Source-to-Sink Study of the Southwestern Barents Sea Margin: Using Ancient Catchments to Constrain Reservoir-Quality Sandstone

Christian Eide[1], Tore Klausen[1], Denis Katkov[2], Anna A. Suslova[2], William Helland-Hansen[1]

[1]Department of Earth Science, University of Bergen, Bergen, Norway.
[2]Petroleum Department, Moscow State University, Moscow, Russian Federation.

ABSTRACT

Present-day catchments adjacent to sedimentary basins may preserve geomorphic elements that have been active through long intervals of time. Relicts of ancient catchments may be investigated using mass-balance models and can potentially give important information both about landscape evolution and reservoir distribution in adjacent basins. However, such methods are in their infancy and often difficult to apply in deep-time settings due to later landscape modification. The Southern Barents Sea Margin of N Norway and NW Russia has been subject to little tectonic activity since the Carboniferous, and large areas have eluded significant Quaternary glacial erosion. This area is therefore ideal for investigating source-to-sink models. The Barents Sea Basin has received sediments since the Caledonian orogeny, and a zone close-to the present-day coast has likely acted as the boundary between basin and catchment for an extended period of time. During the Early Triassic, a large delta-system prograded from the mouth of the Tana River, the largest present-day river in the area, into the SW Barents Sea Basin. This delta-system has much better reservoir properties compared to the rest of Triassic basin infill. The catchment of the Tana River has long been interpreted to show features indicating that it was developed prior to present-day topography. Here, we investigate sediment load of the ancient delta using well, core, 2D-, and 3D-seismic data, and digital elevation models to investigate the geomorphology of the onshore catchment and surrounding areas. Our results imply that the present-day Tana catchment was formed close to the Permian-Triassic transition. This implies that landscapes may indeed preserve catchment geometries for extended periods of time, and demonstrate that source-to-sink techniques can be instrumental in predicting extent and quality of subsurface reservoirs.