

# The Variscan thermal history of west Clare, Ireland

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## Abstract

Vitrinite reflectance data from Namurian rocks in west Clare suggest that high maturation levels, corresponding to palaeotemperatures of 340–370 °C, were attained prior to Variscan deformation. Fluid inclusions in syntectonic quartz veins homogenize between 330 °C and 50 °C with an accompanying decrease in salinity from 27 to 5 eq. wt % NaCl. Maximum fluid inclusion entrapment temperatures ranged from more than 300 °C to 250 °C during Variscan folding in County Clare. The observed maturation levels (*c.* 7.5%  $R_{max}$ ) far exceed values for simple burial maturation based on the estimated burial history and 'normal' geothermal gradients, and do not increase with depth in the Doonbeg No. 1 exploration well. Fluid advective heating is suggested as the most likely mechanism consistent with the Clare reflectance and thermometric data. Vein and shear zone dimensions preclude rapid vertical movements of hot fluids through the section, and extensive lateral fluid migration from sedimentary basins undergoing tectonically driven dewatering to the south or west is therefore proposed.