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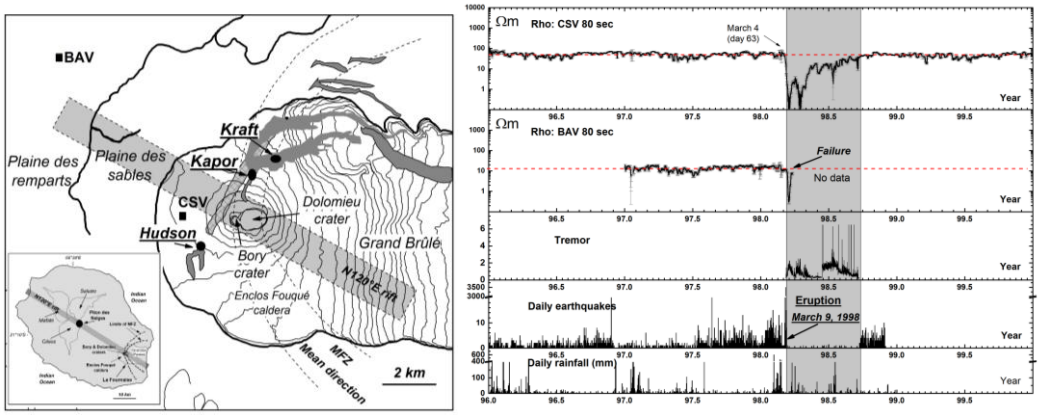
Continuous MT monitoring: Resistivity variations related to the large March 9, 1998 eruption at La Fournaise Volcano.

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The 2645 m-high La Fournaise volcano, located in the Southwest of Réunion Island (Indian Ocean), is a shield basaltic volcano where effusive eruptions generally occur along long fissures starting from the summit, alongside major fractures that characterize the eruptions' dynamism and effusivity. Between 1992 and 1998, the volcano underwent a quiet period during which few earthquakes were recorded. Minor seismic activity returned after 1997 and picked up in March 1998 during the 35 hours preceding the March 9 eruption. From 1996, two autonomous stations (CSV and BAV) were installed on the volcano. CSV was located inside the Enclos Fouqué caldera while BAV was positioned 8.2 km NW of the volcano summit. Horizontal components of the electric and magnetic fields were sampled every 20seconds. Continuous time-series were available from 1996 to 1999 at CSV, and from 1997 to March 1998 at BAV.

Data have been processed using both single-station and remote-reference processing. Both results show apparent resistivity variations synchronous to the eruption. Time-lapse impedance estimates are computed on overlapping time windows of about two days at both stations. They show that the only time interval between 1996 and 1999 undergoing a decrease of the observed impedance coincides with the March 1998 eruption. At CSV, the resistivity started to drop about five days before the eruption, reached several local minima until April, and then slowly increased as the volcanic crisis reduced in activity. After the end of the crisis in September 1998, the apparent resistivity recovered its pre-crisis value. The time-lapse results also show variability in directionality: sharp and elongated phase tensor ellipse residuals also appear during the eruption with a N105° orientation, suggesting the emergence of an almost NS-striking dyke. A simple 1D reference model built from MT soundings performed during the quiet period (1996 to February 1998) and including a 3D NS-striking dyke shows a good agreement with the spatial distribution of the resistivity variations observed during the eruption.



Left Figure: Sketch of La Fournaise volcano. BAV and CSV are the electromagnetic stations. Lava flows emitted by Krafft, Kapor, and Hudson cones are in dark grey color. Dash lines represent the Main Fracture Zone along which most of fissure eruptions occur. The grey rectangle illustrates the regional N120°E volcanic and fissural axis. Grey cross-pattern corresponds to the trace of main earthquakes associated with the March 9, 1998 crisis. **Right Figure:** From top to bottom. Determinant of the resistivity values at CSV and BAV for the 80 second period computed by single MT method between 1996 and the end of 1999. Tremor activity and daily number of earthquakes. Daily rainfall.