



## **The displacement of Darbandkhan dam after the m7.3 Iraq-Iran earthquake revealed by sentinel1, gps and levelling data**

Yasir Al-Husseinawi (1), Zhenhong Li (1), Roberto Tomas (2), Peter Clarke (1), and Stuart Edwards (1)

(1) Newcastle, School of Engineering, Geomatics, United Kingdom, (2) University of Alicante, Department of Civil Engineering

Darbandkhan dam is located east of Iraq 65km south east of Sulaimaniyah governance and 230km north-east of Baghdad. The dam is clay core rock fill dam of 128 m height. The length of the dam is 445m impounding a reservoir having a storage of 3000 Mm<sup>3</sup> and mainly used for irrigation. The dam has been recently exposed to a 7.3M earthquake on 12 November 2017. The epicenter of the earthquake is located 32km from the dam. Previous studies discussed the regional seismicity and concluded that the dam is satisfactory under a maximum 6.5M earthquake. Two GPS observations collected by the Ministry of Water Resources one on March 2017 as a periodic investigation of the dam instability and the second on November 2017 immediately after the earthquake to estimate the dam safety. The GPS measurement conducted on 15 monitoring pillars fixed on the dam body. Twelve of them located on the dam crest and three on the downstream side sloop. The GPS measurements reveals a significant after-shake horizontal movement on the dam crest reaches 22 cm on the upstream direction. Leveling measurements were also conducted on the same epochs show a maximum vertical displacement of 51 cm on the dam center. Furthermore, 68 images from Sentinel1 were used to produce the DInSAR interferograms and ultimately the timeseries of the dam displacement between December 2014 and December 2017 using the Small Baseline Subset (SBAS) techniques. In contrast to the field measurements, there is no clear displacement revealed by our InSAR results and this can be due to the unfeasibility of using the conventional SBAS technique for such small-scale application. In the next stage, we will use the full resolution SABS as it can give more reliable results for the localized applications.