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### **The Shublik's Petroleum Systems of the Alaskan North Slope—a Numerical Journey from Source to Trap**

The complex petroleum province of the Alaskan North Slope comprises seven identified petroleum systems. Two of these systems in which the organic-rich Shublik Formation is the active source rock are investigated in greater detail to serve as the basis for numerical petroleum migration models. The Shublik covers most of the North Slope and can be correlated with pools that occur only in the central and eastern North Slope. This distribution indicates that the Shublik in the western part of the North Slope is either less prolific than in the eastern North Slope or that migration conduits from source to trap are lacking.

Diachronous deposition (progradation) of the overlying Brookian section from west (120 Ma) to east (33 Ma) allows for the designation of western and eastern depocenters, which accounts for the source rock becoming mature at two different times and is the basis for two petroleum systems. The diachronous deposition, combined with the changing geometry of these systems, results in a complicated petroleum migration history as depicted by the charging of multiple reservoir rocks.

Two- and 3-dimensional thermal history models were constructed to determine which migration history best explains the present-day petroleum accumulations on the North Slope. The simulations involve scenarios in which the Shublik Formation is sandwiched between two reservoir rocks, the Sag River Sandstone above and the Sadlerochit Group below. Sensitivity exercises provide insight into the timing and possible pathways of petroleum as well as the volume and richness of source rock that is needed to explain the geographic distribution and sizes of the discovered accumulations.