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Characteristics and dynamics of dissolved organic matter exported from tidal marsh-estuarine systems

M. Tzortziou (1,2,3), P.J. Neale (2), J.P. Megonigal (2), C. Osburn (4), N. Maie (5), R. Jaffé (5)

(1) University of Maryland, ESSIC, College Park, MD, USA, (2) Smithsonian Environmental Research Center, Edgewater, MD, USA, (3) Hellenic Center for Marine Research, Institute of Inland Waters, Anavyssos, Greece, (4) U.S. Naval Research Laboratory, Washington, DC, USA, (5) Southeast Environmental Research Center, Florida International University, Miami, FL, USA (Maria.A.Tzortziou@nasa.gov / Fax: +001 301 614 5903)

Dissolved organic matter (DOM), a major reservoir of organic carbon in the ocean, plays a central role in many biogeochemical processes in aquatic ecosystems, affecting carbon budgets, nutrient availability, ecosystem productivity, ocean color and aquatic photochemistry. Tidal marshes have been previously shown to be important sources of carbon and nutrients to near-shore waters. Yet, the optical and chemical quality of the DOM exported from marshes remain largely uncharacterized, limiting our understanding of the effects of marsh tidal exchanges on estuarine photochemical and biological processes. The Chesapeake Bay estuary, along the western Atlantic coast, is the largest estuary in the United States and, historically, one of the most productive in the world. Brackish and freshwater tidal marshes cover a large area (about 700 km^2) along the western and eastern Bay shores, potentially playing an important role in the complex biogeochemical processes, optics and exchanges taking place in these highly dynamic coastal margins. We measured tidal exchanges of dissolved organic carbon (DOC) and colored DOM in several Chesapeake Bay marsh systems that vary widely in carbon sources and environmental characteristics. Detailed absorption and fluorescence spectroscopy analyses and measurements of DOC concentration and DOM molecular weight distribution were performed. Results were used to determine the role of tidal marshes as a source of optically and chemically distinctive dissolved organic compounds for adjacent estuarine waters, and examine between-marsh variability in the

amount, quality and degradability of exported carbon and DOM.