

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

**Anonymous Referee #2**

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General comments.

1. The overall objective of the research is well posed and of great interest, as being the evaluation of soil moisture space-time variability a crucial factor in models for evaluation of water balance and/or antecedent moisture condition in real-time flood prediction. References to this kind of papers should be placed as well as to papers devoted to theoretical modelling of soil moisture space-time distribution.

2. Authors should mention what could be the operational use of such methodology. I believe that a useful exploitation of the proposed methodology can be identified in enhancing the role of the information arising from experimental campaigns aimed at

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validating results of theoretical and simulation models. The same authors in fact state that such methodology is not immediately exportable to other sites or other datasets, results could change in other hydrological conditions. Nevertheless the individuation of key factors that controls soil moisture patterns is itself important and, this information, coupled with the use of theoretical models may lead to improvement of the same theoretical models (that even could be better focused on crucial process controls) and to context independence of the methodology.

3. A second useful application could be focused on the organization and design of optimal campaign experiments. It is in fact important to highlight that cost and duration of such kind of experiments are key factors for the development and the improvement of the observation datasets available for this kind of analysis. The same authors highlight in the paper that a few observation sets in time are enough to obtain fair results. It could be specified what could be the method applicability to larger spatial scales (basin or regional scale) and the minimum sample resolution required in such a case in order to obtain acceptable results.

#### Specific comments

1. More diffuse explanations could be provided regarding the role and the evaluation of the Expansion Coefficients.

2. A deeper discussion about applicability and results of the tests described by Bartlett (1950) and Johnson and Wichern (2002) should be provided. Accepting the average value of such different results (page 2851, line 11) do not appear as a significant solution, other considerations (later exposed in the paper) actually suffices for the adoption of three EOFs.

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