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Drivers of interannual variability of ventilation and biological pump in the Labrador Sea and Baffin Bay from 1963-2013

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The Labrador Sea is one of the few places in the world's ocean where winter cooling of the surface water leads to deep convection. This process is a window for a large exchange of gas between the deep ocean and the atmosphere. When deep convection ceases in late spring, the gasses exchanged remain trapped within the ocean interior, thus it influences CO_2 concentrations in the atmosphere and oxygenation of the deep ocean. Meanwhile, during deep mixing, surface waters are replenish with nutrients, which precondition phytoplankton productivity the following summer,w which influence the amount of biogenic carbon exported from the surface to the ocean interior during the summer and fall. In Baffin Bay, less is known about the process regulating ventilation and carbon pump, and given that the regional environment is changing quickly in response to raising temperatures and melting of the Greenland glaciers, we decided to include this basin in our analysis. Here we study the long term (1963 to 2013) variability of oxygen and biogenic carbon concentration in the Labrador Sea and Baffin Bay using a fully coupled 3D biogeochemical-ocean-sea ice model simulation on the framework of BLING-NEMO-LIM2 at $\frac{1}{4}$ degree resolution. Our goal is to identify the dominant parameters controlling ventilation and the biological pump in these basins. We focus on the 5 decades evolution of dissolved oxygen between 600-1500m (as a measure of ventilation), and export production at 100m and surface primary productivity (as a measure of biological pump). Using multiple regression we determine the role of sea ice concentration, sea ice thickness, wind strength, mixed layer depth, surface ocean stratification, spring nutrient concentration, and strength of boundary current on the interannual and decadal variation of ventilation and the biological pump in each basin.