

## ***Interactive comment on “Contrasting roles of interception and transpiration in the hydrological cycle – Part 2: Moisture recycling” by R. J. van der Ent et al.***

### **Anonymous Referee #1**

Received and published: 13 April 2014

van der Ent et al. present an analysis of how separate components of surface evapotranspiration are recycled in the atmosphere. They show that direct evaporation tends to have a shorter atmospheric residence time than transpiration, and tends to recycle closer to where it leaves the earth's surface. I found the paper to be generally well written and addresses an important scientific question that could be relevant to many. Overall the scientific methods are sound, and the results are supported by their data. I have a few comments that should be addressed, but overall find the paper to be an important contribution and recommend minor changes.

General Comments: One aspect I had trouble with in this paper was with the authors' terminology for the various evaporative components. In most papers the total evap-

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oration is referred to as evapotranspiration (ET), and the direct evaporation is simply evaporation (E), and as in this paper delayed evaporation is transpiration. In this paper Et refers to just the transpiration component of the water balance. I found it somewhat difficult to keep this terminology straight. Although I suspect this terminology was necessary to be consistent with part I of the paper, I would recommend changing it so total terrestrial evapotranspiration is ET, all the direct evaporative fluxes are E, and the transpiration component is T. It is consistent within the paper as is, but I think this change may help improve readability. This seems like it would also make it more consistent with your moisture recycling terminology where recycled precip from transpiration is  $P_{c,t}$  and similar for evaporation ( $E_{c,t}$ ).

Figure 1 is a key figure but really needs additional clarification. I don't believe  $F_{in}$  or  $F_{out}$  are defined in the sects. 2.2.1 or 3.1. More importantly, it takes a lot of work to determine what exactly is going on at each intersection. Some additional labels on the lines/intersections would be helpful. Also, should describe in caption that this is modeled using the land model and WAM-2 layer.

While I found the West Africa section interesting it doesn't seem to add much to the overall results, and is somewhat distracting from the primary aim of the paper. I would suggest removing this section.

Specific comments: Page 286 line 25 – Should comment explicitly that globally  $E_i$  term is mostly interception, but regionally other components can dominate

Page 287 Line 15 – In appendix would be useful to add figure showing percentage of transpiration relative to total evapotranspiration, and comment briefly whether or not it is similar to 2013(?) Jasechko Nature paper that where they generated observational estimates of transpiration vs total evapotranspiration.

Page 294 line 17 – Recommend additional estimates of global continental recycling here from other authors.

Page 296 line 8 – Please specify what you mean by “whatever evaporates”.

Figure 2 – I like having the equation explicitly in (a) of the figure. Recommend adding it to (b) and (c).

Page 297 Line 10 – Should remove this line. There are parts of the tropics where recycling is longer than 3-6 days and parts of the temperate zones that look very short. More analysis and explanation are needed to support why the tropics should be faster. Also, doesn't fit with rest of paragraph.

Appendix 1 – Would be useful to summarize briefly at beginning what key differences between WAM – 1 layer and 2 layer are.

Page 307 line 14 – Same water balance as what?

Editorial Comments:

These are not complete, but just short comments that I saw as I was reviewing.

ABSTRACT: Line 11 – Remove “As the main result” Line 16 – Without reading rest of paper unclear what “local length scale” is. May want to rephrase in abstract.

PAGE 284: Line 3 – What is “these” referring to? Moisture recycling ratios? Line 3-10 Would be useful to briefly describe here what the length scale represents. Line 7 – Should Dirmeyer paper be 2014?

Page 290: Is there a reason that term in parentheses is opposite in eqn. 12 relative to eqn's 13 and 14?

Page 299 Line 22 – Location of La Plata Basin may not be obvious to some readers.

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Interactive comment on Earth Syst. Dynam. Discuss., 5, 281, 2014.