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Comment on acp-2022-593

Anonymous Referee #2

Referee comment on "Impact of cruising speed on the ship-based sampling of marine fog frequency" by Li Yi and King-Fai Li, Atmos. Chem. Phys. Discuss.,
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This paper is an attempt to introduce corrections to the ICOADS-based fog climatology maps to account for 'target-induced' biases. The aspect considered is the ship speed. The paper is clearly written and straightforward. Unfortunately, there is a fundamental weakness in the paper because of the wrong assumptions made with regard to fog observations. The calculations assume that the observations are made at regular [high] frequencies, and the correction factor introduced assumes that there is a reduction of ship speed upon encountering fog (it is interesting that some of the results show an increase!). However, unless in the case of research ships, which is rare, the reporting to ICOADS is made only in three to six hourly intervals and each fog bank is counted as one event. This makes the correction factor $r(x)$ evaluation incorrect.

In addition, if details such as if high frequency data acquisition is considered as an academic exercise at present, other important sub-grid physics issues need to be taken in to account. The ship traverses a given 1degx1deg grid in a few hours (about 4 hours at 12 knots), and during that time the fog banks appear and disappear within the grid (~ 110 km) so one must consider the space-time intermittency of imbedded fog banks. Such intermittency occurs on tens of minutes to hourly timescales.

In summary, there is a fundamental issue with the assumptions made in deriving the correction factor. It is not useful even in the case that regular-reporting assumption can be satisfied in the distant future, because of the need of considering fog physics in deriving the correction factors in such cases. Given these weaknesses, I cannot recommend publication of this paper in ACP.