Geophysical Research Abstracts
Vol. 18, EGU2016-5094-2, 2016
EGU General Assembly 2016

Dam Safety Assessment using Long-term Geophysical Monitoring at Reservoir Dams, Republic of Korea

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The ground conditions and the geological features of the dam site greatly influence the amount of seepage and its relevant effects. Internal erosion is a major cause of failure of the reservoir wall. Methods for seepage monitoring and internal erosion detection are therefore essential for the safety assessment of earth fill dams and embankments. In Korea, The safety assessment of earth fill dams has been dealt by Korea Rural Community Corporation(KRC) largely. Most of them are worried about the safety due to the deterioration and seepage because the many reservoirs and embankments were built more than half a hundred years ago. The seepage rate depends mainly on the hydraulic conductivity of the core which is strongly dependent upon the core material and its compaction. The identification and investigation of internal erosion is by visual inspection, pore-pressure measurements and measurement of seepage water volumes in dikes below the dam.
We have performed the electrical resistivity method to delineate leakage pathways through the abutment of earth fill dams located in Korea. This resistivity survey has been widely adopted as a key element to investigate the condition of core material, because of the contrast between the electrical properties of water and soil. In other to evaluate the engineering geological properties of the soil deposits, two boreholes a dam were drilled to the bedrock that exceeds the height of the dam. A large set of field tests including standard penetration tests(SPT) and in-situ permeability tests were carried out along the boreholes. Resistivity monitoring has also been performed at a reservoir dam in Korea. The data were collected by a Resistivity monitoring automatic data acquisition system that was developed by KRC. SP monitoring has been performed at sea dike on the Korean peninsula. The data were collected by a SP monitoring automatic data acquisition system that was developed by KRC. During the SP monitoring at a sea dike, the measurements of sea level, conductivity and temperature are gathered at the same time. The primary purpose of long-term geophysical measurements in this study is the dam safety assessment by inspecting anomalous seepage zones and, if possible, realistic estimation of the relevant physical properties. The target sea dike of my study, the SP anomalies resulting from seawater inflow could be strong enough to be interpreted as leakage regions, particularly where the tidal change is significant.