

Dear Mr. Debany Fonseca-Batista,

I have again reviewed your ms on my own and unfortunately it cannot be published at its present form.

As you may still remember the key problem of your manuscript is the lack of logics, although the data have potential of publication.

PLEASE STAY FOCUSE on what you wanna convey as stated in the title: "Evidence of high N<sub>2</sub> fixation rates in productive waters of the temperate Northeast Atlantic". Based on this title, the authors would expect to see the direct evidence for (1) N<sub>2</sub> fixation rate; (2) productive water, i.e., <sup>13</sup>C inorganic uptake; AND the reason behind it including (3) water nutrient and pigment; (4) taxonomic identity of N fixer; (4) environmental force determining the N<sub>2</sub> fixation and inorganic <sup>13</sup>C uptake.

Therefore, in the abstract, it is important to show your key findings in a logic way. i.e., you have observed N<sub>2</sub> fixation at 8 stations out of 10 sampled; you also need to show the flux and importance of inorganic <sup>13</sup>C uptake. Then you might explain what environmental variables play a key role in regulating N<sub>2</sub> fixation and <sup>13</sup>CO<sub>3</sub> uptake, in addition to the taxonomic identity of N<sub>2</sub> fixation. Meanwhile, you could explain why the extraordinarily high rate of N<sub>2</sub> fixation occurred.

Your current abstract cannot be published, and please first revise the Result section (figures and tables), and then materials and methods, then abstract.

Once again, I would like to emphasize that your ms has potential of publication, but it should be organized in a straightforward manner regarding the key findings you want to show.

If you do not want spend more time on it, it is also acceptable that you can notify the editorial office to withdraw this BG submission, and then seek for publication of this study somewhere else.

Best wishes

Zhongjun Jia

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Comments to bg-2018-220

**Abstract**

- (1) L26. Please delete the following phrase. (65 and 45 nmol N L<sup>-1</sup> d<sup>-1</sup> at surface level, respectively).
- (2) L27. Please delete the following sentence. "Although diazotrophic activity was not detected at two northern stations in the central Bay of Biscay". It is not necessary to emphasize these negative two sites. The authors can simply focus on the 8 sites where N<sub>2</sub> fixation occurred during

the sampling period.

- (3) L28. Might contribute to 1-3% of euphotic layer daily PP
- (4) L29-32. Please delete the following sentence. In the Atlantic Ocean, N<sub>2</sub> fixation rates exceeding 1000 μmol N m<sup>-2</sup> d<sup>-1</sup> have previously only been reported in the temperate and tropical western North Atlantic waters having coastal, shelf or mesohaline characteristics, as opposed to the mostly open ocean conditions studied here.
- (5) L35-37. Please delete the description of the early study, while emphasize your own results.
- (6) L37-40. Please rephrase the following statement, and delete the description of early study. Earlier studies in the Iberian region were conducted largely outside the bloom period, unlike the present work which was carried out in spring, yet in all cases the assessment of *nifH* gene diversity, suggests a predominance of UCYN-A and non-cyanobacterial diazotrophs.

Materials and Methods. It should be re-structured as following.

- (1) 2.1. Site description and water sample collection
- (2) 2.2. N<sub>2</sub> fixation Measurement
- (3) 2.3. inorganic uptake determination
- (4) 2.3. Physicochemical and biological properties of oceanic water
- (5) 2.4. DNA extraction and illumine sequencing of *nifH* genes
- (6) 2.5. Statistical analysis

In addition

- (7) The present writing could be improved for reading with great ease. The authors need to specifically describe how the water were sampled for determination of various properties. For example, L107, where the 12 or 14 Niskin bottles were placed (at depth) for seawater sampling?
- (8) The methodological description for environmental condition assessment (such as nitrate measurement) should be placed after the description of sample collection
- (9) L121-124. This part could be placed in the section 2.1 as sample collection for N<sub>2</sub> fixation and primary production
- (10) L130. 13C-HCO<sub>2</sub> spiking could be placed in a separate paragraph.

Results. It should be re-structured as following.

- (7) 3.1. Inorganic 13C assimilation and N<sub>2</sub> fixation. NEW figure 2, it can be made by combining Fig. 4ab and Fig. 5ab in the original ms as NEW Figure 2abcd. In this section, please describe the 13C changes of organic matter, instead of using the term primary production. Or you may start the paragraph by saying that the primary production was assessed by the increase of 13C in organic carbon
- (8) 3.2. Water nutrients and pigment distribution. NEW Figure 3. It can be made by combining Figure 3 and Figure 4c and Figure 4d in the original ms.
- (9) 3.3. Taxonomic identities of N<sub>2</sub> fixers. NEW Figure 4. It is the supplementary Figure S1.
- (10) 3.4. Environmental determinants of N<sub>2</sub> fixation in productive water. NEW Figure 5. i.e. the Figure 6 in the original manuscript.

The figure 2 in the current ms about water mass could be placed in the supplementary section.