

## Acoustic emission of Tarissan boiling Lake, La Soufriere de Guadeloupe

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The Tarissan pit, located at the summit of the andesitic dome (1530 AD eruption) of La Soufriere of Guadeloupe (West Indies), represents a very active thermal zone of the geothermal system, characterized by a deep acid boiling lake. The surface of the lake constitutes a dynamic and complex interface where energy exchanges takes place between the lake and the pit.

In 2011, we recorded simultaneously the acoustic noise inside the boiling lake with two hydrophones, and the ambient seismic noise at the dome summit and slope with seismic sensors, in order to recognize a signature of the lake activity. The frequency signature of this acoustic noise is extremely rich and exhibits several resonant frequencies. We highlight in our analisis energetic frequency bands from noise cross-correlations between the stations. In particular, we show that the frequency centered around 3.2 Hz is measured at each station, and can be attributed to the Tarissan boiling lake. We use the seismic array installed on the dome flank to localize the noise source and we show that it very likely comes from the Tarissan pit, i.e. from the boiling lake.

We present a summary of these different observations and discuss the hypothesis that a model based on collective oscillations of bubbles can explain this source of noise. Remote recording of this noise could thus informs about the activity of the hydrothermal system.