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Interactive comment on "Isotopic composition of nitrate and particulate organic matter in a pristine dam-reservoir of western India: Implications for biogeochemical processes" *by* Pratirupa Bardhan et al.

Anonymous Referee #2

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Based on the isotopic technique, the paper identifies the biogeochemistry of Indian reservoir where monsoons play an important role in controlling vertical mixing and dynamic of carbon and nutrients. This is important for a better understanding of nutrient cycle in natural freshwater lakes. However, the results and analyses presented here are crude. Thus, a significant work has to be done to improve the overall quality of the manuscript.

Specific comments: (1) Abstract, Line 22-24: The last sentence puts emphasis on the potential of stable carbon and nitrogen isotopes in the study reservoir. However,

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throughout the paper the major purpose appears to be identification of biogeochemical processes of the Tillari Reservoir using carbon and nitrogen isotopes. The major purpose of this paper should be made clearer.

(2) The introduction section lacks sufficient overview of previous researches related to biogeochemistry of carbon and nutrients in the reservoirs.

(3) The site description is inadequate. For examples, different vegetation types (C3 plants vs. C4 plants) have distinct values of carbon isotope, which may have an important influence on the carbon isotope of particulate organic matter of the reservoir.

(4) The sampling section lacks a detailed sampling map, which makes it very hard for readers to understand the spatial variations of parameters.

(5) Sampling and analyses. Overall, the sampling time and frequency are not clear. Also, the analyses time and frequency are not clear. For example, when the surface sediment is collected; when nitrogen isotope of NH4 samples are measured.

(6) Results. For this paper, isotopic variations are critical to identify the biogeochemical processes of carbon and nitrogen. Thus, the related isotopic data are needed to present in tables or figures.

(7) Line 10, Page 8: "We observed a nearly 1:1 trend for. . .. . ." Please display the related variations in figures. The figures can be uploaded as supplementary information.

(8) Line 15, Page 8: "As the summer progressed, productivity increased resulting in increased CO2 uptake and elevated δ13C-POM". This statement is wrong. Values of δ13C-POM are excepted to get more depleted due to the preferential uptake of 12C.

(9) Line 14, Page 8: what is the range of δ13C-POM for surface-water? What is the typical range of lacustrine autochthonous organic matter?

(10) Line 18 and 19, Page 8: the units of "ng/l" and "μg l-1" should be uniformly expressed as "ng/l" and "μg/l", or "ng l-1" and "μg l-1".

(11) Line 20-22, Page 8: in addition to the reasons mentioned, the lower δ15N-POM values may be related to the atmospheric input, which have a low value of δ15N (-2.9‰ Line 1, Page 13) in the study area.

(12) Line 21, Page 9: According to the authors, the decrease of δ18O is due to nitrification. How could you exclude the vertical variations of atmospheric contributions when considering the plentiful rainfall (3000 mm, Line 19, Page 2) in the study area?

(13) Line 10, Page 10: How is "the slope values of 0.95 and 0.85" obtained?

(14) Line 15, Page 10: How are the values of ÉŻ15 and ÉŻ18 computed? The values of ÉŻ15 and ÉŻ18 presented here are wrong. They should be corrected to be -8.7‰ and -10.7‰ respectively.

(15) I don't think Table 1 and Table 2 are necessary. Table 1 is not even cited in the paper. They can be provided as supplementary information.

(16) It is not clear about the description of the data in the title of Fig. 4.

(17) Line 11-19, Page 11: This paragraph compare the fractionation factor of the Tillari reservoir with previous studies. However, what is the conclusion after the comparison?

(18) Line 20, Page 11: the subtitle is "Sulphate reduction and evidence for chemosynthesis". However, there is not any table or figure about the variations of SO4.

(19) Line 21, Page 11: "microbial degradation of organic matter by sulphate. . .. . ." what does it mean? Does it mean sulphates act as electron acceptor? Please make it clear.

(20) Line 21, Page 12: How can the nitrate isotopic data prove the nitrate uptake? However, the Fig. 4b indicates the uptake of NH4+. Hence, I am wondering whether there is any competitive uptake between NO3 and NH4.

(21) Line 23, Page 12: Only a precipitation sample was collected. It is not enough. Is there any other research about the nitrate isotope of wet deposition in the nearby area?

(22) Line 4-6, Page 13: Where is the data of POM in the Tillari river? How could the POM data prove the input of Tillari river to the reservoir?

(23) Line 12-13, Page 13: “atmospheric wet deposition seems to be the dominant nitrate source to the water column during the monsoon season”. However, the related discussion about the atmospheric inputs is extremely scarce throughout the paper.

(24) For Figs. 3 and 6, it is clearer to change symbols in different shapes.

(25) Throughout the paper, some statements lack the related references and some statements lack original references. For example, related references should be added for Line 7, Page 8 and Line 9, Page 10; the original references should be added for Line 8 and Line 12 on Page 9.

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