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Interactive comment on "Quantification of multiple simultaneously occurring nitrogen flows in the euphotic ocean" *by* Min Nina Xu et al.

Anonymous Referee #3

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Xu and coworkers present a study of nitrogen cycling processes in two contrasting surface water environments in coastal China and the northwest Pacific Ocean. They use a 'matrix method' for calculating the competing simultaneous processes of N uptake and remineralization.

My main comments on the manuscript are: 1. The manuscript would be stronger if a wider range of environments with varying relative importances of the different processes were examined. At present, the manuscript really just addresses two incubation experiments taken from high light environments.

2. The manuscript should include a deeper discussion of the results beyond just the new method, extending to the actual ecology of the processes being examined. For example, the finding that varying the remineralization rate does not affect the nitrifi-

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Discussion paper

cation rate seems significant, though potentially an artifact of the samples chosen for investigation (see #1 above).

Specific comments: There is an over emphasis on the novelty of this work being 'abandoning inhibitors', as most stable isotope labeling papers in the last decade have not used inhibitors to actually calculate rates, but rather to inform specific groups of organisms that might be contributing to a specific process. This is the case for many of the papers incorrectly cited in lines 61-63.

80% surface light intensity is a very high light intensity for trying to measure nitrification. I would suggest noting in the discussion that the contribution from nitrification to 15N uptake might be considerably different at lower (e.g. 1-10%) surface irradiance. This is somewhat alluded to in lines 381-384, but the implications could be discussed more explicitly.

Line 539: Are rates (nmol L-1 h-1) or rate constants (h-1) being compared here? Clarify language. Also, the phrase 'their nitrate uptake rate' is confusing . . .I think what is meant is 'nitrate uptake calculated using their method'

Line 562: The discussion about the relevance of this research to PNM dynamics is not warranted based on the results presented here.

Table 3: The column title 'Santoro et al.' should be clarified to say 'Rate calculation of Santoro et al' and units should be clarified for all columns (see comment above about rates versus rate constants). Table 2 has the NOx uptake rate constant (k) as 0.059 h-1, but this same value is listed as a rate (nM h-1) in Table 3.

Small errors, typos, etc.

Line 57: 'manily' should be 'mainly' Line 182: is sulfamic, not sulfanilic meant here? Line 482: 'resut' should be 'result'

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