Detection, location and characterization of VLF events during the 2018-2019 seismovolcanic crisis in Mayotte

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The seismovolcanic crisis of Mayotte started in May 2018 with a sudden activation of seismicity to the east of the island. Along with thousands of volcano-tectonic earthquakes, an energetic very low frequency signal (VLF, 15 seconds of period) was recorded on November 11, 2018 at seismic stations worldwide. This exceptional monochromatic signal was not an isolated event: in this study we detected and analyze several hundredths of such signals, all along the duration of the Mayotte crisis.

We used a time-frequency detector based on the filtered signal spectrogram. The data comes from local and regional stations in Mayotte, Comores and Madagascar, and from OBH (Ocean Bottom Hydrophones) installed during marine campaigns aboard the R/V Marion Dufresne II, between May and July 2019 [Feuillet et al, 2019], and shorter campaigns since July 2019.

For good agreement we had to correct the hydrophones signal with respect to physical unites and convert the OBH signal in pressure, witch is important for the following.
Event location is performed though spatial 3D back-projection of station-pair cross-correlation functions (Poiata et al., 2016), assuming surface-wave speed. Further works are made to confirm the location of the VLFs compared to the seismic swarm and Mayotte island.

To study the possible physical origin of such signals, we compare different types of source such as the resonant cavity and the fluid-filled crack model.The addition of some preliminary results on the direct modelling calculated with Axitra would make it possible to understand the source, the path or site effects of these signals.

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