Investigating the Impact of the Hornsund High on Triassic Sedimentation on the Western Barents Shelf

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ABSTRACT

The Triassic on the Barents Shelf is currently of considerable importance for hydrocarbon exploration as several hydrocarbon source and reservoir rocks are located within this interval. Despite favourable conditions for hydrocarbon accumulation, the architecture of the depositional systems and quite varied provenance has caused difficulty predicting reservoir distribution and, where found, their properties. Irregular palaeotopography on the Barents Shelf is also thought to have affected sedimentation. Late Palaeozoic rifting resulted in the uplift of prominent structural highs, such as the Loppa and Stappen highs, which may have acted both as sediment sources and barriers to sediment dispersal. These highs were covered by Mesozoic sediment and are now largely below sea level. However, the analogous Hornsund High and Mesozoic units in south Svalbard are currently well exposed and provide potential insight to correlative successions in the vicinity of the submerged highs. Sedimentological investigations through the Triassic succession associated with the Hornsund High were recently undertaken by CASP. The transgressive regressive cycles characteristic of the wider Barents Shelf are well preserved but significant differences in sediment thickness, facies, and apparent provenance are seen across the high. Away from the high, Lower Triassic shales rest conformably on Permian carbonates; however, on top of the high a thin Lower Triassic conglomerate rests unconformably on tectonised Palaeozoic units of the high. In addition, Uralian-sourced deltaic sediments that form thick reservoir units elsewhere are absent west of the high. Instead, significant thicknesses of mature sandstone are seen in the mid-Triassic interval, likely sourced from Greenland. The results imply that the Hornsund high had a notable impact on sedimentation. The high was exposed in the earliest Triassic resulting in the deposition of local conglomerate units. Following transgression, the highs' influence persisted into the Middle and Late Triassic, possibly creating a barrier to Uralian sediment dispersal from the east towards the west. If the Loppa and Stappen highs affected sediment dispersal in a similar way, then the results could suggest poor reservoir development in the Late Triassic Snadd Formation in areas west of the highs. However, they highlight the possibility of locally-sourced base Triassic, and westerly-sourced mid Triassic reservoirs, generally absent in areas east of the highs.