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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Variability of moisture recycling using a precipitationshed framework" *by* P. W. Keys et al.

Anonymous Referee #2

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Review of the manuscript hess-2014-137

"Variability of moisture recycling using a precipitationshed framework"

by

P.W. Keys, E.A. Barnes, R.J. van der Ent, and L.J. Gordon

The paper investigates the moisture recycling for the three regions Western Sahel, Northern China and La Plata applying the precipitationshed concept. The precipitationsheds are identified with the numerical water transport model WAM-2layers applied to gridded fields of the two reanalyzes ERA-Interim and MERRA. Both, the persistence of the evaporation contribution as well as the spatial variability are taken into account.

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Interactive Discussion
Discussion Paper

The analysis concludes that core precipitationsheds for the three regions exist, that most of the variability can be explained by a pulsing of the evaporation in the core precipitationshed and that the two analysis data sets agree reasonably well in at least two of the investigated regions.

The subject is very interesting, the manuscript is well written and therefore worthwhile to be published in HESS. From my point of view, only some minor revisions and/or additions are necessary before I can recommend the manuscript for publication.

Minor points:

1.)Data (page 5148, top two paragraphs)

a. ERA-Interim data is available for the four time steps 00, 06, 12 and 18 UTC. How do you do the discretization to 15 min? With a linear interpolation? This might be ok for fields like large-scale temperature and wind – but how good is it for temporally and spatially very inhomogeneous fields as precipitation and evaporation. Please add some text to clarifying your procedure.

b. The original resolution of ERA-Interim is approx. 0.7 x 0.7°. Did you download it at the lower resolution of 1.5 x 1.5° to bring both analyses to approximately the same resolution? Just add one sentence to clarify this.

c. Can some of the differences you describe be caused by the resolution differences between the two analyzes of even be caused by the interpolation of the ERA-Interim analysis. Did you compare with the original ERA-Interim resolution?

2.) Model description (page 5149, section 2.3)

The description of the WAM-2layer mode is very short. On the other hand, all your results rely on the model. Therefore, the description of the models should be extended at least by the main concepts. What I have in mind is not a long list of equations but basic concepts that explains a reader not familiar with the model how it works.

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3.) Results and discussion

Your description of the mean precipitationshed, the persistence and the EOF analysis is well structured. However, in my opinion, the discussion would considerably improve when you, more often than just for the few examples you brought, relate your findings to differences in the evolution of atmospheric processes in the two different analyses. It is not necessary to include a long discussion. But it requires looking deeper into the temporal evolution of the atmosphere in the different analyses. I expect that you will find systematic differences in the circulation patterns – responsible for differences in the moisture supply to the three different regions. This will also support the decision about which of the data sets are best suited for future investigations in other regions of the world.

4.) Page 5155, line 16: I would replace “stark” by “clear” or “large”.

5.) Table 1: I guess that the given precipitation amounts are “per growing season”. But are they average values over the selected number of growing seasons (I guess so). Please include one sentence to the Table caption.

6.) Figures: The Figures are well done – but you should make sure that you enlarge them as much as possible to improve the readability.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 5143, 2014.