Geophysical Research Abstracts
Vol. 21, EGU2019-11296, 2019
EGU General Assembly 2019

Emplacement processes of large-volume basaltic sequences during the formation of volcanic rifted margins

Sverre Planke (1,2,3)

(1) Centre for Earth Evolution and Dynamics (CEED), University of Oslo, Norway (planke@vbpr.no), (2) Volcanic Basin Petroleum Research (VBPR), Oslo, Norway, (3) Research Centre for Arctic Exploration (ARCEx), The Arctic University of Norway, Tromsø, Norway

Massive breakup-related basaltic sequences were deposited along the UK and mid-Norway continental margins in the Paleogene. The aim of this presentation is to document the nature and emplacement processes of such volcanic complex based on interpretation of new high-quality 3D seismic data. Five extensive 3D seismic surveys, partly covering the outer parts of the Faroe-Shetland, Møre, and Vøring basins, have been acquired during the past few years. We have interpreted the top and base basalt reflections and the intra-basalt reflection configurations of these cubes using the method of seismic volcanostratigraphy. The volcanic paleo-landscapes have further been studied using the concept of igneous seismic geomorphology. The seismic geomorphological interpretation has been constrained by studies of modern analogues, e.g. from recent eruptions in Hawaii and Iceland. The seismic mapping documents large lateral variations in the basalt thickness, from more than 2 km to a few hundred meters. Locally, the basalt is very thin or absent, e.g. on the Kolga, Mimir, Ygg, Skoll, and Grimm highs. Thin basalts are also mapped in the Erlend and Brendan's igneous complexes, where the basalt thickness is locally constrained by industry boreholes. The igneous seismic geomorphological interpretation reveals extensive subaerial lava flow fields, shallow marine flows, and volcanogenic debris flows and lava deltas along the paleo-coastline. The basalt sequences are partly block faulted, however some late-stage lava flows locally cover the faults documenting the syn-magmatic timing of the extension. The top basalt surface is also incised by fluvial channels with a west-to-east direction. These new interpretations form the basis of a recently submitted scientific IODP drilling proposal with objectives to constrain the magma production and emplacement processes, and the impact of the massive breakup magmatism on the Paleogene climate.