The authors have investigated aerosol-induced changes to cloud properties in shallow maritime tropical clouds. The modelling study demonstrates that increasing the aerosol loading enhances aerosol regeneration at the expense of rainout regardless of aerosol type. Such studies are very important for a process-based understanding of aerosol-cloud interactions. However, clarity and precision are lacking in the manuscript. However, clarity and precision are lacking in the manuscript.

The topic "Aerosol-cloud impacts on aerosol detrainment and rainout in shallow maritime tropical clouds" is of interest and fits the scope of EGUsphere. The paper can be accepted with major revisions. Please see the comments below.

Major Comments:

1. In Figure 1, the schematic illustrates entrainment from the cloud base. Does it mean that there is no lateral and cloud-top entrainment? Then what contributes to the hydrometeor evaporation at the cloud top?

2. The authors clearly explain that at higher aerosol loading, rather than being removed to the surface via rainout, it enhances aerosol regeneration. It is then transported to the free troposphere, where they remain available for reactivation and further aerosol-cloud interactions, which is clearly illustrated in Figure 1, which is a single-layered cloud. Now the question is, how does this relation in a multilayered cloud? So is this finding only apply to single-layer clouds?

3. This study investigates the aerosol impacts on shallow maritime tropical clouds, specifically the influence of aerosol budget. Out of four aerosol types, Mineral dust and ammonium sulphate also can act as INP. From Figure 2, it is evident that the cloud's top height reached up to 7 Km. How does it influence the aerosol budget? Is this also considered by calculating the aerosol budget?

4. Under increased aerosol loadings, the cloud droplets are smaller, and it enhances the cloud albedo. In addition, the regenerated aerosol particle interacts with the radiation. How does aerosol regeneration influences total and effective radiative forcing?

5. It would be much appreciated if you could include the model domain details as well (for example, latitude and longitude) in the experimental setup.

6. In section 2.3, it is mentioned that "..updrafts weaker than 1 ms-1 are necessarily excluded from the analysis". The model domain is over the ocean, and the model is initialised using CAMP^{2}Ex observations. What was the observed range of updraft velocities in CAMP^{2}Ex? I expect for the marine clouds, the updraft between 0.01 to 1 $\mathrm{m\,s^{-1}}$ would be quite strong. Is this a simulated case with a high vertical velocity?

Minor Comments:

1. Page 2, l34; please correct heterogenous to heterogeneous.
2. Page 2, l36; Please change cloud top to cloud tops
3. Table 1; Please expand ERA-5
4. Table 1; Please expand AGL
5. Table 1; Please mention LEAF-3
6. Page 5, l94; "Aerosol particles were initialized in the unactivated aerosol category." Cloud, please elaborate on it; what are these unactivated aerosol categories? It would be easier for the readers to understand.
7. Section 2.3: A very brief explanation of the Tracking and Object-Based Analysis of Clouds (tobac) would be helpful for the readers.
8. Page 8, l146: Is QC means quality control? Then please abbreviate it before (P7, l132).
9. Figure 2: It would be better to have alternative altitude levels (0,2,6,..) for better understanding. Also, please move a bit down the x and y-axis texts.
10. Figure 2 Caption: Please change g kg-1 to $\mathrm{g\,kg^{-1}}$
11. Figure 2 Caption: Please add unit to potential temperature (K).
12. Figure 3: In Figure 3b, At lower initial surface concentration, except ammonium sulfate, all other aerosols increase with initial aerosol mass. An explanation would be useful for the readers.
13. Figure 4: Please add units to the parameters in the figure caption.
14. Figure 5: Please add units to the parameters in the figure caption and to the Figure titles.
15. Saturation effect for the rainout: Would it be possible to show this, perhaps an additional figure?