THE DISTRIBUTION OF DISSOLVED CADMIUM AND ITS UTILITY AS A WATER MASS TRACER IN THE CANADIAN ARCTIC OCEAN

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The marine biogeochemical cycle of cadmium (Cd) is a focus of research because its nutrient-like behavior and preservation in marine sediments can provide information about past ocean states relevant to understanding climate. The correlation of dissolved Cd (dCd) and the algal nutrient phosphate (PO_4) has led to the use of microfossil Cd/calcium (Ca) ratios as a paleoproxy for ocean circulation and nutrient utilization, however considerable spatial and temporal variability in the relationship - particularly in surface waters - limit the utility of the proxy. Until recently little data from the Arctic Ocean were available to biogeochemical modelers to test hypotheses regarding dominant controls on Cd distributions. This work presents depth profiles of dCd and dCd/PO_4 ratios from 18 individual stations in the Canadian Arctic, collected during the Canadian GEOTRACES cruises GN02 and GN03, a section that connects the Arctic Ocean to the North Atlantic through the Canadian Arctic Archipelago (CAA). Salinity-driven water mass stratification exerts a primary control on the spatial distribution of Cd in the region, with elevated dCd and high Cd/PO_4 ratios (~0.37 pM/μM) associated with waters of Pacific-origin. The elevated dCd and Cd/PO_4 ratios are used as a tracer of Pacific-origin waters, identifying the presence of Pacific-origin water as it is transported through the CAA and into Baffin Bay. The utility of using a tracer derived from unique water mass end member dissolved Cd/PO_4 ratios is discussed.