

Interactive comment on “A Lagrangian Perspective of the Hydrological Cycle in the Congo River Basin” by Rogert Sorí et al.

Anonymous Referee #1

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In this work, the authors analyze the sources of moisture for the Congo river basin using the FLEXPART model. The authors find some very interesting results, and quantify the (extremely) important role of terrestrial sources. Overall, the the experiments are well designed and the manuscript is interesting. There are a few grammatical errors, so there needs to be careful editing. However, the authors should improve some aspects of the manuscript:

1) This is quite a unique region. It comprises the second largest rainforest in the world, and while there have been so many studies analyzing the Amazon, the recycling rates in the Amazon are not nearly as large as the ones reported here. I think it is important to point this out. There are few regions in the world that have such high terrestrial sources of moisture and can sustain a rainforest!

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2) Related to the above, you need to explain (in lay terms in the conclusions) how >80% of the moisture is of terrestrial origin. I am not saying this is wrong, but it is difficult to imagine the mechanism by which this is happening. The moisture initially has to come from the ocean. . .but how can it climatologically be of terrestrial origin? I am having a difficult time understanding the process.

3) The results for the extreme events are interesting. Again, this is the first time I see that periods of extreme rainfall are associated with higher recycling – I've never seen this in other regions of the world! I suggest the authors analyze another wet period to see if this result is reproducible. The results for extremes were not reported in the abstract – please include.

4) In the description of the method, it is important for the authors to clearly write what the forward trajectories are providing for the analysis and what the backward trajectories are providing. It is my understanding that figures 9, 10, 11 can ONLY be obtained with the forward trajectories – is this correct?

5) In lines 15-27 of page 6, you need to understand the difference between streamflow and runoff. Streamflow includes baseflow (the contribution of groundwater) while runoff doesn't. It is not only the lag time because of the routing, but also the contribution of groundwater.

6) Line 15 of page 7: I think you mean east to west.

7) The description of Figure 7 very poor. The analysis is not done in the order of the panels and it is very confusing, and I think including Figure 8 only makes it worse. The take-home message is that the contribution from each source can be completely different from the evaporation from each source. This highlights the importance of the atmospheric circulation in determining the contribution from a particular source. Please streamline this conclusion in the manuscript, make it much shorter, and I recommend deleting Fig 8.

8) Figure 10: I would just have two bars, one terrestrial and one oceanic. Then denote part of the terrestrial bar with the CRB contribution.

9) Please show statistical significance for Table 3. It is not clear to me that this figure

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is important for the conclusions in the manuscript.

10) Figure 13 doesn't work for me. What (E-P) are you analyzing, over the entire region? Over the CRB? I don't know what the point of this graph is.

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