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Understanding the Gyda Sandstone: A Matter of Ichnology, Fault-Timing and Diagenesis

The Gyda Field is located in the North Sea Central Trough, offshore Norway. The field started oil production in 1990, and is currently in decline. In an attempt to identify and exploit the remaining reserves, a new detailed reservoir study has been undertaken. The reservoir is of Upper Jurassic age, and represents deposition within a shallow marine synrift setting, with fault movements controlling reservoir thickness and depositional facies architecture. The reservoir lies around 4000m below sea level introducing uncertainty in seismic imaging and also diagenesis.

The study of reservoir heterogeneity included; i) Detailed seismic interpretation of key horizons and faults, ii) Integration of biostratigraphy and sedimentology/ichnology to delimit reservoir zones and 3-D property distributions, iii) Fault classification according to geometry, sealing potential/compartmentalization and control on accommodation space and depositional setting. iv) Utilisation of all available production history to aid well to well correlation and predicting reservoir communication. All the above elements were brought together to construct 3-D reservoir models.

The reservoir sandstones are locally derived from the Triassic. They are very fine to fine grained, moderately well sorted, variably argillaceous sub-arkoses. Compaction and quartz cementation are the main factors that have controlled porosity and permeability. Pervasive carbonate cements (hardgrounds) dominate some intervals. The sediments are heavily bioturbated, and have been classified according to ichnofacies assemblages.