

Biogeosciences Discuss., referee comment RC1  
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## Comment on bg-2021-170

Anonymous Referee #1

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Referee comment on "Simultaneous assessment of oxygen- and nitrate-based net community production in a temperate shelf sea from a single ocean glider" by Tom Hull et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-170-RC1>, 2021

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This manuscript provides measurements of O<sub>2</sub>-derived NCP and NO<sub>x</sub>-derived NCP in a shallow shelf sea environment. UEA and CEFAS have established a strong track record in autonomous Seaglider measurements in this region, and the datasets presented in this manuscript will be a useful contribution. Below are a number of comments below designed to improve the manuscript

1. The initial O<sub>2</sub> and NO<sub>3</sub>-derived NCP estimates from autonomous vehicles were first pioneered by Ken Johnson approx 10-12 years ago. I think O<sub>2</sub> based NCP estimates are now fairly common and so the authors dont need to highlight the novelty of autonomous measurements (Lines 94-104). Instead the authors should describe how the SeaGlider sampling strategy was designed to accomplish the study objectives. This information is currently missing from the manuscript. i.e. what was the scientific motivation behind the East-West transects conducted by the SeaGlider. Not a N-S, butterfly, Eulerian, Lagrangian approach?
2. The manuscript has way too many distractions from the main topic of NCP in shelf seas. This is evident in the abstract where the authors do not provide measured values and becomes highly evident where in the Introduction where only a few lines (Lines 75-77) are about NCP. The rest is about carbon cycling, the Dogger bank ecosystem, deoxygenation, and an AlterECO project. Some NCP concepts are introduced in the methods (Lines 179-181 and Discussion (Lines 274-276) and these should be moved to the Introduction.
3. There are several other distractions in the manuscript which divert the readers attention away from NCP. These include include the buoy-derived measurements from 12-14 years ago and the in-depth discussion about O<sub>2</sub>:N stoichiometry. I suggest the authors think carefully about the content and whether they wish to present a NCP-focused manuscript, a buoy vs SeaGlider comparison manuscript, or an ecosystem-overview manuscript. At the moment the manuscript tries to cover all three topics and it causes the reader to get a little lost.

4. I dislike the units for O<sub>2</sub> and NO<sub>3</sub> used in Figure 2, the O<sub>2</sub> mass balance units presented in Figure 4, and the units used in Table 1. For example, Columns 4 and 5 in Table 1 should state O<sub>2</sub>-based NCP and NO<sub>3</sub>-based NCP and provide the depth-integrated units. You will lose readers if the data is presented in its current format. I don't think the existing format is used by the productivity/autonomous community.

5. Abstract Line 1 and Introduction Line 13 I dislike the description 'ecosystem services' in this manuscript. The publication will (hopefully) be read by non-English speaking readers and they will have no idea what this refers to

6. Abstract Lines 5-10, see comment #2, I was confused why the authors chose to focus on elemental stoichiometry in the abstracts.

7. Line 122 - Initially I wanted to see SML and BML plotted on Figure 2 as I thought it was relevant information but on Line 133, you state that the definition of SML or BML has minimal impact, so now I am wondering why you bothered to even mention it.

8. Figure 1. Where is the mean tidal ellipse shown in red? Is there any significance to the SeaGlider operations occurring ~50 miles to the north of the buoys from 12 years ago?

9. Figure 2. Did you not have a fluorometer? Why is chlorophyll not shown? Seems like this is an obvious biomarker for a phytoplankton bloom

10. Figure 6. I am not sure why observations from 2007-2008 are being compared to 2019. I understand they record NO<sub>3</sub> decline during the spring bloom but why not just include them as an extra Line in Table 2. In the current format, the readers attention gets distracted from the Seaglider observations.