



## **Excess Pore Pressure Evolution of the Marques de Pombal Continental Slope, Offshore Portugal**

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The Marques de Pombal Mass Transport Complex (MTC) is located in the Alentejo Basin in the northern sector of the Gulf of Cadiz (SW Iberian Margin). Several geophysical studies and gravity core analyses over the last two decades reveal the contribution of multiple landslides and turbidity events in the formation of the MTC. The location of the MTC, at the base of the Marques de Pombal active fault, suggests fault activity as the most likely triggering mechanism for local mass wasting events. Moreover, the Marques de Pombal fault is considered by several authors as a possible candidate for the generation of the 1755 Great Lisbon catastrophic earthquake and tsunami event.

The INSIGHT cruise conducted by ICM – CSIC in May 2018 collected new seismic, bathymetric and gravity core data from the study area, including undisturbed sediments at the top of the Marques de Pombal fault scarp. We performed consolidation tests to derive the evolution of porosity, permeability and compressibility of these sediments through time and at different burial conditions.

The aim of this project is to evaluate the contribution of excess pore pressure (pre-conditioning factor) versus earthquake cyclic loading (trigger mechanism) in the Marques de Pombal area, to understand slope stability through time and make inferences about the magnitude of the seismic events that triggered the failures. We integrate into a finite element basin numerical model physical properties of the sediments collected during the INSIGHT cruise with a stratigraphic model of the basin derived from seismic profiles, swath bathymetry deep-towed side-scan sonar mosaics, and well and log data from the IODP 339 expedition. Starting from measured data, we obtained the computed excess pore pressure history for the sediments in the Marques de Pombal area. The results show how a significant lateral flow towards the Marques de Pombal fault scarp contributed to the generation of mid-to-high overpressures up to a value of 0.5, which started developing significantly in the Middle Pleistocene and continued during the Holocene. Since the timing of the overpressure development is in agreement with the occurrence of the Marques de Pombal MTC, we believe that excess pore pressure might have pre-conditioned the slope to fail.