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Interactive comment on "Nitrous oxide variability at sub-kilometre resolution in the Atlantic sector of the Southern Ocean" *by* Imke Grefe et al.

Anonymous Referee #1

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The manuscript by Grefe and coauthors describes nitrous oxide concentrations (and thereby saturation and air-sea exchange) in the Southern Ocean. Data is provided from underway measurements conducted during a 18 day and a 14 day expedition. The dataset serves as a reminder that nitrous oxide can be both super-saturated and under-saturated at high latitudes and demonstrates that underway measurements allow concentrations to be attributed to physical features such as frontal systems which presumably have increased biomass and microbial activity. The manuscript is well-written, well-presented, and builds off a previous methodological paper by the same authors.

The biggest drawback to this manuscript is the short length and lack of novelty. The stated objective of the manuscript is to address the lack of nitrous oxide measurements in the Southern Ocean, yet only 14 days of measurements in the Southern

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Discussion paper

Ocean (cruise ID: JR255A) are presented. It's not clear to me how much of the 18 day expedition (cruise ID: JR260B) which went from the Falkland Islands to S Georgia took place in the Southern Ocean which as I understand is defined as the area south of the Antarctic Convergence. I realize the importance of field data and believe these measurements to have been conducted to a high standard, but with limited data the interpretation is limited and the reader is left wondering what new information or insight did I learn from reading this article.

I recommend this article be considered as a technical note or combined with other datasets for a more substantial contribution.

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Discussion paper