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Ocean Science Discussions

Interactive comment on "Biogeochemical processes accounting for the natural mercury variations in the Southern Ocean diatom ooze sediments" *by* S. Zaferani and H. Biester

C. H. Lamborg (Referee)

clamborg@ucsc.edu

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An excellent manuscript describing biogeochemical data associated with the accumulation of Hg in silica-rich sediments of the Antarctic margin. The fluxes of Hg are enormous on a per area basis, and if they extent beyond some very narrow band of continental shelf will beg a re-evaluation of sources and sinks in the marine Hg cycle. The data are of high quality and the authors carefully "game out" what the results might mean without straying beyond their dataset. I only have a few very minor presentation comments. These include: 1) to save one figure and facilitate "wiggle matching," the authors could include Hg data in Figures 2, 3, 4 and 5 (and dropping Figure 6). 2) Line

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Discussion paper

56, "...the re-emission flux of Hg0 from productive regions will be lower..." should be modified with the caveat that all other factors being equal. To be sure, there are some high productivity areas, such as regions of equatorial upwelling, where productivity is high and Hg(0) fluxes to the atmosphere are high as well. 3) Materials and Methods-is the age-depth model presented in Escutia et al., 2011? Make clear where this comes from and give a sense of the depth-in-core resolution of the samples in addition to the time resolution already presented. 4) In the last paragraph before Conclusions, the authors contemplate how it is that such large fluxes of Hg could be found, and conclude that it is possible that with 100% scavenging of Hg "below" a diatom bloom on just a few occasions could account for all the Hg observed in the sediments. How about on the other end of the spectrum? If there were no scavenging below the bloom and given our meager knowledge of Hg in diatom concentrations, how much Hg could be buried just by diatom uptake and sinking? Since we are in the early days of thinking about Hg scavenging, having these two bounds on the data might be useful. 5) Interesting to observe that in the PCA, Hg does not appear on the same factors as other chalcophilic elements such as Cu and Zn. Could the authors speculate?

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