

North Atlantic Regional Geohistory and Crustal Modeling for the Vøring and Møre Margin: Constraints on Palaeoenvironmental Reconstruction and the Predictive Mapping of Source and Reservoir Rocks

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ABSTRACT

The Northern Norwegian Sea, Atlantic Margin includes a mature exploration province in the Trøndelag Platform and Halten Terrace but outboard of that, in the Vøring Basin there are significant difficulties for exploration; in particular the pre-Late Cretaceous geology is largely unknown. To address this problem a diverse exploration database was compiled and a multi-disciplinary approach was adopted. Seismic interpretation and a biostratigraphic synthesis were used to derive input parameters for a regional crustal model (OCTek gravity inversion). PlateWizard deformable reconstructions together with palaeo-Earth systems model results (UK Met Office HadCM3 climate model) were used with a regional sedimentological synthesis to map palaeoenvironments for key time slices and surface geochemical surveys were used with a regional model of source maturation to define source kitchens. The crustal model and associated deformable plate model were used to reconstruct the Late Palaeozoic - Cenozoic break-up history of the North Atlantic margin basins. The complex subsidence history of the Vøring and Møre Margin created an evolving series of erosional uplift zones and depocentres and was accompanied by variations in palaeoclimate. Together these represent the main controls on stratigraphy and resource potential. Reservoir and source facies distribution were mapped using palaeobathymetry derived from the crustal model with the palaeo-Earth systems model results providing additional constraints. This approach provides an understanding of regional palaeogeographic and palaeoclimatic geohistory that includes drainage basin evolution and clastic sediment flux.