The first deep sea drilling at the Arctic Ocean:Preliminary results of IODP Expedition 302, ACEX

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An international team of scientists is currently evaluating sediment cores collected during the Arctic Coring Expedition, ACEX, conducted under the auspices of the Integrated Ocean Drilling Program (IODP). ACEX, conducted in August and September this year, is an exploration success story. Sediment cores of 430 meters were recovered from the Arctic Ocean. These cores reveal new insights into the past climate of the Arctic. Preliminary results show that the ACEX recovered the first ever climate record of the Arctic Ocean over the past 56 million years. The Arctic Ocean was frozen much earlier than previously thought. Although it is necessary to define the exact time when ice appeared, although it seems clear that perennial ice existed as early as 15 million years ago.

Initial offshore results indicate that the upper hundred and sixty meters represent a record of the past 15 million years comprised of sediment with ice-rafted debris and occasional small pebbles, suggesting that ice covered conditions extended at least this far back in time. Details of the ice cover, timing and characteristics (e.g., perennial vs. seasonal cover) awaits further study. The sediment record during the late Eocene is of dark, organic-rich siliceous composition with a depositional environment dominated by ice-free, warmer surface ocean waters. An interval recovered around 49 million years ago reveals an abundance of a freshwater fern (Azolla spp.) suggesting that a surface fresh/low salinity water setting dominated the region during this time period. Although predictions had placed the base of the sediment column at 50 million years, drilling revealed that the latest Paleocene to earliest Eocene boundary interval was recovered. During this time, about 55 million years ago, the Arctic was subtropical with warm surface ocean temperatures. ACEX also penetrated into the underlying sedimentary bedrock, confirming the hypothesis that the Lomonosov Ridge crust is of shallow-water, continental origin and of Cretaceous age.