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Submarine slope failures associated to the Marquês de Pombal active fault reveal past earthquake events (SW Iberian Margin)

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The relationship between submarine active seismogenic faults and associated slope failures, especially in low-convergence areas, is still poorly known. Here we present a case study from the SW Iberian Margin, at the boundary between the African and Eurasian plates. Despite low plate convergence (4-5 mm/yr), this area has been the source of the largest earthquakes and tsunamis in western Europe¹, such as the 1969 Earthquake (Mw8) and the 1 November 1755 Lisbon Earthquake (estimated Mw8.5). Here we present AUV- and shipboard-bathymetry maps, high-resolution sidescan sonar data, multichannel seismic profiles and sediment cores that allow us to characterize, with unprecedented resolution, the relationship between the fault system and related slope failures. The Marques de Pombal Fault is an active 50-km-long west-verging monocline thrust cutting through the Plio-Quaternary units². Deformation is accommodated by thrusting and folding. Sidescan sonar maps across the MPF reveal a large (260 km²) translational landslide and debris flow. Successive slope failures located at the base of the fault scarp provide evidence of cyclic fault activity. The most recent slide (230 yr BP), may have been triggered by the 1755 Lisbon earthquake. By dating previous slide deposits, we obtained a recurrence period of 2000 yr³, suggesting cyclic activity of the Marques de Pombal Fault