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Weifeng Yang, Laodong Guo



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Sources and burial fluxes of soot black carbon in sediments on the Mackenzie, Chukchi, and Bering Shelves

Weifeng Yang^{a,b}, Laodong Guo^{a*}

^aSchool of Freshwater Sciences, University of Wisconsin-Milwaukee, Milwaukee, WI 53204, USA

^bState Key Laboratory of Marine Environmental Science and College of Ocean and Earth Sciences, Xiamen University, Xiamen 361102, China

*Corresponding author guol@uwm.edu

Abstract:

Black carbon (BC) has been recognized as a climate forcing and a major component in the global carbon budget. However, studies on BC in the Arctic Ocean remain scarce. We report here variations in the abundance, sources and burial fluxes of sedimentary soot black carbon (soot-BC) in the western Arctic Ocean. The soot-BC contents averaged 1.6 ± 0.3 , 0.46 ± 0.04 and 0.56 ± 0.10 mg-C g⁻¹ on the Mackenzie, Chukchi and Bering Shelves, respectively, accounting for 16.6%, 10.2% and 10.4% of the total organic carbon in surface sediment. Temporally, contents of soot-BC remained fairly stable before 1910, but increased rapidly after the 1970s on the Mackenzie Shelf, indicating enhanced source input related to warming. Comparable $\delta^{13}\text{C}$ signatures of soot-BC (-24.95 to -24.57‰) to C3 plants pointed to a major biomass source of soot-BC to the Beaufort Sea. Soot-BC showed similar temporal patterns with large fluctuations in the Chukchi/Bering shelf

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