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Discussions

Interactive comment on "Simulating Synthetic Tropical Cyclone Tracks for Statistically Reliable Wind and Pressure Estimations" *by* Kees Nederhoff et al.

Anonymous Referee #1

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This article describes a new open-source tool (TCWiSE) for the simulation of synthetic TC tracks. The utility of this kind of approach is that in many areas the frequency of the TC is too low to provide adequate historical statistics. Though similar works exist, an important advantage of TCWiSE is that it is open-source, which potentially makes it a useful tool for research groups active in risk analysis.

The paper is clear and well written, though some details of the algorithm require additional explanation (see below).

An important limitation that I see in the applicability of this approach for studies on climate changes, is that it does not consider explicitly variables like SST in the cyclo-

genesis. Hopefully, this limitation will be overcome in future releases.

Overall, I recommend the paper for publication after a moderate revision. Below, some more detailed comments.

p2, l8: how reliable are very old data? Can we assume that the frequency of TC 100 years ago was similar to that of today?

p2, l18: the term "heading" should be defined

p4, l8: it could be useful to add, in the future, 1st order estimations of the ocean variables as well.

p4, l16: "number of points needed per KDE" does not read well. You mean, the kernel size?

p4, l17: "The user can also define bulk ... climate changes." But to do so I should assume a dependency between TC frequency and climate variables such as SST, or build a further statistical model to infer it. I believe this would be better done inside TCWiSE, please consider it as a future development.

p4, l25: .. poisson distribution ... this is not very clear. how do you define the poisson dist? monthy or seasonally?"

p5, l6: .. sea surface temperature (SST) .. I guess SST is somehow estimated by TCWiSE? How?

p5, l12: "last track". How does the algorithm decides that it has to generate nothing else? At the end of its time horizon?

p5, l16: "create wind swaths", in fig 1 it is said that is done by means of POT GPD. would you clarify how?

p5, l16: The difference between wind swaths and maximum wind is not very clear.

p7, l4: "temporal variability of genesis locations or other input parameters are included

in the tool" but you mentioned earlier that a Poisson dist is used to model the seasonal dependency (how?)

p7, l9: "Genesis location in ocean surface temperatures less than a user-definable value .." this sentence is not well formulated

p7, l23: "The KDE that is sampled are constructed for each grid point based on input data within a specific search range." this sencence does not read well

p8, l25: "... not completely similar to the historical ..." maybe this could also depend on the way the termination in historical data is defined? Do all the agencies define the TC termination in the same way?

p8, l30 & p9, l3: see my previous comment for p4, l17

p9, l11: wind swaths: it is still a bit unclear what the wind swaths are and how you do generate them - on what variable is the GPD fitted?

p11, l30: "MAE": you mean, the MAE between historical and TCWiSE cdf? Please clarify

p11, paragraph 3.3.1: I would suggest adding formulas with the error indicators used

p12, l15: "the genesis patterns ..." this sentence does not read well

figure 4: "is the maximum wind speed per TC and not the same as the wind field and/or wind swaths" again, the difference should be explained

p15, l9: "for example" looks out of context

p15, l9: the TCWiSE bias of c vs historical looks generally slightly negative. Is it only in this case?

figure 7: the scale looks in radiants rather than in deg

figure 8: the bias in TCWiSE max wind looks slightly positive. Is it a systematic tendency or is it random?

p19, track termination. To what extend may these differences depend on the uncertainty of historical data on track termination?

p20, l7: estimates *of* TC winds

p21, l2: How many TC were used for the estimation of the extremes on the historical? How do you ensure the extremes on the historical are compatible with the ones on the synthetic tracks?

p21, l5-9: the authors should mention here that the large differences are due to the differences between the historical, used to fit the model, and the observations. They should also mention, earlier, that the historical data are model data, and not observations

p24, l10: "this makes TCWiSE also more sensitive to input errors compared ...", unclear why this should be: the algorithm used by other authors may as well be sensitive to input errors

p25, l2: ".. using datasets derived by global climate models .." you mean, CMIPX? How? These models are quite unable to represent properly the TCs. That's a reason why statistical tools like this can come in handy

p25, l20-22: this sentence is a bit unclear and full of repetitions

p25, l25: " It does seem however that synthetic TC tracks have a less clear southwest-" from what do you see this?

p25, l27: subtitute Jetstream with "climate dynamics"

p25, l30: "These differences can be attributed to the fact that TC termination can get triggered by ..." this sentence does not read well

If the tool is open source, I believe it would be useful to provide a link to a code repository

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