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Carbon Biogeochemistry in Baffin Bay

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The Arctic Ocean and its carbon cycle are expected to be disproportionately sensitive to climatic change and, thus the Arctic is thought to be an area where such changes may most easily be detected. In particular the carbon cycle in polar ocean is vulnerable due to the relatively high Revelle factor and correspondingly weaker CO_2 buffer capacity. The Arctic ocean is influenced by runoff and precipitation, sea ice formation and melting, and the inflow of saline waters from Bering and Fram Straits as well as the Barents Sea Shelf. Pacific water is recognizable as low(er) salinity water, with high concentrations of dissolved inorganic carbon, flowing from the Arctic Ocean to the North Atlantic via the Canadian Arctic Archipelago.
In the Baffin Bay area, at the eastern entrance to the Canadian Arctic Archipelago, the water masses of three major oceans meet. Atlantic Ocean water traveling into Baffin Bay as the east Greenland current mixes with waters from the Arctic Ocean and the Pacific Ocean, which enter Baffin Bay via Nares Strait and various outflows of the Canadian Arctic Archipelago, before the waters head southward along the western side of Baffin Bay, eventually feeding into the Labrador Current and the North Atlantic Ocean. Altered mixing ratios of these three water masses and freshwater in the Arctic Ocean have been recorded in recent decades. Any climatically driven alterations in the composition of waters leaving Baffin Bay may have implications for anthropogenic CO_2 uptake and, hence, acidification, of the subpolar and temperate North Atlantic.

We present carbon cycle, Barium and stable oxygen isotope composition data of sea water and related data from two east to west section across Baffin Bay at 75N and 76N as well as from shelf sections long the eastern and western shelves of Baffin Bay. We investigate water mass characteristics and mixing pattern of the above three major water masses in Baffin Bay. The data have been collected in the framework of two Canadian International Polar Year initiatives: the Circumpolar Flaw Lead Study, and ArcticNet.