

How to prevail potential landslides and risk of over topped dams

Example of Vajont's dam in Italy



CASE STUDY

Full 3D electrical resistivity tomography (ERT) obtained with the FullWaver system

In 1963, 270 million of m³ of rocks of Mont Toc crashed into the Vajont reservoir in Northern Italy during its initial filling. The landslide caused a tsunami in the lake in which 50 million of m³ of water overtopped the dam in a wave of 250m, leading to the complete destruction of several villages and towns, and estimated between 1,900 and 2,500 deaths.



A 10 years ongoing project led by Professor Roberto Francese by University of Parma and OGS (Italy) aimed to image below the slipping surface of this great landslide in order to prevail any other catastrophic scenario. In 2015, the team used the FullWaver system together with a high power transmitter (VIP, 5 kW, 10A), all developed by IRIS Instruments.



The FullWaver system is able to deliver a full 3D electrical resistivity tomography (ERT) of the entire landslide without any directional bias. The FW system consists on at least one I-FullWaver dedicated for current readings and several independent and autonomous V-FullWaver (receivers) specifically developed for recording full waveform time domain resistivity. For each receiver, three electrodes are settled aiming to record potential variation at two orthogonal dipoles. There is no cable between each FW boxes. Time series were recorded at 10ms sampling rate.



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High power VIP 5 kW transmitter.

V-FullWaver specifications

Accuracy 0,2% typical

Resolution 1 μ V

Sampling rate 10 milliseconds (100 Hz)

Internal GPS with PPS (one pulse per second)

Battery test & contact resistance check (could be done via radio)

Data flash memory

2 months recordings

Power supply

Internal Li-Ion rechargeable battery

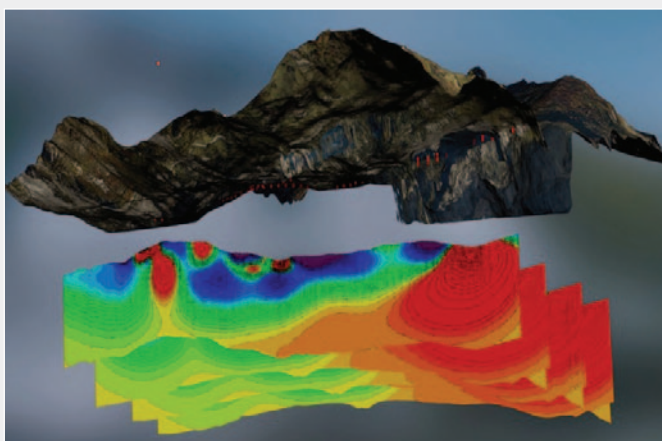
Autonomy: 20 operating hours with internal battery, can be extended with external batteries

Waterproof IP 67

Operating temperature: -20°C to +60°C

Dimensions 31 x 25 x 15cm

Weight 3 kg



The 3D resistivity model is derived from the processing using ERTLab Studio software. The depth is about 600m.

System flexible and scalable

Many FullWavers boxes can be used depending about the area and the target's depth

The FullWaver system can be used with any type of high power transmitter

The survey

The survey area was in a rough terrain (steep with forest)

Several profiles of 2,5 km length

600m depth of investigation

