



## **Imaging the Azores-Gibraltar Fracture Zone and the Madeira-Tore Rise intersection with multichannel seismics. The PROPEL cruise (PROPagation of the Eurasia-Africa pLate boundary East of the GLoria Fault)**

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The E-W trending ~1 600 km long Azores-Gibraltar Fracture Zone (AGFZ) establishes the Africa-Eurasia plate boundary in the Atlantic Ocean. The AGFZ is intersected by the Madeira-Tore Rise (MTR), a N-S trending 1 100 km complex volcanic ridge. MTR magmatism in the Eurasia plate is mainly of Early Cretaceous age while in the Africa plate it varies from Neogene to Present, mainly. At the AGFZ-MTR intersection magmatism is 0.5 My. The tectonic style along the AGFZ varies dramatically across the MTR. West of the MTR the trace of the plate boundary is discrete and defined by the strike slip Gloria Fault, while east of the MTR the plate boundary becomes diffuse, and deformation is partitioned along strike slip and thrust faults. However, instrumental earthquakes from  $M=7$  to  $M=8.4$  have occurred in the last 80 years, not mentioning the historical Lisbon earthquake with estimated magnitude  $M=8.1$  to  $8.9$ .

The PROPEL (PROPagation of the Eurasia-Africa pLate boundary East of the GLoria Fault), a multichannel seismics marine campaign funded by EUROFLEETS-2 aimed at imaging for the first time the crustal through shallow mantle structure of the AGFZ across the MTR. It was run on board the R/V OGS Explora, using a 1500 m long streamer with 120 channels, an array of airguns (16.4 L or 8.2 L) and a magnetometer. A total of 722 km along 11 profiles were acquired.

Processing of the seismic data allowed imaging the transform plate boundary showing a series of various geological phenomena, such as: i) successive events of transtensional and transpressive tectonics interfering with magmatism, ii) the structure and multiple tectono-magmatic evolution of the MTR, iii) the transition from the Horseshoe and Tagus Abyssal Plains towards the MTR and iv) large scale landslides (>50 km of length). PROPEL seismic data also allow for better understanding the nature of magnetic anomalies in this region of the Atlantic, as well as a variety of submarine morphological features of both tectonic and oceanographic origins.

Publication supported by FCT- project UID/GEO/50019/2019 - Instituto Dom Luiz.