

# MOTIONSURVEY

AND CÓRREGO DO FEIJAO

TAILING DAM



business  
incubation  
centre  
Madrid Region



Land, Water and Dams  
Earth and Space Science and Engineering

[info@motionsurvey.com](mailto:info@motionsurvey.com)

# MOTIONSURVEY

On January 25, 2019, Dam I of the Córrego do Feijão mine in Brumadinho (Minas Gerais, Brazil) collapsed. The causes that led to this tragic accident are still being investigated by the Brazilian authorities and by the mining company that owns the exploitation.

The characteristics of the MotionSurvey service offered by Land, Water, and Dams (LWD), and thanks to the radar images captured by ESA's Sentinel-1 satellite prior to the sinking of the raft, allow us to know the movements that were taking place in the body of the dam, months before it collapsed.



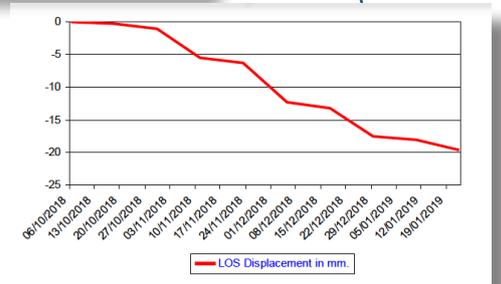
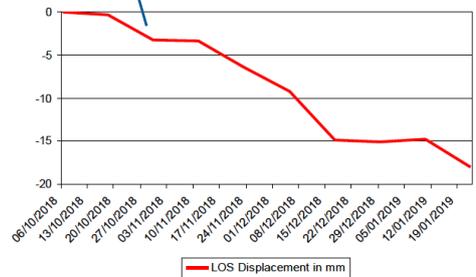
For this, a set of images has been taken that fully illuminates the geographical area where the Córrego do Feijão Dam I is located, and that covers the period from October 6, 2018, to January 22, 2019. Using tools specially designed for the interferometric treatment of time series of SAR (Synthetic Aperture Radar) images, the registered displacements during the mentioned period have been measured along the satellite line of sight (LOS).

The interferometric method used is the so-called PSI (Persistent Scatterer Interferometry). This technique is based on the pre-selection of points (pixels) that present a better degree of stability and coherence throughout the entire time series of images.

To ensure the reliability of the results presented, this work has been carried out by establishing a coherence criterion (value between 0 and 1) that requires that all the points used in the process have reached a value of 0.9 or higher.



As can be seen from the results obtained, in general, the downstream shoulder of the dam shows deformations with higher negative displacements than normal in almost all points. In addition, in two very specific areas (crest and the left bank of the dam), there are settlements with values that we consider especially relevant: displacements during the period in the vicinity of 20 mm and deformation speeds that are in the interval 70 and 80 mm / year.



The case of Córrego do Feijão is just one example of how the MotionSurvey service can provide us with a quick, reliable, and low-cost estimate of the movements that may occur in a tailing dam, wherever it is located, and how remote or inaccessible the site can be. Thus, MotionSurvey is shown as a very useful service that, without replacing the traditional monitoring methods, allows to easily establish surveillance systems that can alert about possible stability problems in any dam in the world.