Geophysical Research Abstracts
Vol. 12, EGU2010-6474, 2010
EGU General Assembly 2010

Rift-drift evolution of the outer Norwegian margin

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Most of the tectonic and dynamic concepts on the evolution of rifted margins have been developed from either intra-continental rift basins or proximal margin usually characterised by small amounts of crustal thinning. Some of these continental margins also display a high level of volcanic activity along the continent-ocean transition (COT). In such a context, the tectonic evolution of the proto-breakup rift system of the outer Norwegian margin is still problematic, due to sub-basalt imaging and a poor knowledge of the mechanisms involved before, during and slightly after the onset of breakup.
Regional analysis and interpretation of multichannel seismic data, potential field data, integrated with refined plate reconstruction and finite-element modelling have provided the opportunity to propose an updated tectonic model for the evolution and segmentation of the Norwegian margin and the early Norwegian-Greenland Sea oceanic domain. Timing of deformation and structural styles observed along the conjugates reflect lateral variations of the rifted system which is influenced by complex inherited features, late magma-tectonic processes and local plate instabilities. We show that the deep structures associated with the volcanic rifted margin are still controversial and not necessarily so magmatic. We have also attempted to investigate the role of localised magmatic intrusion in rift and breakup dynamics and compared the results with our geophysical data, offshore Norway. The thickness, composition and temperature of the underplated and/or intruded bodies seem to be important factors that control lithospheric stretching, basin temperature, rift structure, margin asymmetry and COT formation. We also document the early spreading history of the mid-Norwegian by means of two news recent aeromagnetic surveys which highlight a complex spreading evolution correlated with the onset of microcontinent formation (Jan Mayen microcontinent) and an atypical (mid-Eocene?) magmatic event documented to the west of the Vøring Marginal High.