

Distribution of mercury species in the Western Tropical Pacific Ocean: contribution of anthropogenic and regenerated Hg via biological pump

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The horizontal and vertical distributions of total Hg, dissolved gaseous Hg (DGM), and methyl Hg (MeHg) were determined in the Western Tropical Pacific Ocean (30°S – 22°N) from the surface to a water depth of 500 m. We detected significantly higher Hg concentrations in the subsurface water (1.4 ± 0.44 pM, 40–500 m) than surface mixed layer (0.84 ± 0.40 pM), perhaps resulting from the scavenging Hg by particulate matter and subsequent sinking from surface water. When the concentrations of remineralized and anthropogenic Hg were estimated from the water depth of 100–500 m using the remineralized phosphate data, 45% of the overall Hg was attributable to the anthropogenic fraction. Anthropogenic Hg deposition and subsequent sinking via biological pump may be a significant source of Hg in the subsurface Western Tropical Pacific Ocean. Similar concentrations of DGM were measured in the overall sampling sites (276 ± 80 fM, 1.5–500 m) without typical vertical gradients. In contrast, MeHg increased as the nutrients and apparent oxygen utilization increased by depth ($< DL$ in the surface mixed layer; 233 ± 260 fM, 40–500 m). Microbial regeneration of particulate organic matter seems to increase MeHg concentration, but not DGM concentration, in the subsurface of Western Tropical Pacific.