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Hydrology and Earth System Sciences Discussions

Interactive comment on "A conceptual remote sensing based interception-infiltration model for regional and global applications" *by* M. Tum and E. Borg

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General comments:

In this manuscript a one-dimensional soil water transport model is proposed, which is designed for regional-global applications using as input remote sensing derived LAI values and detailed information from the FAO Harmonized World Soil Database (HWSD). The focus of the model is given to the description of the interception and the infiltration processes, whereas other terms in the soil water balance (mainly the evapotranspiration) are not considered. My main concerns are related to the evaluation of the model and the description of the state-of-the-art. In particular, the first point needs to be

significantly improved.

The description of the state-of-the-art is very limited, in particular regarding the description of other existing models and the use of remote sensing information for these applications. The eventual contributions and benefits of the proposed model cannot be judged unless previous existing models of this kind are properly described.

The evaluation of the model is carried out by comparing its simulations with those obtained with the ECMWF model approach. However, this comparison is just informative and a real statistical model evaluation is lacking. In addition, the ECMWF model is quite simplistic regarding the soil description and the soil layering is different to that of the proposed model. As a result the comparison is not valid and provides only limited information. A thorough statistical model evaluation needs to be carried out, using reference soil moisture or lysimeter data obtained in situ. Alternatively, the modeled surface soil moisture could be compared with operational remote sensing based soil moisture products (obtained from ASCAT, AMSR-E or SMOS).

Detailed comments:

1 Introduction:

The whole introduction needs to be re-structured to better describe the state-of-the-art of 1-D soil water transport models, with special emphasis to the highlights of your model (e.g. interception, detailed description of the soil profile and use of remotely sensed LAI).

2 Theoretical background:

The inclusion of evapotranspiration in your model (also parameterized using remotely sensed LAI) would certainly increase the interest on it.

Some of the equations used for the calculation of the interception and infiltration are rather classical and could be omitted if adequate references are provided.

3 Input data:

Some spatial databases' spatial resolutions are given in lat-long °, but it could be interesting for the readers to show also their spatial resolutions in km2.

Why did you chose the FAO 74 soil classification instead of the FAO 90 or FAO 85? Last sentence of page 3246 (The LAI. . .): This affirmation is not strictly correct, the LAI does not necessarily reflect changes in phenology and neither does phenology control interception (at least in all vegetation types).

Please give more information on the CYCLOPES product of the POSTEL database.

4 Results and discussion:

The comparison of plant available water content between your model and the ECMWF's is not clear. First, the plant available water content is not defined, and in any case it should be restricted to the root-zone, and not to the whole soil profile depth. The differences in soil depths in both models are responsible for the results, so it is not possible to judge whether the description of processes in your model is adequate.

Page 3249, lines 8-10: This affirmation does not necessarily imply that your model simulations are correct.

In Figs 5-7 the soil moisture outputs of both models are represented for three differing soil types. The ECMWF modeled soil moisture is calculated taking into account evapotranspiration or not? In case it is, both models results cannot be compared. In any case, the comparison is very difficult due to the differing soil layer structure.

The assumption of a dry deep soil layer beneath leads to unrealistic soil moisture values in the deeper soil layers. Why did you consider this dry deep layer?

Table 1: Theta_s stands for saturation soil moisture or field capacity?

Figs 5-7: Both model simulations are difficult to compare in these figures. I suggest to add precipitation in vertical bars.

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