

# PSI Deformation Analysis of a Burst Red Mud Reservoir in Hungary

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## **ABSTRACT:**

The embankment of a red mud reservoir collapsed in October 2010 resulted in an unprecedented catastrophe in Hungary. Synthetic Aperture Radar Interferometry (InSAR) is the only geodetic technique that can reveal the past stability and motion history of the broken reservoir. We performed Persistent Scatterer InSAR (PSI) analyses to contribute to the better understanding of the event. The key question we addressed is whether there were signs prior to the collapse that may have prognosticated the disaster. The PSI results could reveal if the dam was stable in the past without prior signs of the failure or there were definite indications of deformation before the collapse and proper monitoring of motions could have highlighted the risk and the disaster may have been prevented. For our analysis we acquired and processed the complete and all existing C-band SAR data set of ENVISAT satellite. The motion rate and direction of the dam walls have been constrained and the deformation history of the reservoir have been outlined with the aim of providing information to structural engineers for the investigation of the event and for future disaster prevention. This also demonstrates that it is possible to investigate not only the present but also the historical motions of such geotechnical structures with PSI, which makes it a unique and the only tool if on-site deformation monitoring is omitted due to misjudged risks, missing regulation or any other reason.