Hydrol. Earth Syst. Sci. Discuss.,
doi:10.5194/hess-2016-668-SC1, 2017

Hydrology and Earth System Sciences
Discussions

Interactive comment on "A non-stationary stochastic ensemble generator for radar rainfall fields based on the Short-Space Fourier Transform" *by* Daniele Nerini et al.

C. Velasco-Forero

carlos.velasco@bom.gov.au

Received and published: 14 March 2017

Dear Daniele et al

It is quite good idea what you are proposing in the paper to locally filter rainfall fields and effectively dealing with their natural spatial anisotropy.

I would like to comment only on the core of your proposal that it is the use of a weighting window in the space domain. I am wondering if the reason of the contraction/differences in the local autocorrelation functions reported in your paper may be caused by the particular type of filtering window chosen to illustrate your technique. The standard Hanning window used in the paper may smooth too much the observed

rainfall fields in particular at the edges of the window and therefore may not capture enough of the structure of the rainfall.

As alternative to better capture the rainfall structures across the whole window, the Hanning window may have a flat top until a given distance from the center of the window and then allow the decay of the filter as per your original Hanning window (See Figure 1).

In this way you will have a significant area of the window preserving rainfall values as they are in the original rainfall field (weighted with a Factor=1) and then weighting values moving down from this "flat plateau" area towards the edges of the window with similar decay than your original (standard) Hanning window (See Figure 2).

The 2D "top flat" Hanning window presented in Figure 2 was made by rotation of the 1D "flat top" Hanning window (Figure 1) but a outer product may be applied as well in the same way that it was used for the "standard" Hanning window in the paper to extend ever further towards the edges the non-zero areas.

I believe that if you make comparisons between the auto-correlation functions calculated using a "standard" Hanning window and a "flat top" Hanning window, the later will produce "noisier" contours and less contracted autocorrelations than the former, probably because a better representation of the rainfall structure within the window.

The selection of which is the best weighting window to filter rainfall fields by applying the SSFT technique is so interesting and definitely worth a separate paper. The best filtering window will probably depend of the characteristics of the particular problem to solve using SSFT and also their properties in the frequency domain.

This is just a comment on how the innovative method proposed in this paper may be improved and therefore it does not invalidate the rest of the results presented here.

Well done Daniele and team.

Kind Regards

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-668, 2017.

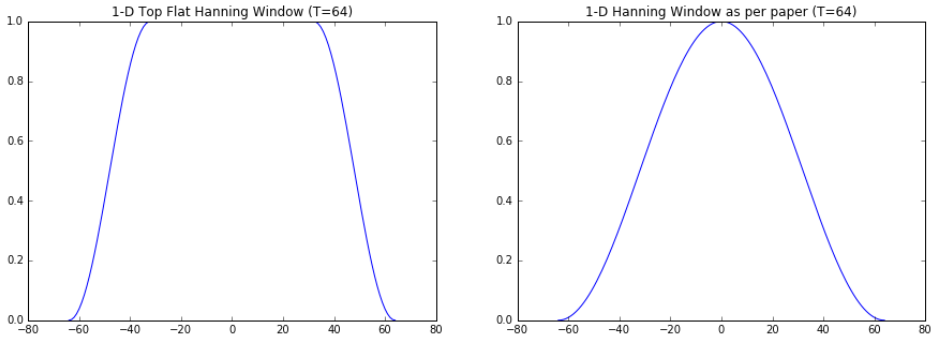

Fig. 1.

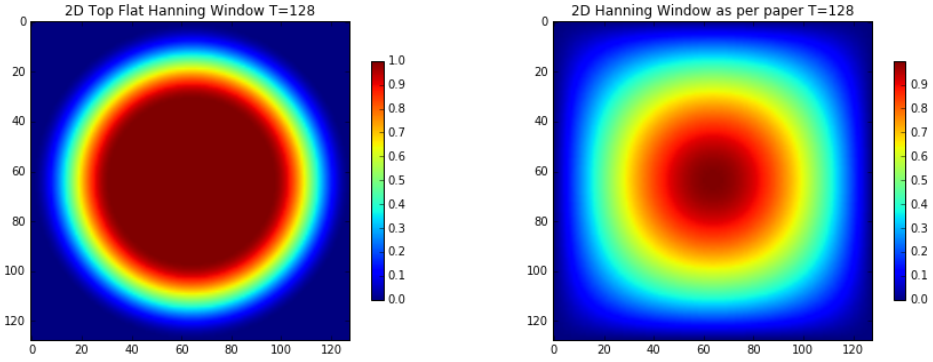
2D Top Flat Hanning Window T=128
2D Hanning Window as per paper T=128

Fig. 2.