Reservoir leaking assessment using electrical resistivity imaging (ERI) with capacitively-coupled system

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keywords: Capacitively-coupled resistivity, ERI monitoring, reservoir assessment

As of 2014, there are 17,477 agricultural reservoirs used in Korea. Among them, 12,148 reservoirs (~70%) were built more than 50 years ago. Thus, reservoir leaking assessment on such aged structures becomes very important to prevent massive leaking and sudden structure failures. Electrical resistivity imaging (ERI) is regularly applied to examine leaking points, if any, and verify effects of grouting to stop water leaking and reinforce the reservoir. In this study, we utilized the Ohm-Mapper resistivity meter with two receivers and one transmitter to assess reservoir leaking detection. For comparison, we also obtained the data from the electrical resistivity monitoring system, which installed measuring rods in a fixed space. The system was developed and operated by the Korea Rural Community Corporation. For the Ohm-Mapper survey, we pulled the system along the ground to produce continuous apparent resistivity data, whose locations were specified by a real-time kinematic (RTK) GPS receiver. The temporal variation of ERI monitoring results exhibits the variation of estimated resistivity values at the water leaking zone, especially before and after the grouting procedures, implying a slow redeveloping of the water leaking. Thus, we demonstrated that the ERI monitoring with the Ohm-Mapper system can be effective to perform a fast assessment on water leaking at reservoirs.

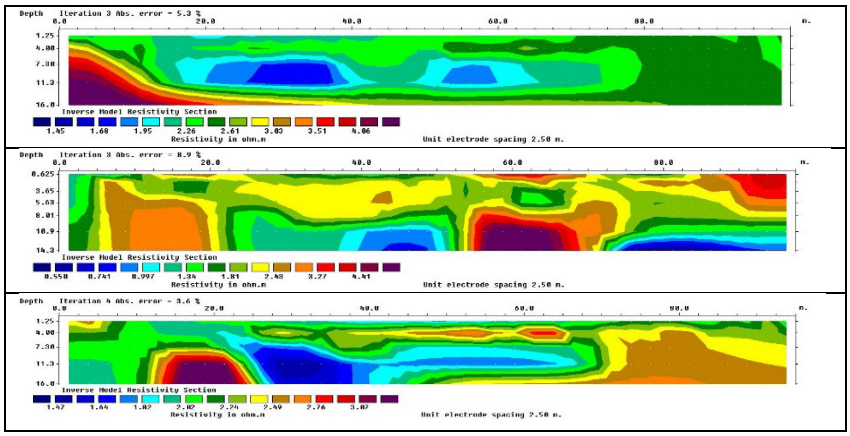

Figure caption: Electrical resistivity imaging results before grouting (top), 2 months after grouting (middle), and 1 year after grouting (bottom). The temporal variation implies the water leaking zone is slowly reactivated after application of grouting procedures.