



Effects of salinity changes on the photodegradation and ultraviolet[visible absorbance of terrestrial dissolved organic matter

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ABSTRACT: We performed laboratory studies to determine the effects of salinity on the photodegradation of dissolved organic matter (DOM) from the Great Dismal Swamp, Virginia, an important source of terrestrial DOM to the lower Chesapeake Bay. Samples were created by mixing Great Dismal Swamp water (ionic strength $\sim 0 \text{ mol L}^{-1}$) with modified artificial seawater solutions of differing salinities while keeping the final dissolved organic carbon (DOC) concentration constant. These samples were then irradiated for 24 h in a light box providing ultraviolet (UV) light similar to that of natural sunlight. Light absorbance and DOC concentrations decreased after photoexposure, whereas dissolved inorganic carbon (DIC) concentrations increased. Variations in salinity affected both DIC production and UV absorption, with the higher salinity samples showing lower DIC production and less photobleaching. Addition of an iron chelator eliminated the relationship between photochemistry and salinity by reducing both photobleaching and DIC production at low salinities. As terrigenous DOM transits through an estuary, its photochemical reactivity and optical properties may change significantly as a function of salinity, probably as a result of changes in DOM conformation or changes in iron-DOM photochemistry, or both.

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