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Birth of a large volcanic edifice offshore Mayotte (Comoros Island, Western Indian Ocean)

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Volcanic eruptions are foundational events shaping the Earth's surface and providing a window into deep Earth processes. We document here an ongoing magmatic event offshore Mayotte island (Western Indian Ocean) unprecedented in terms of emitted volume of lava and duration of the seismic crisis. This event gave birth to a deep-sea volcanic edifice 820m tall and ~ 5 km³ in volume, located 50 km from Mayotte. A plume with distinct chemical signatures compared to open-ocean seawater emanated from the edifice, generating an exceptional 1900m-high vertical acoustic anomaly in the water column. Noble gas analyses in the vesicles from a popping rock dredged on the flank of the edifice, indicate rapid magma transfer from the asthenosphere. The edifice is located at the tip of a WNW-ESE-striking volcanic ridge composed of many other edifices, cones and lava flows constructed by past eruptions. Starting in May 2018 thousand of earthquakes were triggered by the magmatic event. The space-time distribution of the seismicity suggests that magma below the center of the ridge was transported to the new edifice over a few weeks in dikes that penetrated the brittle mantle a result of a lithosphere-scale extensional episode accommodating motion along a transfer zone between the East-African rifts and Madagascar. Since the eruption's onset, the seismicity is mostly concentrated closer to the island, in an exceptionally deep zone (25-50 km) overlain by a zone of enigmatic, very low frequency, tremors.

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