

Assessing preferential seepage and monitoring mortar injection through an earth-dam

CASE STUDY

Resistivimeter SYSCAL PRO SWITCH 48

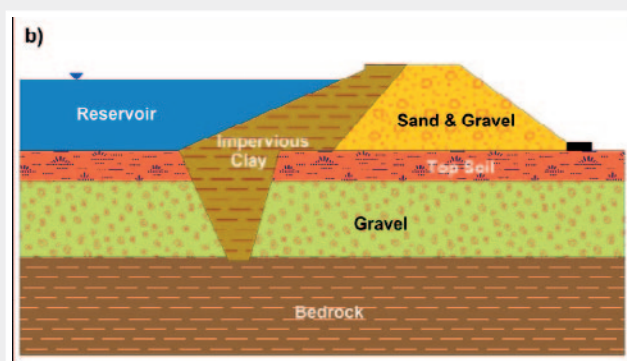
The old earth-dam of Sant Llorenç de Montgai, (Spain) aiming to irrigate and generate power suffers from leakage since its building in the 1930's. Corrective actions as cement mortar injections reduced the flow from leaks gradually. However, after remediation actions stopped in the 1980's, significant sinkholes were detected.

Among with two other complementary methods, the operators implemented two campaigns totalized 13 Electrical Resistivity Tomography profiles (ERT1 to ERT13) for assessing water seepage and imaging the mortar penetration into the ground.



Sant Llorenç reservoir aims to irrigate and generate power.

A total of 13 ERT profiles were carried on along the embankment.



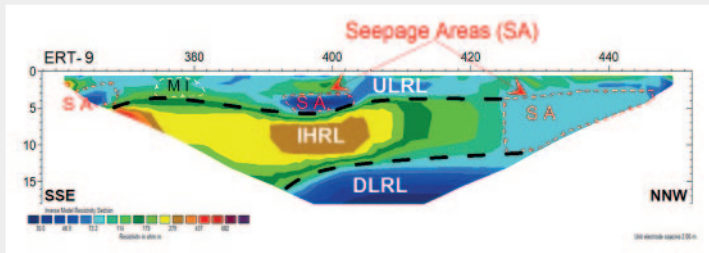
Electrical Resistivity Tomography (ERT) survey is a fast and reliable method. In this example, it succeeded to image seepage areas and the expansion of mortar injected along the embankment.

As soon as the operator knows a the range of resistivity of the geology background, the interpretation of inverted Electrical Resistivity Tomography profiles is easy.

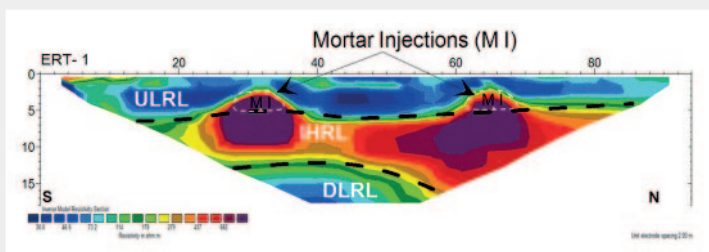
Surveys can be repeated for evaluating evolution of the embankment properties over time.

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The low resistive zones on the inverted ERT #9 profile corresponds to abnormal seepage that cause significant variation in water content inside the material. The resistivity drops with moisture level. The electrodes were 2m apart. Upper Low Resistivity Layer (UHRL), Intermediate High Resistivity Layer (IHRL), Deeper Low Resistivity Layer (DLRL).



The inverted ERT profile #1 reveals two high resistive anomalies that correspond to earlier mortar injections.

SYSCAL PRO SWITCH 48

SYSCAL PRO Switch 48 is a versatile electrical resistivity-meter which combines a transmitter, a receiver and a switching unit in one single casing. **It allows to simultaneously control 48 electrodes.** The output specifications are 800V (1 600V peak-to-peak) in switch mode, 2.5A, and 250W (12V battery).

The SYSCAL Pro Switch uses multi-core cables for controlling a set of electrodes connected in a line or in several lines. The 48 electrodes can be increased through a Switch Pro 48 unit.

Based on a ten channels configuration, SYSCAL PRO Switch allows to carry out up to 10 readings at the same time for a high efficiency.

*From Mahjoub HIMI, Ismael CASADO, Alex SENDROS, Raul LOVERA, Lluís RIVERO, Albert CASAS.
Engineering Geology. 2018*