Hydrol. Earth Syst. Sci. Discuss., 2, S104–S105, 2005
www.copernicus.org/EGU/hess/hessd/2/S104/
European Geosciences Union

Hydrology and Earth System Sciences Discussions

Interactive comment on "Empirical Mode Decomposition in 2-D space and time: a tool for space-time rainfall analysis and nowcasting" *by* S. Sinclair and G. G. S. Pegram

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Received and published: 25 March 2005

General Comments

This paper proposes as new technique for decomposing a rain field into a set of approximately orthogonal basis functions in order to separate out the lower frequency components that are useful in forecasting applications. This paper presents a technique that has been developed for time series analysis in one dimension and develops it further so that it can be applied to two-dimensional rain fields.

Section 2 contains a clear tutorial on how the technique is used in one dimension, which is needed in order to establish the concepts in the mind of the reader.

Section 3 then generalizes the technique into a two-dimensional analysis. It is assumed that the reader knows how to identify the extremes in the rain field, but there are many

options and so I feel that the authors could provide a short discussion on the issues and defend the technique that was selected for this task.

Clearly more work needs to be done concerning the application of this technique to rainfall forecasting, but I expect that this technique will prove to be a useful addition to the techniques that can be used in rainfall nowcasting.

Specific Comments

The selection of the technique to interpolate between the extremes is critical as this is the most computer intensive step in the procedure. The interpolation could have been performed using a local version of the Kriging equations, or indeed a simple distance weighting technique could also be used. It would be interesting to see what the consequences are in using a brute force and ignorance approach to speed up the computations.

The distinction between high and low frequencies in the paper is somewhat arbitrary. The point in Turner et al. is that the amount of spatial smoothing needs to increase with forecast lead time. How will this be accomplished using the EMD technique?

Section 4 presents the results from an analysis of a large number of rain fields. I find it difficult to interpret the results shown in Figures 11, 12, and 13. From the text I think that these figures represent persistence in the power spectrum, but this is simply a measure of the spatial structure in the field. These figures show that the statistical structure is persistent rather than the features in the field. One could have independent fields with identical power spectra.

Interactive comment on Hydrology and Earth System Sciences Discussions, 2, 289, 2005.