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Modelling Temperature at Depth Within a Granite Batholith

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We present the results of numerical modelling of the geotherm in the uppermost 5 km of the Galway granite, western Ireland.

The structure and depth extent of the Galway granite is constrained by 3D inversion of magnetotelluric data, showing the electrically resistive granite extending to a maximum depth of 10 km beneath the central block of the batholith. The electrical resistor associated with the western block of the Galway granite extends to a depth of 4 – 5 km.

Geothermal heat flow data are corrected for palaeoclimate effects, and are modelled with thermal conductivity data and heat production data, to produce a Monte Carlo analysis of the geotherm. Previous studies of the geotherm estimated a maximum temperature of 110°C at 5 km depth within the Galway granite. The Monte Carlo analysis of our study indicates a median temperature of 129°C at a depth of 5 km, with 97% of the simulations being greater than 110°C at 5 km depth.

We conclude that previous calculations of temperature at depth have underestimated the geotherm within the Galway granite.