# Quake or Blast? - Classifying Events in the Carajás Mining Region

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## Abstract

In the Carajás region (Para, Brazil), seismic events such as quarry-blasts, induced earthquakes and regional earthquakes are routinely identified. Blasts are tools of the daily work of the mines, induced earthquakes are those that occur naturally due to the interventions in the mining area and natural earthquakes are the result of regional tectonic sources of natural occurrence, unrelated to the interventions of exploration.

Although there is a difference in the waveform signature between blasts and earthquakes, the classification of these events many times are still based on the operating hours of the mines and the distances between mines and epicenters.

This work presents a method to evaluate in quantitative ways how to separate events into two sets, induced earthquakes and quarry-blasts. The proposal aims to offer an efficient tool to classify events detected in the Carajás region.

Beside the seismograms, this tool also uses appropriate parameters such as the amplitude ratio between S and P-waves, the shape of the power spectrum of the events, magnitude values, duration, frequency and spectrograms. Each parameter was used to build a *decision matrix*, that will take into account every result to make the final classification.

The first results were then compared to events reported as quarry-blasts by local mines personnel with given time and location. For the induced earthquakes classifying tests, we used events which occurred at dawn near the mines, and also reported by the personnel that felt the event.

The *Quake or Blast?* method proves to give reliable solutions. Nevertheless, this cannot be generalized mostly because many parameters in the decision matrix are "station dependent", so values may vary with the region.