

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2021-1071

Anonymous Referee #1

Referee comment on "Vertical aerosol particle exchange in the marine boundary layer estimated from helicopter-borne measurements in the Azores region" by Janine Lückerrath et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-1071-RC1>, 2022

The paper reports a study of vertical aerosol fluxes and vertical concentration profiles in the marine boundary-layer. Three different approaches are used to estimate fluxes using helicopter-based measurements and results are compared. I believe that the topic is interesting and there are elements of innovation especially because the MBL is not frequently studied with these approaches and available information is limited in current scientific literature. I also believe that even if the different methods have relatively large uncertainties, results could give useful insights in the exchanges of particles in the marine boundary layer. The topic is suitable for the Journal.

A few aspects should be made more clear in a revision step as mentioned below.

Lines 50-57. Probably it could also be mentioned the work at Mace Head regarding fluxes focused on sea spray.

Line 99. Better to say less demanding or less difficult rather than less serious.

There is a confusion of time resolution (that should be in s) and frequency (in Hz), for example in line 112 or in Table 1.

Line 113. How have been done the correction for aerosol losses? For this is usually necessary to have a measurement of size distribution.

Lines 116-119. This pendulum motion was seen on meteorological measurements?

It could be useful to discuss how the magnitude of fluxes compare with measurements in different environments that could help the reader to make more sense of the large uncertainties and of the role of counting errors. They seems to be significantly lower than those observed in urban areas but likely larger or comparable with those observed in polar regions.

Median values are used instead of averages for gradient and MLG approach. Is there a reason? I mean did authors verified that it is better compared to the more widely used average values?

Line 223. Better airborne.

Caption of Table 2. It is needed a subscript in zP.

Considering that uncertainties are often quite large and in several instances also the sign of flux could be ambiguous, it would be useful an effort to summarise in the conclusions what can be concluded and what needs further studies regarding particle exchanges in the MBL. It would also be useful to conclude, if possible, what is the more suitable calculation approach for fluxes in the conditions studied.