Geophysical Research Abstracts
Vol. 21, EGU2019-11527-1, 2019
EGU General Assembly 2019

The effect of former Caledonian orogenic structures on the rift decay of the Porcupine Basin (Ireland) during the Jurassic-Cretaceous interval - comparison with other rift propagators

Cédric Bulois (1,2,3), Louise Watremez (4), Manuel Pubellier (1), Patrick Shannon (3), Nicolas Chamot-Rooke (1), and Jacques Deverchère (2)

(1) Laboratoire de Géologie, CNRS/UMR 8538, Ecole Normale Supérieure, PSL Research University, 24 Rue Lhomond, 75005 Paris, FRANCE (bulois@geologie.ens.fr), (2) Laboratoire Géosciences Océan, CNRS/UMR 6538, UBO-IUEM, Brest, FRANCE, (3) School of Earth Sciences, University College Dublin, Belfield, Dublin 4, IRELAND, (4) Univ. Lille, CNRS, Univ. Littoral Côte d'Opale, UMR 8187, Laboratoire d'Océanologie et de Géosciences, F-59000 Lille, FRANCE

In rift systems, the role of crustal discontinuities is often taken into account regarding the basin orientation at the initiation of the extension. However, it remains enigmatic during subsequent rifting propagation. Herein, we specifically investigate the effects of fault systems of the Caledonian orogeny onto the Porcupine Basin (offshore Ireland) during the Upper Jurassic-Lower Cretaceous interval, the rifting phase that mainly formed the basin during the North Atlantic opening.

Detailed reinterpretation of seismic lines, tied to exploration wells, shows a northward rift migration through the Upper Jurassic at a basin-scale, followed by generalised hyper-extension phase in the Lower Cretaceous. We argue that the Iapetus Suture (Caledonian Front), limiting thin-skinned Variscan deformation from the Caledonian foreland, acted as a structural barrier that forced northward-propagating extension to slow during the Kimmeridgian, before more widespread propagation during the Tithonian. Other transversal Caledonian structures (Antrim-Galway Line) had a similar effect during the Lower Cretaceous hyper-extension, and the Caledonian foreland-internides limit (Fair Head-Clew Bay) blocked rifting processes at the end of the Barremian. This produced an internally-pulsed evolution with differential thickening of rift sequences, bounded by erosional unconformities underlined by fans or mass-transport complexes formation.

Inherited transversal structures may therefore initiate, slow down and finally end the formation of a rift basin. Such structural control is very similar to active or aborted propagators (e.g. South China Sea, Coral Sea and Woodlark basins) in which the development and decay are highly dependent of inherited transversal orogenic structures.