

Sand supply to the Slyne Basin, offshore western Ireland – insights into Triassic palaeogeography of the Northeast Atlantic margin

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During the Triassic, present-day Northeast Atlantic margin basins lay within the Laurasian region of the Pangean supercontinent, approximately 15 – 20° north of the equator. Ongoing investigations of Permian–Triassic basins along the Northeast Atlantic margin aim to better understand large-scale drainage patterns throughout the Mesozoic, to better predict sand distribution across these basins, and to potentially identify links between basins on the Atlantic conjugate margins. Sediment transport on the Irish Atlantic Margin during the Triassic remains relatively elusive. Sediment dispersal systems supplying these basins are thought to be independent of those which fed UK basins.

This study is focussed on the Slyne Basin, which is located (~60 km) west of Ireland. A multi-proxy methodology is being employed to ensure rigorous provenance analysis. U–Pb geochronology of robust zircon and relatively unstable apatite and Pb isotopic analysis of labile K-feldspar are being utilised to identify and constrain the relative contribution from possible source areas. This approach aims at reducing the potential bias in each individual method, producing a complimentary dataset which may also help in the identification of any recycling or mixing of detritus.

Results from the Pb isotopic analysis of K-feldspars reveals mixed Archaean–Proterozoic sources. These results suggest sources such as the Lewisian Complex of northwest Scotland, the Nagsugtoqidian of eastern Greenland, and the Rhinns Complex and offshore basement highs such as the Rockall and Hatton Banks, and the Porcupine High. Sources from onshore Ireland identified through feldspar analysis include the Annagh Gneiss Complex, a series of Palaeo–Neoproterozoic orthogneisses in western Ireland, and Caledonian Granites. U–Pb ages of apatite and zircon grains are consistent with the sources identified by the Pb isotopic analysis of K-feldspar; however, a Permian population, with no clear equivalent K-feldspar, has also been detected.

These results support the hypothesis of a drainage divide between the basins offshore western Ireland versus onshore UK and eastern Ireland, possibly due to an uplifted Irish Massif which was not itself a major supplier of sediment. Sand supply was dominantly from the north with significant input from the eastern and western flanks of the basin, with previously unrecognised sources, such as Permian rocks, playing an important role. Potential Permian sources include volcanic rocks in the Midland Valley of Scotland, the Ulster Basin, and the Shetland Platform.