

Interactive comment on “HESS Opinions: A perspective on different approaches to determine the contribution of transpiration to the surface moisture fluxes” by S. J. Sutanto et al.

Anonymous Referee #2

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The discussion paper from Sutanto et al. describes different approaches to calculate the transpiration fraction of total evaporation. The authors compare the outcome of isotope based techniques, hydrometric measurements and modelling studies and critically assess the differences. The main conclusion is that on the one hand isotope based and hydrometric results can definitely show comparable results when comparable systems and conditions are assessed. On the other hand, however, it appears that isotope based approaches often give unrealistic high values for the transpiration fraction whereas land surface models most likely underestimate the fraction. The authors call for a reassessment of model parameterisations in land surface models and point to

C884

the strong need to validate modelled water isotopologues signals from isotope enabled land surface models with measured data.

The opinion article is definitively timely and well-written and puts forward an important discussion on cross-comparison of different approaches on different spatio-temporal scales that is needed to get a deeper understanding of the global water cycle.

I have only a few minor comments the authors might want to take into account:

Section 2.1 and/or linked to section 4: It would be important also to clearly refer to the accuracy (or the lack of it) of sap flow measurements and discrepancies among different techniques. Kathy Steppe's paper in *Agricultural and Forest Meteorology* (2010; vol 150) would be an appropriate reference. Moreover it needs to be explained more clearly that sap flow measurements mainly work for woody species – it is said somehow in the table (representative only for one vegetation type) but it might be made clearer.

Section 2.2: For the reader not into stable isotopes, we might need a sentence in that section explaining why transpiration does not affect the isotopic composition of soil water. It might be trivial but helpful for a broader audience.

Section 2.2. (p. 2592; line 3): Isn't it however more important to derive the isotopic composition of transpiration water under non-steady state conditions than that of leaf water (δL)? I fully agree that this is linked and also described in the cited paper of Lukas Cernusak and Graham Farquhar. It would, however, be more clear in my opinion to state that directly: //just an example //: “According to Farquhar and Cernusak (2005) the degree of isotope enrichment of transpired water above source water under non-steady state conditions is related to the isostorage (i.e the leaf water content and its isotopic enrichment above source water) and its change over time in the leaf.” This might also be linked more closely to the assessment of potential errors of the isotope method in section 4.

Section 3: I think it would be good to acknowledge here that the different numbers of

C885

studies applying the different methods might introduce a bias.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 2583, 2014.