

Cretaceous (Brookian) Deep-Water Deposits of the Alaskan North Slope: Evidence from 3D Seismic Data

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ABSTRACT

The Brookian section (Middle Cretaceous) of the north slope of Alaska is characterized by high-relief clinoforms prograding towards the northeast into a deep foreland basin. The paleo-water depth ranges from sea level at the topset beds to approximately 800 m at the basin floor. The shelf-edge staging area, where the deep-water sediments originated, appears to be mud dominated. The slope is characterized by numerous gullies and isolated slope channels. Several sand-prone leveed channels and associated frontal splays imbedded within an overall mud-prone section have been identified on the slope and across the basin floor using 3D seismic data using a variety of imaging techniques including amplitude extractions, opacity rendering, illumination, and horizon slicing. Successive channels and splays appear to be arranged in a compensating pattern. In the study area, channels track down the slope and trend subparallel to the toe of slope. These slope-parallel fairways appear to generally correspond to paleobathymetric lows. Other depositional features observed in the deep-water environment include slumps and sediment waves. The sediment waves are characterized by a series of slope-parallel, sinuous-crested, low-amplitude ridges that are distributed from the lower slope across the basin floor. These also appear to be mud-prone features.