METHYLMERCURY PRODUCTION POTENTIAL ASSESSMENT IN SEDIMENTS FROM THE BRUNSWICK, GA ESTUARY

Travis William Nicolette and Francisco J. Cubas

AFFILIATION: Civil Engineering and Construction Management Department, Georgia Southern University, Statesboro, GA
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Mercury is potentially toxic to the environment. Mercury sorbed to anaerobic sediments of surface waters may be converted to methylmercury, which is the toxic form of mercury that bio-accumulates in aquatic biota. Sources of mercury to the environment vary, but the production of methylmercury is common in sulfur-rich sediments containing mercury. In such environments, sulfur reducing bacteria (SRB) produce methylmercury as a by-product of the metabolic process used to extract energy from the reduction of sulfate to sulfide. This study focuses on determining the methylmercury production and release potential from sulfur-rich sediments extracted from different areas of the Brunswick Estuary. Previous studies note of historical considerable levels of mercury in the Brunswick estuary due to waters draining areas of a local super fund site for mercury. Water and sediment samples were collected from six different sites to seed microcosms designed to measure the sediments' potential for methylmercury production. Microcosms were operated under anaerobic conditions to determine if sediments produced methylmercury under extreme conditions (e.g. low dissolved oxygen, low oxidation-reduction potential, and highly productive environment) that may seasonally exist in different zones of the estuary. Results revealed that sediments have the potential to reduce sulfate under anaerobic conditions. In the microcosms, sulfate concentrations rapidly decreased from values as high as 290 mg/L to practically 0 mg/L, suggesting that sediments provide an adequate environment to support SRB activity, which may result in methylmercury production. Further, results revealed that methylmercury production potential varies across different zones of the estuary. Precise methylmercury concentrations collected from the different sites are currently being evaluated. Due to the environmental conditions that prevail in the estuary, its proximity to a mercury super fund site, and its accessibility for fishing activities, it is crucial to further assess the methylmercury formation in this area.

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