Reviewer report on "Presumptive nitrification in the oligotrophic Atlantic Ocean"

The revision has addressed my previous concerns on the methodology part (sensitivity and accuracy of R_{NO2-} measurement under extreme low concentration); and partly answer my curiosity about the hemispheric differences of the R_{NO2-}. While I am not convinced by the conclusion that NO_2^- production by phytoplankton is insignificant throughout the study area and all depths.

Line 1: 'Presumptive nitrification' is not clear enough to the audience. I would suggest using 'nitrite production'.

Lines 419-430: The conclusion is made on the assumption that NO_2^- release during assimilative NO_3^- reduction is negligible in NO_3^- depleted water. i.e., the upper mixed layer of the oligotrophic ocean. However, NO_2^- production via NO_3^- reduction has been measured above the nitracline. The rate is higher than NH_4^+ oxidation in both the California Current (Santoro et al., 2013) and the North Pacific Subtropical Gyre (Wan et al., 2021), suggesting a considerable fraction of NO_2^-, is contributed by phytoplankton even in the nutrient-depleted water. On the other hand, NH_4^+ oxidation is frequently to be found at a rate 'below the detection limit' using $^{15}NH_4^+$ labelling incubation at the surface ocean (i.e., Horak et al., 2013; Santoro et al., 2013; Shiozaki et al., 2016), demonstrating extreme low activity of marine AOO in the surface layer of the oligotrophic ocean. These results indicate that at least a certain fraction of NO_2^- is contributed by phytoplankton in the mixed layer.

Lines 431-453: Accumulating evidence demonstrates that NH_4^+ oxidation is the main source of NO_2^- at the lower euphotic zone (i.e., the primary mechanism that sustains the PNM). The contribution of NH_4^+ oxidation to PNM ranged from ~70% to ~90% in different studies (i.e. Buchwald and Casciotti, 2013; Chen et al., 2021; Santoro et al., 2013; Wan et al., 2021). It's better to review the literature to provide a more comprehensive statement on the contribution of NO_3^- reduction to NO_2^- at the PNM layer. And again, the NO_2^- release during assimilative NO_3^- reduction is not negligible.

Lines 454-473: I agree that at a depth of 0.1% of PAR, NO_2^- production should be predominated by NH_4^+ oxidation as the growth of phytoplankton is limited by the dim light. However, the statement that 'The fact that such elevated NO3- concentrations persist at this depth (an average of 8.2±7.1 μmol L-1 was measured) implied that NO3- was not an important N-source for photosynthetic cells.' is not justified. The high NO_3^- concentration at the subsurface water indicates that NO3- supply rate is higher than NO3- assimilation rate due to the light limitation, it cannot tell the nutrient structure (i.e. NO3- vs. NH4+ or DON) by the phytoplankton.

Lines 486-493: Inhibition of marine nitrifiers by light has been well demonstrated in numerous studies, and the rate measured in the present study (1.2±1.9 nmol/d) appears to be lower than the rate collected from 24h incubation (2.9±2.4 nmol/d). I agree with the statement that 'Results presented here may represent a lower limit for RNO2', but not for the idea that 'the exclusion of a dark phase to the incubations used here had no significant impact on average values between studies'.

Ref.

Buchwald and Casciotti, 2013. Isotopic ratios of nitrite as tracers of the sources and age of oceanic nitrite

Chen et al., 2021. Nitrite cycle indicated by dual isotopes in the northern South China Sea

Horak et al., 2013. Ammonia oxidation kinetics and temperature sensitivity of a natural marine community dominated by Archaea

Santoro et al., 2013. Measurements of nitrite production in and around the primary nitrite maximum in the central California Current

Shiozaki et al., 2016. Nitrification and its influence on biogeochemical cycles from the equatorial Pacific to the Arctic Ocean

Wan et al., 2021. Phytoplankton-nitrifier interactions control the geographic distribution of nitrite in the upper ocean