



## **The IRETherm project: Magnetotelluric assessment of the Rathlin Basin as a possible geothermal aquifer**

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IRETherm ([www.iretherm.ie](http://www.iretherm.ie)) is a collaborative, SFI-funded research project to identify and evaluate sites within Ireland possessing the greatest potential for deep, low-enthalpy, geothermal energy provision. Possible areas for geothermal potential include the Permian and Triassic sedimentary basins in Northern Ireland, which contain groups with relatively high primary porosity, with viability depending largely on the permeability distribution, which controls fluid flow and heat-exchange. The most promising of these is the Triassic Sherwood Sandstone Group, which has measured porosities and permeabilities of 8-24% and 2-1000 mD respectively from borehole core samples.

The subject of the work presented here, the Rathlin Basin in County Antrim, is one of three onshore basins in Northern Ireland, where measurements in two independent boreholes show geothermal gradients of between 36 and 43 °C/km to depths of 1481 m. Previously published interpretations of gravity models across the basin attribute a thickness of 2000 m to the Sherwood Sandstone Group, with a maximum depth to the Permo-Triassic basement of 4000 m. Magnetotelluric data were acquired onshore in June 2012 across a 2-D grid of 57 sites with a 2 km site spacing, and on the nearby Rathlin Island on two profiles totalling 12 sites with an 800 m site spacing in April 2013 in order to image the thickness and continuity of the sediments in the north-eastern portion of the basin. In the modelling results presented here, the Permo-Triassic sediment fill has a well-imaged resistivity contrast to the surrounding basal Dalradian metasediments.

The data have been analysed and modelled to determine a resistivity model that maps the variation in thickness of the sediment fill and the truncation of the basin sediments against the Tow Valley Fault. Further synthetic testing of the model sensitivity to variation of the thickness of the Sherwood Sandstone Group within the sediment fill has also been performed, as the overlying sediments have lower porosities and permeabilities from core sampling.