EGU22-1025
https://doi.org/10.5194/egusphere-egu22-1025
EGU General Assembly 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Geological hazard assessment of volcanic islands: Insights from seafloor geomorphology and turbidites in sediment cores, central Azores Islands

Yu-Chun Chang[1], Neil Mitchell[1], Rui Quartau[2,3], Thor Hansteen[4], Julie Schindlbeck-Belo[4], and Armin Freundt[4]

[1]University of Manchester, Earth and Environmental Sciences, Manchester, United Kingdom (yu-chun.chang@postgrad.manchester.ac.uk)

[2]Divisão de Geologia Marinha, Instituto Hidrográfico, Lisboa, Portugal

[3]Instituto Dom Luiz, Faculdade de Ciências da Universidade de Lisboa, Lisboa, Portugal

[4]GEOMAR, Helmholtz Centre for Ocean Research Kiel, Wischhofstrasse 1–3, Kiel 24148, Germany

Volcanic eruptions and submarine landslides and may have occurred frequently among the central Azores (Faial, Pico, São Jorge, and Terceira islands) because landslide valleys are abundant on their submarine slopes and dark volcaniclastic beds are common in sediment cores. The threats of future such processes need evaluating for citizens living on the islands. A multidisciplinary approach was applied to provide a hazard assessment based on high-resolution multibeam bathymetric data and four gravity cores collected in basins amongst the islands.

More than 1200 submarine slope valleys were documented from the bathymetric data. Based on their morphological features, >300 of them were interpreted to be likely of landslide origin and produced by single slope failures. Thirteen of them would probably have generated tsunamis with heights at source 1-7 m. This may explain some tsunamis recorded in the area that cannot be assigned to earthquakes. Different landslide abundances and mean volumes were also found between two groups of islands. There are more and smaller landslides in one group (Faial and Pico) compared with fewer but larger landslides around another group (São Jorge and Terceira). This may be explained by a more frequent triggering of slope failure around Faial and Pico, which prevent the accumulation of thick superficial deposits, or sediment densification by ground shaking. This may suggest a greater threat from large earthquakes among these two islands that is not currently found in earthquake records.

The sediment cores were analyzed to interpret whether emplacements of volcaniclastic beds were from tephra fallout, pyroclastic flows or submarine landsliding. This required assessing various information, including sedimentary structures, glass shard geochemistry and morphometrics, bulk composition and organic geochemistry. From the results, 2/3 of the volcaniclastic beds originated directly from erupting volcanoes, whereas only 1/3 involved slope remobilization such as landsliding. The modal thickness of the volcaniclastic beds is small (2-20 cm). The low incidence of beds of landslide origin could be explained either by landslide-generated sediment flows

infrequently reaching the basin floors and/or eruptions creating beds more frequently. Based on ^{14}C datings, all types of turbidity currents have reached the core sites at a modest frequency since the Last Glacial Maximum (0.45 events/kyr on average).