

Author Responses

We thank the editor for the review and comments concerning the revised manuscript. Our responses and revisions are enumerated below. We would like to note that we made a minor text edit referring to ARMTRAJ's operational product. This edit reflects the progress that has been made in the implementation of ARMTRAJ in the ARM infrastructure since our initial manuscript submission. Thus, in the abstract, we changed "*ARMTRAJ is expected to become...*" to "*ARMTRAJ will soon become...*"

L65: the phrase "the effect of aerosols entrained at cloud top on sink processes in clouds observed over ARM sites using ARM measurements as observational constraints on model simulations initialized using ARMTRAJ data;" is hard to understand please rephrase.

Phrase changed to: "*evaluating the effect of cloud-top aerosol entrainment on sink processes by using ARMTRAJ data and ARM measurements to initialize and force model simulations; and analyzing ...*"

L110: In my opinion, the following sentence requires a citation: "surface measurements are typically the most informative 110 about the sampled aerosol chemical, morphological, microphysical, and radiative properties"

We extended the sentence to clarify that with surface measurements, we do not face the same limitations such as payload properties as in the case of airborne systems: "*... surface measurements are typically the most informative about the sampled aerosol chemical, morphological, microphysical, and radiative properties given fewer limitations such as payload dimensions and weight.*"

We could not find references that explicitly state that. We could have added citations for papers describing airborne systems, but we suspect that readers might miss the direct connection to the text.

L116 consistently -> often (to avoid repetition of the word consistent)

Good point. Changed to "*predominantly*".

L116 and -> nor

Done.

L179 "Concatenate "cloud" samples distant by less than 50 m from each other. " are you referring to distance in the vertical, please clarify

Yes. Modified to "*vertically distant by ...*"

L188 Many studies, e.g., marine stratocumulus cloud studies -> Many studies, such as those on marine stratocumulus clouds...

Done. Thanks.

L188 referred to here as ... -> which in this context refer to the optically ...

Done.

L202 greater -> larger

We think that “greater depths” would be a better fit in this context and therefore prefer to leave the text as is.

Figure 1: CBH is not defined, please do so

Unless we misunderstood the editor’s intention, the figure caption already notes that the green markers represent the cloud base: *“The green markers denote the ARSCL-reported cloud deck base.”*

L231”ARMTRAJ,s 4 datasets” -> ARMTRAJ,s datasets. (too many “fours” in the sentence making it confusing)

Done.

Figure 2: please define the meaning of the bigger circles in the hurricane markers

Unless we misunderstood the editor’s intention here, this is already noted in the figure caption: *“Larger markers denote 24-hour increments from the trajectory initialization time.”*

Please use center and ensemble as in Figure 3 for the legends in the middle and right panels.

We originally had legends in each panel, but this resulted in significant overlap with the plotted curves, and therefore we eventually decided to retain a single legend in each “panel set”.

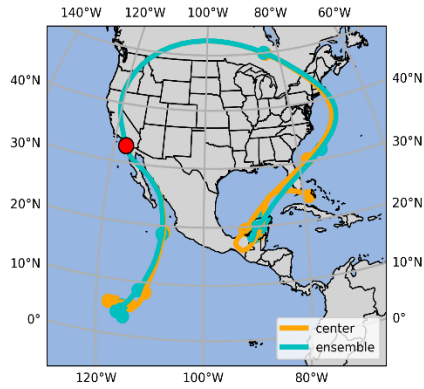
L260: is the sounding observation shown somewhere. I think it should be part of the Figure 2.

We removed from the text that part of the sentence mentioning the sounding. The sounding-based cloud layers were already discussed above and presented in Figure 1.

