

Control ID: 41073

Final ID:

Submitted On: June 7th 2017 2:28:00 AM

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]

REVIEWER RECOMMENDATIONS:

Noriyuki Suzuki: [No Recommendation]

Kohji Marumoto: [No Recommendation]

REQUESTED PRESENTATION TYPE: Platform

Student Presentation Award:

TITLE: Distribution characteristics of methylmercury and dissolved gaseous mercury in the Western Pacific Ocean

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AGREE TO BE RECORDED: TRUE

ABSTRACT BODY: Methylmercury (MeHg) accumulation in marine organisms poses serious ecosystem and human health risk, yet the sources of MeHg in the surface ocean remain uncertain. We present the first mass budget estimation and distribution characteristics of MeHg and dissolved gaseous Hg (DGM) in the Western Pacific Ocean, based on the 2012 and 2014 SHIPPO survey (30°S-50°N). We found from the cruise data that the major net source of MeHg in surface water to be vertical diffusion from the subsurface layer (1.8 to 12 nmol m⁻² yr⁻¹). A higher upward diffusion in the North Pacific (12 nmol m⁻² yr⁻¹) than in the Equatorial Pacific (1.8–5.7 nmol m⁻² yr⁻¹) agreed with elevated surface MeHg concentrations observed in the North Pacific (limit of detection-34 fM) as compared to the Equatorial Pacific (< limit of detection). On the contrary, surface water DGM concentration was found to be significantly higher in the Equatorial Pacific (100-300 fM) than the North Pacific (50-100 fM). The higher DGM in the Equatorial Pacific could be explained by redistribution of surface water in the tropical upwelling zone, supporting high primary production and dissolved organic carbon concentration. Our results suggest that MeHg and DGM distribution in surface of the Western Pacific Ocean is mainly controlled by the upward diffusion from subsurface water and the in situ reduction associated with the Ekman overturning process, respectively.

KEYWORDS: Biotransformation, Metals, Monitoring