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Siliceous microfossil derived salinity changes in the early middle Eocene central Arctic

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Integrated Ocean Drilling Program Expedition 302, “The Arctic Coring Expedition” (ACEX) made, arguably, the most significant discovery of Paleogene siliceous microfossils in nearly 2 decades. 100 m of finely laminated, organic-rich, biosiliceous sediments of earliest middle Eocene age (∼50-45 Ma) are abundant in marine and freshwater siliceous microfossils allowing intriguing insights into central Arctic paleoenvironments during the start of Cenozoic cooling. Largely endemic assemblages of marine diatoms and ebridians are preserved along with very high abundances of chrysophyte cysts, the endogenously formed resting stage of freshwater algae. Palynomorphs (freshwater-tolerant and marine dinoflagellate cysts, spores, pollen) and other organic material are also abundant but the sediments contain no calcareous microfossils. These microfossil groups imply an overall brackish environment, but variations in group dominance suggest episodic variations in salinity, stratification and trophic status. We hypothesize an environmental model to explain not only the co-occurrence and preservation of marine and freshwater microfossils but also varia-

tions in siliceous group dominance through the sediments. In doing so, we highlight episodic salinity changes through the early middle Eocene in the central Arctic and discuss the significance of these episodes in terms of climate change and sea-level variation.