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Discussions

Interactive comment on "The effect of flow and orography on the spatial distribution of the very short-term predictability of rainfall" *by* L. Foresti and A. Seed

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Just when one thought there was nothing more to be done in modelling radar-rainfall, except for making possible incremental improvements, there appears a paper with a quantum leap in ideas, which opens up a whole new area of rainfall modelling and forecasting using weather radars. This is the paper.

The treatment of spatial inhomogeneity and linking this with topography, and coupling this over the range of scales defined by the STEPS model online, form the core of the

paper. The treatment of the power spectrum by giving it a 'knee' and modelling the different slopes of low and high frequencies on the fly is novel – most practitioners go for an average slope and ignore the consequences. This detail is supported by careful and extensive corroboration of other facts with ideas producing a very thorough job.

There are a couple of small points which I think can be streamlined. The first is the computation of the correlation length LT using equations (3) and (4). An analytical solution would dispense with the need for a numerical integration using Simpson's rule. The integral (4) Int[r^t]dt from 0 to infinity has the solution: -1/ln[r]. The first moment about the origin is Int[t.r^t]dt from 0 to infinity = {1/ln[r]}^2. Thus the distance LT = -1/ln[r]. That should save a bit of time and give an exact result.

The second is the recursive computation of the mean and variance using equations (5) and (6), each of which gradually stabilise to a limit as the time progresses, ignoring later local fluctuations or trends. An alternative which yields local smoothing of these statistics is to use a weight g: 0 < g < 1 in the following recursion equation, borrowed from Recursive Least Squares computations. The running mean of the series {x(t)} can be conveniently calculated as w(t+1) = (1-g).x(t+1) + g.w(t). This idea can be easily adapted to the calculation of the variance. What is more, there is no need to carry forward previous observations, as was also the idea in the authors' formulation. At any rate, the authors make remarks to this effect in the last paragraph of the conclusions, pointing to the future. I hope this paragraph helps to open the way.

The language is clear and in my opinion does not need any correction.

I congratulate the authors on an excellent paper and recommend its publication in HESS, with or without incorporating my suggestions.

Geoff Pegram

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 7733, 2014.