Geophysical Research Abstracts
Vol. 18, EGU2016-12468, 2016
EGU General Assembly 2016

Assessing the volcanic styles of the North Atlantic Igneous Province and their potential implications for the PETM

Dougal Jerram (1), Peter Reynolds (), Morgan Jones (), Henrik Svensen (), Sverre Planke (), John Millett (), Olivier Galland (), Syahreza Angkasa (), Nick Schofield (), and John Howell ()

(1) CEED, University of Oslo, Norway (dougal@dougalearth.com), (2) DougalEARTH LTD. Solihull, UK

In order to understand the role that large igneous provinces play in changing climatic conditions, it is important to constrain the different styles of volcanism and their volumes, both temporally and spatially. Regional variations in palaeo-environment as well as different volcanic materials (basic-acidic) can all have effects on the eruption styles, and determine whether eruptions effectively release gases into the atmosphere and hydrosphere. The North Atlantic Igneous Province (NAIP) covers a vast area as well as a significant time span, having formed at 60-55 Ma. Importantly, its' formation is implicated in the climatic perturbations at the Palaeocene-Eocene Thermal Maximum (PETM). The products of volcanism in the NAIP range from lava flows and hyaloclastites to more explosive tephra forming eruptions from both basaltic and more evolved eruptions. The explosive end member styles of both mafic and felsic volcanism also produce ash beds in the rock record at key times. Hydrothermal vent structures which are predominantly related with the emplacement of large (>1000 km3) intrusions into the subvolcanic basins in the NAIP are another style of eruption, where climate-forcing gases can be transferred into the atmosphere and hydrosphere. In this case, the types and volumes of gas produced by intrusions is heavily dependent on the host-rock sediment properties that they intrude through. The distribution of vent structures can be shown to be widespread on both the Norwegian and the Greenland margins of the NAIP. In this overview we assess the main eruption styles, deposits and their distribution within the NAIP using mapped examples from offshore seismic data as well as outcrop analogues, highlighting the variability of these structures and their deposits. As the availability of 3D data from offshore and onshore increases, the full nature of the volcanic stratigraphy from the subvolcanic intrusive complexes, through the main eruption cycles into the piercing vent structures, can be realised along the entirety of the NAIP margins. This will help greatly in our understanding of the evolving palaeo-environments during the evolution of the NAIP. Furthermore, the roles of volcanic eruptions, magmatic intrusions, associated vent complexes and how these may have influenced the development of the PETM crisis can be better constrained.