

# ***Interactive comment on “High-resolution global atmospheric moisture connections from evaporation to precipitation” by Obbe A. Tuinenburg et al.***

## **Anonymous Referee #1**

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The study produced a globally complete dataset of atmospheric moisture flows from evaporation to precipitation based on ERA5 data. The paper is generally well-written and the data are useful. I have a few comments, mostly on the discussion of the results in the background of previous studies.

1. Please note the paper below. It also discussed nonlocal moisture contribution to precipitation. Therefore, the introduction around Line 35 and some other places should be careful.

Wei, J., & Dirmeyer, P. A. (2019). Sensitivity of Land Precipitation to Surface Evapotranspiration: A Nonlocal Perspective Based on Water Vapor Transport. *Geophysical*

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Research Letters, 46, 12,588–12,597. <https://doi.org/10.1029/2019GL085613>

The above paper also calculates the travelled distance of the moisture for precipitation but uses moisture content as weight (their Fig.3c,d). In this way, the very remote moisture, if in very tiny amounts, will have little effect on the average travelled distance. Is it more reasonable to use weights?

2. Section 2.1. It seems that you used a recently developed new moisture tracking method. In addition to the reference paper, can you summarize the advantages or differences of this method compared to other Lagrangian methods? According to your description, the method is similar to the QIBT back-trajectory method (Dirmeyer et al.) but is forward-trajectory.

3. About the evaporation recycling ratio and precipitation recycling ratio, I believe there are some previous studies. There should be some comparisons between your results and their results. To list a few:

Dirmeyer, P. A., J. Wei, M. G. Bosilovich, and D. M. Mocko, 2014: Comparing Evaporative Sources of Terrestrial Precipitation and Their Extremes in MERRA Using Relative Entropy, *J. Hydrometeorology*, 15, 102–116.

Van der Ent, R. J., Savenije, H. H. G., Schaefli, B. and Steele-Dunne, S. C.: Origin and fate of atmospheric moisture over continents, *Water Resources Research*, 46, W09525, doi:10.1029/2010WR009127, 2010.

4. Line 217-220. About the low recycling ratio in some basins, the explanation is not convincing. Actually, there have been studies on this. Generally, if the the remote moisture transfer is strong, such as in monsoon regions, the precipitation will be high and the recycling ratio will be low because the contribution from local evaporation is relatively small. For example, in Yangtze River basin, recycling ratio is higher (lower) in dry (wet) period. Refer to:

Wei, J., P. A. Dirmeyer, M. G. Bosilovich, and R. Wu, 2012: Water vapor sources

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for the Yangtze River Valley rainfall: Climatology, variability, and implications for rainfall forecasting, *Journal of Geophysical Research - Atmospheres*, 117, D05126, doi: 10.1029/2011JD016902.

5. Line 137. Data stored in NetCDF4 format will be less precise? Or because you stored data into unsigned integers?

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Interactive comment on *Earth Syst. Sci. Data Discuss.*, <https://doi.org/10.5194/essd-2020-89>, 2020.

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