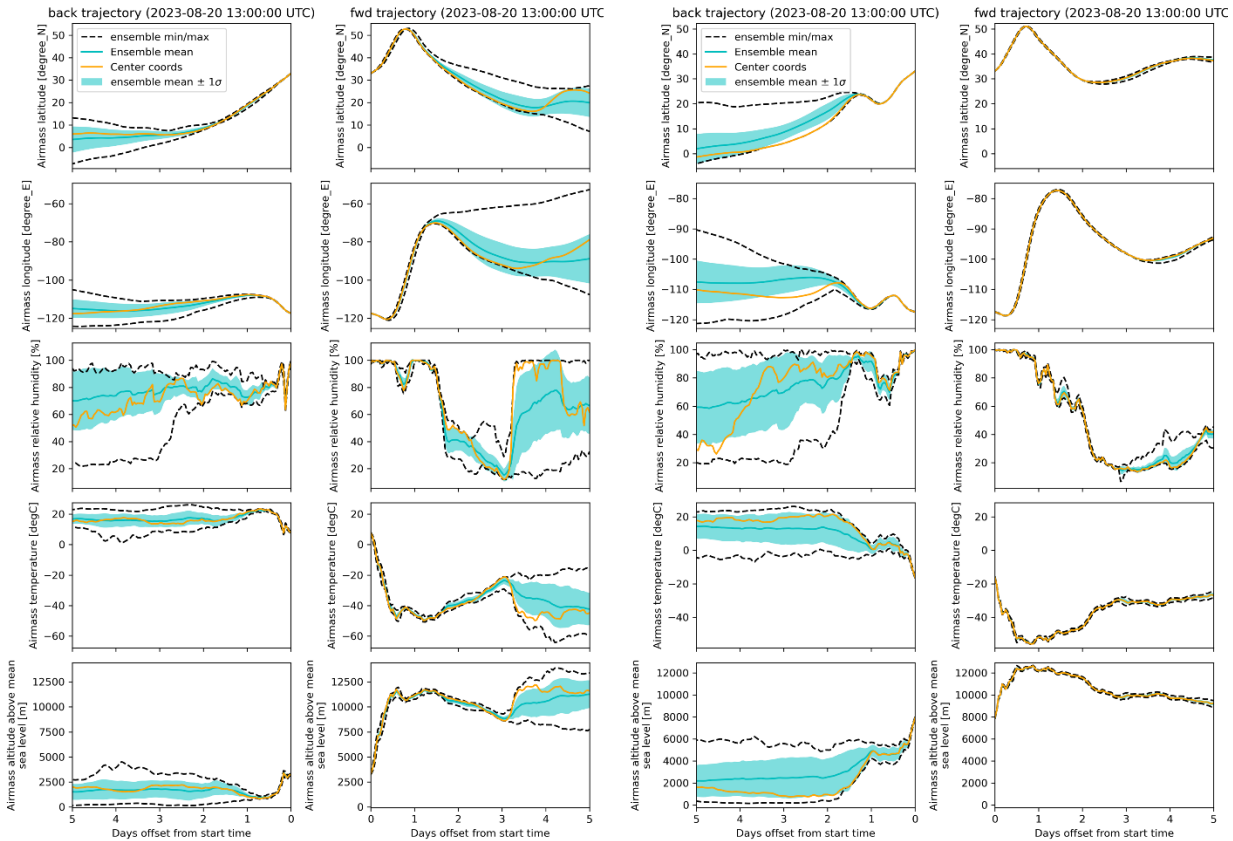
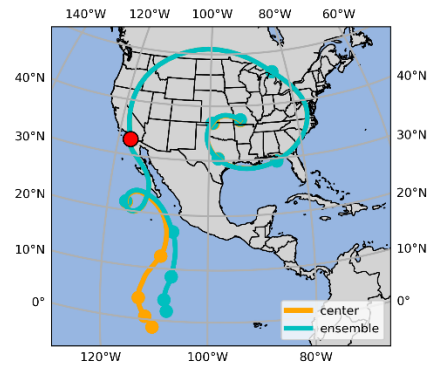
Figure 3: This figure is really confusing because the titles on the left and the right are the same. Please include the altitude launching height to differentiate the two

We agree with the editor and understand the concern. We added a large title to each panel set to accommodate this comment. The updated figure is shown below.

Mid-level cloudy airmass



Upper-level cloudy airmass



L272: “the same mid-level cloudy airmass” -> a mid-level cloudy airmass

Since that is the same cloudy airmass discussed above (Fig. 2) we now clarify that in the text: “... of the same mid-level cloudy airmass discussed above”.

L289: How about the confidence in the back trajectory? Please add a similar sentence.

The sentence was extended to address this point:

“Taken together, these ensemble results suggest low confidence in the airmass forward trajectory properties, especially beyond 2-3 days, and somewhat higher confidence in the airmass back trajectory properties.”

L337: “surface and vegetation properties (implemented in the IFS model and reported in ERA5)” are these reported in the ARMTRAJ data? If yes, please make it clear that this information is included, if not, please explain how to procure it, etc

Yes, this information is included in ARMTRAJ. We corrected the text: “*surface and vegetation properties (implemented in the IFS model and reported in ARMTRAJ) ...*”