RAPID OCEANIC CHANGES AT THE YOUNGER DRYAS TERMINATION INFERRED FROM DIATOM ANALYSIS OFFSHORE NEWFOUNDLAND

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The coastal waters of eastern Newfoundland form an ideal site to study past variability in the southwestern sector of the North Atlantic Subpolar Gyre. At the meeting point of the cold Labrador Current flowing south and the North Atlantic Current bringing warm, saline waters northward, marine sediment cores from this area are used to infer large scale shifts in ocean current regimes during the last deglaciation. Although in this region several records of the Younger Dryas – Holocene transition are available from the terrestrial realm, marine records spanning this interval at high resolution are so far rare. In this study we present results from a multi-proxy reconstruction of oceanic conditions and sea ice variability at the onset of the Holocene.

During a 2007 research cruise of RV 'A. Ioffe', a sediment gravity core (AI07-14G) was taken from 239 m water depth in Placentia Bay off the south coast of Newfoundland. Based on 6 radiocarbon dates, the 510 cm core spans the age interval from 12.9 to 9.9 cal. kyrs. BP and changes in the core show a very good correlation with both nearby terrestrial and Greenland ice core records. With an average accumulation rate of 5.7 years/cm, the core provides a high resolution record of the transition from the Younger Dryas stadial into the Holocene. After X-ray fluorescence (XRF) core scanning, the core was subsampled and analyzed for diatoms, benthic foraminifera, grain size distribution, calcium carbonate content, total organic carbon content, and the geochemical diatom sea ice proxy IP_{25}.

The transition from the Younger Dryas into the warmer Holocene is clearly reflected in the record as a sudden increase in productivity of both foraminifera and diatoms, with a relative increase in warmer water diatom species, and is further characterized by a steep rise in both calcium and organic carbon content. Based on the calcium record from the XRF core scan, the entire transition took place in only 55 years. The presence of sea ice, inferred from the IP25 analysis, is greatly reduced after the Younger Dryas termination, although the concentrations of "classic" sea ice diatom species do not show any significant change. The abrupt transition is followed by a 1000-year interval of stable conditions in the early Holocene after which further warming picks up in the youngest section of the core.