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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Technical Note: On the Matt–Shuttleworth approach to estimate crop water requirements" *by* J. P. Lhomme et al.

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We agree with Reviewer 1 who suggests illustrating the numerical effects of M-S assumption on surface resistance with another value of crop coefficient Kc. A similar remark was made by Reviewer 2. Therefore, our idea is to replace the present case (Kc = 1, zh = 1 m) by two contrasting cases: one representing the initial stage of an annual crop with Kc = 0.5 and zh = 0.5 m and the other case with Kc = 1.1 and zh = 1.5 m representing the mid-season stage. Also, as suggested by reviewer 1, a further table or figure will be added to complete the results of Figures 2 to 3, showing the net impact of different values of surface resistance on crop evaporation under standard conditions.

The remark made by Reviewer 1 concerning the reason why the M-S approach seems to work better in semi-arid conditions than in sub-humid conditions will be discussed in parallel with the suggestion made by Reviewer 2 to introduce the complementary relationship into the discussion. The M-S approach works better in semi-arid conditions because, as shown in our Figure 1a, ET0 is closer to P-T evapotranspiration in semi-arid conditions, which is not completely surprising. Indeed, the climatic classification introduced in the paper, taken from FAO-56, is only based upon air relative humidity and it has been shown that the P-T coefficient (alpha) defined by our Eq. (15) can vary from values close to 1 in very humid conditions (high relative humidity such as in equatorial regions) to values greater than 1.7 in arid conditions (very dry air). In fact, the "semi-arid" conditions defined by FAO-56 should certainly represent a mid-value in terms of air humidity, where alpha is close to 1.26 and where consequently the M-S assumption holds. This point will be further developed.

The comments made by Shuttleworth on our Technical Note have already been thoroughly commented in the interactive discussion of his own Comment (see SC C1551 by Lhomme and SC1769 by Boudhina).

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 4217, 2014.