



Black carbon in estuarine and coastal ocean dissolved organic matter

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ABSTRACT: We measured black carbon (BC) in ultrafiltered, high-molecular weight dissolved organic matter (UDOM) in surface waters of Delaware Bay, Chesapeake Bay, and the adjacent Atlantic Ocean (U.S.A.) to investigate the importance of riverine and estuarine dissolved organic matter (DOM) as a source of BC to the ocean. BC was 5-72% of UDOM-C ($27 \pm 17\%$), which corresponds to $8.9 \pm 6.5\%$ of dissolved organic carbon (DOC), with higher values in the heavily urbanized midbay region of the Delaware Estuary and lower yields in the river and coastal ocean. The spatial and seasonal distributions of BC along the salinity gradient of Delaware Bay suggest that the elevated levels of BC in surface water UDOM originate from localized sources, possibly from atmospheric deposition or release from resuspended sediments. BC in UDOM made up 4-7% of the DOC in the coastal Atlantic Ocean, revealing that river-estuary systems are important exporters of colloidal BC to the ocean. The annual flux of BC from Delaware Bay UDOM to the Atlantic Ocean was estimated at 2.4×10^{10} g BC yr⁻¹, supporting the hypothesis that the DOC pool is an important contributor of BC to the ocean.

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