



Maratea Rockfall, Italy



San Leo landslide monitoring, Italy



Vico Equestre rock wall, Italy

# REFERENCE PROJECTS

## Italy

Maratea landslide monitoring  
 Plan de Coronas landslide  
 Miglionico landslide monitoring  
 Laurinziano landslide monitoring  
 Montelupone rock consolidation monitoring  
 Molunghi landslide monitoring  
 Permafrost monitoring, Gressan  
 Perticara landslide  
 Niscredi landslide  
 Gerace rock consolidation monitoring  
 Slope monitoring, San Vito Romano  
 Rock masses monitoring, Crocefieschi-Busalla

## Europe

Slope monitoring, Coslada - Spain  
 Landslide monitoring, Karlik - Czech Republic  
 Landslide monitoring, Moscow - Russia  
 Preddvor landslide - Slovenia  
 Slope monitoring - Greece  
 Vorobyovy Gory landslide - Russia  
 Landslide monitoring, Sochi Region - Russia  
 Partnachklamm warning system for rock falls - Germany  
 Landslide monitoring, Sibiu - Romania  
 Stuttgart landslide monitoring - Germany  
 Pipeline slope monitoring - Greece  
 Landslide monitoring SGI, Stockholm - Sweden  
 ESRC Project Landslide monitoring - Russia

## Other Countries

NEA landslide monitoring - Georgia  
 Langkawi Project - Malaysia  
 Landslide monitoring Highway West - Georgia  
 Landslide monitoring - South Taiwan  
 Tamparuli-Ranau Sabah Package 2 Project - Malaysia  
 Landslide monitoring - Australia

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# LANDSLIDES SAFETY AND MONITORING

# LANDSLIDES SAFETY AND MONITORING

Landslide monitoring refers to the process of monitoring the stability of slopes and identifying potential landslides. Landslides and slope stability monitoring involves the use of various techniques and instruments to continuously monitor the behavior of slopes and detect any signs of instability.



Installation of MEXID extensometer into the cavern's ceiling

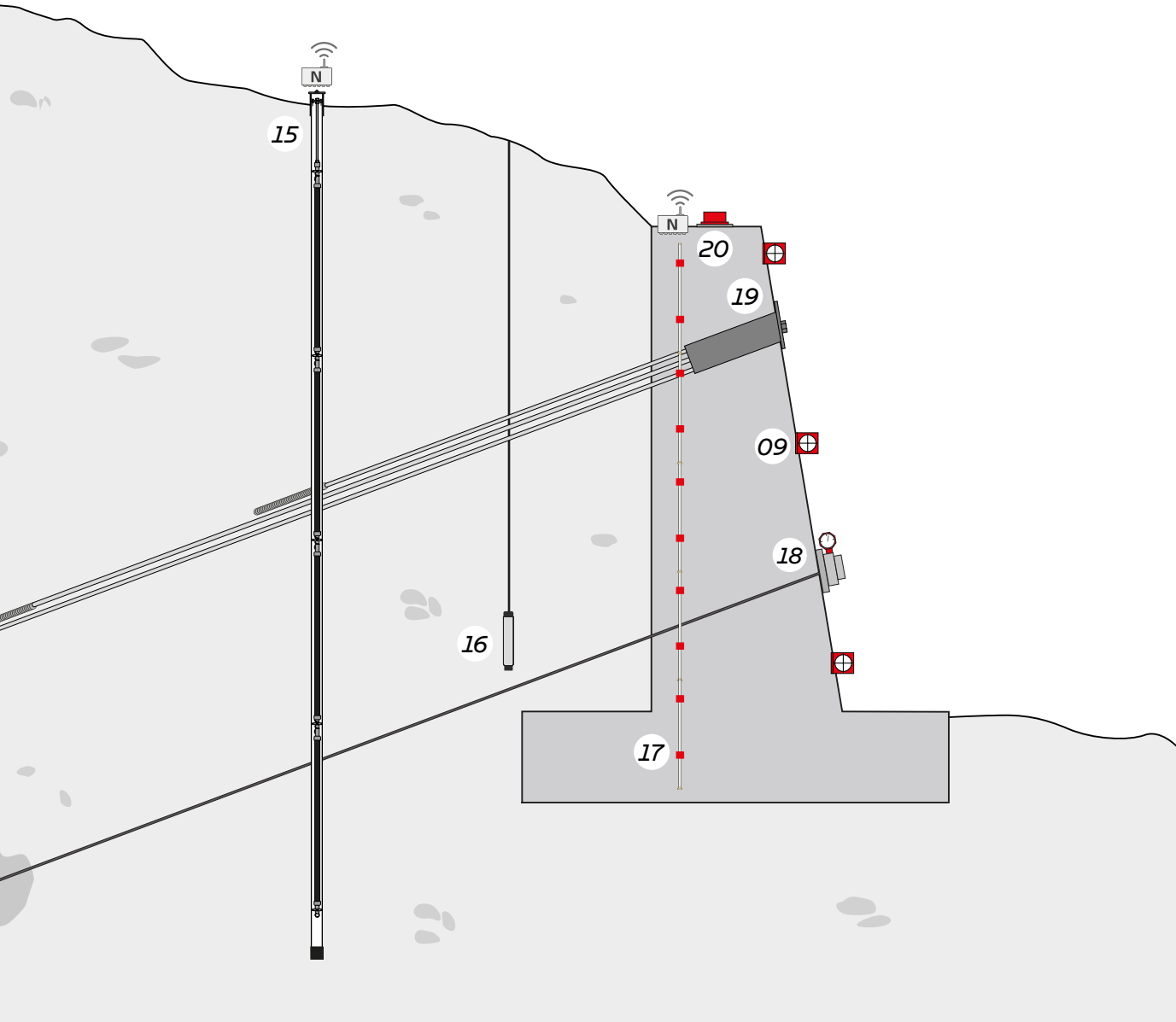
It involves installing sensors, such as inclinometers, piezometers, and tiltmeters, which measure the movement, deformation, and water pressure within a slope. These sensors provide nearly-real-time data, that is analyzed to identify any changes or trends that may indicate an increased risk of landslides. The data collected through geotechnical landslide monitoring is used to assess the risk of landslides and to develop appropriate measures to mitigate the risks. This can include slope stabilization measures, such as the installation of retaining walls, anchors, or drainage systems, as well as the implementation of early warning systems to alert nearby communities of an impending landslide.

