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Interactive comment on "Monthly resolved modelled oceanic emissions of carbonyl sulfide and carbon disulfide for the period 2000–2019" *by* Sinikka T. Lennartz et al.

Anonymous Referee #2

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Monthly resolved modelled oceanic emissions of carbonyl sulfide and carbon disulfide for the period 2000–2019

This is a well written paper that provides up-to-date, gridded OCS and CS2 oceanic fluxes that have been evaluated against ocean surface layer observations. These fluxes are a badly needed update to products used in global models of OCS and will enable the community to better constrain the "missing" component of the OCS budget.

line 49: I would say multiple trace gases, rather than both. That would still be true. line 51: comparably? Technically you would have to say compared to what in the same sentence. You could say better understood than CS2. line 52: I had to admit that I

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had to look up Diapycnal... line 64: I would say the mechanism is not well understood rather than well known.

What is the sign of dOCS_ase in Eqn 1? Should it be negative for release of OCS from the sea to the air?

line 168: Is there a reason you don't run the model at 0.25 x 0.25 degree instead of coarsening it to 2.8o? It would be good to add a sentence here justifying it.

line 175: How much uncertainty is introduced by using the 15th of the month instead of the monthly average conditions? I doubt it's too much but it would be good to have an idea of the magnitude mentioned here

line 205: I'd be careful to clarify that its a missing OCS source. Not CS2 as is implied with the wording here.

line 209: How realistic is that assumption (0ppt atmosphere)? And how dependent is the net source vs sink of this atmospheric conc? ie. How much CS2 would you need to have in the atmosphere to stop the net emission?

Fig 3: What is going on in 2019 to have so many negative OCS fluxes (Fig 4 suggests 60-90N might be driving this; Fig5 says combined CDOM and wind minimum)? And what happened in 2017 that there is year-round flux (seems like high Arctic is really high; CDOM also really high)? A sentence or two would be really interesting. I was expecting something different in 2015/2016 for the El Nino too. Could you mention why there is no significant change for that period?

line 290: CS2 emissions correlate with temperature even though no direct driver. If you look at a specific lat/time (ie. hold radiation ~constant) does that correlation hold over the various years?

Section 4.4: What is the slope of the fit in Fig 6b? This is a really great comparison so I wonder if you could calculate a correction factor from the bias to apply based on the comparison with the data? Fig 6d: the Yellow dots are a little hard to see. Could you

add an outline to the symbols or something?

line 334: A sentence here explaining what the difference is between the cruises would be useful. Even just to call out the different areas sampled Fig 6d inset

line 348: I would say explicitly OCS and CS2 (instead of both) as its your last paragraph of discussion and people often flick through to check it out (like a conclusions section)

line 360. This is a great paper! Nice job. My one question at the end was: Did you find evidence for the large oceanic source that the top down studies were saying had to be there? Based on everything you presented here, the answer is no. And I think it's ok to say that! This is still a great product that the modelers will need to find the real source of the budget mismatch.

Interactive comment on Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2020-389, 2020.