**Hydrology and
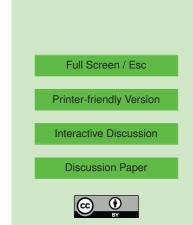Earth System
Sciences
Discussions**

Interactive
Comment

Interactive comment on "Resolving structural errors in a spatially distributed hydrologic model" *by* J. H. Spaaks and W. Bouten

Anonymous Referee #2

Received and published: 3 April 2013

General comment:

This paper describes a model diagnostic approach to detect errors in structures of hydrological models. The approach is compelling, and the paper is very well written. While I have only a few minor comments and suggestions on how to improve the clarity of the text (see below in specific comments), my main comment (or concern) is: How can this approach help with real-world field experiments with infrequent measurements, measurement errors, data gaps, unknowable boundary fluxes (e.g. spatially distributed loss to bedrock), soil heterogeneities with subsequent parameter uncertainty etc? Will it still be able to improve the model structure if the error-free perfect "truth" is not known? These are questions that could be investigated within the chosen modeling framework. I definitely recommend a publication but would suggest to either

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

add simulations that look at these questions and that way make the paper relevant for "modeling experimentalists" or at least to expand the section 3.2.1 which at the moment does not really deal with implications and recommendations for experimental designs.

Specific comments:

Title is a little general

Fig. 1 not very meaningful, can easily be described in words

P. 1821, L 9: scale triplet?

P. 1821, L 27: being right for the wrong reasons is not even acceptable in the first case!

P. 1821, L 28-29: "..our understanding of how hillslopes and watersheds function".

P. 1824, L 28: what does "assimilating observations" mean exactly? Unclear

P. 1826, L 10: the terms "forward model" and "inverse model" are a little confusing; maybe use perfect/reference model and simplified model?

P. 1828, L 19: How were the parameters listed in Table 1 chosen? Random? Taken from another study?

P. 1828, L 20: provide more details here how the initial state was generated; zero pressure head at the soil-bedrock interface, i.e. lower boundary, and then in the soil column above?

P. 1829, L 6: insert here the total simulation time of 216 h

P. 1829, L 20-21: note that variable 1 is not measurable in the field whereas the other two can be measured (although not completely, error-free,...)

P. 1831, L 17: When convergence has not been...

P. 1833, L 9: i.e. the variables that are used in the first two OF describe integrated hydrologic response whereas the third variable is spatially-distributed hydrologic infor-

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

mation

Fig. 2 and 4: I would combine those figures, i.e. indicate the location of hot spots with high leakage to bedrock on the soil depth map. Fig. 4 doesn't really provide additional information, and relating soil depth and hot spots to pressure head patterns in Fig. 5 and others becomes easier

P. 1836, L 27-28: "residuals cannot be interpreted as being new and local" – can you explain this better? Meaning unclear

P. 1838, L 18-20: I would agree! Except that in the real world we wouldn't have the perfect, error-free observation. How does this concept then work?

P. 1839, L 16: "installing a more precise measurement device" sounds much easier than this actually is; there is always the problem of density of installations and the representative volume of a measuring device

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 1819, 2013.