

Variability of the hydrothermal fields within the Portuguese seafloor (MAR)

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Portugal is a country geographically linked to the ocean with one of the largest worldwide EEZ, spanning 1.7 million km², and sovereignty over the seafloor and seabed, within the extended continental shelf to an area up to 2.4 million km². This oceanic domain includes bathymetric anomalously elevated segments of the Mid-Atlantic Ridge (MAR), mainly between the Maxwell and Hayes Fracture Zones, under the influence of the Azores mantle anomaly and the triple junction between the Eurasian, Nubian, and North American plates. Several hydrothermal fields (HFs) were identified in this region. The first one was discovered in 1997 - the Lucky Strike HF - whereas the last one - the Luso HF - was discovered in 2018. Moreover, the geotectonic context along this zone allows anticipates the occurrence of more HFs yet to be identified. The known HFs are located at depths ranging from 2700 to 600m and are harboured in a variety of geological frameworks, showing heterogeneities in the tectonic and magmatic settings (e.g., on ridge axis, long-lived detachment faulting and/or under interference of Azores volcanic anomalies), on the host rocks (mafic and/or ultramafic), on the hydrothermal typologies (type of venting; fluid temperatures, physicochemical properties), and on the mineralization processes and depositional mechanisms. This wide variability makes this area a perfect laboratory to understand how different settings can generate distinct hydrothermal regimes, fluids signatures and mineralization processes. Here we summarize, compare, and discuss the different geological contexts generating such a variety of HFs, with a focus on their mineralogy and geochemistry. Additionally, new data on *in-situ* trace elements and S isotopic analyses is presented to discuss fine-scale seafloor precipitation and replacement processes in some of these fields (e.g., Saldanha, Menez Gwen, and Rainbow).