

Atmos. Chem. Phys. Discuss., referee comment RC2
<https://doi.org/10.5194/acp-2021-120-RC2>, 2021
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Comment on acp-2021-120

Anonymous Referee #2

Referee comment on "Uncertainties in eddy covariance air-sea CO₂ flux measurements and implications for gas transfer velocity parameterisations" by Yuanxu Dong et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-120-RC2>, 2021

General Comments:

This paper presents a comprehensive analysis of uncertainties in eddy covariance flux measurements over the ocean, discussing in detail the separation of systematic from random noise with a thorough overview of different methods for estimating the latter. The authors clearly demonstrate that with current top-end commercial gas analyzers, instrumental noise no longer contributes significantly to the flux uncertainty, this being dominated by variance associated with the nature of turbulent transport. The paper is very well written and structured, and may serve as an excellent reference for researchers looking for a state-of-the-art starting point for uncertainty analysis.

Specific Comments:

Line 40, Eq 1: perhaps briefly explain the "660" for those readers unfamiliar with gas transfer velocity parameterizations

L76: Li-COR Inc. USA

L79: expected fluxes

L80: ... 2011). This problem is generally considered ...

L124: Comment on the deflection of the streamlines from horizontal and effects on the vertical wind component

L133: add the Reynolds number for completeness

Fig. 3: adding a schematic explanation similar to that in Fig. 7a would clarify the method of separating the white noise from the total variance.

L432: should be Eq. 8

L504 etc.: eliminate the space between : and signal; otherwise the colon looks like punctuation.

Fig. A1: I recommend using color schemes that are more distinguishable from each other for sea ice and dFCO₂ (eg. a grey scale for the sea ice coverage).

L942: Chapt. 2