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# Inferences on the tectonic history of the western Arctic from the Amerasian margin of the Lomonosov Ridge

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The Lomonosov Ridge is a submarine continental fragment that extends from the North American craton to the Siberian Shelf. The ridge divides the Arctic Ocean into two basins: the Amerasian and Eurasian basins. Unlike with the latter, the method of opening for the Amerasia basin is not well-constrained by magnetic isochron anomalies. As a consequence of this uncertainty, competing paleo-reconstruction models for the opening of the Amerasia Basin presented the Amerasian margin of the Lomonosov Ridge as both a passive and a transform margin. The morphological and geophysical character of the margin and adjacent Makarov Basin are investigated to reconcile this apparent contradiction. Under the scenario that the Amerasian margin was created due to strike-slip faulting, analogous tectonic environments (e.g., the Malvinas/Falkland transform boundary) commonly exhibit marginal ridges seaward of their respective continental blocks. Special attention is, therefore, focused on the Marvin Spur, which sub-parallels the Lomonosov Ridge in the Makarov Basin. The crest of this feature is about 30 km away from the foot of the slope of the Lomonosov Ridge at its most eastern end on the North American side (87.7° N, 176.3° E). This distance gradually increases to 70 km westward (towards the Siberian Shelf) where its bathymetric expression terminates at 87.1° N, 72.4° W. Images from the latest Arctic bathymetric charts reveal steep flanks and a disjointed blocky character along the length of the spur. Results from multi-channel seismic reflection, acquired in 2011 by a joint Canada-US mission, show Marvin Spur buried beneath sedimentary cover at 87.5° N, 176.3° E. The position of Marvin Spur on the seismic line corresponds with a positive gravity anomaly. Furthermore, seismic reflection data show a deep trough, filled with upwards of 2 km of sediment, between the Amerasian margin of the Lomonosov Ridge and Marvin Spur. The areal extent of this trough is inferred from its corresponding low gravity signal. Tentative interpretations of the data suggest that the Makarov Basin formed as a transtensional pull-apart basin and that the Marvin Spur splintered from the Lomonosov margin during opening of the Amerasia Basin.