



Deformations of Pournari I dam (Greece) based on long-term geodetic monitoring data

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A big number of large earth fill dams worldwide are expected to exceed their design lifespan until 2020. This number is becoming larger when taking into account predictions that dam infrastructure is not expected to withstand future natural disasters, with severe consequences to public safety and significant economic losses. Systematic monitoring and analysis is an important tool that enables the evaluation of the on-going performance of a dam, the validation of laboratory models and the assessment of different engineering designs. Currently, relationships describing the long-term evolution of dam deformations are based on only a few studies and mainly focused on the magnitude of crest settlements and the downstream horizontal deflections of the dam.

This study presents the post-construction analysis of the behaviour of one of the largest earth fill dams in Greece, based on long-term monitoring data. The 29 year long dataset consisted of geodetic measurements of vertical and horizontal deformations from the crest and the body of the dam, reservoir level fluctuations, in addition to rainfall records of the dam area.

Our analysis shows that the settlement of the crest remains within normal limits while the rate of deformations was stabilised almost seven years after the completion of the dam, which is longer than the period suggested by previous studies. The impoundment of the reservoir had a significant effect on the horizontal deflections of the body of the dam: an upwards and upstream movement in part of the downstream shoulder was detected. We compare our results with those obtained from the analysis of one of the highest earth fill dams in Europe, the Kremasta dam. We suggest that this pattern, though rarely mentioned in the international literature, is neither uncommon nor abnormal (when the horizontal deflections are still within safety limits) and is related to changes in the water pressure within the dam along with the on-going consolidation of the dam clay core.