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Paleogene black shales from the Central Arctic Ocean: A Black Sea analogue?

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IODP Expedition 302, i.e. the Arctic Coring Expedition (ACEX), for the first time recovered thick Paleogene sequences of organic carbon-rich sediments from the central Lomonosov Ridge in water depths of around 1300 m. This sedimentary record provides a unique archive of the geological and paleoenvironmental evolution of the Arctic Ocean.

In general, organic carbon-rich Paleocene sediments from the Arctic Ocean are characterized by total organic carbon contents of up to 14% and extreme enrichments in S of on average 8% with extreme values reaching 19.8% owing to the presence of large amounts of pyrite. Accordingly high amounts of Fe (11% Fe_2O_3 on average with maxima up to 24.8%) and As (average 77 ppm, max. $>$300 ppm) are encountered. Other trace metals (e.g. Ag, Cd, Co, Mo, Re, Sb, V, Zn) show enrichments comparable to or even exceeding those seen in recent anoxic settings like the Black Sea or the Cretaceous C/T boundary event. Trace metal analysis supports the idea that the Paleogene Central Arctic Ocean paleoenvironment may have been analogous to the present day Black Sea situation.

Geochemical changes at the major hiatus in the sedimentary record, likely spanning at least 25 Ma as indicated by dinoflagellate and benthic foraminifer stratigraphies, will be discussed based on major element provenance indicators and REE patterns.