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Mid-Cenozoic tectonic and paleoenvironmental setting of the central Arctic Ocean

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Results from drilling on the Lomonosov Ridge during the Integrated Ocean Drilling Program's Arctic Coring Expedition (ACEX), have shown that one of the most profound changes in the character of sedimentation in the central Arctic Ocean was the mid-Cenozoic shift from freshwater influenced biosilica rich deposits of the Eocene, to the fossil poor glaciomarine silty clays of the Miocene. In the ACEX record, this shift culminates in a $\sim$ 5 meter interval where the two modes of sedimentation are captured in centimeter scale cross-banding and is preceded by a surprising 25 million year hiatus that separates mid Eocene from early Miocene sediments. Micropaleontological, sedimentological and geochemical results from ACEX reveal a shallow, freshwater dominated setting in sediments bounding this hiatus. A shallow water setting for the Lomonosov Ridge during the time of the hiatus is in stark contrast to predictions from tectonic subsidence models. Linking these observations, which suggest a large relative lowering of regional sea level, requires a mechanism that can operate over millions of years. Two possible explanations are a mid Eocene onset of tectonic uplift, resulting in the vertical migration of the Lomonosov Ridge through a fresh to brackish surface water lens, or a period of large regional sea level fluctuations occurring throughout the late Eocene and Oligocene. The required magnitude of these variations are not observed in global records. A review of Cenozoic tectonic processes affecting the geodynamic evolution of the central Arctic Ocean suggests a prolonged phase of compression that likely influenced the subsidence history of the Lomonosov Ridge and isolated the Arctic Ocean until the early Miocene. Published seismic reflec-

tion profiles crossing the Lomonosov Ridge and adjacent basins allow us to evaluate the two possible scenarios for the shallow water signal surrounding the hiatus in the ACEX record and speculate on the paleoenvironmental setting of the Arctic Ocean in the Oligocene.