

Crustal and Petroleum Framework of the US Chukchi Shelf as Interpreted from 9-km, Long-Offset ArcticSPAN™ 2-D Seismic Data

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Abstract/Excerpt

The US Chukchi Shelf is a highly prospective petroleum province with estimated mean technically recoverable resources of more than 29 billion barrels of oil equivalent (MMS, 2006). Because of the remoteness of the area in northwest Alaskan offshore and the cost of operations, the area has seen only one round of leasing and drilling which was almost 20 years ago. With high oil prices and new technology, industry has shown a renewed interest in the area.

In response to this interest, ION Geophysical (GX Technology) acquired 3,132 km of 2-D long-offset seismic data in the area in late 2006. The program was designed to image down to the base of the crust with a 9 km long cable, 18 second recording, and final depth processing (Prestack Depth Migration) to 40 km. The interpretation of this data has allowed us to regionally map the MOHO discontinuity and the top of the crystalline basement as well as to identify the major stratigraphic sequences which extend from the highly petroliferous North Slope of Alaska. We have also attempted to interpret the pre-Mississippian (prior to the opening of the Canada Basin) rifting and compressional history of the area based on this data.

Highlights of interpretation of this data set include: 1) Chukchi Shelf is underlain by “normal” continental crust (30-40 km thick) with some suggestion of an extended or attenuated crust in the northern and north-western part of the area; 2) The North Chukchi Basin contains up to 12 km (40,000 ft) of apparent Cretaceous- and Tertiary-age sediments and should be considered quite prospective; 3) Part of the shelf is underlain by mildly deformed pre-Mississippian sediments and thus may be prospective for hydrocarbons; 4) The interpretation of the data supports the anticlockwise rotational hypothesis of the Alaska-Chukotka plate from the Canadian Arctic islands.