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Ocean Science Discussions

Interactive comment on "Chemical and physical transformations of mercury in the ocean: a review" *by* N. Batrakova et al.

N. Batrakova et al.

batrakova.nv@gmail.com

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The authors are thankful to the Anonymous Referee 2 for the helpful comments and constructive suggestions for improvement of the manuscript. Below there are answers to specific comments of the Referee (original comments are in *italics*):

> *1. Page 4 Line 6: What does "reactive mercury" mean? As reactive mercury is operationally defined, more information is needed here to clarify what mercury species are considered reactive mercury.*

Here "reactive mercury" is used in sense "bivalent mercury". This term is often used in the studies that describe behavior of mercury in the water environments. To avoid

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ambiguousness, appropriate changes have been made in the manuscript.

2. Page 4 Line 21: The statement "whereas Hg(II) is the predominant form found in water" might not be necessarily true in some cases. For example, surface ocean water could be supersaturated with respect to elemental Hg, which could account for a considerable amount of total Hg (e.g., approximately 50)

This statement is generally true but in some cases it is not exact. The manuscript has been accordingly corrected. In particular, the example offered by the Referee, has been included to the text.

3. Page 7 Line 13: Does "reduction" refer to photoreduction?

Yes, here “reduction” refers to photoreduction. This correction has been made in the text.

4. Page 8 Line 23: A wide range has been reported for the stability of Hg(II)-DOM complexes, with the logK ranging approximately from 10 to 40. The range given here might not be the representative stability constants of Hg(II)-DOM complexation, as higher stability constants (logK about 20-40) are probably more reasonable.

Additional analysis of the literature has shown that the logK range proposed by Referee is more reasonable. Therefore, the range of logK from 10 to 40 and corresponding additional references have been included to the revised manuscript.

5. Page 11 Line 22: For the statement "The rates of oxidation reactions are higher under solar irradiation", compared to what? In comparison to dark condition?

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Yes, here the rates of oxidation reactions under solar irradiation are compared to the oxidation rates under dark conditions. Appropriate changes have been made in the text.

> *6. Page 12 Line 3: Chloride (Cl-) and bromide (Br-) may be involved in the processes of Hg(0) oxidation, but from a chemical perspective it is probably inappropriate to say they are oxidants, as they cannot accept electrons. Maybe chlorine and bromine atoms are referred to here?*

Of course, chloride (Cl-) and bromide (Br-) cannot be oxidants. This is our fault. Appropriate corrections have been made in the manuscript. The corrected text contains the phrase that "...halides such as chloride and bromide may also be involved in the processes of Hg(0) oxidation in natural waters...".

> *7. Page 19 Line 18: The bioavailability issue of colloidal mercury is much more complicated than a simple statement that colloidal mercury is poorly bioavailable. Recent studies have suggested that in colloidal form, in particular at nano-scale, some mercury species (e.g., HgS nanoparticles) could be bioavailable for bacteria that methylate inorganic Hg into methylmercury.*

Agree. In accordance with this comment appropriate changes have been made in the text stating that bioavailability of colloidal mercury depends on size and species of particles. The suggested example and appropriate references have been inserted in the manuscript.

Interactive comment on Ocean Sci. Discuss., 11, 1, 2014.