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Magma periodic bursts into shallow volcanic reservoir. Implication for the quantification of intruded magma volumes.

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Broadband seismic data enable us to test whether Ultra Long Period (ULP) signals can be used to determine the magma chamber pressure state and to forecast volcanic eruptions. In a systematic investigation of seismic signals recorded at the GEOSCOPE station RER in la Réunion Island near the Piton de la Fournaise, we show that ULP signals from the past two decades are typically associated with eruptions of Piton de la Fournaise. Some of these unusual signals were previously detected and interpreted in terms of tilt (Battaglia et al., 2000). We tentatively propose to interpret these signals as signatures of the activity of the upper magma feeding system of the Piton de la Fournaise volcano chamber. They are detected using STS-1 seismometers sensitive in the lower part of the bandwidth 10-3 to 10-2 Hz. Assuming geometrical parameters of the source and magma injection rates in the upper reservoir, the collection of all seismic events allowed us to build a time-series of absolute pressure in the upper magma chamber. The absolute pressure framework provides new constraints to parametrize a wide range of geophysical and geochemical models together. This alternative model should provide new insights in the eruptive processes that characterize Piton de la Fournaise volcano (La Réunion).