A Continuous Record of North Atlantic Rifting under the Influence of the Iceland Mantle Plume
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Evolution of the North Atlantic Ocean has been dominated the Iceland mantle plume. Here, an unbroken record of variable mantle plume activity stretching back 55 Ma is presented, through analysis of regional seismic reflection images. Residual depth anomalies of oceanic lithosphere, long wavelength gravity anomalies and seismic tomographic models show that this convective upwelling reaches from Baffin Bay to Western Norway, and from offshore Newfoundland to Spitzbergen. At fringing passive margins, there is strong evidence for present-day dynamic support of the crust (e.g. Scotland, Western Norway). The Iceland plume is bisected by a mid-oceanic ridge, which provides a record of the temporal evolution of the plume. Transient behavior of the plume is indirectly recorded within the fabric of oceanic floor south of Iceland. Regional seismic reflection profiles that traverse the oceanic basin between northwest Europe and Greenland have recently been acquired. A diachronous pattern of V-shaped ridges is imaged beneath a thickening blanket of sediment, revealing a complete record of transient periodicity that can be traced continuously. This periodicity increases from ~3 to ~8 Myr with clear evidence for minor, but systematic, asymmetric crustal accretion. V-shaped ridges grow with time and reflect small (e.g. 5–30°C) changes in mantle temperature, consistent with quasi-periodic generation of hot solitary waves triggered by growth of thermal boundary layer instabilities within the mantle. This continuous record of convective activity suggests that the otherwise uniform thermal subsidence of sedimentary basins, which fringe the North Atlantic Ocean, has been periodically interrupted by transient uplift events. These elevation changes can explain a suite of diverse observations from the geologic record. Regional Paleogene erosion surfaces in the Faroe-Shetland Basin, the punctuated deposition of contourite drifts, and the history of denudation on the UK continental shelf can all be explained by transient mantle plume behaviour. These manifestations of convective activity should lead to improved insights into the fluid dynamics of the mantle, with implications for the subsidence history of sedimentary elsewhere.

Biography
I completed my undergraduate degree in Earth Sciences at Oxford University in 2006, which included a Masters project on uplift of the Western USA with Tony Watts. I then worked for BP for 4 years, completing their graduate scheme (Challenge) with various exploration and production roles in Algeria, Trinidad & Tobago, West of Shetland and the Southern North Sea. My interest in research led me back to academia, and I completed a PhD in geophysics at Cambridge University in 2013, using seismic data to investigate dynamic uplift and mid-
ocean ridge processes with Nicky White and John Maclennan. I am now a postdoctoral research associate in the Basin Analysis group in Cambridge.