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The Mayotte seismo-volcanic crisis: characterizing a reactivated volcanic ridge from the upper slope to the abyssal plain using multibeam batymetry and backscatter data.

Paquet F., Jorry S., Deplus C., Le Friant A., Bernard J., Bermell-Fleury S., Feuillet N., Gaillot A., Guérin C ., Thinon I.

Since the 10th of May 2018, the Island of Mayotte has undergone a seismic crisis characterized by clustered epicentres located offshore between 10 and 50 km east of the Main Island (Grande-Terre). In addition, rapid subsidence and displacement of the island toward the east occurred from July 2018, both with rates over 15 mm.yr-1. These aspects pointed towards a magmato-volcanic origin to the crisis.

The MAYOBS offshore geological and geophysical surveys were carried out by IPGP, IFREMER, BRGM and CNRS from May to July 2019 in order to recover and deploy Ocean Bottom Seismometers as well as to acquire bathymetric, backscatter and sub-bottom profiler data over an extensive area of the slope and abyssal plain. These surveys allowed the discovery of a newly developing 800-meter-high volcano located at the eastern end of an elongated volcanic ridge, at 3500 m of water depth. This N105-N110° ridge is approximately 100 km long and extends to the west until “Petite-Terre” and the northern part of “Grande-Terre” (Feuillet et al., submitted).

Bathymetric data highlight the presence of tenth of volcanic edifices including cones, eruptive fissure ridges, lava flows and plateaus, laccolith domes, and inflated lava flows. Few of these features have been sampled but they confirmed the volcanic origin. Volcanic ridges develop along specific orientation have already described onshore. The sequence of bathymetric and backscatter surveys from May to July allow to describe the evolution of the newborn volcano and to estimate the volume of lava and the effusion rate (about 5km3).

The eastern Mayotte insular slope has been described using bathymetry and backscatter data. Several large active canyons transport sediments from the lagoon, the outer-reef drop off, and the upper-slope, down to the abyssal plain. We also detect evidences of past slope instabilities over the area.

In the context of the important seismo-volcanic crisis affecting Mayotte for more than a year, these new data offer a reference data set that will provide additional constraints for hazard and risk assessment.

References:

Feuillet et al., Submitted. Birth of a large volcano offshore Mayotte through lithosphere-scale rifting. Nature.