Hydrology and Earth System Sciences Discussions

Interactive comment on "Mapping model behaviour using Self-Organizing Maps" *by* M. Herbst et al.

Anonymous Referee #2

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General comments

This manuscript presented an innovative way to describe model behavior through Self-Organizing Map (SOM). The approach is technical sound and the experimental results support the conclusions. The paper is well written and will be of interest to the readers of Journal of Hydrology and Earth System Science. I suggest its publication after revision.

Specific comments:

1. How the parameters of distributed conceptual model NASIM were assigned in the Monte Carlo simulation? Do you consider the study area as a lump or distributed catch-

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ment? How the parameters listed in Figure 5 fit into the distributed modeling frame-work? Are they average parameters of both sub-catchment/grids and Monte Carlo samples allocated to each SOM unit?

2. It is not clear for the notations used in the Equations, such as Eqs. (7) and (12). In Eq.(7), x is a input vector to the SOM and y is input data. What is the x vector? Is it a set of NASIM parameter vector or those Signature Indices? What is the y vector? Is it a set of Signature Indices or flow time series? If the x is set as NASIM parameters, why the parameter distributions in the BMU are rather wide spread in the normalized parameter domain (see red "x" marker of RetBasis, StFFRet, and hL, for example). Shouldn't they be close together based on SOM classification on parameters?

3. How the best matching unit (BMU) is found? In Fig. 3, each SOM unit is associated with 5 Signature indices; do you use all five indices to select the BMU and how?

4. Lines 10-15 of page 3534: "The aforementioned results lead us to infer that this pat-tern is likely to be indicative of parameter sensitivity, i.e. parameter interaction involving threshold behavior"

It is interesting to explore the stability of SOM with respect to the initial m(t) is assigned. Given different set of random initial m(t) when iteration t=0, it might come out with different distribution maps in Fig. 5. It could be chances that you could find a better organized RetOf, StFFRet, and vL maps with different m(t=0) settings. A discussion on this is suggested.

5. Some Equations indices are not corresponding to the manuscript text well. For example: Line 6 of page 3530: "with respect to the criterion given by Eqs. (9) and (14)"

Lines 5 and 17 of page 3531, "Eqs. (14) and (15)" Line 3 of page 3536, "Eq. (16)"

6. The information provided by Figures 1 & 2 is similar. Figure 1 may be removed.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 3517, 2008.

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