

Atmos. Chem. Phys. Discuss., referee comment RC2 https://doi.org/10.5194/acp-2021-705-RC2, 2022 © Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.

Comment on acp-2021-705

Anonymous Referee #2

Referee comment on "Ship-based estimates of momentum transfer coefficient over sea ice and recommendations for its parameterization" by Piyush Srivastava et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-705-RC2, 2022

This paper presents ship-based measurements of near-surface momentum fluxes obtained from two field campaigns namely Arctic Clouds in Summer Experiment (ACSE; July-October 2014) and Arctic Ocean 2016 experiment (AO2016; August-September 2016). Authors have presented over 500 new estimates of surface drag and local sea-ice concentration measurements derived from onboard imagery. The datasets presented here are much larger than those documented in the literature to date and are supposed to be representative of much of the Arctic sea-ice region. This unique dataset is utilized to investigate the relationship between surface drag and sea-ice concentration within the framework suggested by Lupkes et al. (2012), Elvidge et al. (2016), and Lupkes and Gryanik (2015). It is shown that with minor tuning two parameterizations are in well-agreement to the measurements.

Firstly, I would like to emphasize that these types of observations over the Arctic are rare, and it requires huge efforts to collect, process, and analyze measurements like this. Apart from that, processing the over \sim 500, 000 sea-ice images to derive the local sea-ice concentration for each flux period requires enormous effort.

The paper is very interesting and well written, and the authors have brought out the novelty of the study in a logical manner. I have only a few minor comments and suggest publication after minor modification.

(1) Line 74-75: References should be in order.

(2) Is the second dataset Arctic-Ocean 2016 (AO2016) is utilized for the first time for scientific publication? If not, I would suggest adding a reference.

(3) Line 179: Field measurements

(4) Line 190 and other places: eddy-covariance

(5) Line 197: I suggest computational fluid dynamics (CFD) model

(6) Line 211: 7th

(7) Line 223: 10-m

(8) Line 258: Satellite-based

(9) Line 268: References should be in order,

(10) Line 289-291: I think this needs rephrasing.

(11) Line: 382: 'at low an ice concentration'

(12) Line 424: Merely presenting a Figure in the supplementary material doesn't look well. I suggest adding a few lines to explain it.

(13) Table2: This table looks quite interesting and informative. Please correct it- Overland (1985)

Beyond the scope of this paper, I hope to see the validity of the stability-dependent form of the L2015 scheme in future studies. Further, high-quality measurements like this could also be utilized for the analysis of scalar transfer.