Hydrol. Earth Syst. Sci. Discuss., 7, C3391–C3392, 2010
www.hydrol-earth-syst-sci-discuss.net/7/C3391/2010/

Hydrology and Earth System Sciences Discussions

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 #2

Received and published: 8 November 2010

This paper applies time series modelling to soil physics data collected along a spatial transect. The methodology is standard and well known, but usually applied to time series data because the method assumes a sense of direction, i.e. it takes into account that the future is derived from the past. In space there is no such sense of direction, and this really makes me worried when I see equations such as Eq. (1) applied on a static spatial series of data. There is no justification for the asymmetric approach in such a case. For instance, presumably the authors took one end of the transect as their initial point, but which end? Both could be used, and results might be slightly different. Also, how is the 'initial' condition Z_0 chosen when predictions are made?

So in my view there are principal objections against applying ARMA and state-space models along a spatial transect as done in this study. Moreover, there is also no need for it because alternatively, kriging could have been used (e.g. using the model defined on page 6558, line 13). That would make much more sense although of course this is also very routine.

The data set seems to be very interesting, and so it is a real pity that authors did not apply a more sensible method to their data. One such a method might be to use a space-time autoregressive (STAR) model, the structure of which would be appropriate for the case at hand and also, this method has not been frequently used in the past.

The added value of the two-dimensional analysis (section 5) is limited (note also that soil water content and tension measurements are not at the same locations but always 0.5 meter apart, which is ignored in the analysis), and particularly the attempt to ascertain that the bivariate model complies with the univariate models may be criticized. These models are similar but they are not the same and that is perfectly acceptible, if only the output of the models are in sufficient agreement (e.g. model output should lie within each others prediction limits).

The paper is well structured and generally reads pleasantly although at places it is somewhat difficult to grasp what authors mean precisely.

In summary, interesting data set and fairly well-organized text, but disappopinting because it applies a basic, common methodology to the wrong case. It does not advance scientific knowledge.

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