Hydrology and Earth System Sciences Discussions

Interactive Comment

Interactive comment on "Generation of soil moisture patterns at the catchment scale by EOF interpolation" *by* M. A. Perry and J. D. Niemann

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I was positively impressed by the paper entitled "Generation of soil moisture patterns at the catchment scale by EOF interpolation"; by M.A. Perry and J.D. Niemann. The topic is of interest for hydrologists, the methods are sound and generally well described, and the application is very well documented.

I only have some specific comments, which are specified below:

1) The Introduction of the paper is very useful in delineating the relevance of the problem of correctly characterizing the spatial variability of soil moisture. However, I would find it appropriate to mention some of the important theoretical results that have been

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recently obtained on this topic: examples are in the papers by Rodriguez-Iturbe et al. (1995), Isham et al. (2005), and Manfreda and Rodriguez-Iturbe (2006).

2) Reference to a recent paper by the Authors, published on Journal of Hydrology in 2007, is made at page 2841, line 19-29. The paper on JoH is similar to the present one under some aspects (description of the EOFs, application to the soil moisture Tarrawarra dataset, etc.). In my opinion the Authors should try to better clarify what are the differences between the two papers.

3) The explanation of the methods is rather clear also for a non-expert. I only encountered some difficulties where the expansion coefficients (EC) are defined (page 2842, line 24-25), and where it is explained how these ECs are estimated (page 2848, line 10-23). Maybe some more details could be useful in these parts of the paper.

4) The results of the two test statistics used to verify the significance of the eigenvalues are very much different from oneanother (see Figure 3). It is often the case that different tests provide different results, but in this case the magnitude of the differences is so large that one is tempted to conclude that one of the two procedures is wrongly applied. In particular, the test by Johnson and Wichern (2002) does not seem to properly account for cross-correlation among the eigenvalues.

5) Page 2854, line 22-28: if the lack of independence among the data hinders the use of a t-test, than also the confidence limits in Figure 6 are wrong, because they are based on a wrong estimate of the standard deviation. I think the real confidence intervals should be wider.

References

Manfreda S, Rodriguez-Iturbe I, On the spatial and temporal sampling of soil moisture fields WATER RESOURCES RESEARCH 42 (5): Art. No. W05409 MAY 3 2006

Isham V, Cox DR, Rodriguez-Iturbe I, Porporato A, Manfreda S , Representation of space-time variability of soil moisture, PROCEEDINGS OF THE ROYAL SOCIETY

RODRIGUEZ-ITURBE I, VOGEL GK, RIGON R, ENTEKHABI D, CASTELLI F, RINALDO A, On the spatial organization of soil moisture fields, GEOPHYSICAL RESEARCH LETTERS 22 (20): 2757-2760 OCT 15 1995

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