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Assessing Holocene Climate Variability in the Western Arctic Ocean

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The Arctic Ocean remains one of the least studied ocean basins. The Western Arctic is thought to be strongly influenced by the continents of North America and Asia. The coexistence of two pools for organic carbon inputs to the Ocean, one highly labile from marine primary production and the other largely from recalcitrant terrestrial sources, makes the Arctic Ocean possibly one of the most complex environments in which to study carbon cycling. The balance of terrestrial versus marine material is closely tied to climate variability via the hydrologic cycle, and ultimately, these signatures are preserved in sediments.

This project is an integrated, multi-proxy approach that will provide a robust means for evaluating spatial and temporal variations in climate through analysis of chemical and isotopic signatures of the different carbon pools. Molecular biomarkers and bulk and compound-specific stable carbon isotopes will provide the means for linking spatial and temporal organic carbon preservation with climate variability. Biomarkers allow for the assignment of sources to organic carbon inputs, and when coupled with bulk and compound specific isotope data, enable more specific evaluations of both the transport of terrestrial matter and paleoproductivity. Associated measurements of 18O and radiocarbon age of foramimifera will provide the means for calculating the variability in sedimentation rates, temperature and ice cover for the Western Arctic Ocean.