Sedimentary architecture and Cenozoic magmatic evolution of the Hatton Basin, offshore Ireland, from seismic and potential field data

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The Hatton Basin is located at the western European Atlantic Margin, approximately 600 km west of Scotland and Ireland, and bounded by the Rockall Bank to the east and the Hatton High to the west. Little is known about its structure and evolution within the context of the North Atlantic opening. Here, we present a preliminary interpretation of the large-scale sedimentary structure and Cenozoic magmatic evolution of the Hatton Basin from new 2D regional long-streamer seismic reflection data, DSDP information, and potential field data (i.e. magnetic and gravity data).

First interpretations of the seismic data suggest the presence of three sedimentary megasequences referred to as Ha (Early Pliocene to Holocene), Hb (Late Eocene to Late Miocene) and Hc (Paleocene to middle Eocene), which are bounded by regional unconformities C10 (intra-Early Pliocene), C30 (intra-Late Eocene) and C40 (base Cenozoic) respectively. Furthermore, an angular unconformity possibly of latest Early–Middle Eocene in age is present locally in the basin which corresponds to a post-rift volcanic phase. Some of the volcanoes formed during this period were active until the deposition of the intra-Late Eocene (C30) unconformity.

The presence of Mesozoic and/or older rocks in the basin is proposed based on the seismic character of the reflectors and the apparent rotated fault blocks. The lower Cenozoic succession contains Eocene prograding sedimentary wedges as well as intrusive and extrusive igneous rocks of basaltic composition (Late Paleocene–Early Eocene and Early– Middle Eocene? in age). The upper Cenozoic sediments are characterized by the deposition of contourites and mass transport deposits.

Both magnetic and gravity data show similar NE-SW trending lineaments of anomalies extending from the center of the basin towards the southern end. The location of the mapped volcanic craters in the basin is coincident with these anomalies. The connection between the craters and the magnetic and gravity anomalies potentially reflect areas with stronger magmatic influence. The absence of these anomalies in the northern part of the basin implies that magmatic activity during basin evolution might have been stronger and more pronounced on the southern part of the area and was weaker towards the north.

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