

Lithospheric structure below the currently active Mayotte volcanic area from joint inversion of receiver function and surface wave dispersion data

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The Comoros archipelago is composed of four volcanic islands with contrasting morphologies ranging from a high uneroded relief in the west to a low-lying island surrounded by a broad lagoon around Mayotte islands to the east. This morphological evolution, typical for hot spot volcanoes, along with the increase in the volcanic age from west to east and the isotopic signature of the lavas emitted in Grande Comore were the main arguments for interpreting the volcanism of the Comoros Archipelago as the result of a hot spot. The seismo-volcanic crisis that started in May 2018 east of Mayotte, and the growth of a submarine volcano more than 250 km east from the active Karthala volcanic zone, can hardly be explained within such a hot spot framework. Moreover, this phenomenon was accompanied by several of seismic events located between 5 and 40 km east of Mayotte at a depth of 20 to 45 km below sea level and down to 62 km deep. We performed a joint inversion of receiver functions and surface wave dispersion curves, which allow us to investigate the lithosphere structure under Mayotte. We show that the seismicity occurs in the lithospheric mantle as we constrain a *Moho* depth to 27 km. In addition, our results reveal a slight low velocity zone (LVZ) in the crust that could correspond to an intra-crustal transfer/storage zone of magmatic material, probably not related to the current eruption since the seismicity swarm do not connect to this LVZ. Within the lithospheric mantle, two LVZs are modeled at 45 and 55 km depth and may correspond to magma storage and/or transfer zones. We found a LAB at around 60 km depth above the main LVZ located below this interface, which is consistent with the proposed magma origin around 60-80 km depth. Thus, these results allow us to hypothesize a magma plumbing model at a lithospheric scale under Mayotte.

Keywords: Mayotte, Lithosphere, Receiver functions, Magmatic plumbing system