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Hydrology and Earth System Sciences Discussions

Interactive comment on "Evaluation of Penman-Monteith model applied to a maize field in the arid area of Northwest China" *by* W.-Z. Zhao et al.

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Dear the anonymous referee#1, We are grateful to you for your valuable and fruitful comments that help to improve our manuscript (hess-2009-275). On behalf of co-authors, I reply to the interactive comments on our manuscript named "Evaluation of Penman-Monteith model applied to a maize field in the arid area of Northwest China" by you (hessd-7-C30-2010) as following: Notes: The contents of reply to the comments from the anonymous Referee #1 by co-authors were marked with blue text. (1) The English writing is poor. It is better to revise the manuscript by people whose native language is English. I have sent our manuscript to an expert whose native language

is English to revise. (2) Some variables were represented by different symbols. For example, the bulk canopy resistance was represented by rc at line 16 and 20 in page 5, while it was represented by rs at other palaces. Also, VPD in the sentence at line 2 in page 14 hasn't been defined. I think that VPD is vapor pressure deficit, while it is represented by Ds in the paper. It's better to use the same symbol for a variable. The bulk canopy resistance should be represented by rs at line 16 and 20 in page 5, but not rc. "VPD" is the abbreviation form of "vapour pressure deficit", the variable "Ds" is the vapour pressure deficit at plant level. So, "VPD" in the sentence at line 2 in page 14 should be revised as "vapour pressure deficit" (3) There are several mistakes in the manuscript.

1) The expression "F2 =1 when w2 >wwilt" in equation (5) in page 6 should be "F2 =1 when w2 >wcr". Yes, in equation (5), "F2=1, if w2 > wcr" instead of "F2=1, if w2 > wwilt". 2) The sentence "where rsmin is the maximum stomatal resistance (s m-1)" at line 10 in page 6 should be "where rsmax is the maximum stomatal resistance (s m-1)". Yes, at line 10 in page 6, "rsmin" should be revised as "rsmax" (i.e., "rsmax" instead of "rsmin"). 3)The sentence "The large gaps were filled were filled by means of the look-up table approach or, if not possible, by the by the mean diurnal variation method (Falge et al., 2001)" at line 21 in page 11 should be "The large gaps were filled by means of the look-up table approach or, if not possible, by the mean diurnal variation method (Falge et al., 2001)". Yes, you are right. At lines 21-23 in page, the extra "were filled" and "by the" should be deleted. 4) The sentence "maize filed under the arid climatic condition" at line 20 in page 14 should be "maize field under the arid climatic condition". Yes, at line 20 in page 14, "field" should substitute for "filed". 5)The sentence "reaching the maximum value near mid-day (13:00 LT) during the different stages of maize growing season" at line 7 in page 15 should be "reaching the minimum value near mid-day (13:00 LT) during the different stages of maize growing season". Yes, you are right, at line 7 in page 15, the sentence should be "reaching the minimum value near mid-day (13:00 LT) during the different stages of maize growing season".

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(4)The ratio between wcr and wsat was taken as 0.65 at line 5 in page 7. It is different from the value of 0.75 in the reference paper. Why? At line 5 in page 7, “0.65” can be attributed to spelling mistakes, namely, the sentence should be “wcr is the soil water content below which transpiration is stressed by soil moisture, taken as 0.75 wsat”. (5)How the values of saturated soil water content wsat, wilting point, and the species dependent empirical parameter ïAËŻc′ are determined (at line 7 and 10 in page 7)? The value of “saturated soil water content” and “wilting point” at line 7 in page 7 derive from the hydraulic test data in the laboratory. The species dependent empirical parameter β was derived a value of 0.0238 hPa-1 for crop from ACE (1994). However, due to spelling mistake, the species dependent empirical parameter β was set to 0.001 hPa-1 by mistake. Therefore, at line 9-10 in page 7, the sentence “β is a species-dependent empirical parameter and set to 0.001 hPa-1 for maize in this study” should be “β is a species-dependent empirical parameter and set to 0.0238 hPa-1 for maize in this study”. In addition, for References section, we should add “ACE, F.: A coupled soil-vegetation scheme: description, parameters, validation, and sensitivity studies, J. Appl. Meteor., 33, 268-284” to the References. (6)The sentence “The levels with the leaf orientations of east, west, north and south were selected to represent the 25% of the canopy” at line 20, page 12 is difficult to understand. “The levels with the leaf orientations of east, west, north and south were selected to represent the 25% of the canopy” means “Canopy was divided into four level, each level represented the 25% of the canopy. For each level, the leaves with orientations of east, west, north and south were selected” (7)Does “small level-basin irrigation’ at line 25 in page 14 mean “small basin-level irrigation”? No, “small level-basin irrigation” is one of the surface irrigation approach. (8)Figure 5a shows that most of dots are below 1:1 line. It means that J-D approach underestimated the bulk canopy resistance, which is contrary to the conclusion “From the MBE given in Fig. 5, it can be seen that the J-D approach over-estimated the bulk canopy resistance” (line 17, page 14). Why? Is the figure correct? It looks as if most of dots are below 1:1 line from the optical effects of Fig.5. But actually, the values above 1:1 line are more than that below 1:1 line from the results of statistical

