

Post-rift tectono-sedimentary evolution of the deep West Iberian Margin.

M. Simões^{1,2*}, C. Roque^{1,3}, C. Ribeiro^{2,4,5,6}, J. Noiva⁷, P. Terrinha^{7,3}

¹ EMEPC – Estrutura de Missão para a Extensão da Plataforma Continental, Portugal

² Universidade de Évora, Évora, Portugal

³ IDL- Instituto Dom Luíz, Universidade de Lisboa, Lisboa, Portugal

⁴ MARE – Centro de Ciências do Mar e Ambiente, Évora, Portugal

⁵ ARNET – Aquatic Research Network, Portugal

⁶ Departamento de Geociências, Escola de Ciências e Tecnologia, Universidade de Évora, Portugal

⁷ IPMA – Instituto Português do Mar e da Atmosfera, I. P., Lisboa, Portugal

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The West Iberian Margin (WIM) is the conjugate margin of the Grand Banks of Canada and the rifting processes that originated both margins have been widely studied over the last decades.

Therefore, WIM is well known as a classical example of a non-volcanic rifted margin with two main rifting phases related to the North Atlantic opening. Despite the studies carried out so far, the knowledge about the sedimentary and tectonic evolution of this margin during the post-rift stage is scarce. The main focus of this work is to characterize post-rift tectono-sedimentary sequence of the deep West Iberian Margin.

The study area is bounded to the north by the Galicia Bank, to the south by the Narazé Canyon, to the west by the Iberian Abyssal Plain, and by the Iberian coast to the east, covering about 120 000 km². The dataset includes five multichannel seismic reflection profiles acquired in the scope of the Portuguese Project of Extension of the Continental Shelf by EMEPC (Task Group for the Extension of the Continental Shelf) and the EMODnet (European Marine Observation and Data Network) bathymetry in the study area.

The seismic survey was carried out onboard R/V Akademik Shatskiy using a source of 5720 cu in bolt gun array, cable length of 7950 m and shot interval of 50.00 m. Four of the multichannel seismic lines are oriented W-E, and one N-S, three of them with about 200 km length and two approximately 100 km length located, at about 5300 m water depth. Lithostratigraphic information from the Ocean Drilling Program (ODP) drills was used for the characterization of seismic units and the chronological constraint.

The multibeam bathymetry used is from an EMODNet digital terrain model (DTM) with tiles of approximately 115m * 115m (1/16 * 1/16 arc minutes) of grid resolution, resulting from the combination of bathymetric survey datasets, DTMs, satellite derived bathymetry (SDB) data, and GEBCO 2020 (General Bathymetric Chart of the Oceans 2020) data to fill in the gaps (www.emodnet-bathymetry.eu).

The seismic lines and the bathymetric data were loaded into Landmark software for sismostratigraphic interpretation. The geomorphological analysis was made using ArcMap and Geocap software, in order to identify and characterize the main seafloor reliefs. .

The sismostratigraphic interpretation allowed the identification of a pos-rift sequence formed by six seismic units of different ages calibrated with ODP drilling sites. The oldest seismic unit is of Late Cretaceous age and the youngest of Quaternary age.

The sedimentary sequence is cut by several normal faults and few reverse faults; sealed fluid scape structures are also present.

The joint analysis of the seismic reflection profiles and multibeam bathymetric analysis allowed to recognize that the main sedimentary processes and their interaction responsible for the build-up of the post-rift sedimentary sequence are: i) depositional related to bottom-current circulation, which deposited contourite drifts and sediment

waves; ii) gravitational responsible for mass transport deposits (MTD) and turbidites; iii) erosive that incised moats and channels; and iv) tectonic processes responsible for structural highs that controlled locally the sedimentary processes.

The present-day complexity of the seabed morphology reflects the interaction between the main tectonic episodes like Mesozoic rifting, Cenozoic compression and uplift, and the sedimentary processes.

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