

## ***Interactive comment on “Manganese in the world ocean: a first global model” by Marco van Hulten et al.***

### **Anonymous Referee #1**

Received and published: 4 August 2016

The threshold  $Mn_{ox}$  that is used to account for the homogeneous background concentration of dissolved Mn of about 0.10 nM to 0.15 nM observed throughout most of the deep ocean, may result from over simplification of the model. There might be very different  $K_{ox}$  and  $K_{red}$  values at upper (above  $\sim 300$  m) and deeper (below  $\sim 300$  m) part of the ocean.  $Mn_{diss}$  may be mainly derived from remineralization of sinking organic matter in the upper ocean, and from an equilibration with colloidal or fine particles via absorption/colloid formation processes in the deeper ocean. One would expect very different  $K_{red}$  values at different depths. In addition,  $Mn_{diss}$  may be mainly removed from the water column via oxidation to insoluble Mn(IV) with a rate that decreases with increasing depth due to lower dissolved oxygen concentration and lower pH at deeper depths, leading to very different  $k_{ox}$  values at these different depths. Thus both  $k$  values and their ratios  $K_{red}/k_{ox}$  are not homogeneous throughout the water column. Such

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difference may cause lower modelled Mndiss than the observed values, thus requiring a threshold Mnox to account for higher Mndiss at deeper depths.

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Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-282, 2016.

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