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Hydrology and Earth System Sciences Discussions

Interactive comment on "Analysis of surface soil moisture patterns in agricultural landscapes using empirical orthogonal functions" *by* W. Korres et al.

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Response to Anonymous Referee #2:

We would like to thank referee #2 for the comments to our manuscript and use the opportunity to address some issues addressed by the referee. First, the referee comments are quoted after the page/line index.

(1) p 5573, l 16-18: "but only the ...meaningful" −− > "Only min(n,p) eigenvalues are greater than zero, but only a subset (usually much smaller set) of these positive eigenvalues are meaningful/useful.

The wording of the referee is much clearer and will be inserted in the next version of

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the manuscript.

(2) p 5575, l 13-15: "Another calculation ...here." It is not clear what is meant by randomized. Better to delete this sentence.

The positions of the elements of the real measurement data matrix were randomized along one dimension. For the spatial Monte Carlo-analysis the positions of the elements in every row (all measurements on every single date), for the temporal Monte Carlo-analysis the positions of the elements in every column (all measurements on every single point) were randomized.

(3) p 5576, l13-17:"The EOFs ... patterns". This is not entirely correct. What the authors could do is to correlate, not the EOFs but the associated EC with, eg the temporal development of biomass.

Initially we had the same idea, but this only possible when analyzing areas with a similar development of biomass. In both of our test sites we have a different development of biomass on the different test fields, because of differences in cutting, grazing, sowing, harvesting and/or different crops. Hence, this correlation between the EC and the temporal development of biomass across the whole test site is not useful.

(4) p 5579, end of paragraph 1: Clearly EC2 shows a trend of surface soil moisture. I think the authors should find out/discuss the origin of this trend. Also, the S- and T-EOFs should in principle have the same spectrum (with may be different expressions of confidence intervals). This is not so in Figs. 6,7. Explanation is required here.

The discussion of that trend can be found in the manuscript from page 5584, line 17 to page 5585, line 7. But instead of a continuous trend we identify three different states (first two dates, mid-dates, last three dates in Fig. 7d) of the EC2 value, which are connected to reversing management patterns at different measuring dates. To substantiate this conclusion, the analysis of the associated EOF2 must be considered (carried out in the section noted above). For the second question: There is no obvious

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reason why the spatial and the temporal EOF-analysis should have the same spectrum, because they are computed differently (see page 5572, line 15). Our findings are consistent with comparable studies (e.g. Perry, M. A. and Niemann, J. D.: Analysis and estimation of soil moisture at the catchment scale using EOFs, J. Hydrol., 334, 388–404, 2007).

(5) p 5584, 2nd paragraph is a little clumpsy with many details. Consider reduce this substantially.

The comment will be considered in the next version of the manuscript; the paragraph will be reduced and rephrased.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 5565, 2009.