

## ***Interactive comment on “State-space approach to evaluate spatial variability of field measured soil water status along a line transect in a volcanic-vesuvian soil” by A. Comegna et al.***

**Anonymous Referee #1**

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Review on “State-space approach to evaluate spatial variability of field measured soil water status along a line transect in a volcanic-vesuvian soil”.

This manuscript deals with the fact that it is often times difficult to derive the complex relationship between soil water content and soil water pressure head under field conditions. It can be much more efficient to describe the spatial relationship between water content and pressure head stochastically rather than deterministically. In their contribution, the authors apply a bivariate autoregressive state-space model to describe their spatial process. The goal in general has to be appreciated, and this paper is a good

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contribution to the journal.

Here are my suggestions for revisions: I recommend to begin the abstract section with a problem statement, rationale and objective before it is mentioned what was done.

The literature review on page 6555 is nice. Here are some further articles on field studies in this field of soil physics that may be of interest to the authors:

Ünlü, K., M.L. Kavvas, and D.R. Nielsen. 1989. Stochastic analyses of field measured unsaturated hydraulic conductivity. *Water Resour. Res.* 25:2511-2519.

Ünlü, K., D.R. Nielsen, J.W. Biggar, and F. Morkoc. 1990. Statistical parameters characterizing the spatial variability of selected soil hydraulic properties. *Soil Sci. Soc. Am. J.* 54:1537-1547.

Greminger, P.J., K. Sud, and D.R. Nielsen. 1985. Spatial variability of field-measured soil-water characteristics. *Soil Sci. Soc. Am. J.* 49:1075-1082.

Buchter, B., P.O. Aina, A.S. Azari, and D.R. Nielsen. 1991. Soil spatial variability along transects. *Soil Technology* 4:297-314.

Wendroth, O., S. Koszinski, and E. Pena-Yewtukhiv. 2006. Spatial association between soil hydraulic properties, soil texture and geoelectric resistivity. *Vadose Zone J.* 5:341-355.

Page 6556, line 6: Isn't this soil type called Andisol (instead of Andosol)?

Page 6556: "... the bubbling pressure (Pa) is greater than 0.5 hPa ..." does not really tell much. Please specify this value.

Page 6559, middle: The matrices and vectors used in Eq. 3 need to be explained, at least their name and purpose.

Page 6559 bottom: The matrix denoted with a capital Greek Theta needs to be briefly explained. Moreover, since theta (lower case) has been used as a symbol for soil water

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content, I do not recommend use of capital THETA here.

Page 6561: Bottom paragraph beginning with "The estimated model ...": This paragraph needs to be reworded and clarified.

Page 6563 bottom: is this auto- or crosscorrelation matrices or both?

Editorial: Page 6556, line 2: spelling of "drawn".

Page 6557: spelling of the author "Vieira" (twice), and twice in the reference list.

Page 6557 bottom" I could not find the Anderson and Moore (1979) reference in the list of references.

Page 6560, second to the last paragraph from the bottom should read : "... they are recorded at constant intervals ..."

Page 6562, line 7 should read: "... and h values ...".

Figures: From figure 3 on, most figures came out in bad quality in my downloaded version.

In general, all figure captions are very short and should be more informative to the reader.

Figure 3: Axes titles need to be added.

Figure 4: The x-axis titles are wrong. These are not lag distances but distances along the transect. Size of individual plots should be enlarged. There is too much unused space in between plots. Font size should be increased.

Figure 5: y axis needs to be added.

Figure 6: the different line styles can hardly be distinguished.

Figure 9: I could not figure out the purpose of this figure showing groups of black boxes.

Figure 10: Again, x-axis is not a lag distance but a distance along the transect.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 6553, 2010.

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