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# The thermal history of the Western Irish onshore

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The thermal history of a passive margin yields key information on its tectonic evolution, as phases of tectonic activity (e.g. exhumation or burial) can be inferred from periods of enhanced cooling or heating. We present here the results of a thermochronological study (apatite fission track and U-Th/He dating) on selected targets along the western coast of Ireland (four vertical thermochronology profiles in Counties Kerry, Mayo and Donegal). The combined use of U-Th/He and vertical profiles for the first time in Ireland should allow us to constrain better phases of cooling / heating.

The fission track and U-Th/He ages range from the Late Jurassic to Early Cretaceous and show relatively little inter-sample variation. Inverse modelling of the age and track length data shows that during post-orogenic exhumation the samples cooled to temperatures of around 80°C. A rapid cooling event (down to temperatures as low as 20°C) occurred during the Late Jurassic to Early Cretaceous and is slightly diachronous from North to South. We attribute this cooling event to rift-shoulder related exhumation and erosion, which can be temporally linked to the main stage of rifting in the western Irish offshore (the Porcupine, Slyne and Erris basins).

During the Cretaceous and Early Tertiary slow reheating is inferred to temperatures of about 50-60°C, and is probably linked to a small pulse of sedimentation onshore. Finally a rapid cooling event during the Neogene is observed. This late cooling phase could be linked to a reactivation of the margin under compressive forces (i.e. due to Alpine collision and/or mid oceanic ridge-push). Our inverse modelling does not therefore require an Early Cenozoic cooling / exhumation phase as proposed by many authors. However constrained tests show that introducing an Early Cenozoic phase of cooling does not change significantly the model predictions nor the presence of Mesozoic and Late Cenozoic cooling phases and thus the presence of an Early Cenozoic pulse of cooling is uncertain.

This onshore study is now being complimented by a new thermochronological study on the Porcupine High and on the wells of the western offshore basins. The first results from the Porcupine High show a remarkable similarity in the timing of rift-related exhumation with the onshore part of the margin.