

## Post-eruptive Submarine Terrace Development of Capelinhos, Azores

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Erosion of the coasts of volcanic islands by waves creates shallow banks, but how erosion proceeds with time to create them and how it relates to wave climate is unclear. In this study, historical and recent marine geophysical data collected around the Capelinhos promontory (western Faial Island, Azores) offer an unusual opportunity to characterize how a submarine terrace developed after the eruption. The promontory was formed in 1957/58 during a Surtseyan eruption that terminated with extensive lava forming new rocky coastal cliffs. Historical measurements of coastline position are supplemented here with coastlines measured from 2004 and 2014 Google Earth images in order to characterize coastline retreat rate and distance for lava- and tephra-dominated cliffs. Swath mapping sonars were used to characterize the submarine geometry of the resulting terrace (terrace edge position, gradient and morphology). Limited photographs are available from a SCUBA dive and drop-down camera deployments to ground truth the submarine geomorphology. The results reveal that coastal retreat rates have decreased rapidly with the time after the eruption, possibly explained by the evolving resistance to erosion of cliff base materials. Surprisingly, coastline retreat rate decreases with terrace width in a simple inverse power law with terrace width. We suspect this is only a fortuitous result as wave attenuation over the terrace will not obviously produce the variation, but nevertheless it shows how rapidly the retreat rate declines. Understanding the relationship between terrace widening shelf and coastal cliff retreat rate may be more widely interesting if they can be used to understand how islands evolve over time into abrasional banks and guyots.