Structure and Depositional Systems in the Northern Barents Sea

Leanne Cowie[1] and Jan Inge Faleide[1]

[1]Centre for Earth Evolution and Dynamics (CEED), University of Oslo, Oslo, Norway.

ABSTRACT

Knowledge of the structural and depositional evolution of the northern Barents Sea is of critical importance for understanding the formation and provenance of the depositional systems within the northern Barents Sea and adjacent parts of the proto-Arctic. The Barents Sea has abundant observational data and has been the subject of numerous seismic, potential field and geological studies in recent years. Integrated geophysical analysis of seismic, gravity and magnetic data has been used, in order to map the sedimentary basins and the underlying basement in the northern Barents Sea, which in turn are used to further expand on our knowledge and understanding of the tectonic and depositional evolution of the northern Barents Sea. The temporal and spatial evolution of the northern Barents Sea, in particular the wavelength and amplitude of the tectonic subsidence affecting this region is uncertain. We have used geophysical analysis to determine the processes driving subsidence in this region. Our geophysical analysis focusses on several key regional seismic profiles across the Barents Sea and consists of: (i) gravity anomaly inversion, incorporating a lithosphere thermal gravity anomaly correction, has been used to determine Moho depth, crustal basement thickness and continental lithosphere thinning. Sediment thickness and horizon depths have been derived from the Barents Sea seismic profiles; (ii) subsidence analysis has been used to determine the distribution of continental lithosphere thinning. In addition, within this study, both 2D and 3D flexural isostatic backstripping has been applied to determine the palaeo-bathymetric evolution of the region. Flexural backstripping involves the sequential removal of sedimentary sequences incorporating the isostatic and sediment decompaction responses to this unloading. Sensitivities to end Permian, Carboniferous and Devonian rift ages have been explored.