

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.

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Biogeosciences Discussions 7:3125-3151, 2010 Title: Nitrous oxide in the Changjiang (Yangtze River) estuary and its adjacent marine area: river input, sediment release and atmospheric fluxes Authors: Zhang et al.

This interesting paper discusses the results of measurements of N₂O concentrations in the Changjiang river, fluxes from sediments and concentrations and derived fluxes from the water of the Changjiang estuary and adjacent sea.

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The paper is well written, well structured and reads easily. There are a few editorial suggestions listed below.

The results of the paper are really interesting. However, the paper could be even more interesting for a wider audience if the results are put in perspective. Firstly, the estimated N₂O fluxes could be compared to the river DIN and total N load in the Changjiang. On page 3127 there is only data for sediment load.

The river load of N₂O was estimated to be 15.8×10^6 mol/yr. This is only a small fraction of the N₂O in the estuary. I wonder how the authors conclude that the river input of N₂O is “significant”.

The total N₂O flux from the estuary and adjacent marine area is more than 1000 g N₂O-N per year. Such high fluxes are comparable to fluxes from fertilized agricultural soils. My suggestion is that the authors make a comparison of fluxes and total emission from Chinese agricultural land (of agricultural land in the Changjiang river basin) and the estuary and adjacent sea area. I wonder how important the estuary is compared to agricultural land. Also, is there reason to modify the IPCC methodology for estimating N₂O emissions from nitrogen leached from agricultural soils, transported via runoff and through groundwater to surface water and estuaries. At present the default estimate is 0.25% for N in groundwater, plus 0.25% for N in rivers, and 0.25% for N in estuaries. I wonder what % of N is eventually emitted as N₂O.

Detailed comments Page 3127, line 28: is only inorganic N responsible for N₂O? Could not dissolved organic N and particulate (mainly suspended organic matter, and sediment) be involved in nitrification and denitrification processes whereby N₂O is formed?

Page 3131: The discussion of the calculation of the sea to air flux of N₂O is confusing. Different terms are used (transfer velocity, transfer coefficient, see also page 3136, line 21-22) which may or may not be the same. Other terms (Sc , k_{600} , u_{10}) need explanation, because most readers will not know.

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Figure 2 and page 3132: The relationship between DIN and N₂O concentrations is counterintuitive. One would expect that when DIN is lost through denitrification, N₂O is high, so an inverse relationship. Could the authors add a brief explanation?

Editorial suggestions Page 3128, line 4: change desiccated to aerobic. Page 3128, line 6: Here we present. Page 3128, line 7: The objectives of our study ... Page 3129, line 26: Microbial activity in filtrates was inhibited by HgCl₂ and then stored Page 3130, line 2: using the closed chamber technique .. Page 3130: what are bungs and bangs? Page 3131, line 12: added instead of purposeful. Page 3132, line 17: may be partly due to the fact that most ... Page 3135, line 10: change easily into high. Page 3136, line 7: change "In any way" into "In summary". Page 3137, line 10: change "should be relatively" into "are probably".

Page 3136, line 18: what is the unit of the salinity?

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