

Interactive comment on “Satellite ice extent, sea surface temperature, and atmospheric methane trends in the Barents and Kara Seas” by Ira Leifer et al.

Ira Leifer et al.

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Dear Lori Bruhwiler,

Thank you for taking the time to read our manuscript and comment. We fully agree on the importance of validation and will propose to the editor to add a figure on validation – we note that our paper does not analyze terrestrial atmosphere.

Furthermore, we agree that coastlines are challenging to retrieve, and in any case, are not relevant to our analysis. We appreciate your comment as providing an opportunity to improve our manuscript's communication, for example, by highlighting that we do

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not include coastline pixels in the analysis. Similarly, our analysis is not on single pixel values but trends "relative" to the regional trend. This greatly improves the SNR and also greatly reduces TIR retrieval biases. We will expand the discussion on the TIR retrievals as this is a very important aspect that we take very seriously.

Respectfully, the treatment of bubble processes by Ruppel and Kessler 2016 is incorrect, and in disagreement with significant (and ignored) field data; however, it is irrelevant – the issue is not whether the methane is in the form of hydrates or free gas, although it is (coincidentally?) at the HSF, but simply that it is associated with large hydrocarbon reserves that globally are always associated with geologic seepage. WRT the source of this methane, we note that basic Gaussian plume theory, on which we have a publishing track record, cannot explain a narrow plume a hundred kilometers offshore by transport from northern Europe over hundreds of kilometers – the plume would be very broad unless you artificially set turbulence diffusion to near zero.

We will work on the manuscript to improve the clarity in this and the other areas you highlight. A full response to your helpful comments will be posted with response to reviews, as well.

Sincerely The authors

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2018-237>, 2018.

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