**Noise signature of microseismic monitoring systems of tailingS dams**

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In the last decade, dams’ failures caused catastrophic environmental harm and multiple fatalities. These events put in the spotlight the geotechnical monitoring approaches applied in this type of structure, which are often punctual in nature and fail to monitor the whole dam. Geophysical methods were identified as an alternative. Among those, microseismic monitoring systems stand out as high sensitivity monitoring of ground motions. Despite some restrictions usually imposed on the installation of receivers at great depths, microseismic monitoring proved to be effective, and there are several publications demonstrating its applicability. In the mining context, the main seismic sources acquired by those systems are natural events, blasts and, in rainy areas, electromagnetic spurious noise induced by lightning strikes. All these sources must be discarded when we think about noise-based monitoring, such as Seismic Ambient Noise Interferometry (SANI), an alternative processing approach applied to ambient noise data recorded by microseismic systems. This technique is based on the noise correlation between signals recorded at different receivers, and can be used to monitor minute velocity changes in time due to saturation or effective stresse changes. The basic premise adopted by this technique is that receivers are homogeneously illuminated by ambient noise, which implies a homogeneous azimuthal contribution of noise. As a consequence, strong isolated sources that occur irregularly compromise data processing, and ought to be removed (e.g., earthquakes and blasts). For tailings storage facilities, the homogeneous distribution may not be the reality. In this work, we aim to present and discuss the good practices of acquisition, signature characterization and processing of ambient noise data. We analyse the ambient noise data acquired by 7 tailing dams’ microseismic systems. We show that the ambient noise data is usually created by the wind interaction, tailings reservoir and thunderstorm, but are also associated with cultural noise induced by surrounding mining operations. The latter may correspond to strong isolated monochromatic noise sources that might negatively impact the monitoring, as they are not homogeneously distributed around the receivers and not random in nature. The identification of this type of contribution should be made in the early stages of monitoring, which is why we considered a calibration period to evaluate the ambient noise signature acquired for at least 1 month and the noise’s spectral response. Different filtering and acquisition strategies are compared to remove the monochromatic noise during data processing. However, filtering can impact the technique sensitivity and, eventually, the observed response. In conclusion, we demonstrate that for some cases, by filtering isolated noise sources data, we are not able to monitor the full dam depth, which might affect the monitoring effectiveness.