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Temporal Changes of Iodine-129 in the Canada Basin Over the Past Decade

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The Arctic, a region highly sensitive to global climate change, has experienced a temperature increase exceeding four times the global average rate since the onset of the industrial era. Concurrently, warmer and saltier Atlantic water is encroaching further northward into the Arctic Ocean, driving the phenomenon known as "atlantification." These shifts have led to significant Arctic sea ice loss and alterations in seawater thermohaline structure, potentially impacting Arctic ocean currents. Understanding the response mechanisms of these currents to climate change is crucial for comprehending and addressing the broader impacts of climate change. Notably, substantial quantities of iodine-129 (¹²⁹I) have been discharged directly into the North Atlantic from nuclear fuel reprocessing plants (NFRPs). Enriched with NFRP-derived ¹²⁹I, Atlantic Waters penetrate the Arctic region via the Fram Strait and the Barents Sea, rendering ¹²⁹I an ideal tracer for tracking Arctic currents. While numerous studies have utilized ¹²⁹I to investigate ocean currents in the Eurasian Basin of the Arctic Ocean, research in the Canada Basin, characterized by equally intricate current structures, remains scarce. Here, we present a decade-long analysis of temporal changes in ¹²⁹I concentrations at two stations (NAP and CB, Fig. 1) within the Canada Basin spanning from 2013 to 2023. Our findings reveal a diminishing influence of Atlantic water on the surface of the Canada Basin over time. In the early 2010s, ¹²⁹I concentrations in the intermediate layer of both stations remained consistent, suggesting a common source. However, by the late 2010s, the concentration of ¹²⁹I in the intermediate layer of the NAP station significantly surpassed that of the CB station, indicative of a shift in ocean currents, likely influenced by changes in the Arctic Oscillation and potentially linked to atlantification.

Student Submission

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