EGU22-6489
https://doi.org/10.5194/egusphere-egu22-6489
EGU General Assembly 2022

Drone-magnetic survey along the Alentejo coast (SW Portugal): a quest for the intruded Messejana fault

Diogo Rodrigues[1,2], Marta Neres[1,3], Pedro Terrinha[1,3], Machiel Bos[4], and Bento Martins[5]
[1]Instituto Português do Mar e da Atmosfera (IPMA), Portugal
[2]Faculdade de Ciências da Universidade de Lisboa (FCUL), Portugal
[3]Instituto Dom Luiz - Universidade de Lisboa, Lisboa, Portugal
[4]Instituto Dom Luiz - Universidade da Beira Interior, Covilhã, Portugal
[5]TeroMovigo - Earth Innovation Lda

The Messejana fault is a 500 km long crustal-scale left-lateral strike-slip fault of Permian age, which cuts across half of the Iberia Peninsula. It formed during the Late Variscan fracturing event and hosts a doleritic dyke 200 Ma old that is genetically linked to the Central Atlantic Magmatic Province (CAMP) and allows the fault to be efficiently mapped by magnetic methods. The Messejana fault has been assigned important tectonic roles during times of Iberia geological history, including during the Alpine /Pyrenean orogenic phase, and its extension has been reviewed for 100 km longer towards NE than previously mapped, based on geophysical methods (de Vicente et al., 2021). Quaternary vertical movement with > 50 m uplift of its south block has been reported (Cabral, 1995).

The offshore prolongation of the Messejana fault and dyke towards SW is generally assumed. However, its exact location is unclear since its trace is mostly lost close to the coastline under Cenozoic sedimentary cover. It may be offset by ~N-S faults or splay into different segments, and how it continues to offshore is not documented.

In this work we will present new magnetic data that help constraining the onshore-offshore transition of the Messejana dyke and fault and its relationship with other mapped structures. A new aeromagnetic survey was designed and conducted with a drone with a triaxial magnetometer (e.g., a SENSYS MagDrone R3) at a height of around 50 m above the surface. The accuracy of the observed scalar magnetic field is 10 nT. Near the fault a pattern of observation with a spacing of 100m will be collected that will extend up to 1 km into the sea. An accurate onboard GNSS/IMU will be used to convert the observed magnetic field to the north, east and downward component. This new survey is complemented with marine magnetic data (Neres et al., 2019) that detected offshore anomalies which origin is still to confirm, as well as other existing onshore magnetic maps (e.g. Matos et al., 2019).

This work was developed in the frame of ATLAS project (PTDC/CTA-GEF/31272/2017, POCI-01-0145-FEDER-031272, FEDER-COMPETE/POCI 2020) partly funded by FCT. FCT is further acknowledged for financial support through projects UIDB/50019/2020–IDL, PTDC/CTA-GEF/1666/2020 and ALT20-03-0145-FEDER-000013.

References:

Cabral, J., Neotectónica em Portugal Continental, Memórias do Instituto Geológio e Mineiro, nº31, Lisboa, p. 265, 1995

de Vicente, G., Olaiz, A., Muñoz-Martín, A. and Cunha, P.P., 2021. Longest and still longer: The Messejana-Plasencia dyke and its links with later Alpine deformation belt in Iberia. Tectonophysics, 815, p.229009

Matos J, Carvalho J, Represas P, et al (2020) Geophysical surveys in the Portuguese sector of the Iberian Pyrite Belt: a global overview focused on the massive sulphide exploration and geologic interpretation. Comun Geológicas 107:41–78

Neres, M., P. Terrinha, P. Brito, M. Rosa, J. Noiva, V. Magalhães, M. Silva, M. Teixeira, L. Batista, C. Ribeiro (2020). High-Resolution Marine Magnetic Mapping of the Portuguese Nearshore: Unraveling Geological Domains, Faults and Magmatic Structures. AGU 2020 Fall Meeting, 01-17 December 2020, online