

## **New Insights Into the Structure and Tectonic Provenance of the Chukchi Borderland Terrane: Implications for Arctic Reconstructions**

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### **ABSTRACT**

The provenance and tectonic histories of many Arctic terranes remain suspect because sparse data and overprinting by an unknown number of subduction and accretion events make kinematic reconstructions highly uncertain. The Chukchi Borderland is a conspicuous topo-bathymetric feature adjacent to the Chukchi Sea and East Siberian Sea shelves—and one of the least understood features in the Amerasia basin. Its isostatic elevation suggests continental and/or arc affinity, but resolving its provenance and emplacement history have been problematic due to the paucity of physical data. It is often interpreted as a fragment of continental crust rifted from the south–central Canadian Laurentian margin. But recent results from published dredge-sample studies, and ION’s newly reprocessed Chukchi Borderland 2D seismic survey suggest the Chukchi Borderland is a peri-Laurentian volcanic arc terrane, and may be exotic relative to the Arctic Alaska–Chukotka superterrane. As interpreted here, the top of acoustic basement is defined by high-amplitude events that display seismic structures and geometries consistent with subaerial basalt flows and isolated seaward-dipping reflections. These are underlain by a zone of semi-transparent reflections ~50–5000 m thick we interpret as synrift volcanoclastic deposits and possible pre-rift basement. High-amplitude horizontal and sub-vertical events within acoustic basement suggest volcanic intrusion by dikes and sills. Published geochemical and geochronological analyses of dredged rock samples indicate the Chukchi Borderland has Grenvillian basement affected by subduction, deformation, and magmatism related to events recorded in both Svalbard and the Pearya terrane. We interpret a domain of structures on the northern edge of the survey to be salt-cored bodies and diapirs with rim-synclines—suggesting this area originated in the vicinity of salt provinces on Axel Heiberg and Ellesmere islands, Svalbard, or the Barents Sea shelf. Isolated, but well-defined seaward-dipping reflections imaged in the northwest corner of the survey suggest the Chukchi Borderland may also be genetically related to the North Chukchi basin. The volcanoclastic assemblage and possible salt domain interpreted here support published dredge-sample data, and indicate the Chukchi Borderland has a complex history of episodic arc construction, extension, and rotation related to currently unknown arc or backarc systems outboard of the Canadian Laurentian margin.