

## Toppling of rock cliff: risk mitigation by monitoring displacements and tilt



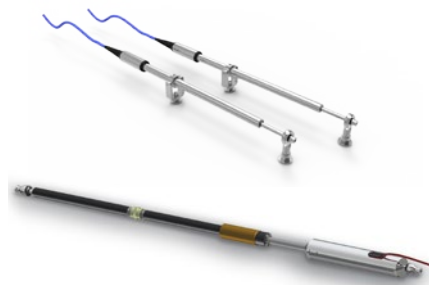
Rock cliffs, often located in remote areas, potentially dangerous for structures but also for habitats are more and more equipped with sensors and data acquisition systems for risk mitigation. In fact with appropriate systems at low investments, good and reliable solutions can be achieved. This example of a rock cliff is dangerous for the road and traffic but ,installing tiltmeters and displacement transducers operated by an autonomous data logger with data transmission, an efficient monitoring is established.

### Mems Tiltmeters



Tiltmeter, both analogue and digital types are available, detect the change in inclination of the critical rock cliff with a  $\pm 0.1$ mm/m accuracy. They are simple to install to the rock cliff by screws and by using an adjustment device.

### Displacement transducers



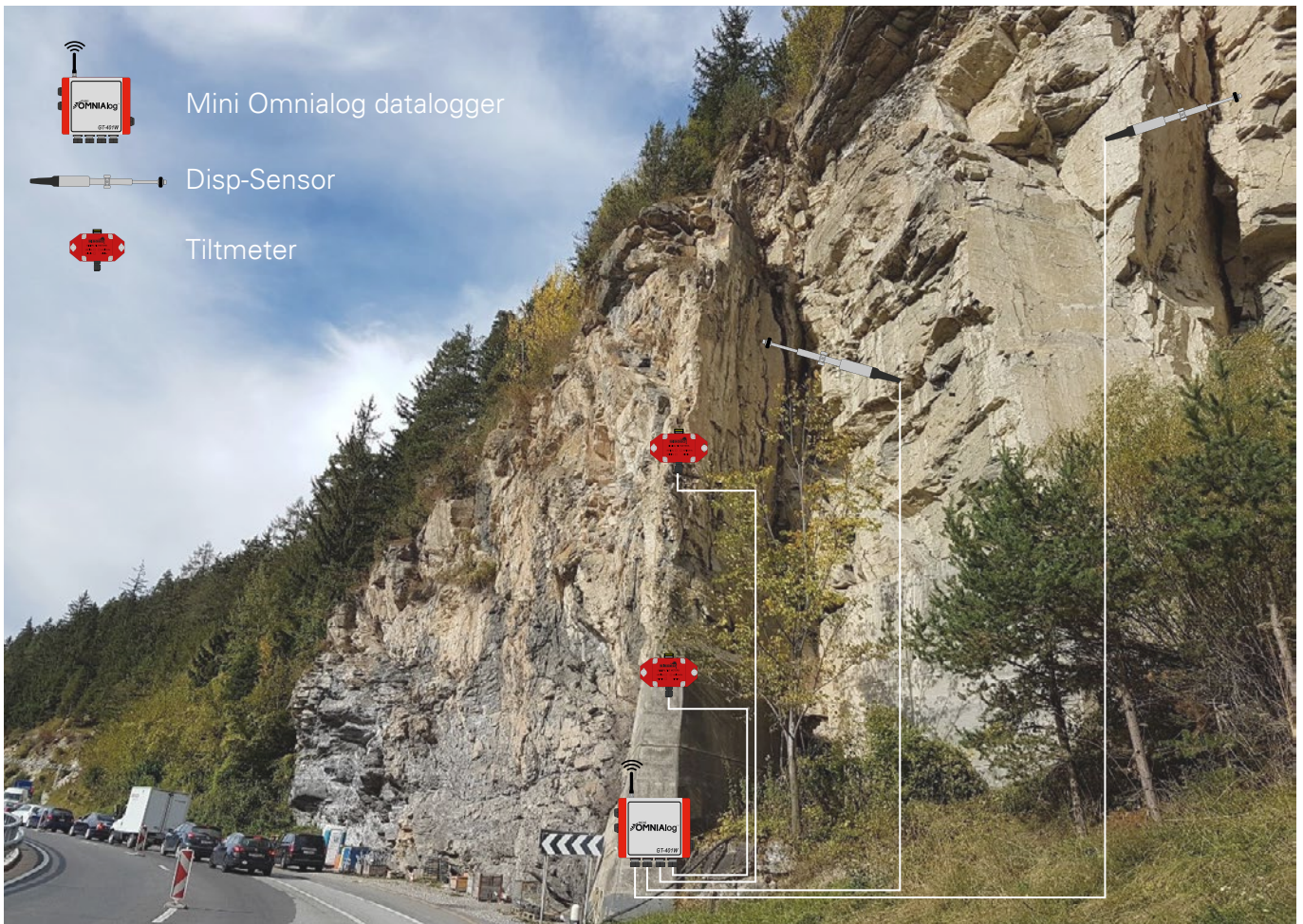
Displacement transducers are mounted between the stable rock cliff and the potentially instable cliff. For small distances crackmeters can be used. If distances between the measuring points of more than about 1m is to be equipped, then a convergence extensometer will be an optimal choice.

### Mini OmniaLog datalogger

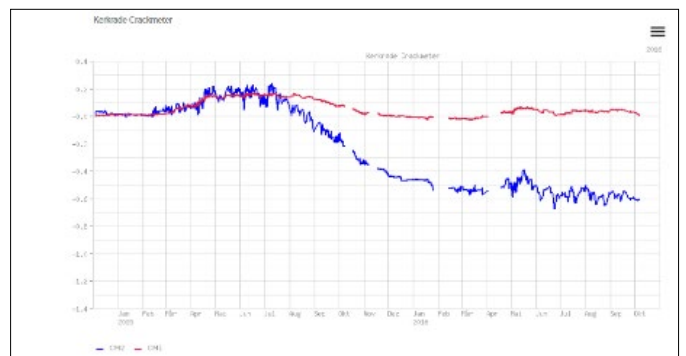
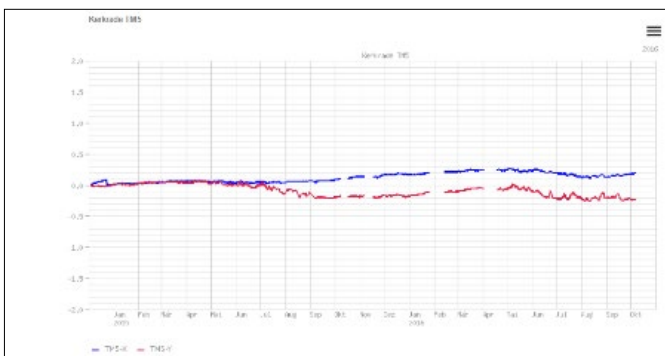


The battery operated Mini OmniaLog data logger operates up to 4 sensors with an autonomy of about 1 year and, if equipped with a GSM-Modem, sends out data after every measurement or once a day. If the readings of the sensors exceed pre-set alarm values, then a message will be sent out to alert responsible persons. At the site an alarm or a traffic light can be activated to, in case of an event, stop traffic.

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Rock cliff monitoring



On-line data management showing results of monitoring

**LINKS:**  
TILTMETER  
CRACKMETERS  
CONVERGENCE EXTENSOMETER  
MINI OMNIALOG DATALOGGER