

Interactive comment on “Ideas and perspectives: A strategic assessment of methane and nitrous oxide measurements in the marine environment” by Samuel T. Wilson et al.

Anonymous Referee #2

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The authors here put together a comprehensive review of oceanic CH₄ and N₂O measurements and state of the knowledge. As an “ideas and prospectives” paper that is lead by the world’s best in this field, this contribution is important. This is a timely review with respect to methane especially because of the recent global methane budget which just came out through the global carbon project. In terms of the journal required review criteria: 1. Does the paper address relevant scientific questions within the scope of BG? Yes, the scientific questions they bring up in the review is relevant to BG 2. Does the paper present novel concepts, ideas, tools, or data? As a review paper, they do not bring up novel concepts, but they bring together many concepts in a novel way so I think this paper checks this box. 3. Are substantial conclusions reached? They give

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three key initiatives they are pushing with their review. If these initiatives are followed, the scientific consequences for oceanic methane and N₂O science to really move forward is clear. 4. Are the scientific methods and assumptions valid and clearly outlined? NA 5. Are the results sufficient to support the interpretations and conclusions? NA 6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? NA 7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? For the most part, yes. 8. Does the title clearly reflect the contents of the paper? yes 9. Does the abstract provide a concise and complete summary? yes 10. Is the overall presentation well structured and clear? yes 11. Is the language fluent and precise? yes 12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? NA 13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? no 14. Are the number and quality of references appropriate? For the most part 15. Is the amount and quality of supplementary material appropriate? NA Specific comments: Line 42: reference should be 23, not 22 Line 56: It was good to see the “numerical modeling” portion in the abstract. And modeling came up throughout the review, but it might be more informative to have a section dedicated to what is needed for these models, in a comprehensive way. Specifically, what sort of temporal and spatial resolution is needed? What sort of precision on measurements is required? Line 141: check out: Gelesh, L., et al (2016). Methane concentrations increase in bottom waters during summertime anoxia in the highly eutrophic estuary, Chesapeake Bay, USA. *Limnology and Oceanography* 61, S253-S266. Line 172: can you be more specific on what predictor variables are for methane and what are for N₂O? Just separate the citations here for which gas they focus on and what they find are the predictors Line 190: “other processes”. Please elaborate on what processes you mean here. Line 197: check out: Lorenzen, T.D., Griener, J., and Coffin, R.B. (2016). Dissolved methane in the Beaufort Sea and the Arctic Ocean, 1992–2009; sources and atmospheric flux. *Limnology and Oceanography* 61, 300-323. And, Lapham, L., et al (2017). Dissolved methane concentrations in

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the water column and surface sediments of Hanna Shoal and Barrow Canyon, Northern Chukchi Sea. *Deep-Sea Research II* doi: 10.1016/j.dsr2.2017.01.004. Line 220: check out: Lapham, L., et al (2013). Temporal variability of in situ methane concentrations in gas hydrate-bearing sediments near Bullseye Vent. *Geochemistry, Geophysics, Geosystems* 14, 2445-2459. Line 242: check out: Grant, N., J., and Whiticar, M.J. (2002). Stable carbon isotopic evidence for methane oxidation in plumes above Hydrate Ridge, Cascadia Oregon Margin. *Global biogeochemical cycles* 16 (4), 1-13.

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