Interactive comment on "ERA-5 and ERA-Interim driven ISBA land surface model simulations: Which one performs better?" *by* Clement Albergel et al.

Anonymous Referee #2

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This paper documents the improvements in land surface simulations driven by ERA-5 relative to ERA-Interim. The work is relevant from the standpoint of documenting the improvements in ERA-5 as it relates to hydrology. The manuscript is somewhat sloppily prepared (a figure was missing!). My comments and suggestions are below.

Major comments: 1. The text has numerous language issues and grammar mistakes, some of which are listed below. I ran out of steam documenting all of them. I assume that the author would take a fresh and careful look at the manuscript to correct them all (including the ones that are not listed). Note that Figure 5 was missing in the manuscript version that I reviewed. 2. The paper is really an offline LDAS simulation,

but makes no mention of other LDAS work. The literature review should encompass the recent work in this regard that have considered the assimilation of land measurements (NCA-LDAS, for.e.g). I think the paper would be more powerful and of broader interest if the authors can document how the ERA-5 forced system compares with the such LDAS efforts. For example, does ERA-5 have comparable skills to NLDAS2, the defacto standard land product over CONUS? How does it compare to MERRA2 and ERA-Interim-Land? Without such comparisons, the paper sounds more as a technical report the impact of ERA related changes. 3. I found the use of metrics to be a bit convoluted and inconsistent. For example, why use NIC for metrics such as R, instead of simply taking a difference? NIC is more useful when the dynamic range of the metrics are really large (NSE ranges from -infinity to 1, so a large negative value would blow up a domain average). I suggest sticking with simple differences so that the impact on the model runs are more intuitive. Why use ubRMSED to look at impacts on fluxes? (It is used for soil moisture because of the large climatological differences)Also, I would change the sign of N_MAE and N_ubRMSD to be the same as that of NIC values (Positive value indicating improvements). 4. Section 3.1: I think the descriptions need to tone down the language on how much improvements are actually gained. From table 1, it looks like the improvements are quite small though they are systematic with the new version. I think it is important to quantify the magnitude of improvements (showing their spatial distribution through, for e.g., histograms).

Minor comments: 1. Fix the sentence starting with 'ERA-5 important changes ..' to something like ' ERA-5 has important changes relative to ERA-Interim former atmospheric reanalysis including . . .' 2. Change the sentence 'ERA-5 is forseen .. ' to something like 'As ERA-5 is expected to replace ERA-Interim reanalysis, this study assesses whether . . .' 3. Change the sentence 'ERA-5 impact on the ISBA ..' to 'ERA-5's impact on ISBA LSM relative to ERA-Interim is evaluated using remote sensing . . .' 4. Line 34 – Fix 'Interim .' to 'Interim.' (only one period). 5. Line 36: change 'extend' to 'extent' 6. Line 46: Change 'essentials' to 'essential' 7. Line 52: Change 'progresses' to 'progress' 8. Line 55: Add a comma after 'decade'. 9. Lines 58-60: MERRA is

retired. More appropriate to refer to MERRA2 papers. Given that this paper focuses on land-only simulations, there should be a description of LDAS analysis forced by observed precipitation (and meteorology) such as NLDAS, GLDAS ,etc. 10. Lines 65-68: Similar to abstract, these sentences are awkwardly written. 11. Lines 96: Change to say 'Section 2 presents the details of two atmospheric ..' 12. Line 120: Change to say 'which allows it to use ..' 13. Line 132: Add a comma after 'study' 14. Section 2.3: I would say 'interpolated to' rather than 'interpolated at': What interpolation methods were used? 15. Line 217: Kumar et al. (2009) is not in the list of references. 16. Line 237: I would not say 'artificially increasing the perceived agreement' – Just that the skill values are higher because it includes the seasonal cycle. 17. Line 239: 'Monthly averaged are also computed' (?) 18. Line 240: Change 'week' to 'weeks'. 19. Lines 239-242: It sounds like this you are really computing the z-scores rather than anomalies, since you are scaling the differences with standard deviation 20. Line 245: What significance test is done to compute the p-values? This varies depending on the metric of interest. In particular, since several derived metrics (NICs) are used here, how did you compute the statistical significance? 21. Line 265: Change from 'an NSE' to 'a NSE' 22. Line 323: Change 'exercises' to 'studies' 23. Line 347: Change 'equivalents' to 'equivalent' 24. Figure 1: As the authors describe, this figure is not very useful. The lines are too close to each other in most part. It will be easier to see them if you plot the differences (relative to ei_S ; then you only have two lines). Another option is to show a seasonal cycle rather than the entire time series. 25. Lines 390-395: Say NSE rather than 'efficiency' 26. Lines 465: Change 'Aprils' to 'April' 27. Lines 479-480: What does 'lasting dataset' mean? 28. Lines 509-510: Fix – 'It is however acknowledge that ..'