Nonlinear Processes
in Geophysics

EGU

Discussions

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Interactive comment on "Dynamical properties and extremes of Northern Hemisphere climate fields over the past 60 years" *by* Davide Faranda et al.

Anonymous Referee #1

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Authors present an important application of the of the extreme value theory to Poincaré recurrences in dynamical systems, which can provide estimations of some metrics of the ergodic chaotic attractors, namely the phase-space local dimension and local recurrence. Authors apply the technique to relevant daily fields: the sea level pressure, surface air temperature and precipitation rate, trying to understand their seasonal dependency in the Northern Hemisphere and exploring the atmospheric patterns which are consistent with maximum and minimum values of those metrics. There are, however some minor worthwhile points which should be addressed before publication.

1 - Annual cycles of the local dimension d for slp and Temp(air) are in phase opposition

(Figs. 2a, 2c). There is any physical reasonable explanation for that? The authors present a hypothetical explanation for the minimum of d for slp at the summer and maximum at the equinoxes as being more 'unstable' because of an incremented exploration of the summer and winter configurations. However, that could apparently be valid for any field but in fact it is totally contradicted in the case of the Temp(air) where d is higher in summer. Therefore, the authors should reformulate the explanation (which, as presented likes somehow ad-hoc) or give and explanation why it does not work for Temp(air).

2 – In Pg. 8 in the Analysis of Precipitation data. Authors explain the higher value of d (compared to slp and air) thanks to the scattered and noisier character of the precipitation field. However, analysis of precipitation extremes has been done using the multifractal analysis (MFA) (Langousis et al. 2009) which also give hints about the dimension. Authors should try to relate the presented results with those of MFA.

3 - The graphs of ACFs(s) (Fig.1 and others) present discontinuities or overlaps near the zero line. This is maybe because of the symbol size? Use a format avoiding that artifact.

4 - Caption of Fig. 11 shall be more complete, i.e. making explicit the pairs of variables: Fig11a,b (slp-air), Fig. 11c,d (slp-prp), Fig. 11e,f (air-prp). Which variable lags in the future?

LANGOUSIS, A., VENEZIANO, D., FURCOLO, P. y LEPORE, C. (2009): ÂńMultifractal rainfall extremes: Theoretical analysis and practical estimationÂż. Chaos, Solitons and Fractals, n° 39, 1182-1194.