condition of the road via webcams and can quickly initiate evacuation work.



ROCKFALL ALARM SYSTEM GUMPISCH, AXENSTRASSE (CH)

The Axenstrasse, one of the most important north-south axes in Europe, is threatened by rockfall and debris flows in several places. Heavy rainfall leads to repeated mudslides and rockfalls. The slope is permanently monitored using a customized monitoring system consisting of two rockfall radars, seismic sensors, cameras and other sensors at various locations. If a rockfall event is detected, the road is closed within seconds. If the road is not reached, the traffic lights automatically switch back to green.



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SLOPE MONITORING BRIENZ/BRINZAULS (CH)

The slope above Brienz/Brinzauls has been moving for many years, but has accelerated considerably in the last 20 years, which is why the local authorities set up a comprehensive early warning system. GEOPREVENT has been operating an energy-autonomous interferometric radar, a high-resolution deformation camera and a rockfall radar with automatic road closure at various locations for several years. The landslide broke off on June 15, 2023 after a strong acceleration and without any major damage to the village. As the slope is still sliding, monitoring will continue.



DEBRIS FLOW ALARM SYSTEM SPREITGRABEN (CH)

Since 2013, a complex system has been monitoring the Spreitgraben, automatically closing the roads in the event of danger and alerting the population. The warning and alarm system is a combination of various measuring sensors: level radars and ripcords are installed at several locations for early debris flow detection, webcams create event videos and provide an insight into the danger spots at any time. A precipitation alarm also provides information about heavy precipitation and saturation and several independent high-resolution cameras are used to monitor the Ritzlihorn and the trench.



AVALANCHE DETECTION SYSTEM BEAR PASS (CANADA)

The automatic avalanche detection system (AADS) at Bear Pass, BC, consists of seven self-sufficient stations; five avalanche radars cover over 20 avalanche tracks up to 7 km away. Two systems are repeater stations, which ensure data transmission from the radar stations via radio to Stewart, over 40 km away. The avalanche data supports the Ministry's avalanche program in forecasting and road management on Highway 37A.

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YOUR RELIABLE PARTNER IN NATURAL HAZARDS MONITORING.
WE DEVELOP, INSTALL AND OPERATE CUSTOMIZED ALARM AND
WARNING SYSTEMS WORLDWIDE.



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