

## General Comments

In general, the manuscript is well written and contains interesting information regarding the nitrate sources and transformations in the salinized rivers and estuaries in China based on DIN and dual isotopic compositions.

However, the paper needs some clarification and additional support for many of its interpretations.

1. Page 4568, line 19 and 25. When an enriched external source or biological transformation contributes into the river, DIN distribution is expected to fall above the mixing line. In turn, when a depleted external source or the internal removal processes appears in the river, DIN distribution is expected to fall below the mixing line. As the base of the base, the authors need to briefly interpret the mechanisms regarding the judgment of the sink/source of DIN by the mixing curves or lines.
2. About the nitrogen transformations, such as denitrification and nitrification, the authors must need to examine and probe those data carefully before drawing some conclusions.
3. As the river having floodgates, the authors need to review and check the rationality of the mixing curves or lines being adopted.

Page 4571, line 7-9: The  $\text{NH}_4^+$  species was accumulated as a source, potentially originating from organic matter decomposition not sewage discharge, as the  $\delta^{15}\text{N-NO}_3$  values ( $-0.7$   $-1.1$  ‰) were out of the sewage range. ( $-0.7$   $-1.1$  ‰) is ( $-0.2$   $-1.1$  ‰)? So, please give the nitrate source of first point ( $\delta^{15}\text{N}$  as  $-0.2$ ‰).

Page 4572 line 7-10. After the separation of the floodgate F1, the upstream of the HH River serves as a river-type reservoir. Thus, a new mixing line (HH2-E mixing line) was recalculated between the sampling location after the floodgate F1 and estuarine water (Fig. 3).

But it also includes the floodgate F2, which is different from F1? How to consider the sampling points between F1 and F2 when new mixing line was re-calculated? So, if the river has floodgates, is it appropriate that some results and conclusions were obtained based on those mixing curves or lines?

Page 4572 line 16 – page 4573 line 3. Denitrification usually occurs only where  $\text{O}_2$  concentrations are less than  $20 \mu\text{M}$ . If denitrification really occurred in the HH river before F1, it will cause the  $\delta^{15}\text{N}$  of the residual nitrate to increase exponentially as nitrate concentrations decrease, and also cause the  $\delta^{18}\text{O}$  values to increase. Please interpret the increase of  $\delta^{15}\text{N}$  and  $\delta^{18}\text{O}$  of  $\text{NO}_3^-$  in these four points.

Page 4573 line 13 - page 4574 line 9. In fact, between F1 and F2, these six sampling points can be divided into two groups, as front four (salinity 1.0, 2.3, 2.4, 3.7) and last two (salinity 4.6, 4.9). Except for  $\text{NO}_2^-$  and  $\text{NH}_4^+$  content of that point-salinity 1.0, the DIN and isotopic compositions of front four samples were almost same, and there is no nitrate accumulation (94.7, 90.2, 94.0, 89.0) and no obvious ammonium

decreasing (124.1, 127.1, 127.3). Therefore, whether concerned the analytical precision or not, the variations in  $\delta^{15}\text{N}$ - (4.5, 4.6, 4.3, 3.9‰) and in  $\delta^{18}\text{O}$  (0.6, 1.1, 1.3, 1.2 ‰) will never draw a conclusion that nitrification occurred.

As for last two points between F1 and F2, The  $\text{NH}_4^+$  concentrations ..., probably from the release of particle-bound  $\text{NH}_4^+$ ... could explain the sharp increase of the  $\delta^{15}\text{N}$  from 3.9 to 8.4 ‰ while the  $\delta^{18}\text{O}$  only increased slightly from 1.2 to 1.5 ‰.

That is to say, particle-bound  $\text{NH}_4^+$  leads to the sharp increase of the  $\delta^{15}\text{N}$ ? Why? Where are the particle-bound  $\text{NH}_4^+$  originated from? The  $\delta^{15}\text{N}$  values of particle-bound  $\text{NH}_4^+$  are high?

Page 4576 line 11-14. The downstream part of the HH River between floodgate 1 and floodgate 2 showed an extremely weak  $\text{NO}_3^-$  removal tendency (remove  $2.5 \pm 13.3\%$  of  $\text{NO}_3^-$ ) from active  $\text{NO}_3^-$  turnover processes and the HH Estuary demonstrated a conservative behavior with respect to  $\text{NO}_3^-$ .

What are the active  $\text{NO}_3^-$  turnover processes in the HH River between floodgate 1 and floodgate 2? The concentrations of  $\text{NO}_3^-$  in the HH Estuary decreased from 25.7 to 17.8, 15.1, 7.1, why is it a conservative behavior?

Page 4576 line 21-23. Estuaries of rivers are considered as active sites of massive  $\text{NO}_3^-$  losses (Brion et al., 2004; Seitzinger et al., 2006), removing up to 50 % of  $\text{NO}_3^-$  (OsparCom, 2000). However, our data do not support this view as in the HH and the CJ estuaries.

From table 1, along with the increase of salinity, the  $\text{NO}_3^-$  decreased from 25.7 to 7.1 in HH estuary, from 153.4 to 6.1 in CJ estuary, respectively. Please interpret those decreases.

### Specific Comments:

Page 4567, line 24-26, please give the analytical precision or the average standard deviations for replicate analysis of an individual sample for  $\delta^{15}\text{N}$  and  $\delta^{18}\text{O}$  of  $\text{NO}_3^-$ .

Page 4568, line 12 and 17, Dähnke et al., 2006 and Dähnke, 2006 should be Dähnke et al., 2008? Check all the other references again.

Page 4571, line 6, ... $\text{NO}_3^-$  source contamination... why contamination detected here?, how to define and judge it?

Page 4571, line 7, ... a salinity of 1.0, a floodgate ..., should be "the floodgate F1". And make clearly all the floodgates as F1 or F2 throughout the entire article.

Table 1, please give the unit of Salinity, ‰ or g/kg? and for  $\text{NO}_3^-$  and  $\text{NH}_4^+$ .

Figure 2, please break Y axis, and make the range of  $\delta^{18}\text{O}$  more wide and clear. "Ranges of isotopic composition for five potential  $\text{NO}_3^-$  sources are adapted from Xue

et al. (2009)..." is better referred from "Kendall et al., 2007".

Figure 5, "HH\*downm" is "HH\*down"?