

Mercury Biogeochemistry at WHOI: Introduction

Human Health and Mercury Biogeochemistry

Mercury (Hg) is a toxic trace metal with both natural and anthropogenic sources to the environment (Fitzgerald and Clarkson, 1991). The primary exposure route for humans is the consumption of fish and fish products, and the majority of the consumed fish species are marine (NRC, 2000). Studies of the secular change of Hg in the environment using a variety of natural archiving media have indicated that the amount of Hg entering ecosystems has increased by 2-5x (avg. ca. 3x) since the Industrial Revolution (e.g., Jensen and Jensen, 1990; Swain *et al.*, 1992; Monteiro and Furness, 1997; Lamborg *et al.*, 2002; Schuster *et al.*, 2002). Subsequently, numerous local, state, national and international authorities have recognized Hg as a pollutant of special concern (e.g., JECFA, 2000; NAS, 2000). This is highlighted by the adoption of fish consumption advisories for fresh and saltwater fisheries around the United States and Europe (e.g., USDA, 2001; Schober *et al.*, 2003).

Hg is found, under typical ambient conditions, in three chemical forms: elemental Hg (Hg⁰), divalent ionic Hg in a variety of inorganic and organic complexes (in total, Hg(II)) and methylated forms (mono- and dimethylHg, MMHg and DMHg, respectively). As illustrated in the figure below, these species groups are intricately linked together. Formation of the methylated forms is of particular interest, as it is these more lipophilic forms that are especially toxic and bioaccumulative.

In our lab, we are investigating the biological, physical and chemical factors that affect the movement of Hg between these forms...not only in the ocean, but in lakes and the atmosphere as well.

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The biogeochemistry of mercury in the atmosphere and ocean.

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Mail: Woods Hole Oceanographic Institution, 266 Woods Hole Road, Woods Hole, MA 02543, USA.

E-Contact: info@whoi.edu; press relations: media@whoi.edu, tel. (508) 457-2000

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