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Size Distribution and Causes of Submarine Landslides, Central Azores Islands

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Giant landslides are now well known to occur in ocean islands with a frequency globally of ∼10 ky, but small landslides occurring in the steep upper submarine slopes of islands are more common and likely more frequent, making them also a potential hazard. The central and eastern Azores Islands, which are scattered about the Africa-Europe plate boundary, experience frequent earthquakes and volcanic activity. There have been at least 31 destructive earthquakes, and 28 volcanic eruptions registered both on land and sea in the past six hundred years. Although their exact triggers are unclear, these events likely frequently result in failure of submarine slopes, which are densely embayed in multibeam sonar data. Failures are also recorded by turbidites found in sediment cores recovered in the deep basins below these slopes. In this study, landslide areas have been mapped out from high-resolution bathymetry datasets. We are computing their area frequency distributions and distributions of other geometrical characteristics to compare with power-law distributions found for landslides on land, e.g., U.S. Atlantic margin, Guatemala, and Umbria and North Ridge (Malamud et al., 2004; Brink et al., 2009). This comparison ultimately can address the relative importance of the small compared with large landslides in the submarine setting. Subsequently, in order to try identifying primary causes of failure, we intend to compare the landslide occurrences against the spatial distribution of known active faults, coastal lava flow locations, and earthquake peak ground acceleration maps.