

## **Response to reviewer comments for manuscript number: acp-2019-1052**

Comments by the reviewers are shown in an italic typeface and the responses are shown in a normal typeface.

We thank both the reviewers for providing further constructive comments and suggestions to our modified manuscript and are glad that they both find it worthy of publication pending minor changes. The following is a point by point response, with corresponding changes made to the manuscript. We hope that the manuscript will now be acceptable with these changes.

### ***Report #1***

*The authors should address the following general points before publication can be suggested:*

We thank the referee for the comments and have responded to them below.

*-Measurement, flux parametrization, and model details, errors and uncertainties:*

*>Discuss the impact of using 1 hourly averaged winds. Add the measurements details (shortly) into your paper as well.*

Response: We referee is right in suggesting that using hourly averaged winds for flux parameterisation would add to the uncertainty. The main issue is that the high temporal resolution variability of the instantaneous flux would be underestimated. The reason for doing this is to match the temporal resolution to the model output. We have now added a sentence regarding this caveat in the manuscript. 'The fluxes were calculated using the hourly wind speeds for the results to be comparable with model outputs as described below. This would result in a loss of high temporal resolution emission variability, but considering the frequency of the iodide and IO observations, computing the fluxes at a higher resolution would not give any extra information.' (line 505-508)

*-Indian Ocean:*

*>Discuss the impact of Indian Ocean variability (seasons and regions) of currents and Chla on their results (see e.g. SIBER report for details).*

Response: Whilst exploring the variability in the Indian Ocean on a regional and seasonal scale is important, we do not have enough observations to discuss these in detail. All our observations are during the same season and hence any such discussion would be speculative in nature. The cruises discussed in the paper are held during the austral summer and show similar chlorophyll-*a* concentrations (Figure 4). Hence, we feel that this discussion is beyond the scope of the paper, and something that should be explored in the future.

*-Earlier studies:*

*>The mentioned IO, I2 data are "published" in the corresponding ship cruise reports.*

The I<sub>2</sub> data is not measured but estimated. This paper brings together past reports along with new data from the ISOE-9, SK-333 and BoBBLE cruises. IO data for cruise ISOE-9 are not reported before and measurements of iodide were done for the first time in the Indian Ocean. The earlier reports of IO have been cited in the manuscript.

## **Report #2**

*My previous recommendations for major revisions have been substantially addressed. The publication of Chance et al., 2020 in the interim has obviated my remaining concern. Improvements to the figures and the transparent presentation of statistical method in particular are to be praised. I have the following minor technical comments.*

We thank the reviewer for the kind comments and are glad to see that the changes made have made the manuscript more understandable. The minor corrections suggested have been made according to the points below.

*Line 635: While likely clear from context, it may help to specify here that these are surface wind speeds in the models. Are these wind speeds meant to be fully comparable to U10? Clarification of this here or elsewhere would be helpful.*

Response: Yes, the winds used in models are surface winds and are the closest match that the models have to U10. This has been now made clear on line 635. The line added is ‘...and hence fluxes calculated using the surface winds in these models are expected to be slightly different.’

*Line 1136: "observed" here is in red when it should be in black.*

Response: Changed.

*Table 2: 'sst' here should be consistently capitalized as 'SST' in the table, caption, and footnotes for consistency with the rest of the manuscript.*

Response: Changed.

## References

Chance, R., Liselotte, T., Sarkar, A., Sinha, A. K., Mahajan, A. S., Chacko, R., Sabu, P., Roy, R., Jickells, T. D., Stevens, D., Wadley, M. and Carpenter, L. J.: Surface Inorganic Iodine Speciation in the Indian and Southern Oceans from 12o N to 70o S, Earth Sp. Sci. Open Arch., 36, doi:10.1002/essoar.10502894.1, 2020.

Mahajan, A. S., Tinel, L., Hulswar, S., Cuevas, C. A., Wang, S., Ghude, S., Naik, R. K., Mishra, R. K., Sabu, P., Sarkar, A., Anilkumar, N. and Saiz Lopez, A.: Observations of iodine oxide in the Indian Ocean Marine Boundary Layer: a transect from the tropics to the high latitudes, *Atmos. Environ.* X, 1(January), 100016, doi:10.1016/j.aeaoa.2019.100016, 2019a.

Mahajan, A. S., Tinel, L., Sarkar, A., Chance, R., Carpenter, L. J., Hulswar, S., Mali, P., Prakash, S. and Vinayachandran, P. N.: Understanding Iodine Chemistry Over the Northern and Equatorial Indian Ocean, *J. Geophys. Res. Atmos.*, (x), 2018JD029063, doi:10.1029/2018JD029063, 2019b.