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Using 226Ra and 228Ra isotopes to distinguish water mass distribution in the Canadian Arctic Archipelago

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226Ra and 228Ra are the two long-lived isotope species (226Ra, t1/2=1600y and 228Ra, t1/2=5.8y) derived from the Radium Quartet. Each isotope in the Quartet is radioactive, mostly water soluble, and unperturbed by biological activity. Compared to the short-lived radium species (223Ra and 224Ra) the slow decay rate of 226Ra and 228Ra allows for these isotopes to be traced over great distances, thus providing insight towards the water mass composition, mixing processes and distribution patterns and timescales throughout the Canadian Arctic Archipelago (CAA). For this study, samples for radium isotope measurements were collected at 17 stations during the 2015 Canadian GEOTRACES cruise through the CAA. Both long-lived Ra isotopes were found in a large range of activities, which may be attributed to the diverse coast, shelf and ocean environments present within the study area. Plotting the 226Ra, and 228Ra data, as well as their ratio 228Ra/226Ra over salinity allowed for trends to be estimated from Pacific, Atlantic and polar mixed layer distinctive end members. From these trends an attempt will be made to assess the flow rate as the Pacific water works through the CAA from west to east. Alternatively, although the Atlantic water was observed on either side of the Archipelago, it's is suspected that the shallow depth and underwater shelf found within the CAA prohibit the dense Atlantic waters from flowing through in eastward direction. Finally, under consideration of biogeochemical data such as dissolved inorganic carbon or alkalinity, an attempt will be made to forecast the effects of changes in the ocean trajectory through the CAA might have on biological life. This study aims to provide a stepping stone for future research initiatives within the Canadian Arctic Archipelago, indicating how quantifying disparities in radioactive isotopes can provide insight toward climate change within vulnerable areas.