



Northern Hemisphere Cryospheric Connections during Deglaciation: Expected and Unexpected Responses.

Ingrid Hendy (1) and Alice Chang (2)

(1) University of Michigan, Geological Sciences, Ann Arbor, United States (ihendy@umich.edu), (2) School of Earth and Ocean Sciences, University of Victoria, Victoria, BC, Canada (asmchang@uvic.ca)

We present a high-resolution glaciomarine record for MD02-2496 (48°58.5N; 127°02.1W; 1243m water depth), collected from the Vancouver Island continental slope. 46 AMS ^{14}C dates have been generated from both planktonic foraminifera carbonate and bulk sedimentary organic carbon. The presence of two ^{14}C plateaus during deglaciation (~13.3 and ~14.8 ^{14}C kyr BP) provide a potential stratigraphic marker allowing for correlation with other deglacial paleoclimate records as the ^{14}C plateaus should be geologically instantaneous due to rapid atmospheric mixing. After correcting for the estimated local surface ocean ^{14}C reservoir age (>807 years), these plateaus coincide with global ^{14}C plateaus (12.2 and 13.3 ^{14}C kyr BP).

The resulting chronology enables correlation of glaciomarine sedimentary sequences within MD02-2496, to well known terrestrial units associated with Cordilleran Ice Sheet (CIS) advance and retreat in the Pacific Northwest over the last 50 ka and provides new insight into ice sheet processes. Of significance is the previously unknown ice-rafted debris events identified in the $>250\mu\text{m}$ grains g^{-1} record at ~42, 17.2 to 16.1 and 14.8 ka. These are interpreted to represent catastrophic retreats of the western marine margin of the CIS that are co-incident with North Atlantic ice rafting events – Heinrich Events 1 and 5. Elemental analysis of bulk sediments reveals the provenance of glacial sediment discharged before and after these catastrophic events shifted between granitic and basaltic sources. These glaciomarine sedimentary sequences may reflect a shift from proglacial lake outburst flooding (i.e. Lake Missoula flood events) to meltwater associated with a downwasting ice sheet, with the catastrophic iceberg calving providing the transition between these two ice ablation states.

The planktonic foraminiferal $\delta^{18}\text{O}$ record from MD02-2496 suggests rapid warming and cooling (i.e. Bølling and Younger Dryas) in the local marine realm may have had little impact on the CIS as the ice sheet response generally preceded these climatic events by ~100 years. However, the near co-incidence of ice sheet retreat/advance with climate events does suggest an intriguing connection between rapid climate change and ice sheets. Disruption of meridional overturning circulation (MOC) via rapid ice sheet melting has received much attention in the North Atlantic but not in the Pacific. The climatic consequences of meltwater discharge to an already stratified North Pacific Ocean have previously been considered to have been limited when compared to similar events in the Atlantic. Recent observations of the Cascadia Basin where glaciomarine sediments from the CIS were deposited during the last glacial/deglaciation suggest that the basin contributes to the upwelling limb of thermohaline circulation. Could CIS activity provide a mechanism for NE Pacific Ocean destabilization during deglaciation that needs to be considered alongside the impact of Heinrich Events on MOC?