## Main landslides types

- Rotational landslide
- Translational landslide
- Lateral landslide
- Rockfall
- Topple
- Debris flow

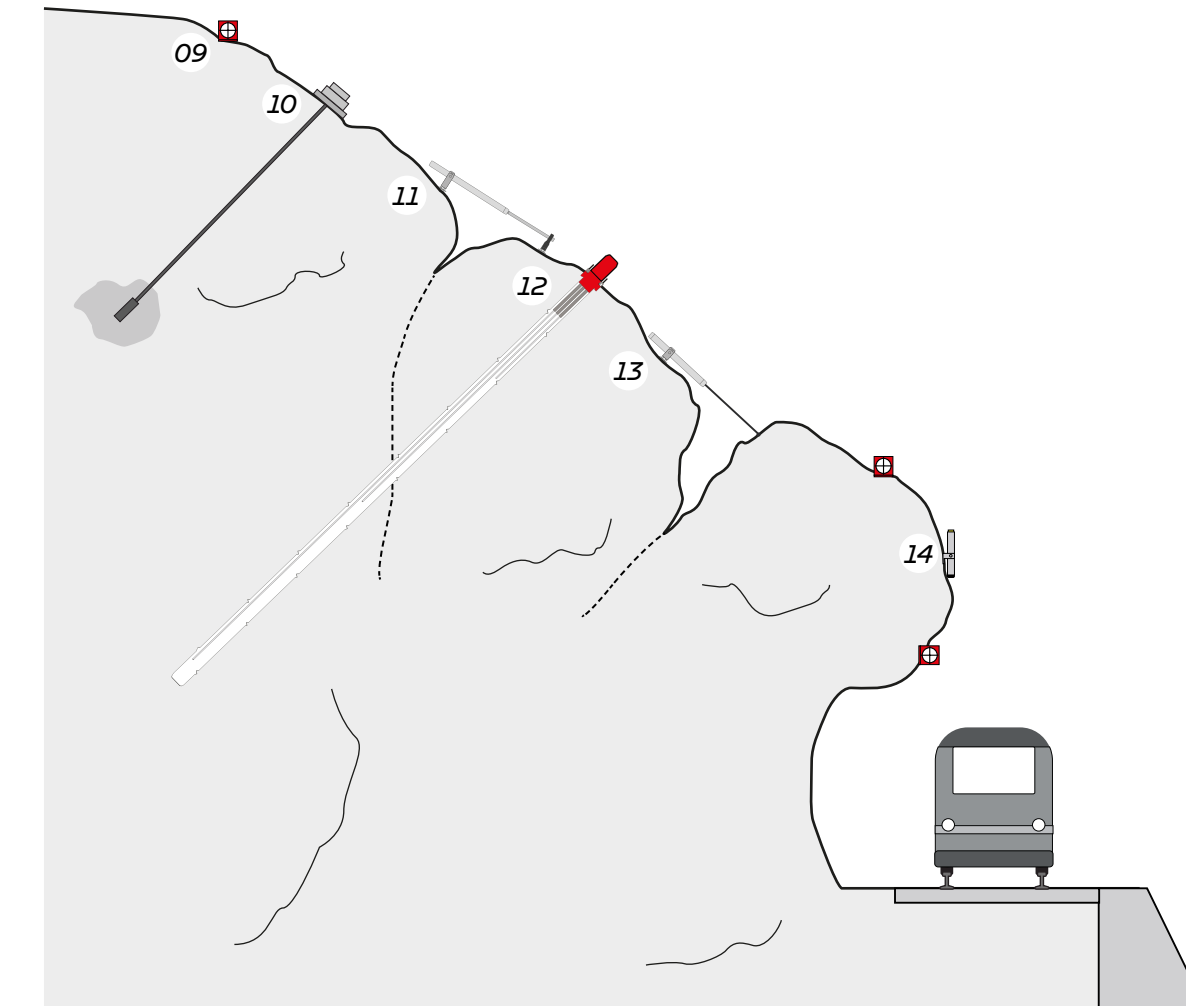
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# RETAINING WALL MONITORING



