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Biogeosciences Discussions

Interactive comment on "Contrasting biogeochemistry of nitrogen in the Atlantic and Pacific oxygen minimum zones" *by* E. Ryabenko et al.

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The concern expressed by the first referee was about the interpretation of the very low DIN δ15N samples occur in water samples with substantial nitrate concentrations (fig.1). The low δ15N values are only observed in the upper 20m depth and increase with depth as well as nitrate concentration. We argue that the source of nitrate at the very surface, is the atmospheric dep-osition. However, with depth another source (i.e. diapycnal mixing) of nitrate have to be tak-en into account. Diapycnal mixing bring up the nitrate from below thus increasing both nitrate concentration and its δ15N values. Another source of nitrate can be remineralization of organic matter, which would also

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increase δ15N values at 40-50 m depth.

In the section 4.2.5 we've been referring specifically to the upper 20 m, where nitrate concen-trations are < 2 μmol/l. We argue that it is plausible that these modest concentrations originate from atmospheric deposition. In the figure 5, however, at 30-50 m we do observe δ15N<5 and increasing nitrate concentration up 7 μmol/l. Rise of nitrate and nitrite concentrations with δ15N signature of few per mil is likely due to N-fixation, which was observed in the region in other studies (i.e. Bourbonnais 2009).

We are very thankful to the review for noticing a mistake in the figure 4, which we corrected. The new figure was produced with correct scaling, where δ15N-DIN is indeed in-between δ15N-NO3- and δ15N-NO2- (fig.2).

Minor comment to the table 1 concerning Ftotal will be corrected in the revised manuscript as follows: Ftotal = Fdust + Fmixing – Fassimilation, taking into account the removal of nitrogen from the system via assimilation. The fractionation factor of assimilation process can vary under different conditions. In oligotrophic waters, however, the fractionation factor will be close to zero due to nitrate limitation. The assimilation process will increase δ15N of ambient waters by 5‰ and Fassimilation = -5‰Ṫhus, the calculation in the table does not need any correction.

Interactive comment on Biogeosciences Discuss., 8, 8001, 2011.

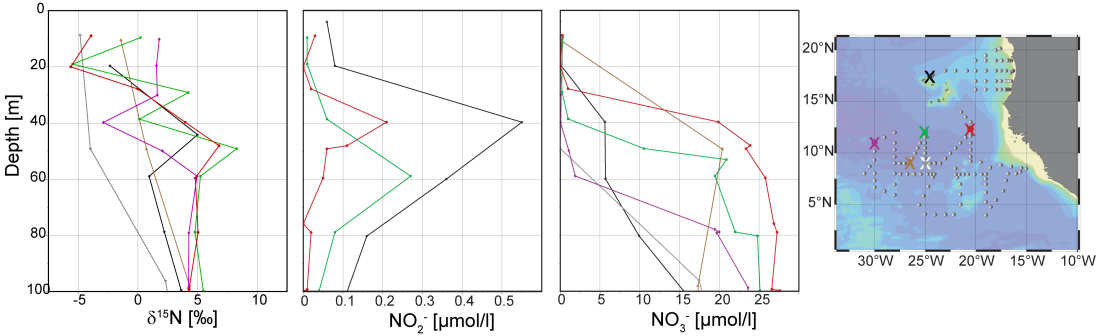

Fig. 1.

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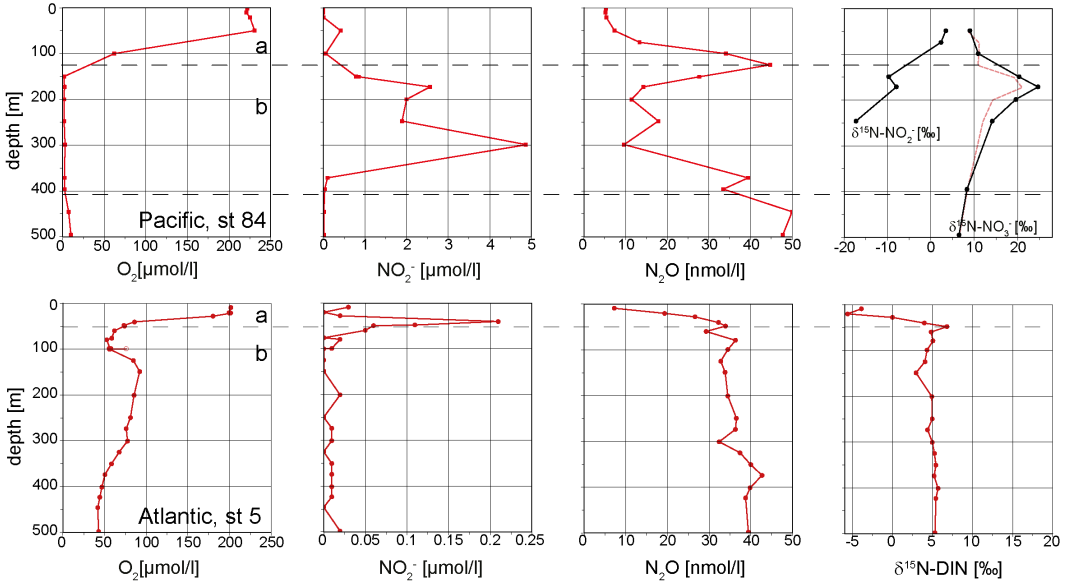

Fig. 2.

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