

Reviewer report:

Review of “Model analysis of biases in satellite diagnosed aerosol effect on cloud liquid water path” Harri Kokkola et al., 2024

The authors have done an excellent job incorporating my comments. Thanks for including Figs. S15 and S16, I think the figures are intuitive and helpful. The manuscript is now cohesive and well-presented. I have only a few additional comments and questions for clarification. Recommendation: Minor revision.

1. Lines 38-39: If the authors do not show figures of cloud top pressure, then I suggest not including the detailed description (e.g., 850 hPa-890 hPa) as it lacks sufficient support and is not convincing.

- **Author reply:** We have removed the following sentences “Although some of the variability can come from changes in aerosol, over that region the cloud top effective radius and liquid water path follow the changes in cloud top pressure. The cloud top pressure increases from 850 hPa to 890 hPa going from west to east indicating {boundary layer depth change} which might affect boundary layer dynamics and thus cloud properties.”

2. Lines 114-115. The sentence is duplicated.

- **Author reply:** We have removed the duplicated sentence “Estimates of f_{ad} could possibly be improved combining MODIS/CALIOP observations”.

3. Figs. 1-4 examine the correlation between CDNC and LWP, yet Fig. 5 highlights aggregated CCN and LWP. Would it make more sense to show aggregated CDNC instead, as it is more relevant? CCN data cannot be retrieved from satellites after all.

- **Author reply:** The reason we have CCN on the x-axis illustrates one of our main conclusions that if cloud condensation nuclei concentrations are well-defined, changes in liquid water path due to changes in aerosol can be confidently determined using satellite data. Although CCN cannot be retrieved satellite data, there are for example ways to combine in situ and satellite data to get better estimates of CCN. We have left the Figure as it is and added the following sentence to justify the figure better: “*This indicates that if cloud condensation nuclei concentrations are well-defined, changes in liquid water path due to changes in aerosol can be confidently determined using satellite data.*”