Nonlin. Processes Geophys. Discuss., 1, C118–C119, 2014
www.nonlin-processes-geophys-discuss.net/1/C118/2014/

Nonlinear Processes in Geophysics
Discussions

Interactive comment on "Finding recurrence networks' threshold adaptively for a specific time series" *by* D. Eroglu et al.

Anonymous Referee #1

Received and published: 8 May 2014

The manuscript of Eroglu et al. discusses how to select a threshold of recurrence plot adaptively for a given time series. Their method is to choose the smallest threshold such that the elements of the recurrence plot are all connected when it is regarded as a recurrence network. They demonstrated their method using time series generated from the logistic map and the real dataset of palaeoclimate record. The paper discusses the important problem when we use a recurrence plot, and thus I will support its publication after the following minor points are revised.

1. It is very interesting that the authors finally have reached the proposed condition, which (accidently?) coincides with the mathematical condition that one can reproduce the rough shape of the original time series from a recurrence plot (see Thiel et al., Phys. Lett. A 330, 343-349 (2004); Hirata et al., Eur. Phys. J. Spec. Top. 164, 13-22 (2008)). Therefore, it would be nice if the authors can discuss the relationship between their intention for the proposed condition and this mathematical condition for the reproducibility of the original time series from a recurrence plot.

2. How long did it take for a computer to obtain ϵ_C in Eq. (4) for the examples of Figs. 2-4?

3. Because Figs. 2 and 3 look to me that the results of constant thresholds are more consistent with the behavior of Lyapunov exponent, it might be more appropriate to say that the proposed threshold should be used especially for identifying some bifurcations where the maximal Lyapunov exponent keeps non-positive.

4. It was great that the authors demonstrated the difference between the results obtained from a standard criterion for the threshold and the ones obtained from the proposed condition. It would be greater if the authors can show further difference between their results and the ones possibly obtained from conventional recurrence quantification measures.

5. How computationally expensive to calculate the network transitivity and the average betweenness centrality? Because the former contains the triple sums and the latter needs to count the number of shortest paths, I suspect that the computational demands could be huge. In such a case, I imagine that the authors can state the advantages for computing the network transitivity and/or the average betweenness centrality more strongly if they compare it with computing the Lyapunov exponents.

Interactive comment on Nonlin. Processes Geophys. Discuss., 1, 803, 2014.