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geoConvention 2013

Late Cretaceous and Cenozoic dynamic uplift and plate kinematics in the NE Atlantic realm.

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At present a pronounced residual depth anomaly (RDA), centred on Iceland, is characterizing the bathymetry of the NE Atlantic region (Figure 1). For the oceanic lithosphere this anomaly represents a <500 to >2500 m elevation difference compared to 'normal' oceanic lithosphere, but despite the shallow elevation the oceanic crustal thickness is not significantly different from normal oceanic crust, except along the Faroes-Iceland-Greenland Ridge. The observed depth anomaly has since Cochran and Talwani (1978) been ascribed to a 200 -300 km thick moderate thermal anomaly beneath the oceanic lithosphere, the existence of which today has been proven by a sizable low velocity zone on seismic tomography data (e.g. Weidle and Maupin, 2008). The sub-lithosphere low velocities are, however, not limited to the oceanic domain, but also underlie the adjacent continental lithosphere, thus causing a similar magnitude anomalous elevation of the continental shelves and landmasses. The thermal anomaly is presumed to relate to the arrival of the Iceland mantle plume demonstrated by excess Paleocene and Early Eocene magmatism in the region. The present width of the RDA compares with the regions that experienced excess magmatism during breakup, which implies that the sub-lithospheric thermally anomalous body was emplaced in Paleocene time, but still resides in the area.
This presentation aims to describe the temporal and spatial development of uplift based on combining plate kinematic modeling with models of lithospheric and plume body thickness development through Late Cretaceous-Paleocene extension, and subsequent seafloor spreading. The model prediction of uplift compares well with descriptions of erosional episodes and depositional sequences off West and East Greenland, in the Northern North Sea, off mid-Norway and in the SW Barents Sea, and represents a mechanism that explains the present elevation of East Greenland as well as western Norway.

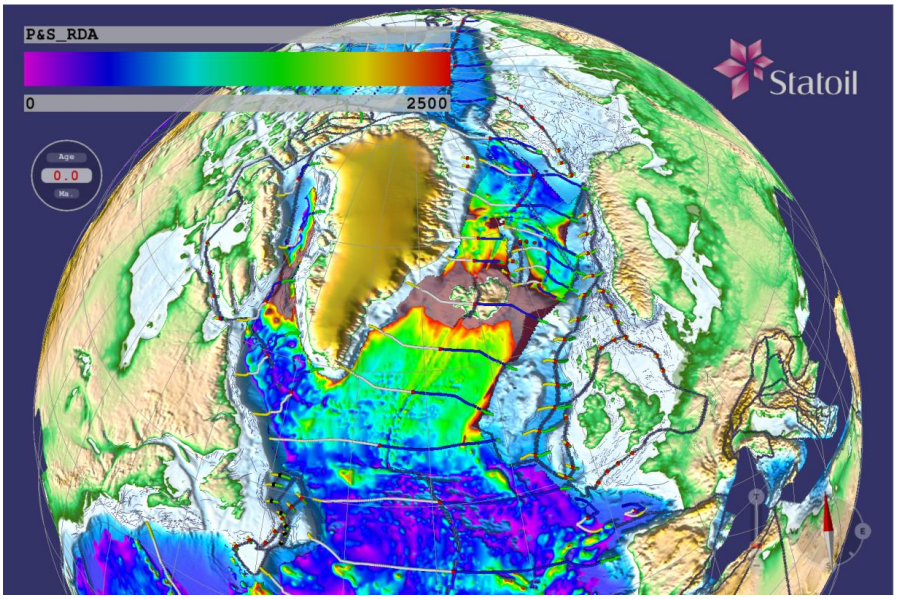

Figure 1. Calculated residual depth anomaly (RDA) for the North Atlantic region based on Parson and Sclater (1977)