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tests. So, the figure 5 is correct, and the explanation of “From the MBE given in Fig. 5, it can be seen that the J-D approach overestimated the bulk canopy resistance” is also right. (9)The paper attributed the reason why the bulk canopy resistance is larger in the morning than that in the afternoon to “both the increase of water vapour deficit and the more intensive solar radiation in the afternoon” (line 12, page 15), which is inconsistent with the conclusion that the conductance decreases with the increasing vapor pressure deficit (Fig 2). It’s better to revise the explanation. At line 12 in page 15, the sentence “This is due to both the increase of water vapour deficit and the more intensive solar radiation (or PAR) in the afternoon” should be revised as “This is due to the decrease of water vapour deficit and the more intensive solar radiation (or PAR) in the afternoon” (10)The paper said that “Under the dry soil condition before irrigation, the J-D approach overestimated the bulk canopy resistance in the midday” (line 12, page 15). But figure 5 shows that the J-D results are very close to the measured value in the midday at about 13:00. At line 12 in page 15, the sentence “Under the dry soil condition before irrigation, the J-D approach overestimated the bulk canopy resistance in the midday, while the N-P approach underestimated that” should be “Under the dry soil condition before irrigation, the J-D approach slightly overestimated the bulk canopy resistance in the midday except for the later stage of maize growing season, while the N-P approach underestimated that” (11)In order to consistent with the figures and paragraphs in the paper, I suggest changing the title of 4.4 “Simulation of evapotranspiration” at line 21, page 15 to “Simulation of latent heat flux”. It is the same for the title of Figure 7. Strictly speaking, there is difference between “evapotranspiration” and “latent heat flux”. The unit of “evapotranspiration” is mm, while the unit of “latent heat flux” is W m-2. Therefore, this suggestion is very good, and the title of 4.4 should be “Simulation latent heat flux”. (12)The titles of Fig. 2, 3, and 4 (stomatal resistance) are inconsistent with the titles of y-axis (stomatal conductance). It’s better to change the figure title ‘stomatal resistance’ to ‘stomatal conductance’. I’m very sorry that “stomatal conductance” in the titles of Fig. 2, 3 and 4 was spelled mistakenly as “stomatal resistance”. So, the title Fig. 2, 3 and 4

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should be changed as “Fig. 2. Response of stomatal conductance to vapour pressure deficit at the four levels in the maize canopy on DOY 130 (a), DOY 162 (b), DOY 195(c) and DOY 229(d), respectively”, “Fig. 3. Response of stomatal conductance to photosynthetically active radiation at the four levels in the maize canopy on DOY 130 (a), DOY 162 (b), DOY 195(c) and DOY 229(d), respectively” and “Fig. 4. Response of stomatal conductance to air temperature at the four levels in the maize canopy on DOY 130 (a), DOY 162 (b), DOY 195(c) and DOY 229(d), respectively”, respectively. (13)It is said that “The maize field for this study was sufficiently supplied with water, and the soil water content were generally above 0.27” (line 17, page 16), what is the unit of soil water content? The unit of soil water content is “m3 m-3”. Therefore, “0.27” should be changed as “0.27 m3 m-3” in this sentence.

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/7/C80/2010/hessd-7-C80-2010-supplement.pdf

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 461, 2010.

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