Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2021-1071

Anonymous Referee #3

Referee comment on "Vertical aerosol particle exchange in the marine boundary layer estimated from helicopter-borne measurements in the Azores region" by Janine Lückerath et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-1071-RC2, 2022

The authors present a novel analysis of airborne (helicopter-based) vertical fluxes of aerosol particle number concentrations. Three separate techniques for deriving vertical fluxes are explored and a systematic discussion of their strengths and weaknesses are included. The authors present a fair assessment of the limitations of the techniques which will be valuable for future analyses. The paper focuses primarily on measurements of the entrainment flux of aerosol from the free troposphere, concluding that in the airmasses sampled here, entrainment could supply 30-40 particles/cm3 per hour to the MBL.

My only comment is that it would be helpful to expand on this last point a bit more to include a short discussion on the sources and sinks of particles in the MBL and the extent to which numbers of this magnitude (30 p/cm3 h) compare with what one might estimate for dry deposition to the ocean surface or that needed to sustain some of the larger NPF events that have been sampled at ENA. This might help the reader (and future scientists) get a better handle to the limitations of this approach in the context of the magnitude of the fluxes required to change particle concentrations in the MBL.