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Middle Eocene cyclicity in Central Arctic Ocean sediments; preliminary results

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In 2004, a first ever drilling expedition in the Central Arctic Ocean was completed (IODP Expedition 302, a.k.a. the Arctic Coring Expedition, ACEX). $>$ 400 m of sediments were partially recovered from the Lomonosov Ridge, about 250 km from the North Pole. Continuous XRF-scanning of middle Eocene cores revealed apparent cyclic changes in important major and trace elements (e.g., Al, K, Ti, Si, Fe), suggesting shifts in sediment composition, provenance and/or freshwater input. To further constrain the nature of the cycles, analyses of siliceous microfossils and palynomorphs have been performed. Diatoms, Ebridians and Chrysophyte cysts are assumed to represent fully marine, brackish and freshwater conditions, respectively. Shifts in their relative abundances can be used as proxy for salinity variations in surface waters. Palynomorphs were divided into two major groups: terrestrial (pollen and spores) and aquatic palynomorphs (mainly organic-walled dinoflagellate cysts and acritarchs). The ratio between terrestrial and aquatic palynomorphs gives a good indication of changes in freshwater input to the system, and the ratio between fresh to brackish vs marine dinoflagellate cyst species can also be used as an indication for relative changes in salinity. Preliminary results show an overall dominance of fresh-brackish water dinocyst species and terrestrial palynomorphs. The ratio between marine and fresh-brackish water dinocysts and the ratio between terrestrial and marine palynomorphs indeed both show cyclic patterns which are consistent with the shifts in silicofossils and trace elements. Combined proxies point to periodical enhanced runoff which caused peri-

odic freshening of the (surface)waters during the middle Eocene in the Arctic Ocean. Given the available age model (Backman et al., 2006), this periodic increase in runoff seems to be related to the 40 kyr obliquity cycle. Ongoing organic geochemical analysis will be used to constrain the climatic and environmental changes associated with the cycles in terms of quantified temperature changes (TEX_{86}) and relative variations in freshwater input (BIT).