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Hydrology and Earth System Sciences Discussions

Interactive comment on "Analysis of soil and vegetation patterns in semi-arid Mediterranean landscapes by way of a conceptual water balance model" *by* I. Portoghese et al.

Anonymous Referee #2

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General comments

At the first stage of the study a simple water balance model was showed, which one estimated the soil water storage response S(t) using parameters from literature. At the second stage of the study, a statistical analysis of relative frequencies was done between soil water storage obtained from the model and field surveys to each crop, with the aim to find vegetation and soil distribution patterns. In general, the paper is very difficult to read and understand what do you pretend with it, because are very disperse. I suggest reviewing the redaction and structure of the paper and the relevance of the

each of figures presented. If you have an extensive geo-database, you should take advantage of it.

Specific comments

i) The Model is a simple water balance model, when aspects like different soil layers, rooting depth and steady biomass are simplified. The model was not calibrated. And in spite of in page 3917 row 9-12 you report that monthly crop coefficients adopted in the model has incorporated local observations, it will be interesting to corroborate that the parameters of water use efficiency in Table 2 (Allen, et al. 1998) are in agreement with the "natural" behavior of the crops in the study zone.

ii) In Eq. (1), P represents the rate of precipitation, but is not specified if it is the effective precipitation, since in arid and semiarid zones it is very important the interception process like losses of water and seems that data needed for its estimation are available.

iii) It is not mentioned the aquifer influence in the model, moreover, point out if the crops in the study zone either taken water either from it or not.

iv) If the vegetation is in steady conditions (page 3918 row 5-9), (i.e. permanent tree crops are referred to mature plants with no biomass growth through the years), what is the sense to do many intra-annual simulations? Why do you evaluate the plant productivity? It will be better to do annual simulations to observe the inter-annual behavior of S(t) and ET to several initial conditions of soil moisture (may be, the initial value of soil water storage has high influence on model results).

v) Knowing that the vegetation crops could harvest at least once time per year, why did is not mentioned the harvest practice in seasonal crops or prune in permanent crops? Or if the vegetation are considered in natural regime, what really happen with the evapotranspiration rates with seasonal crops? In this case, you should estimate the factor Kc for natural vegetation under non-standard conditions (Allen et al., 1998).

HESSD

4, S1853–S1856, 2008

vi) In the section 2 (Methodology) -page 3915 row 16- is not specified the nature of "direct measurements", I suppose that these are the 4000 soil samples available in a geo-database. In any case, there is not specified neither they were done (date and spatial distribution) methodology used nor results obtained. A figure could be needed to see the soil samples coverage.

vii) In section 3 (Results and discussion) many results (sensitivity analysis) and figures are showed. Since the model's simplicity, a great extension of results it does not permit; the statistical analysis is too basic, it will be better to use statistical analysis test more robust. It will be better to find a concise way to show the results, and address to the conclusions, since the present conclusions are not clear moreover obvious, they must be based on paper objectives.

Other comments

i) To specify what kind of statistic is the "central values".

ii) To specify the bc parameter use.

iii) Page 3910 row 20: When you mention "regional applications" is referred either due to particularity of the study zone and therefore the model is only applicable on it, or due the spatial scale of the model (mesoscale).

iv) Page 3912 row 24: When you say "In particular, the habitats selected for plant domestication are chosen so as to provide reduced competition, improved fertility, and reduced disease incidence to the introduced vegetation, thus allowing increased productivity" Are you pointed out that these reasons are decisive to choose a crop or another one? What happen with others criterion like terrain slope, facility and feasibility extensive terrain to crop or socioeconomic factors?

v) Page 3928 rows 15-19: "Model simulations are utilized to explain and explore differences in the soil moisture response due to different vegetation types and their impact on the temporal variability of water balance, and in this way explaining the spatial pat-

HESSD

4, S1853–S1856, 2008

Interactive Comment

terns of soil-vegetation occurrences extracted from the statistical analysis of available data over the study region". This text is a good summary of the aim of the paper; it should be put in section 2.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 3909, 2007.