

Meso-Cenozoic Evolution of the Chukchi Borderland | Constraints on the Tectonic Development of the Amerasia Basin, Arctic Ocean

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ABSTRACT

Any model for the tectonic development of the Amerasia Basin requires structures to accommodate the continental Chukchi Borderland in a plate-tectonic framework. We have interpreted 2D multi-channel seismic reflection data and tied these data to the late 80's Crackerjack and Popcorn exploration wells in order to: (1) develop a tectono-stratigraphic framework for the Chukchi Shelf and Borderland, and (2) indirectly test existing models for the development of the Amerasia Basin. Based on sequence stratigraphic principles, we have mapped four regional unconformities and used these to subdivide the basement and basin fill into tectono-stratigraphic sequences. These sequences are: (1) pre-Brookian deformed strata (Mesozoic-Paleozoic); (2) pre-Brookian Syn-rift#1 and Dipping Reflectors; (3) Post-rift#1, inferred condensed section and Lower Brookian orogenic sediments (Barremian-pre-Cenozoic); (4) Syn-rift#2 (inferred upper Cretaceous-Paleocene); (5) Post-rift#2, Upper Brookian progradational wedge (Cenozoic); and (6) Glacio-marine (Quaternary). The angular relationship between the inferred lower Cretaceous unconformity and the underlying Syn-rift#1 sequence along the north striking normal faults of the Chukchi Plateau is inconsistent with clockwise rotation of the Chukchi Borderland away from the East Siberia. This falsifies one popular model for the Chukchi Borderland and its role in the development of the Amerasia Basin. The Dipping Reflectors underlying the lower Cretaceous unconformity are associated with volcanism that may be concurrent with east-west rifting of the Borderland. The recognition of condensed section and continuity of the overlying lower Cretaceous orogenic sediments across the southern Chukchi Borderland substantially constrains other models that require significant discontinuity between the Chukchi Shelf and Borderland since the Early Cretaceous proposed for tectonic development of the Amerasia Basin, Arctic Ocean.