

Interactive comment on “Nitrous oxide in the Changjiang (Yangtze River) Estuary and its adjacent marine area: riverine input, sediment release and atmospheric fluxes” by G.-L. Zhang et al.

Anonymous Referee #2

Received and published: 24 May 2010

Review of Zhang et al N2O in the Changjiang Biogeosciences

This paper reports on N₂O concentrations and sediment-water fluxes in the Yangtze River and in the plume of its estuary. This topic is relevant to BG, there has been already several works published on the same subject at other sites. The MS is written in good English, but suffers from many imprecision and contains several truisms. The dataset of N₂O concentrations does not cover the region of low salinity, including the Estuarine Turbidity Maximum, where a maximum N₂O is expected. In fact, because no sample was taken between the river point and the plume, the objectives of the paper,

C1092

both quantitative and qualitative (P3128L7-10) cannot be fully reached. An original part of the work, the sediment core incubations, is not shown with enough detail, so reader cannot have a precise idea of the quality of the data. This paper provides little new insights on N₂O dynamics in estuaries in comparison with what has already been published in other sites. Its main interest is to provide the first N₂O measurements in the Yangtze River Estuary, but it is a pity the dataset is partial. The authors themselves emphases a "need for more measurements" P3138L24. I doubt this reaches the BG standards.

Major comments 1-Gap in the dataset. Where is the river station exactly located? The authors write "the most downstream main channel station. . . . at the further upstream side from limit of salt water intrusion during dry season". So I guess the point is influenced by the tide, it is located in the tidal river and is already influenced by estuarine processes? . . . what are O₂ and turbidity at this point? I would expect a river reference station more upstream. In between that river point and the next one downstream in the plume, a large part of the salinity gradient occur. I could not find the salinity data in the MS, nor in the text, neither in tables 1&4, there is a line missing with "this study" in table2, where salinities of other studies appear. . .(!). There should be N₂O versus salinity plots in a paper with such a title. As the authors themselves write in P3132, that sampling missed the ETM and the potential max N₂O. The problem is that, if a max N₂O occurs at low to intermediate salinity (higher than the 30nM at the "river" station), it becomes necessary to plot N₂O vs salinity in order to estimate the input to the East China Sea. With their river station data, the authors compute a flux to the estuary, but the output to the coastal sea might be much larger if a max occurs at intermediate salinities. O₂ concentrations are also missing in figures and tables, and throughout the MS

2-Sediment-water fluxes. Protocol seems OK because no headspace, but many details could make it wrong, more info is needed to trust it. First, how many cores where incubated? Sediment-water fluxes always show extreme heterogeneity at the metric

C1093

scale. Second, if incubation lasted 48h and aliquot were taken every 4h, why not provide a figure with the time course (13 points) of the N₂O and other parameters (NO₃, NH₄...)? Authors write P3130L18 "the emission rates of N₂O... from the slope of the increase... versus time". How can the reader trust the increase was linear? In particular in the case of an uptake of N₂O by the sediment (DC10 station), it may follow a first order curve... what was the quantity lost in comparison with the initial value, and what was the final concentration of all parameters in comparison with initial and in situ? Also the authors used filtered seawater on top of the sediment core, N₂O might have been lost during filtration.

Detail comments P3128L4 "Garnier" not "Ganier" L15 Specify on what criteria Yangtze is the 3rd L22-30 PON and DOC might also be a large source of N for N₂O production P3131 there are many papers dealing with gas transfer velocities in estuaries, much better to use than the L&M... which is an underestimate even in the ocean P3137L17... the authors interpret the N₂O distribution in the plume with changes in river inputs, but it might also be due to changes in estuarine processes, in particular in the ETM.

End of review

Interactive comment on Biogeosciences Discuss., 7, 3125, 2010.