Hydrology and Earth System Sciences Discussions

Interactive comment on "Parameterization of bucket models for soil-vegetation-atmosphere modeling under seasonal climatic regimes" *by* N. Romano et al.

R. S. Crosbie (Referee)

russell.crosbie@csiro.au

General Comments

This paper looks at two alternate methods of specifying the field capacity of a bucket model (BM) and compares the results to a Richard's Eqn model (RE) for a Mediterranean climate. This is a worthy topic for investigation that falls within the scope of HESS. The two alternate methods are setting the field capacity based upon matric potential (fix) and the point at which drainage becomes negligible under a drainage experiment (drain). This is compared for two soils, a loamy-sand and a clay. The results

show that for the loamy-sand the drain method gives results that are more consistent with the Richard's equation model but for the clay soil there is very little difference between the drain and fix methods. I think the conclusions are overstated for the results considering that only 2 cases are investigated and 1 of those is inconclusive.

Specific Comments

The aim of this paper is to investigate alternate parameterisations of a bucket model but two methods are chosen a priori. I would have thought a more appropriate way to approach this problem would be to calibrate the BM to the results from the RE and then see if the calibrated value of field capacity matches either the fix or drain methods of estimating field capacity. If a sufficient number of soils (e.g. (Carsel and Parrish, 1988)) were analysed in this way then the results could perhaps be generalized into something more widely applicable (similar to what was done by (Twarakavi et al., 2009) but coming at the problem from a different direction).

The clay soil results are not discussed in relation to the ME or RMSE. From Table 5 I can see that there is very little difference between the two methods of estimating field capacity for the clay soil, this is not surprising as the value of field capacity is pretty close for the two methods. This means that the conclusion reached that the drain method should be used for estimating field capacity is based on the results of only a single experiment with a loamy-sand soil. I would be expecting a much higher standard of evidence to reach that conclusion.

Technical Corrections

P5084, L13 – It appears that something is missing, the sentence ends in "and."

P5085, L13 – "offers a comprehensive" is repeated

P5086, L5 – RE models are also used at the global scale in Land Surface Models e.g. (Kowalczyk et al., 2006; Oleson et al., 2010)

P5086, L24 – BM are also used extensively in rainfall-runoff modeling

P5088, L8 – there are many bucket models that can simulate Hortonian flow, e.g. PERFECT (Littleboy et al., 1992) and SWAT (Arnold et al., 1999)

P5089, L16 – tVG is not used anywhere

P5093, L12 – Romano and Santini, 1999 is not in the reference list

P5094, L17 – I don't understand why a time series of PET is not used rather than a constant value of PET for each of the two seasons

P5094, L19-27 – It is not explained why a stochastic generated rainfall sequence is used in favour of an observed time series of rainfall.

P5101, L8-29 – the loamy sand soil is described but there is no mention of the results from the clay soil

P5104, L21-6 – this is a different result to that obtained in a dry environment where the BMs were not able to match the REs (Scanlon et al., 2002). A comment on this is probably appropriate.

P5104, L29 – I am not sure that I understand the 99 simulation runs. Is this a stochastic 100 year time series with the first year cut off (P5099, L7 & L22)? I would count this as 1 simulation run.

P5122 – the caption to fig 6 needs to have the drain and fix plots identified

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Littleboy, M. et al., 1992. Impact of soil erosion on production in cropping systems .I. Development and validation of a simulation model. Soil Research, 30(5): 757-774.

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