Biogeosciences Discuss., 6, C116–C117, 2009
www.biogeosciences-discuss.net/6/C116/2009/

Biogeosciences Discussions

Interactive comment on "Dissolved iron (II) in the Baltic Sea surface water and implications for cyanobacterial bloom development" *by* E. Breitbarth et al.

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Received and published: 17 April 2009

On page 3817, line 20-21 we state that "Half-lives based on oxidation by H_2O_2 are longer throughout the data set so that only oxidation by O_2 is considered". We discovered an error in our calculations and now have to correct this statement. The following correction does not affect the general outcome of our manuscript. In several cases H_2O_2 concentrations contribute significantly to the Fe(II) oxidation rates. As stated on page 3827 line 17, H_2O_2 only exceeds 200 nmol L^{-1} in one case at Gotland Deep (20 July 40m, Fig. 4d+f). Matching the general paradigm, it's contribution to the expected Fe(II) oxidation rate is significant, resulting in Fe(II) half life times ($t_{1/2}$) of 1.1

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minutes versus 15.2 minutes, when only the present oxygen concentration would be considered (no Fe(II) was detected at this depth on this station) (Millero and Sotolongo, 1989;Millero et al., 1987). Additionally, O_2 is undersaturated in this case, which promotes the role of H_2O_2 as an oxidant for Fe(II). Oxygen undersaturation is a general pattern with increasing depths during our study in the Baltic Sea. Thus, also lower H_2O_2 concentrations can act as the main Fe(II) oxidant. This is the case at Landsort Deep on 1 August (20+40m), Gotland Deep 20 July (60m), and Gotland Deep 2 August (40m). Here the calculated Fe(II) half life times are 27.2 vs. 30.7 and 45.7 vs. 56.9 minutes, 13.0 vs. 350.2, and 7.6 vs. 44.6 minutes for H_2O_2 and O_2 respectively (Figs: 3d+f, 4d+f, and 5c+e). We do not have O_2 and H_2O_2 datasets that fully cover all depths on all sampling occasions, but the generally high DOM concentrations and rapid oxygen depletion with depth in Baltic Sea waters suggest that H_2O_2 control of Fe(II) oxidation rates may not be uncommon in subsurface waters.

Millero, F. J., Sotolongo, S., and Izaguirre, M.: The oxidation kinetics of Fe(II) in seawater, Geochimica et Cosmochimica Acta, 51, 793-801, 1987.

Millero, F. J., and Sotolongo, S.: The oxidation of Fe(II) with H_2O_2 in seawater, Geochimica et Cosmochimica Acta, 53, 1867-1873, 1989.

Interactive comment on Biogeosciences Discuss., 6, 3803, 2009.