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Inorganic Carbon Cycling and the Biogeochemical Processes in Hudson Bay

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Coastal seas, like Hudson Bay, are biogeochemically active areas with high primary productivity. High productivity can be expected to lead to fractionation of 13C/12C creating depletion of 12C isotope of Dissolved Inorganic Carbon (12CDIC) in the surface and enrichment of 12CDIC in deeper waters. The increase of anthropogenic CO_2 concentration can have drastic impacts on the biogeochemical properties of the ocean. Since the Arctic and coastal seas are primarily sensitive to these changes, assessing the carbon cycle of this area is very important for future studies. We present the carbon cycle and related data from the Arctic Net 2010 Cruise. We investigate and assess the processes governing the carbon cycle over the entire water column of Hudson Bay. We find that the deep waters of Hudson Bay are Pacifically derived and do not interact with Atlantic waters beyond the mouth of the Bay. River input greatly affect the waters of Hudson Bay. Also, the longer residence time of the deep Hudson Bay waters allows the accumulation of products due to various biogeochemical and physical processes. These include respiration of organic matter, which causes greater DIC and lower del13C values at depth, and brine formation, which increases salinity, DIC and alkalinity. The eastern side of Hudson is observed to have greater DIC concentrations and is isotopically lighter in del13C than the western side.