

“A nitrate budget of the Bohai Sea based on an isotope mass balance model” by Tian, S. et al.

The present study, by Tian, S. and colleagues, upgrades the “Reactive Nitrogen (N_r)” budget in the Bohai Sea (BHS) by characterizing their sources, sinks and internal nitrogen cycling. The researchers achieved their goal by employing mass-based calculations accompanied by studying dual stable-isotopes of $\delta^{15}N$ and $\delta^{18}O$ of nitrate, $\delta^{15}N$ of suspended particulate matter, sediments in depth and pre-existing information available from BHS and the surrounding riverine systems. Nitrification was found to be the key player of nitrogen cycling and massive sink by sedimentation restrict the supply of N_r to the adjacent yellow sea. The work carried out is impressive and will significantly improve the knowledge of biogeochemistry of N_r in this region. The authors, addressed previous reviewer’s doubts meticulously and improved in the manuscript version2. Overall, the manuscript (bg-2020-471-manuscript-version2) is clear and easy to follow. However, I suggest minor technical revision which will further improve the scientific understanding of the study performed as well the quality of the manuscript.

Specific comments have been mentioned below:

Line 18 (Abstract): Introduce symbol of Nitrate (NO_3^-).

Line 33 (Introduction): Missing “Nitrogen” for N_r . Rephrase the sentence without repeating dinitrogen.

Line 42: Explain DIN as dissolved inorganic nitrogen here

Line 47: Remove ‘the’ from fifty years

Line 48: Use only DIN here

Line 53: Remove ‘the’ from present day

Line 81: Replace ‘by’ with ‘on board’

Line 92-92: Mention year.

Line 102: Add symbol of phosphate

Line 106: replace ‘with’ by using ‘following/employing’. Please also mention the samples used for dual isotope of NO_3^- analysis were filtered or not. Are those same samples used for nutrient analysis?

Line 111: Use the latest classification code “IAEA-NO-3”

Line 124: Rephrase the part “and the standard deviation is less than 0.03 ‰”.

Line 161: $mg L^{-1}$ for spring values. There are various arguments on oxygen threshold for denitrification process. Please cite references for the value ($0.15 mg L^{-1}$) considered here in the manuscript.

Line 165, Figure 2 and 3: Remove ‘(psu)’

Line 170: Please explain exceptional prominent plume of low NO_3^- and other nutrients along stations B45 and B63.

Line 176-180: Nutrient distribution in spring should be stated first and then summer as per the figures.

Figure 4 and Figure 5 both in revised manuscript represent results from Section 1. Please change Figure 5.

Line 209: replace “anti-correlated” with “inversely correlated”.

Line 225: replae ‘tendency’ with ‘trend’.

Line 249: Cite reference for spring as the season of biological productivity/Chlorophyll concentrations were not measured during present study.

Supplementary information: Line 6-8: Contradictory to the Figure S1, negative AOU values are above the thermocline, could be due to active biological production. Positive significant AOU below the thermocline represents active respiration