**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Length and time scales of atmospheric moisture recycling" *by* R. J. van der Ent and H. H. G. Savenije

F. Dominguez (Referee)

francina@hwr.arizona.edu

Received and published: 8 November 2010

This work follows from the previous analysis of Van de Ent (2010) and includes a global scale analysis of recycling. I think that this is a very useful contribution. It nicely delineates regions where local moisture actually falls within a region making the interpretation of previous results (Dirmeyer and Brubaker, Trenberth, Dominguez) much more physically meaningful. I learned a lot from this paper. I do agree with the previous reviewer that the benefit of doing this analysis is not clearly stated. It wasn't until I read the entire paper that I got the point (particularly Page 21877 brings the point across very nicely - if you could condense this into a motivation that would significantly strengthen the paper). Having said this, there are big issues with the mathematical derivation. The authors must revise this in a significant way:

C9527

The basic equation that this paper uses is presented in Savenije (1995). This equation uses MANY assumptions that make its applicability limited: 1 - Precipitation is proportional to the moisture content of the atmosphere. This is not a good assumption. 2 - Evaporation is proportional to precipitation. This is not a good assumption in energy limited environments. 3 - Lambda is a rather complicated function, and it is not absolutely clear to my why this would be the representative length scale.

There have been many advances since Savenije (1995). In particular Dominguez et al. 2006 used a Lagrangian approach without having to include these parameters - their Equation 20 is analogous to Savenije's equation - without the underlying assumptions. This is a more robust equation to use for your analysis.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 21867, 2010.