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SESSION TRACK: Integrated Environmental Assessment and Management
REQUESTED SESSION: Integrated Understanding of Biogeochemical Cycling of Mercury around Ocean Environmen... [Noriyuki Suzuki]
REVIEWER COMMENTS:
Noriyuki Suzuki: [No Comments]
Kohji Marumoto: [No Comments]
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Noriyuki Suzuki: [No Recommendation]
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REQUESTED PRESENTATION TYPE: Platform
Student Presentation Award:
TITLE: Sources and cycling of methylmercury in coastal and offshore waters
AUTHORS/INSTITUTIONS: Robert Mason, University of Connecticut / Department of Marine Sciences; Zofia Baumann, University of Connecticut / Marine Sciences; Sofi Jonsson, Emily Seelen, University of Connecticut / Department of Marine Sciences; Celia Chen, Dartmouth College / Department of Biological Sciences
PRESENTER (E-MAIL ONLY): robert.mason@uconn.edu
AGREE TO BE RECORDED: TRUE
ABSTRACT BODY: For humans and wildlife, exposure to methylmercury (MeHg), the most toxic and bioaccumulative form of mercury (Hg), is mostly from the consumption of seafood. Historically, coastal sediments have been viewed as the major source of the MeHg which is bioaccumulated by marine organisms, primarily because microbe-mediated production of MeHg has been demonstrated in marine sediments and other MeHg sources have been considered negligible. Overall, Hg speciation and the quality of organic matter have been pointed as major controls of net Hg methylation in coastal sediments. Contrary to this historical view, however, recent research highlights the presence of coastal marine ecosystems where sediments are not a significant source of MeHg to biota when compared to its other sources. For the open ocean, field measurements and Hg methylation/demethylation assays suggest that net methylation of Hg occurs in conjunction with organic matter degradation, mostly in lower oxygen subsurface waters. However, there is increasing evidence for the formation of MeHg in conjunction with the microbial loop of the surface ocean, where a substantial fraction of the organic matter produced via primary production is degraded. This presentation will explore the importance of Hg methylation in oxic surface waters as a source of MeHg to marine food webs. Estimates will be made based on mass balance calculations, which will include the results of recently conducted methylation/demethylation assays in seawater and sediments. The factors that influence the pathways of MeHg formation will be discussed, as will the processes of photochemically and biologically-mediated MeHg demethylation. Moreover, the detection of Hg methylating genes within bulk waters and in suspended marine particles will be highlighted as further evidence for microbe-mediated methylation of inorganic Hg in seawater, including the oxic water column. This recent research helps constrain the potential importance of Hg methylation in the water column, both in the open ocean and coastal waters, compared to other sources in providing MeHg to pelagic food webs.
KEYWORDS: Bioaccumulation, Metals, Speciation, Surface water