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Tectonic Setting and Petroleum System Significance of Upper Triassic-Jurassic Strata, Qaidam Basin, Northwest China

Lower-Middle Jurassic strata are recognized as important source rocks in the northern Qaidam basin, where they are responsible for the bulk of commercial petroleum accumulations in the Lenghu district. Throughout most of the basin, the Mesozoic is concealed by a thick (>5-10 km) section of Tertiary strata. Furthermore, industry boreholes routinely penetrate only the shallowest parts of this sequence, and produced hydrocarbons away from the Lenghu district are linked to Tertiary source rocks by biomarker analysis. Thus, the distribution and nature of Jurassic strata away from the NE margin of the basin is relatively unconstrained, but these strata potentially represent an important, yet untested, petroleum system concept.

New subsurface and outcrop data from the NE Qaidam basin, allow the tectonic setting of nonmarine Upper Triassic-Middle Jurassic strata to be defined. Sedimentation initiated in the Late Triassic in a series of discontinuous half graben concurrent with extensional faulting. Before Early Jurassic sedimentation commenced, extensional faulting ceased and Lower-Middle Jurassic strata were deposited in larger, integrated foreland-style basins associated with contractile deformation along the Kunlun and Qilian margins of the basin. Structural relations, angular unconformities, and facies distributions suggest that this phase of contraction was not restricted to the basin margins, but resulted in a 'broken foreland' setting. We interpret this succession of basin styles to reflect the progression from plate-margin backarc extension during northward subduction of oceanic lithosphere beneath the Kunlun Shan in the Triassic, to collisional orogenesis and continued intracontinental shortening during the Jurassic.