Holocene paleoceanography of the Mackenzie Trough, Beaufort Sea, Canada: preliminary results

André Rochon[1], S. Blasco[2], D. Scott[3], T. Schell[3], R. Bennett[2], and K. Jenner[2]
1. ISMER, Université du Québec à Rimouski, Rimouski, QC, G5L 3E1 ¶ 2. Geological Survey of Canada, Natural Resources Canada, Bedford Institute of Oceanography, Dartmouth, NS, B2Y 4A2 ¶ 3. Department of Earth Sciences, Dalhousie University, Halifax, NS

A series of 3 piston cores collected in 2002 in the Mackenzie Trough (Canadian Beaufort Sea) will serve for the reconstruction of sea surface parameters during the Holocene (last 10 000 years), with emphasis on the evolution of sea ice conditions. Preliminary results of core MR02-K05-PC2 (Lat. 69° 55'30.68" N, Long.138° 23'03.69" W, length: 9 m, water depth: 223 m) are presented here. The chronostratigraphical framework of the core relies on 3 AMS-^{14}C ages obtained on bivalves, and the sequence encompasses the last 9000 years BP. The sediment consists of olive grey hemipelagic silty clay. The analyses of the sediment's physical properties (density, magnetic susceptibility, resistivity, P-Wave) and colorimetry reveal no important change throughout the sequence, which suggests a continuous deposition without interruption or hiatus. Fossil dinoflagellate cyst assemblages will be used as proxy for the reconstruction of sea surface parameters (temperature, salinity, sea ice cover) using transfer functions based on the best analogue method.

Preliminary palynological analyses performed at ≈1 m intervals reveal relatively diversified dinoflagellate cyst (dinocyst) assemblages composed of 12 cyst species routinely recovered from surface sediments of the Canadian Arctic Archipelago and Beaufort Sea, with the exception of one taxon characteristic of the Pacific Ocean. Dinocyst concentrations are relatively high and vary between 800 and 3400 cysts.cm^{-3} of wet sediment. The lower 4 m of the sequence are characterized by the dominance of the "Arctic species", *Islandinium minutum, Polykrikos quadratus, Spiniferites frigidus*, accompanied by *Brigantedinium* sp. and the cyst of *Pentapharsodinium dalei*. These taxa represent more than 80% of the assemblages and indicate freezing sea surface temperature for several months of the year and abundant sea ice cover.

Between 4 and 2 m down core (≈5422 to 3575 years BP) the Arctic species relative abundances reach minimal values,

while the relative abundance of *Operculodinium centrocarpum*, which dominates modern dinocyst assemblages in the northern Pacific Ocean, increases to 50%. In the same interval, we also observe the maximum abundance of the cyst of *P. dalei* and the presence of the cyst of *Protoperidinium americanum* (recorded for the first time in the Arctic), which are also present in modern dinocyst assemblages from the northern Pacific. The maximum abundance of these 3 taxa suggests warmer sea surface temperature and less sea ice relative to modern-day values, and increased input of Pacific water into the Beaufort Sea during that period, which also corresponds to the Holocene thermal maximum as recorded in sediment cores from the eastern Canadian Arctic. This in turn suggests that both eastern and western Arctic were simultaneously characterized by warmer water masses during that period relative to modern-day values. Finally, the dinocyst assemblage recovered in the upper 2 m of the sequence indicate a gradual return to the dominance of Arctic species and modern-day conditions of sea surface temperature and sea ice cover.