Characterization of the recent seismic activity in Jacobina-BA

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Abstract

The recent known seismic activity in the region of Jacobina-BA was first observed by the Brazilian Seismographic Network (RSBR) in 2018. After that, in 2021 we observed an increase in the seismic activity rate per month, which included some events that were felt by the local population. Therefore, since to early 2022, the Seismological Laboratory from UFRN deployed a local temporary seismographic network in the area. The six short-period station network has been active ever since and has been recording continuous data. Preliminary analysis have shown that a considerable amount of events occurred in the observation period. Moreover, these events present a very shallow hypocentral depth (< 1 km). Interestingly, we also observed that the epicenters are localized near an industrial mining site. Blasting operations are included in the mining activities.

The purpose of this work is to characterize the seismic activity in Jacobina-BA using the data provided for the local network employed in the area of interest. The complete characterization comprises the event location (absolute and double-difference location methods), magnitude estimation and source parameters determination. For the identification of the seismic signals embedded in the continuous data, we used the tool Python Matching Phase Algorithm (PyMPA). The package PyMPA is an open-source seismological software created to increase the capability of seismic signals detection (earthquakes, explosions, etc.), using advanced routines, distinct from the standard fast amplitude-ratio methods (STA/LTA). The PyMPA methodology is optimized to increase the detection sensibility of micro-seismic events. Since, in a visual inspection, such signals can be hidden by the background noise, we expect that the PyMPA approach will enhance the detection efficiency of seismic events, especially the smaller ones.

Finally, we expect to investigate if the occurrence of the earthquake is correlated with the local and regional geological features and to evaluate if the mining activity is somehow associated with the observed seismicity.