The Tsunamigenic Gravitational Flank Collapse of Fogo Volcano, Cape Verde Islands

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Sector collapses resulting from subaerial and submerged volcanic flank instabilities are known for their hazard potential, but are often not well understood. A detailed analysis of the debris distribution and the failure mechanism of the flank collapse is paramount for any hazard assessment of such a slope failure. Fogo Island in the Cape Verdes is one of the most active volcanoes in the world, and the recent discovery of tsunami deposits at up to 270 m above coeval sealevel on the nearby Santiago Island indicates the tsunamigenic nature of its flank collapse at ~73 ka. The depositional area and number of events, however, were previously poorly constrained using only medium-resolution multibeam data. Here, we present recently acquired multibeam, parasound sediment echo-sounder, and gravity core data from RV Meteor cruise M155 (May-July 2019), which aimed to better constrain the lateral extent of the slide deposits and find out more about the nature of the slopes south of the islands of Fogo and Santiago. We find that the emplacement of ~110 km^3 debris avalanche deposits from Fogo's Monte Amarelo flank collapse on the seafloor triggered a ~20 km^3 secondary failure of fine-grained seafloor sediments. This increases the depositional area of the deposits linked to the Monte Amarelo flank collapse by at least twenty times compared what was previously estimated. Our results lay the groundwork for ongoing and future work on the tsunamigenic potential of the volcanic flank collapse of Fogo Island.