**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 #1:

First of all, we would like to thank referee #1 for the comments to our manuscript and use the opportunity to address some issues addressed by the referee.

General:

1.) We will sharpen the rational of the paper to underline why the EOF (PCA) method was applied and what can be learned from our analysis. Hence, the goals of our work should be clearer.

2.) Before re-submitting, the manuscript will be proof-read by a native speaker.

For the specific comments: All specific comments (mostly wording aspects) will be taken into account. The more substantial comments are addressed in this response to referee #1. The referee comments are quoted after the page/line index.

5568/1: Under very wet conditions variability in soil moisture probably decreases, see "Explaining soil moisture variability as a function of mean soil moisture: A stochastic unsaturated flow perspective" by Vereecken et al., GEOPHYSICAL RESEARCH LETTERS 34(22);

The suggested literature will be taken into account and the influence of various soil moisture conditions on variability will be extended.

5571/21: How accurate is that visual estimation of the coarse fraction!?

The connection between the stone cover and the coarse fraction of the top soil layer (0-30 cm) was evaluated by analyzing the visual estimation and soil samples on two parallel transects with 8 measuring points resulting in a pearson correlation coefficient of r=0.89.

5576/5-7: This assumption is not valid. For example the paper of Vachaud et al. (1985) clearly demonstrates the temporal persistence of soil moisture patterns in time.

We agree with the referee; a temporal autocorrelation of soil moisture patterns is stated by several authors. The assumption of independent measuring dates was just used for simplification and concerns only the selection of the number of significant EOFs and not the structure of the EOF analysis itself. Since the temporal analysis in both test sites yields only one significant EOF whether the temporal persistence of patterns was considered in the calculation or not, the result of the analysis is exactly the same. In the revised manuscript this will be addressed and the recalculated error bars and significance level in the temporal scree plot figures will be inserted.

5576/27: 1:50000 is a very coarse scale. You better use a pedotransfer function cause

texture and bulk density are measured on-site.

This coarse scale soil map is the only soil data source that corresponds to the extent of our spatial measurements. The onside measured texture and bulk density maps provided information only for a smaller part of our measurement locations.

5577/15: Isn't that statement contradicted by a CV of 9.6% versus 14.2%? Variability is 50% higher, and that despite lower slopes in the arable site.

The statement was referring to the standard deviation of soil moisture in the two test sites. This will be rephrased and extended for clarification.

5585/24 what is the link between SOC and Stagnosols?

The highest soil moisture variability during dry and wet periods in the grassland test site is located in its low-lying parts where also high SOC contents in the topsoil can be found. These high topsoil SOC contents are associated with areas where higher soil moisture content prevails over the years resulting from and indicated by Stagnosol soils.

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