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3D time-lapse ERT monitoring of an experimental simulation of olive-oil mills' waste movement

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In this work 3D ERT was evaluated for the monitoring of a conductive saline tracer in a controlled experimental environment. This is part of a larger scale research project which aims to the study of the transfer mechanisms of the geoelectrically conductive olive-oil mills' wastes (OOMW) which can be a serious source of contamination in olive oil producing countries as they are being typically disposed to open ponds. The particular experiment was aiming into verifying the measurement, processing setup in order to be transferred into a real scale experiment. In the first place, some preliminary tests have taken place in a smaller scale tank (almost 2D) that formed the basis to design and execute a full 3D time-lapse ERT experiment in a larger scale using a bigger 1x1x1m tank.

Geoelectrical monitoring involved using a set of 6 boreholes as well as a single surface to horizontal borehole pair. Optimized 3D ERT data sets were obtained for every 100ml injection of the colored tracer into permeable sand surrounded by fine grained well compacted material. Data were processed using a 4D inversion algorithm. Subsequent excavation helped to evaluate the geoelectrical images. The resulted geoelectrical 4-D time-lapse images followed the movement of the saline tracer successfully and verified the applicability of the entire measurement set-up. Current work involves further processing of the geophysical data to extract hydrogeological parameters and create a model of the saline tracer flow and evaluate the applicability of ERT monitoring in this context.