

Constraining Early Cenozoic exhumation of the British Isles with vertical profile modelling

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Despite decades of research is the Early Cenozoic exhumation history of Ireland and Britain still poorly understood and subject to contentious debate (e.g., Davis et al., 2012 and subsequent comments). One reason for this debate is the difficulty of constraining the evolution of onshore parts of the British Isles in both time and space. The paucity of Mesozoic and Cenozoic onshore outcrops makes direct analysis of this time span difficult. Furthermore, Ireland and Britain are situated at a passive margin, where the amount of post-rift exhumation is generally very low. Classical thermochronological tools are therefore near the edge of their resolution and make precise dating of post-rift cooling events challenging.

In this study we used the established apatite fission track and (U-Th-Sm)/He techniques, but took advantage of the vertical profile approach of Gallagher et al. (2005) implemented in the QTQt modelling package (Gallagher, 2012), to better constrain the thermal histories. This method allowed us to define the geographical extent of a Late Cretaceous - Early Tertiary cooling event and to show that it was centered around the Irish Sea.

Thus, we argue that this cooling event is linked to the underplating of hot material below the crust centered on the Irish Sea (Jones et al., 2002; Al-Kindi et al., 2003), and demonstrate that such conclusion would have been harder, if not impossible, to draw by modelling the samples individually without the use of the vertical profile approach.

References

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