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Hydrology and Earth System Sciences Discussions

Interactive comment on "Calibration of a crop model to irrigated water use using a genetic algorithm" *by* T. Bulatewicz et al.

Anonymous Referee #1

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Genetic algorithm was used to calibrate a crop model for irrigated water use. EPIC model was used for this purpose. Bootstrap probability distributions for ten model parameters were obtained for each crop by entropy maximization via genetic algorithm.

Comments:

1. Page 2 (2369) line 4: All the stake holders consulted are corporate entities viz., "governmental agencies, administrative units and private sector enterprises". None of them are farmers on the field. Hence, they cannot have on filed knowledge and all their impressions are second hand, based on what little they could glean from their field workers. Thus the entire exercise remains mostly academic.

2. Page 2 (2370) line 1: It is stated that computational requirement mandated prototyping of many facilities required. But it can seldom be a case on field that the field practices can be safely jacketed into set prototypes. The soils differ, soil moisture content differs, precipitation is not uniform and application of water to the crops differs from field to field. Hence prototyping necessarily differs from the actual field practices.

3. Table 2: The range, the EPIC model can handle is 10 to 30 C of optimal temperature for plant growth (TB). But the TB values of all the 4 crops considered are 5, 5, 7 and 5 C beyond the range of the model. Similar is the case of TG, minimum temperature of plant growth, the range of the model not covering the maximum values of 3 out of the 4 crops. Thus the very capability of the EPIC model is inherently inadequate to handle the max and min temperatures of plant growth, which is a serious lacuna.

4. Page 3 (2371) lines 20&23: What KDWR reports is the total yearly irrigated water volume. The total annual volume cannot cover the intricacies of intra-seasonal variations of the crop requirements depending on various causative factors such as precipitation, soil moisture content, sunshine hours etc. This inadequacy is further aggravated by the three deficiencies, the authors themselves pointed out in lines 1-8 (Page 3, 2372). Moreover, by clubbing together the water usage for two different soil groups (lines 15-23), the inherent variations for the two soil groups are smoothened out.

5. Table 1: Most of the parameters considered are the values of the extremities (max or min) and practically normal values were not at all considered. The extreme values invariably present a lop-sided picture greatly different from the normal of any instant.

6. Page 7 (2379) lines 21-23: The parameters considered were "total amounts of water on a country wide basis" and "average well capacity for all wells considered". Such aggregation and averaging inherently deviates from the performance of individual cases – crops or wells.

7. Page 7 (2379) line 26: It is clearly stated that "EPIC outputs are not particularly

sensitive to IRI in the range of 4-10 days". The capability of the EPIC model remains low, not to be sensitive to an irrigation interval of even 10 days.

8. Page 7 (2380): In line 17 and from Table 6, the optimum value of WA obtained by the analysis is 33.4. From lines 25-26, the corresponding value in literature cited is from 16 to 28 which is far below the obtained value.

9. Page 7 (2380): In line 17 and from Table 5, WA value for alfalfa arrived is 29.2 against the range in cited literature of 12 to 15 and 17.2.

10. Page 7 (2380): In line 17 and from Table 7, WA value arrived at is 31.2 against the range in cited literature of 20 to 25.

11. Similarly TB values arrived at are far above the ranges cited from the literature.

12. TG for alfalfa arrived at is 0.5 C against the range in literature of 5 to 10.7 C. Such a very low minimum temperature requires proper justification.

13. Table 10: RMSE of the values of water for all the 4 crops is too high to be acceptable.

Recommendation: In view of the above comments the manuscript is not recommended for publication.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 2367, 2009.