

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

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By being even more specific in our reply, we feel we can adequately address the issues raised regarding low  $\text{NO}_3^-$   $\delta^{15}\text{N}$  values. We felt we could readily explain results in the upper 20 m with low  $[\text{NO}_3^-]$  as influenced by atmospheric deposition. We now realize that low values found deeper the water column also need to be specifically addressed as they appear at first glance difficult to account for. The station the editor referred to ( $-4\text{‰}$  at 50m depth) is station 87 at  $25^\circ\text{W}$  (marked with a white cross in figure 5). The nitrate concentration at this station at 50m depth is  $0.25\ \mu\text{mol/l}$  and the nitrite concentration is below the detection limit. Another station which is remarkable

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in this regard is station 67 ( $11^\circ\text{N}$ ,  $30^\circ\text{W}$ ), which has  $\delta^{15}\text{N}$  of  $-3\text{‰}$  at 40m depth, with a nitrate concentration of  $0.20\ \mu\text{mol/l}$  and an undetectable concentration of nitrite. While these values appear to be too deep to be influenced by atmospheric input, in fact the mixed layer is indeed deeper at these stations: 40-50 m instead of 20m. Thus, we believe, that the low  $\delta^{15}\text{N}$  signal at these stations could also originate from atmospheric deposition.

To be conservative, we only included the upper 20m water column for our calculations in the Table 1. Furthermore, these calculations were meant to be qualitative and intended to show that this signal indeed can come from atmospheric deposition under extreme conditions.

Unfortunately, we do not have data from PON from this cruise, thus we cannot estimate the signal from remineralized organic matter.

The comment on fractionation factors is not clear to us. We did estimate the fractionation factor for denitrification within OMZ in the Pacific region (section 4.2.2). Using a closed system Rayleigh model resulted in comparatively low value of  $11.4\text{‰}$ . An open system approach would only decrease this value even more (Altabet 2007).

We calculated the overall  $\delta^{15}\text{N}$  as the concentration weighed average of the  $\text{NO}_3^-$  and  $\text{NO}_2^-$   $\delta^{15}\text{N}$  values which is the same as using proportions. We will reformulate the text accordingly to be more precise.

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