

CIRCUM-ARCTIC LITHOSPHERE EVOLUTION (*CALE*)

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The geological evolution of the Arctic region is one of the last unknowns in global plate tectonics. The Arctic Ocean basins are relatively inaccessible to direct sampling and known mostly from 'remote' geophysical methods. For example, the Amerasia Basin at c. 3800 meters below sea level is virtually unexplored. Its age and spreading history have been inferred from structural and stratigraphic relationships observed on the basin margins. These inferences have not been confirmed by observations within the basin itself. On-shore, the Arctic region comprises remote wilderness areas far from supporting infrastructure and consequently is mapped mostly at a reconnaissance scale; the lack of age control on units, structural fabrics, timing of fold and thrust belts, etc., makes it difficult to correlate geology from one region to another, to extrapolate geology from on-shore to off-shore, or to constrain the development of Arctic ocean basins using circum-Arctic geologic data.

In the past decade a number of campaigns in the Arctic region have focused on marine, aerogeophysical and geological investigations, however, very few of these initiatives actually integrate on-shore and off-shore geology. Furthermore, in recent years new methods and surveys have become available which allow us to test existing, and confidently formulate new, hypotheses regarding various submarine features of the Arctic, such as:

- *Where are the plate boundaries associated with the Amerasia Basin?*
- *How and when did the Canada Basin open?*
- *What was the pre-drift setting of the Chukchi Borderland?*
- *Which tectonic processes formed the Laptev, East Siberian, and Chukchi sea shelves?*
- *How and when did the major ridges in the Amerasia Basin form?*
- *Where are the Early Tertiary plate boundaries in the Arctic?*
- *What is the relationship between segmentation of the Gakkel Ridge and ultra-slow spreading processes?*
- *Has the axial geometry of the Gakkel Ridge changed since rifting? If not, why?*
- *What structures connect seafloor spreading on the Gakkel Ridge to continental extension on the Laptev Shelf?*
- *Where are the continuations of pre-Eocene orogens in the Arctic?*
- *How do these crustal-scale discontinuities influence Arctic tectonic evolution?*
- *What is the nature, age, internal structure and stratigraphy of the main sedimentary basins?*
- *How has this tectonic evolution affected the sedimentation history of the Arctic basins?*

Circum-Arctic Lithosphere Evolution (*CALE*) is a multinational and multi-disciplinary research program investigating these questions in order to understand circum-Arctic lithosphere evolution in general, and to unravel the tectonic development of the Amerasia Basin in particular.