

## ***Interactive comment on “Factors influencing the dissolved iron input by river water to the open ocean” by R. Krachler et al.***

### **Anonymous Referee #2**

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The dissolved iron input to the ocean via rivers is not well known in part because of the large uncertainty as to the amount of iron that is removed in estuaries due to precipitation at increasing salinities. This paper addresses the causes of variability in estuarine removal and speculates that organic matter derived from bogs/wetlands may be critical in enhanced delivery of iron to the ocean. The quality of the paper is good. The experiments in relatively small streams far from the estuary may, however, not be directly relevant to estuarine iron precipitation. The basics of the study are to use 2 riverine/stream systems that vary in chemistry including dissolved Fe and DOC concentrations.  $^{59}\text{Fe}$  spiked water from these two systems was mixed with artificial sea water and the percent of Fe remaining dissolved was estimated. Results showed that for the stream that drained a bog area and had high DOC had about 25% of Fe remaining in solution even at sea water. The paper then uses global estimates of bog area to generate an estimate of how much these systems could alter the view of iron

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delivery to the ocean.

The main strength of this paper to me is that it points out the large uncertainties in the riverine iron delivery to the oceans. The experiment seemed good for estimating chemical nature of iron compounds in the system but is perhaps a less than realistic indicator of the role of wetlands in changing Fe delivery to the ocean. Between the streams receiving bog inputs and the estuary there are lakes, reservoirs, and larger rivers and the organic compounds that reach the estuary may be very different than the material higher in the flow path. Organic materials can both be lost and added along the flow path. It would be nice, therefore, if the paper had compared the results found here with mixing results from actual estuaries. Is there any evidence from in situ mixing studies that rivers with more wetlands in the watershed have less Fe loss in estuaries than those with fewer wetlands? Also what is the long term fate of iron precipitated in wetland areas of estuaries themselves? Do Fe burial rates in estuaries agree with the estimated 90% of iron delivery in rivers? Is the iron really permanently lost in the estuary or is there remobilization (perhaps in marshes/wetlands within the estuary)?

Despite the potential difficulty of applying the results of this study directly to the question of iron retention in estuaries, I believe this paper should to be published. The paper would benefit, however, from a discussion of potential changes to the stream before it reaches the estuary.

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Interactive comment on Biogeosciences Discussions, 2, 537, 2005.

**BGD**

2, S248–S249, 2005

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