Ambient Noise Seismic Interferometry Applied to Tailings Dam Monitoring in Minas Gerais State, Brazil

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The latest accidents involving tailings dams in Brazil have shown the need to seek effective monitoring methods for these structures in order to prevent further accidents. Currently, promising results have been obtained through the continuous monitoring of these structures through microseismic events, through the approach of seismic ambient noise interferometry. This method identifies small variations in shear wave velocity (Vs) by pairing and cross-correlation of geophones. Small variations of Vs are directly linked to the stiffness modulus of the embankment or maximum shear modulus, associated with low soil deformations. Microseismic events occur as a result of the propagation of natural elastic waves or by anthropic action. Currently, continuous monitoring of the BR dam of this study uses 10 sensors of 4.5 Hz, 8 uniaxial and 2 triaxial, distributed along the crest, embankment, and abutments. The objective of this work is to prove the effectiveness of microseismic monitoring in real time associated with the increase or decrease of the structure's stiffness, correlating the variations of Vs with the rainfall index, WLM, blasting in the mining pit, and amplitude of peak ground velocity (PGV) and peak ground acceleration (PGA) in the structure during one year. The data are provided and processed by the IMS software. During this period the method was sensitive enough to record significant decreases in velocity variations across sensor pairings. The analysis of the presented data indicates its strong correlation with operational activities in the dam and its surroundings; however, other variables still need to be detailed. The research will consist of confirming the cause of these drops in velocity variation by observing the behavior of the sensors in isolation and correlating these data with geotechnical parameters.