Nat. Hazards Earth Syst. Sci. Discuss.,
doi:10.5194/nhess-2016-318-SC3, 2016

Natural Hazards and Earth System Sciences
Open Access
Discussions

Interactive comment on "Time-clustering of wave storms in the Mediterranean Sea" *by* G. Besio et al.

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Received and published: 8 December 2016

After reading the comments of the two Reviewers, I would like to further highlight a point.

Referee 1 states "it seems that before 20-50 days the AF appears well approximated by a straight line, and the interpretation as a signature of fractality or clustering at timescales below 20-50 days seems to be appropriate", while Dr. Wahl writes "What about the "wobbles" that exist at all example sites for the 99.5% threshold in the model data at ≈ 5 and ≈ 25 days, it seems to be something systematic".

As far as I know, wave data exhibit multiple (superimposed) cyclic patterns related not only to annual seasonality, but also to semi-diurnal, diurnal, fortnightly, and lunar (29.5 days) cycles, and others. Maritime/Ocean engineers know this much better than

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me. My point is that all these cyclic processes might affect (if not removed) the AF diagram proportionally to their relative amplitude/magnitude within the overall signal. This results in an overlap of "wobbles" whose maximum is centered around the half period of each cyclic component. The evidence of such "wobbles" depends on the relative amplitude (weight) of the cyclic component within the signal. The overlap can also result in apparently local "linear" patterns.

To summarize, before drawing conclusions about scaling/fractality whose attribution might be problematic (especially in a very small range of scales), we need to exclude that the AF patterns result from much simpler (I would say, trivial) well-known properties of the wave signals. Note that AF provides information very similar to other techniques such as classical power spectrum, wavelet spectrum averaged over time, etc., which can therefore provide complementary information.

As far as the significance of the AF patterns is concerned, I stress once again that this should be assessed by comparing the signal with simple but informative (non trivial) point processes. In the present case, a homogeneous Poisson process is not enough (it is trivial), as we already know that the signal is characterized by annual seasonality, at least, and cannot be homogeneous. Actually, a suitable benchmark should be a non-homogeneous point process involving all the main possible cycles characterizing the wave signal. As an alternative (as I mentioned in my previous comment), data should be pre-processed by filtering out such periodic components.

Moreover, in order to support scaling/fractal behavior (or whatever else), simulation of fractal point processes and subsequent comparison of AF patterns are required. Whatever is the explanatory "model" we assume (fractal, cyclic, both, etc.), one needs to show that such a model yields AF patterns (or whatever summary statistic of interest) comparable to the observed ones. In fact, excluding a trivial behavior, such as the homogeneous Poissonian, is not enough to support alternative conclusions on different processes if we do not show that such processes are able to reproduce the observed behavior. This is the rationale of the simulations reported in fig.4 of Serinaldi and Kilsby

(2013), and this seems to me a sound scientific way to test a theory/model/assumption showing its (provisional) validity for operational purposes.

Sincerely,

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