Tectonic domains of the Betic Foreland System, SW Iberian Margin: Implications for the Gulf of Cadiz Contourite System

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The southwestern margin of Iberian (SWIM) marks the transition between the Mediterranean Alpine Orogenic Belt and the Atlantic Azores–Gibraltar Fracture Zone, near the diffuse segment of the Africa (Nubia)-Eurasia (Iberia) plate boundary. The Gulf of Cadiz Contourite System (GCCS) has been build-up by the circulation of the Mediterranean Outflow Water (MOW) on the continental middle slope. This work aims to understand how the tectonic structures controlled the development, evolution and morphology of the GCCS. This has been accomplished with the analysis of high quality regional 2D seismic reflection profiles. Four sedimentary basins were mapped in the study area – the Algarve, Doñana, Sanlucar and Cadiz basins – developed in the foreland of the Betic-Rif Orogen. Three major tectonic structures – the Gil Eanes Fault (GEF), Cadiz Fault (CF) and the Albufeira-Guadalquivir-Doñana Basement High (AGDBH) – were identified on the SWIM. The NW-SE-oriented GEF and the NE-SW to ENE-WSW-oriented CF were identified as dextral strike-slip faults. The AGD is an E-W to ENE-WSW elongated morphostructural high that marks the southern boundary of the Algarve Basin. Based on their location and orientation they were interpreted as being inherited structures from the Mesozoic rift system. Based on the described regional structures, the SWIM was divided into four tectonic domains (A, B, C and D) with different structural and seismological characteristics. Contourite depositional and erosional features show different characteristics - distinct size, extension, configuration and depositional architecture - for each of the tectonic domains recognised. Tectonic-controlled subsidence led to the development of an accommodation space, forming the main depositional sector in the GCCS (Domain C). Contrariwise, where the margin suffered uplift, the accommodation space was limited and the contourite depositional features are not very extensive (Domain D). The presence of structural obstacles (e.g. AGDBH, paleo-slope) is another important factor in the drift evolution: mounded geometries were only observed where important structural obstacles conditioned the current circulation (Domain B, C and D). Where the seafloor is gentle with smooth relief, spread-out MOW circulation occurs, forming sheeted drifts related to weak and wide non-focused bottom-currents (Domain A). This work demonstrates the influence that the inherited tectonic structures and the
margin paleo-topography has on the development of the contourite system. Furthermore, we propose that tectonics also control the dimensions and types of the contourite depositional features.

Acknowledgements: D.D. thanks the Portuguese Foundation for Science and Technology (FCT) for a PhD scholarship (reference SFRH/BD/115962/2016). This research has been conducted under the framework of ‘The Drifters Research Group’, Department of Earth Sciences, Royal Holloway University of London (UK). This project is partially funded by a Joint Industry Project supported by TOTAL, BP, ENI, ExxonMobil, TGS and Wintershall and partially supported through the CGL2016-80445-R (AEI/FEDER, UE), CGL2015-66835-P and CTM2016-75129-C3-1-R.