

Title

Slope instability in contrasting tectonic settings along Mediterranean margins

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Abstract

Submarine landslides are among the largest mass-wasting processes on Earth and can generate damaging tsunamis, threatening coastal populations and seafloor infrastructure [1]. Their styles, scales, and run-out behaviors vary widely as a function of sediment properties, triggers, slope settings, and geodynamic context [2,3]. In the Mediterranean Sea, landslides have been extensively mapped on the modern seafloor, yet their deeper stratigraphic record over million-year timescales remains poorly constrained [4]. As a result, although basin-scale tectonics is expected to influence landslide type and dynamics, it remains unclear whether the region's diverse geodynamic settings exert a systematic control on landslide style, geometry, and run-out behavior, thus influencing their tsunamigenic potential.

This PhD project aims to investigate the nature, geometry, and kinematics of Neogene–Quaternary submarine landslide deposits across Mediterranean basins, focusing on how tectonic activity and sedimentation rates control their distribution, frequency, and volume over geological timescales, and how different tectonic settings influence their tsunamigenic potential.

To reach this goal, I will analyze multiple geophysical and borehole datasets from selected Mediterranean basins that offer both scientific relevance and data availability through public repositories of governmental and academic institutions. Landslide deposits preserved in the stratigraphic record will be characterized following established procedures [5], and parameters such as volume, surface area, internal architecture, and run-out distance will be quantified. This dataset will then be used to assess whether landslide deposits vary systematically as a function of tectonic regime and sedimentary history.

This research will significantly advance our understanding of the spatial and temporal distribution of submarine landslides along Mediterranean continental margins and of how landslides influence basin infill history in relation to varying tectonic settings. The integrated approach proposed in this project will improve our understanding of the recurrence patterns and depositional architecture of potentially tsunamigenic submarine landslides. These insights will contribute to the development of more informed and effective marine geohazard assessments, supporting future risk mitigation and coastal planning strategies.

References: [1] Tappin, D.R., 2021. *Annual Review of Earth and Planetary Sciences*, 49, 551-578. [2] Masson, D.G. et al., 2006. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 364, 2009-2039. [3] Huhn, K. Et al., 2019. In: *Submarine landslides: Subaqueous mass transport deposits from outcrops to seismic profiles*, 181-200. [4] Urgeles, R., Camerlenghi, A., 2013. *Journal of Geophysical Research: Earth Surface*, 118, 2600-2618. [5] Clare, M. et al., 2019. Geological Society, London, Special Publications 477, 455-477.