Review of: Impact of numerical choices on water conservation in the E3SM Atmosphere Model Version 1 (EAM V1)
by: Kai Zhang, et al.
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I recommend publication after addressing concerns cited below. The paper is a useful description of water conservation errors in EAM V1.

Suggested word changes; if these suggestions are not correct then there are more serious problems that I do not understand in this paper.

1-16: “.. errors in early V1 versions decrease ..”
1-17: “Increased vertical resolution in V1 results ..”
1-20: “.. beneficial for V1.”

2-18: “.. errors in V1α and ..”

3-3: “ .. 30 everywhere ..” I assume this model does not use step-mountain.
3-15: “.. 6 sub-steps of 5 minutes each as ..”

5-1: “..chemical processes that operate on a single vertical column."
5-7: “..passed on ..”

6-11: “.. which includes advection of air mass, momentum, and heat.”

8-20: “.. evaporation and ignoring the heat of sublimation.”
8-32: “.. clipped amount of downward moisture ..”

9-2: “.. received by the sub-surface components ..”
9-3: “.. are unclipped, ..”
9-9: “This can be seen ..”
9-20: “.. used in this alternative ..”

17-5: “.. advection time steps of 5 minutes for each vertical remapping step.”
17-6: “.. increase in linear horizontal resolution),” or “.. increase in Δx),
17-8: “.. advection steps stays at 3 per remapping step.”
17-14: “.. increased to 2 hours, 4 times that of 1° ..”

Confusing things.
3-2: 90*90*6 = 48600. Why are there 2 additional columns on the cube sphere grid.

3-12: How thick are the 14 layers over mountains?

6-Fig2: It should be mentioned that this diagram shows processes of the stadium shaped cells of Figure 1, that (a) relates to se_type = 1, and (b) relates to se_type 0. From what I understand, that are 3 se_rsplit steps for each se_nsplit which makes the diagram misleading. I suggest you discard Figure 2 and explain its contents in the text.

6-11 to 7-3: Clean this up. According to Table 4 there are 2 to 3 r steps for each n step. Make this clear. Mention that humidity advection is grouped with dynamical advection or with tracers depending on model version.

7-22 to 7-24: Does this sentence apply to all se-ftypes? If so, move it.

8-27: Say more about the time stepping method. Is it explicit ? If it is implicit, is it intelligent enough no recognize the availability of water vapor in the boundary layers and not just the lowest layer?

9-22: Do these errors occur consistently over mountain tops of at ocean cells adjacent to mountains, or are they more sporadic? Same question applies to other sub-sections of Section 3.

10-27: It appears that your water mass change is distributed uniformly over the globe. This water mass mainly affects the ocean fraction of the Earth. Should your sea-level changes be computed as ΔH / (1 - OceanFraction). Please comment on this.

12-Figure3: Most noticeable in the lower left panel, do these spikes originate from large errors at single grid cells? Although water mass borrowing has eliminated the spikes in model V1γ, the original errors are still there.

17-14 to 17-16: “increased” or “decreased” relative to what. Perhaps this sentence should start: “Comparing V1α model at 2.8° versus that at 1°: the ..”