

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 #3

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This paper presents nitrous oxide concentrations in the Yangtze estuary and its adjacent marine waters collected during five sampling campaigns conducted in 2002 and 2006. The authors also present monthly N₂O data obtained during 2007 and 2008 from an upstream site, covering a period of thirteen months, which they use to calculate the river N₂O contribution to adjacent coastal areas. Finally they also discuss benthic and air-water N₂O fluxes.

Current literature for coastal N₂O concentrations is rather limited and this type of study is significant for our scientific understanding. However, there are several issues that

C1229

need to be addressed prior to publication.

P3128 L23-24. The authors say that they collected temperature, salinity and dissolved oxygen data from the CTD profiles, but they do not show those data in the manuscript. Please include.

P3129 L25-28. Again the authors mention that they made nutrient measurements but they do not show the data. Please include.

P3130 Sediment-water N₂O fluxes section is insufficient. How many incubations were performed for each station? Was the decrease of DO and N₂O linear with time? Marine sediments often show high spatial variability, how did the authors deal with that (this goes back to the question of the number of cores taken in each site)? The authors should include a plot showing some examples of the evolution of DO and N₂O with time during the incubations.

P3132 L7-8. As the surveys were conducted in different years and there could be inter-annual variability in N₂O data, the authors should refer here to the surveys instead of the season, and leave the seasonal assessment for the monthly data at Xuliujing station.

P3132 L16-19. If the sampling sites just covered the outer estuary, the authors should point this out from the very beginning of the manuscript (and the title). In that case it would be more interesting to compare their results with published N₂O data collected in estuarine plumes instead of in inner estuaries.

P3133 L21-22. The negative relationship between dissolved N₂O and water temperature is probably just due to higher N₂O solubility at lower temperatures. It would be interesting to see how N₂O saturation values correlate with temperature to check for any seasonal trend.

P3134 L11-15. The authors estimate the input of N₂O from the river to the estuary based on monthly averages of N₂O measurements at Xuliujing station and river dis-

C1230

charge rates, and they claim that the input is significant. In relation to what is this input significant? There are a few issues that need to be taken into account here. First, as the authors mention in the manuscript, estuaries show maximum N₂O concentrations in the TMZ, where high N₂O production rates occur. However, their study did not cover this region, and thus the authors may be underestimating the input from the river if the production in the TMZ is significant. Second, if the input from the river to the estuary is significant, one would expect N₂O concentrations to be correlated with salinity. If this is not the case, the authors should discuss why. In any case, the authors should show the salinity data (and maybe N₂O versus salinity plots). Third, a significant fraction of the N₂O pool could ventilate to the atmosphere before reaching estuarine waters, leading to an overestimation of the river input.

P3134 L16. 'Sediment release of N₂O' should be replaced by 'Sediment-water N₂O fluxes' or 'N₂O benthic fluxes', as the sediments acted either as a source or a sink of N₂O.

P3136 Given the large uncertainty associated with air-sea fluxes, the estuarine and marine areas showed fairly similar values, so I wonder if it makes sense to distinguish between them. Also, the authors affirm that N₂O air-water fluxes were usually higher in estuarine than marine waters. However, mean annual N₂O fluxes are higher in marine than in estuarine waters. Please clarify.

P3138 L16-19. One of the conclusions of this manuscript is that dissolved N₂O concentrations in the study site fall in the low range of the values reported for other estuaries. This may be partly due to the fact that the authors are comparing their N₂O data (obtained in the plume of the Yangtze Estuary) with data reported for inner estuaries. The authors should compare their data with values N₂O concentrations reported for estuarine plumes.

Figure 1. I would either use the same scale for both graphs or draw a box in the Fig 1b, indicating the area covered by Fig 1a.

C1231

Figure 2 is too small and difficult to see. It could be separated into two figures. The graphs should be organized chronologically. Contour plots of salinity and temperature should also be included.

Table 2 & 3. The results from this study should also be presented in these tables for comparison.

Table 4. The surveys should be ordered chronologically.

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C1232