

## Reviewer 1

This manuscript by Kolomijeca et al. addresses the environmentally important ocean methane paradox (OMP) and both widens and confirms previous studies in this field. Most importantly, their work seems to be rooted on a solid dataset, comprising many parameters, thereby allowing interesting insights into this phenomenon. It also seems to be clear that the two investigated cyanobacterial organisms significantly contribute to methane formation in the marine environment. Still, it does not become fully clear how great the contribution of these organisms to the overall OMP, in comparison to other marine species, really is – this point should be more openly addressed (also if a clear answer cannot be provided). Furthermore, spelling/grammar of the manuscript require minor improvements. Overall, this manuscript provides important field data that (i) confirm and describe the OMP more closely and (ii) thereby help to provide a solid base for future, more mechanistic studies.

## Response to Reviewer 1:

We thank the reviewer for this feedback and appreciate the concerns regarding the individual contribution of both *Prochlorococcus* and *Synechococcus* to OMP. The authors note, that the scope of this work was not to measure and quantify the specific methane production by these two prominent primary producers, but to correlate their occurrence and distribution to areas of interest in regards to oceanic methane production in order to highlight the involvement of the cyanobacterial community towards the OMP. Furthermore, we provide insight into the metabolic mechanisms involved in methane production and relate these to concurring nutrient regimes present in the area of study. However, we agree, that there was a need to further discuss the individual contribution of different primary producers to oceanic methane production and we now include a paragraph in the discussion presenting individual rates of methane production from other studies for different primary producers, including both mentioned in the present manuscript and other abundant groups. The authors would like to mention, that to measure individual methane production rates in situ is rather difficult and requires additional experimental design and setup, i.e. mesocosms and/or sensor-controlled incubation settings and the distinction of individual rates per organism would be further complicated when using natural communities. As stated by the reviewer, our work provides a solid base for future research of the OMP, which should focus on such further developed experimental studies to estimate individual rates of different marine organisms. Here, we present observational high-resolution data to highlight the need for further research regarding OMP. Lastly, we improved the language of our manuscript and hope that we could satisfy the reviewer's comments with the revised version. We would like to thank the reviewer again and hope that the revised manuscript will be considered for acceptance.

On behalf of all authors,

Anna Kolomijeca

Reviewer 2

I support the publication of this paper. The observations and analysis discussed in this paper were clearly described and the results support the conclusions drawn. The overall objective of the manuscript "An update on dissolved methane distribution in the North subtropical Atlantic Ocean" by Kolomijeca et al. is good and is a useful contribution to the understanding of the release of methane from the oceans or the ocean methane paradox (OMP) and the factors that control the concentration distribution and the flux of CH<sub>4</sub>. The results discussed in the paper support the hypothesis that cyanobacteria play a role in regulating CH<sub>4</sub> concentrations in upper waters with higher oxygen concentrations. The types of measurements made and the analysis completed are very good. Additional work needs to be done to show that the mechanisms suggested are really occurring in the natural environment. This paper supports this direction of future research. There were only a few minor typos.

Response to Reviewer 2:

The authors would like to thank the reviewer for this feedback and are pleased that it was received well. We appreciate, that the reviewer shares our view that cyanobacteria might play a significant role towards the OMP. We do agree, that additional work is needed, both in investigating the occurrence of the mechanisms of methane production, described in this manuscript, in a natural environment and also to estimate specific rates of methane production in natural communities. However, this was not the scope of this work, but to provide a fundamental understanding of the role cyanobacteria play in the OMP. In our revised manuscript, we do now include a paragraph discussing individual rates of methane production of different marine primary producers, including both mentioned in our paper. We note, that there clearly is need for further research and would like to provide a basis with this manuscript present and enable research to proceed in this direction. Further, we did appreciate the reviewers comment regarding the language and worked over the manuscript. The authors would like to thank the reviewer again for his feedback and hope that the revised manuscript will be satisfactory and considered for publication.

On behalf of all authors,

Anna Kolomijeca