Drawings not in scale

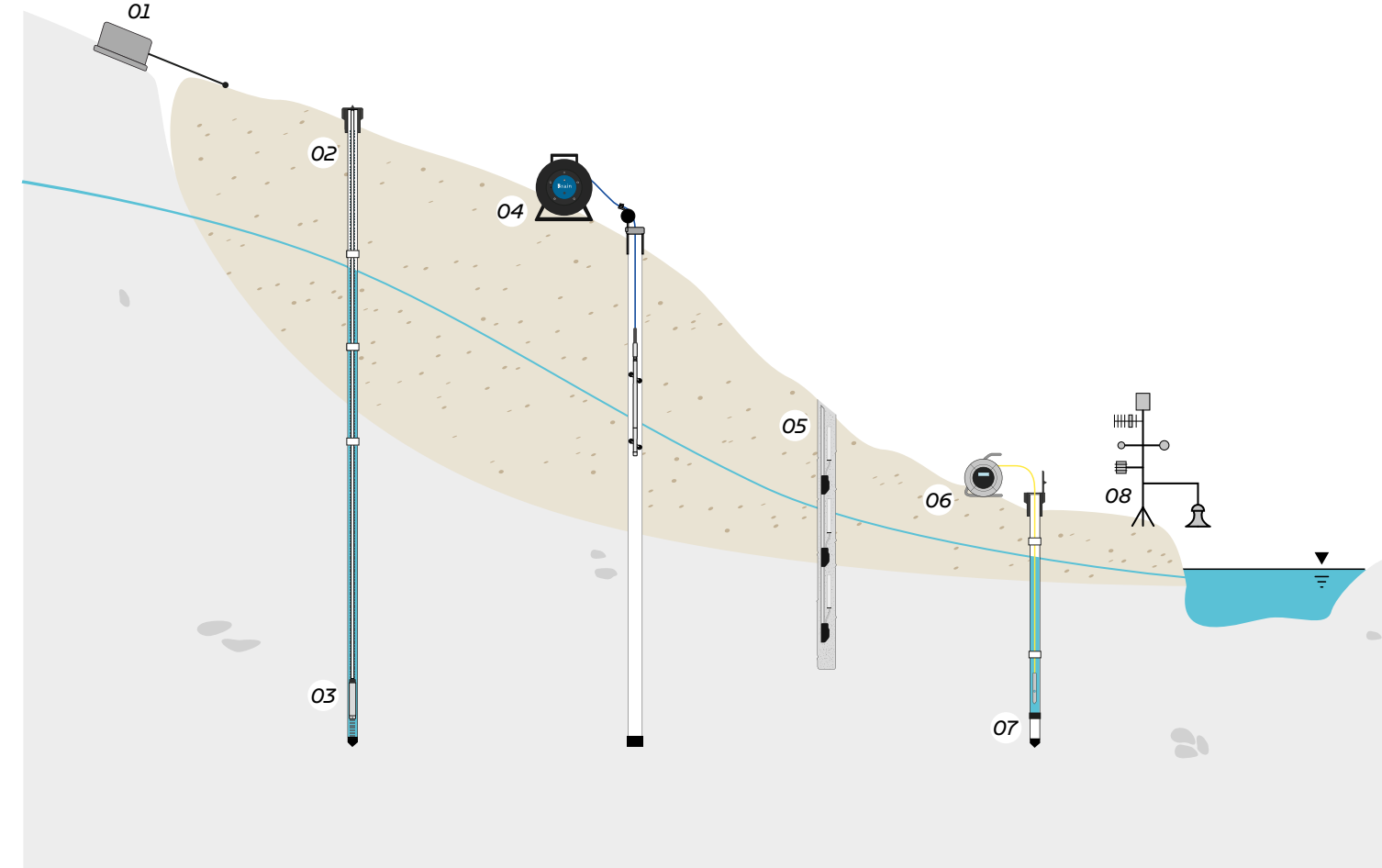
# ROCK MASS MONITORING



## Reading solutions and data collection

The readout units and dataloggers are an essential part of the monitoring system. The readouts are needed during the installation procedures, in order to check any instruments before and after their installation, or when an automatic monitoring solution is not required. MIND readout is the new portable multichannel readout unit able to read and store data from both digital and analogue instruments, via its MIND App. Dataloggers and wireless solutions are ideal for the automatic and remote monitoring in any geotechnical conditions. OMNIAlog and WRLog dataloggers offer precise measurement and reliable data acquisition from various sensor types and gauges supporting vibrating wire, MEMS and digital sensors, and all major geotechnical instruments. Sisgeo can also offer a dedicated service for data/measurement management from automatic and manual monitoring systems called AIDA IoT (powered by Field Srl). The electric signals of the instruments are captured by the Data Acquisition Units, sent to a Server and later imported to a dedicated Database, where they are divided by project, instruments and measurements. Data are then converted into engineering units, validated, processed and represented in charts and table format.

# ROTATIONAL LANDSLIDES



## INSTRUMENTS

- 01 Wire crackmeter: Monitoring of cracks in rock masses or ground displacement
- 02 Standpipe piezometer (slotted tube): Measurement of water table with water level indicator or pressure transducer
- 03 Vented pressure transducer: Measurement of water level in standpipe piezometer
