

Marine methylmercury production and marine boundary exchange – results of the 2012 GEOTRACES West Pacific PANDORA cruise

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Is methylmercury (MeHg) primarily formed *in situ* in the oceanic water column or is it produced in marginal sediments and subsequently advected into the open ocean? To answer this outstanding question we measured MeHg and total mercury (tHg) in a highly dynamic zone where boundary exchange is important, the Coral and Solomon Seas (0-20°S, 145-165°E). Here, a broad westward current extending from the equator to 30°S, the South Equatorial Current splits upon arriving at the major islands and archipelagoes of Fiji (18°S, 180°E), Vanuatu (15-20°S, 168°E), and New Caledonia (18-23°S, 165°E), resulting in a complex system of western boundary currents and zonal jets that feed the Coral and Solomon Seas [1]. We present vertical profiles (to 1300m-depth) for tHg and MeHg that were sampled in summer 2012 on RV Atalante. The 9 profiles consist of 89 unfiltered acidified (HCl 0.4%, v:v) samples. MeHg (MMHg+DMHg) was analyzed via isotope dilution GC-SF-ICP-MS after derivatization with propylborate and extraction into hexane. tHg concentrations vary only little at all stations (mean=0.90±0.18pM, range=0.55-1.69pM, n=87). The vertical tHg profiles show neither surface enrichment nor indications for sedimentary sources. Also MeHg vertical distributions are similar at all stations (mean=0.17±0.14pM, range=DL-0.42pM, DL=0.01pM, n=89). MeHg concentrations are generally low (0.043±0.021pM, n=39) at the surface (0-200m), increase gradually from 200 to 400m-depth (0.195±0.103pM, n=21) to reach their maximum below 400m-depth, (0.337±0.034pM, n=29). The fact that MeHg and tHg distributions are relatively homogeneous in this dynamic zone and comparable to what is observed eastward in the open Equatorial Pacific [2, 3] suggests that MeHg is formed *in situ* in the oceanic water column and that boundary exchange has little or no influence on Hg dynamics.

[1] Gasparin et al. DSR 2011

[2] Mason et al. ER 2012

[3] Mason and Fitzgerald DSR 1993