

Interactive comment on “The influence of wind and land evapotranspiration on the variability of moisture sources and precipitation of the Yangtze River Valley” by Astrid Fremme and Harald Sodemann

Anonymous Referee #2

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This study used a Lagrangian model FLEXPART to analyze the moisture sources of Yangtze River Valley (YRV) during summer based on the “Watersip” method and the ERA-Interim reanalysis data. The dataset and methods used in this study are reliable. Although there have been several studies focusing on the moisture sources of precipitation in the YRV region, this study provided detailed discussion on the seasonal cycle, continental and local recycling, intraseasonal and interannual variability of the moisture sources of YRV region, which makes this study a valuable study. The results of this study show a consistency with the previous studies regarding the importance of conti-

C1

mental moisture source for the precipitation in the YRV region, and also show some new findings regarding the second-order moisture source and the interannual variability of moisture sources. On the other hand, there are some issues in this paper needing to be addressed. I suggest that the authors should address these questions before this paper is published. Specific questions: (1) The authors divided the Section 3 into eight subdivisions, which makes the key points in the results not highlighted. The readers may want to know the focus of this study when reading through these eight subdivisions. I suggest the authors to highlight the key points in Section 3, where the number of subdivisions in Section 3 may be needed. For instance, if the focuses of this study are the continental recycling and the interannual variability, the main body of Section 3 should be associated with these two issues. The subsection 3.1 “precipitation seasonality” is a background knowledge, which could be combined with the subsection 3.2 “moisture sources of YRV precipitation”. In addition, the title of this paper is “the influence of wind and land evapotranspiration...”. However, only section 3.6 and 3.7 gave a discussion on the influence of wind, while the other six subdivisions in Section 3 did not mention wind at all. It makes the reader wonder whether the wind speed is a key factor in this study. (2) In section 3.7, the authors concluded that the Indian Ocean plays an important role for the interannual variability of YRV moisture sources and precipitation, and the South China Sea and Western Pacific contribute less to the interannual variability. According to Fig. 10, the moisture contribution changes from 3.1 to 5.1×10^{11} kg day⁻¹ between dry and wet summers for South China Sea. This change is just slightly smaller than the change of moisture contribution for the Arabian Sea, which suggests that the South China Sea is also an important moisture source for the interannual variability. In addition, in Fig. 10, the pattern of South China Sea is distinct from the pattern of Western Pacific. It is not reasonable to put the two source regions into the same category. (3) I tried to understand Fig. 8 and the discussion on Fig. 8, but it seems difficult to understand the information in Fig. 8b and 8c. I suggest to clarify what is “the fraction of continental recycling to a larger section of Asia” (Fig. 8b). (4) “Sources for precipitation over the ocean are excluded with a minimum threshold of 25m elevation.” What

C2

does this mean? (5) “Other thresholds for . . .and relative humidity>80% for precipitation over YRV”. Does this mean that only the air parcels with a relative humidity>80% were traced back? Why not trace back all the air parcels that have a release of moisture within the YRV region? (6) “for the YRV% Zhao et al. (2016)”. I think the “YRV%” is a typo. (7) In the end of section 3.6, the authors concluded that “Decreasing winds. . .and strong solar forcing in combination lead to a sharp rise in local recycling. . .”. But there is no discussion on the influence of solar forcing in the previous discussion. (8) In section 4, the first term of the key results, “Although land contributions were large, the moisture supplied by land sources was well within the evapotranspiration rates at the source regions.” I don’t quite understand the meaning of this sentence. The land source regions contribute moisture to atmosphere via evapotranspiration. I think this is a well-understood process. Why the authors said “Although land contributions were large, . . . was well within the evapotranspiration rates. . .” ? (9) In section 4, the fifth term of the key results, “. . .17.6% was recycled on land once, 40.8% was recycled on land more than once.” $17.6\%+40.8\% = 58.4\%$. In the first term of the key results, it is mentioned that the continental moisture sources supplied 57.8% of the moisture for the YRV precipitation. 58.4% and 57.8% are not consistent, although they are two close numbers.

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