- 04 Brain mems inclinometer system: Monitoring of horizontal displacements in sliding area
- 05 Multipoint piezometer: Multiple pore pressure readings at different depths
- 06 Water level indicator: Monitoring of water table level in standpipe and Casagrande piezometers
- 07 Casagrande piezometer (blind tube): Pore pressure or water table with water level indicator or pressure transducer
- 08 Meteorological station: Monitoring of meteorological parameters such as rain, wind, temperature, etc.
- 09 Optical target or miniprism: Monitoring displacement with geodetic methods

## INSTRUMENTS

- 10 Electric anchor load cell: Measure anchor tension
- 11 Jointmeter/crackmeter: Measurement of small cracks in rock mass or buildings
- 12 Borehole extensometer: Monitoring subsurface displacements in rock masses
- 13 Wire deformometer: Surface displacement monitoring in rock masses
- 14 Waterproof tiltmeter: Monitoring rotation in big rock masses
- 15 MD-Profile array: Monitoring of deep lateral movements in sliding areas
- 16 Vibrating Wire piezometer: Monitoring of pore water pressure
- 17 LT-Inclibus array: String of tiltmeters to monitor horizontal displacements in concrete
- 18 Hydraulic anchor load cell: Measurement of anchor tension
- 19 Mexid miniaturized MPBX: Monitoring subsurface movement and related deformation of retaining wall
- 20 Tiltmeter (horizontal application): Monitoring rotation of wall

## READOUT AND DATALOGGER

- MIND readout
- OMNIAlog multichannel datalogger
- WR Log wireless system



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LANDSLIDES SAFETY AND MONITORING  
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