



## **Constraining uplift and denudation of the British Isles region by inversion of stacking velocity data**

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An inverse model that determines the magnitude of denudation at the seabed by using root mean square (RMS) stacking velocity data derived from processing seismic reflection profiles has been applied to data from 50 seismic lines located around the British Isles. This model assumes exponential porosity decay with depth and a standard velocity-porosity relationship in order to compute a synthetic RMS velocity profile. The amount of denudation at the seabed is then adjusted until the fit between the model and the data is optimized (Walford & White, 2005). The majority of the seismic lines modelled in this study are BIRPS profiles, which have been both acquired and processed to high academic standards (Klemperer & Hobbs, 1991).

No seabed denudation was found in the SW approaches to the British Isles nor in the distal North Sea. Approaching the British Isles denudation varies from a few hundred meters in coastal North Sea areas and in the English Channel, to over 2 km of denudation off NW Scotland, Western Scotland, NW Irish Sea and off Western Cornwall. The results of inverting the RMS velocity data show an excellent correlation with the solid geology outcrop pattern, with the denudation estimates increasing in areas where older rocks are exposed. Independent evidence suggests that uplift and denudation of the British Isles region occurred during the Cenozoic era. It is probable that more than one uplift and denudation event affected the region during this time: at least one episode in the Early Paleogene period and probably a second during the Neogene period, however the timing of the uplift events cannot be constrained using this technique.

The denudation estimates obtained in this study agree, within error, with estimates obtained using methods such as vitrinite reflectance, subsidence analysis, apatite fission

track and sonic velocity modelling. However, the inversion of stacking velocity from seismic lines provides superior spatial coverage in comparison to the other methods which are restricted to borehole locations.

## **References**

KLEMPERER S. & HOBBS R. (1991) *The BIRPS Atlas: Deep Seismic Reflection Profiles around the British Isles*.

WALFORD H.L. & WHITE N.J. (2005) Constraining uplift and denudation of West African continental margin by inversion of stacking velocity data. *Journal of Geophysical Research*, In Press.