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# New Aerogeophysical Results from the Arctic Ocean, north of Greenland: Implications for Late Cretaceous rifting

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The tectonic history of the Arctic Ocean remains poorly resolved and highly controversial. While there is general agreement on the basic evolution of the Eurasian Basin, details regarding breakup of Lomonosov Ridge (LR) from the Barents Sea Margin and the establishment of seafloor spreading are unresolved. More importantly, the history and evolution of the Amerasia and Canada Basins is essentially unknown. Competing models do not agree on fundamental parameters such as crustal type, age of crust, and spreading directions of probable oceanic crust. The Arctic Ocean North of Greenland is at critical juncture that formed at the locus of a Mesozoic three-plate setting between LR, Greenland, and North America. In addition, the area is close to the European plate, resulting in complicated interactions between all these areas that are difficult to resolve. In 2009, the 550.000 km2 LOMGRAV aero-geophysical survey produced the first collocated gravity and magnetic measurements over the area significantly increasing the data coverage. We present a joint interpretation of new gravity and magnetic compilations that show a distinct and regionally consistent structural grain across the LR, Ellesmere - Lincoln Sea margins and Alpha Ridge. Based on correlation with Upper Cretaceous NNW-trending dykes in North Greenland and parallel Labrador Sea - Baffin Bay spreading centers, we interpret the structural grain as evidence of Late Cretaceous – early Paleocene regional extension in response to opening of the North Atlantic/Labrador Sea. Evidence is also shown of continuous Upper Cretaceous lineaments from the LR to the Ellesmere Shelf indicating that they moved as one plate during the Late Cretaceous. In contrast, a distinct fault zone, reactivated during the Eurekan Orogeny, separates this plate from the Lincoln Sea margin and Greenland. We suggest that these plates were brought to their present position during the Eurekan Orogeny, which can explain the raised plateau of the LR against the Lincoln Sea/Greenland plate. Our results provide important geometrical constraints for Late Cretaceous plate reconstructions of the Arctic and have important implications for understanding the earlier Cretaceous and possibly Jurassic episodes of seafloor spreading around the Arctic.