Nonlin. Processes Geophys. Discuss.,
https://doi.org/10.5194/npg-2017-19-RC1, 2017

Nonlinear Processes in Geophysics
Discussions

Interactive comment on "Multi-scale event synchronization analysis for unravelling climate processes: A wavelet-based approach" *by* Ankit Agarwal et al.

Anonymous Referee #1

Received and published: 11 July 2017

General comments

The manuscript proposes a new method for the detection of synchronization between event time series based on the discrete wavelet transform. The approach is straightforward being based on the already established event synchronization method but applied on a scale-by-scale basis to wavelet components instead of the original signal. The idea is sound, however I think that the manuscript needs to be improved, particularly in what concerns the presentation and better explanation of the actual results. In the present form the performance of the method is difficult to assess and thus the claims of the manuscript are not well supported. One of my main concerns is the type of

synthetic test cases performed, since the connection between the smooth and regular signals used for illustrating the method and actual event time series is not clear to me. Is the approach identifying time series correlation or synchronization between events? I think that showing examples of actual event time series (instead of only the wavelet power spectrum) could be helpful. In my opinion the procedure should be shown in more detail at least for one case study: the time series, the corresponding discrete wavelet decomposition, and the results of the quantity Q.

Specific comments

Figure 1: I understand the idea of illustrating the whole proposed procedure using Figure 1, but the figure is only very briefly mentioned in the introduction and not even the caption gives much further detail, for example a short description of a) and b) panels is not given. The quality of the figure itself is also poor.

Eq (4): I think that the exponent of ao in eq (4) should be lambda (and not 2)

Figure 2: Is this figure (from another source, included in the caption) really needed? The quality is very bad (particularly the left side) and doesn't really add much new information. Maybe merge Figures 1 and 2??

Page 5, line 10: Eq(11) is redundant

Figure 3: the wavelet power spectrum is from a continuous wavelet? For consistency shouldn't be shown instead the spectrum based on the discrete wavelet transform? the connection between the periods in Fig 3 and the scale lambda in Figs 5 to 10 should be indicated.

Interactive comment on Nonlin. Processes Geophys. Discuss., https://doi.org/10.5194/npg-2017-19, 2017.