GRASP : GLACIOGENIC RESERVOIR ANALOGUE STUDY PROJECTS

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The glaciogenic reservoir analogue studies project (GRASP) is a collaborative joint industry project focusing on the record of Pleistocene glaciations in NW Europe and principally in the North Sea and the surrounding onshore areas.

The study focuses both on tunnel valleys and associated proglacial depositional systems which are studied using diverse data types: high-resolution bathymetry, offshore 3D seismic and high-resolution 2D seismic data, outcrop studies, and groundwater borehole static and dynamic data.

Tunnel valleys represent outstanding features of the meltwater systems associated with past glaciations and recent 3D seismic studies in North Western and Central Europe have documented that many valleys contain clinoform 'backfills' suggestive of syn-genetic valley erosion and infill, thus shedding some possible new light on a century old problem regarding the genesis and link between the valleys and their infill.

The evolution of proglacial landscape during the Elsterian glaciation of NW Europe is also compared to Permo-Carboniferous and Late Ordovician glaciations where sedimentation was characterised by the complex interplay of ice re-advance and sea/lake level rise.

Both tunnel valleys and proglacial sedimentary sequences are particularly well documented in the North Sea Pleistocene and can be used as geological and reservoir analogue of similar features observed in the Late Ordovician and Permo-Carboniferous sedimentary record in North Africa and the Middle East. where glaciogenic and related deposits constitute important hydrocarbon reservoirs, often characterised by a complex sedimentary architecture.

The efficient exploitation of natural resources in tunnel valley and related glaciogenic reservoirs is currently hampered by a lack of process understanding (e.g. genesis and distribution of facies association, potential occurrence of self-contained reservoir-source-seal systems) and predictive capabilities. Until now the glaciogenic deposits from each glaciation have been studied in isolation and little connections has been made between Pleistocene shallow subsurface (i.e. groundwater reservoirs) and hydrocarbon reservoir studies, leaving an enormous potential for cross-disciplinary learning.

The aim of GRASP is to build a comprehensive knowledge of the Pleistocene North Sea glacial system by integrating the different type of data, and compare it to the ancient glacial rock record, both in terms of regional distribution of large scale sub-depositional environments, genetic control of ice-sheet evolution (e.g. bedrock morphology and type, meltwater discharges, structural framework) and sedimentary body geometries and reservoir internal architecture.

References

Moscariello A.¹, Huuse M.², and Gibbard P.³ 2007 - Genetic Models and Analogues to Unravel the Potential of Glaciogenic Hydrocarbon Reservoirs of North Africa and Middle East. AAPG Search and Discovery Article #90072 © 2007 AAPG and AAPG European Region Conference, Athens, Greece