

The Effect of Particle Composition and Concentration on the Partitioning Coefficient for Mercury in Three Ocean Basins

XINYUN CUI¹, CARL LAMBORG¹, CHAD HAMMERSCHMIDT², YANG XIANG¹ AND PHOEBE J. LAM¹

¹University of California, Santa Cruz

²Wright State University

Presenting Author: xcui12@ucsc.edu

The downward flux of sinking particles is a prominent Hg removal and redistribution process in the ocean; however, it is not well constrained. Using data from three U.S. GEOTRACES cruises including the Pacific, Atlantic and Arctic Oceans, we examined the mercury partitioning coefficient in the water column. The data suggest that the K_d varies widely over three ocean basins. We also investigated the effect of particle concentration and composition on K_d by comparing the concentration of small-sized (1-51 μm) suspended particulate mass (SPM) as well as its compositional fractions in six different phases to the partitioning coefficient. We observed an inverse relationship between K_d and suspended particulate mass, as has been observed for other metals and known as the “particle concentration effect”, that explains much of the variation in K_d . Particulate organic matter (POM) and calcium carbonate (CaCO_3) dominated the Hg partitioning in all three ocean basins while Fe and Mn could make a difference in some places where their concentrations are elevated, such as in hydrothermal plumes. Finally, our estimated Hg residence time has a strong negative correlation with average log bulk K_d , indicating that K_d has significant effect on Hg residence time.