Pleistocene Tectono-magmato-volcanic events recorded east of Mayotte – insights for the ongoing seismo-volcanic crisis

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The offshore eastern Mayotte area has been extensively studied since the outbreak of the seismo-volcanic crisis in May 2018. Several oceanographic surveys have been carried out by REVOSIMA – https://doi.org/10.18715/MAYOTTE.REVOSIMA (MAYOBS cruises -https://doi.org/10.18142/291) for monitoring purpose, or for academic research (SISMAORE - https://doi.org/10.17600/18001331 and SCRATCH cruises - https://doi.org/10.17600/18002274). They offer a complete coverage of the eastern slope and abyssal plain with multibeam bathymetry and backscatter imagery, sub-bottom profiler (SBP), and several sediment cores. This set of data offers the opportunity to describe the morphology of the area and details the first tens of meters of the sedimentary succession on the abyssal plain.

We discover several features including faults, domes and massive chaotic deposits that developed or occurred during Quaternary in the vicinity of the new Fani Maore Volcano. Domes are interpreted as forced folds related to the intrusion of a large sill at depth. The main fault crossing the largest forced fold is a succession of en-echelon segments with vertical throws of up to 8 meters and a preferential N130° strike compatible with the present day regional dextral context. Analysis of the SBP profiles reveals that faulting and doming associated to sill intrusion occurred simultaneously, and together with the deposition of two massive (several km3) and chaotic lobes at the foot of the Mayotte slope. Sediment cores collected over or close to the massive deposits indicate a mixed bioclastic-volcanoclastic content with a large amount of pumices, whose aspect and chemical composition are identical to volcanic edifices located on the upper slope (Horseshoe Volcano) or onshore (Petite-Terre). Backscatter imagery also reveals streaks that cover the lobes and trace back to the same upper slope area. Analysis of bioclasts from a core catcher stopped in the upper part of the deposit shows a large variety of foraminifers, shells fragments, with a little proportion originating from the upper-slope and shelf. We propose that these massive lobe deposits might have occurred as the pumice-dominated material ejected at HV or PT flows downslope, thus reworking and incorporating a substantial amount of hemipelagic deposits along the slope and over the abyssal plain. These observations suggests that a tectono-magmato-volcanic event occurred during recent geological time (Late Pleistocene according to early estimations). At least one comparable set of similar and synchronous features appears on our dataset thus implying the occurrence of a similar event, earlier in the Pleistocene. The correlations between these events and the activity at HV and PT volcanic centers are critical, as it would provide a recurring scenario to compare with present day seismo-volcanic crisis at Mayotte.

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