

Interactive comment on “Assessing the impact of SSTs on a simulated medicane using ensemble simulations” by Robin Noyelle et al.

Anonymous Referee #2

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The paper "Assessing the impact of SSTs on a simulated medicane using ensemble simulations" from R. Noyelle et al. exploits a large ensemble of regional climate model simulations to analyze the impact of varying sea surface temperatures on various properties of a historical medicane case. This topic is interesting and relevant to the ongoing research on medicanes, given the potential implications for both forecasting and better understanding of climate projection for such impactful phenomena.

I find the scientific goals clearly set out, the paper well written, and the provided analysis well supporting the conclusions.

I only have a number of (mostly minor) comments that in my opinion should be addressed prior to publication on NHESS.

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GENERAL COMMENTS:

- while reading the paper in several occasions I wondered what the spatial pattern and numerical values of the SST field look like at the time of the medicane occurrence. I think it would be useful if a figure with e.g. the original prescribed SST field could be added.

- one could wonder if the domain shifting technique can potentially introduce some systematic effects (e.g. anomalies in the atmospheric circulation) that could have a comparable role to variations of the SSTs on the evolution of the cyclones. Even if it is not in the scope of this paper, it would be useful if the authors can somewhere in the paper shortly comment on this issue.

SPECIFIC COMMENTS:

PAGE1-LINE2: it is not immediate to understand that the size of the ensemble is 24x11, I suggest to rephrase the sentence to make it more clear that 11 members with perturbed SSTs are produced for each of the 24 domain-shifted ensemble members.

P3-L3: I suggest to move the information on the boundary conditions earlier in the paragraph (e.g. "... resolution parent domain, driven by 0.7 resolution ERA-Interim, in which ...")

P3-L13: in order to provide complete information to the reader, the central domain over Europe should be described or shown (or if it is the same as in Mazza 2017 specify something like "as shown in Fig. xx of Mazza et al. (2017))

P3-L19: same as above for the inner domain

P4-L4: It could be useful for readers not familiar with Hart phase space if it is explicitly mentioned what the modifications with respect to the original phase space are (reduced radius and change of the upper bound for VTU from 300 to 400 hPa)

P5-L5: "this period is excluded from the analysis". Do you mean the "early phase of

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the cyclone" is the phase before MWTC-20h? This should be made clearer as at this stage of the paper since you have not specified yet what period of the cyclone lifetime you are going to analyze.

P5-L7: "Vtu on its own proved ...". I find this a bit confusing since there is no universal definition of what a medicane is, and you have stated earlier (Page 4, lines 15,16) that your definition of a medicane involves all the three parameters. Please clarify.

P5-L16: do you find for all the cyclones (also the non transitioning ones) at least one instant where $B < 10$ and $-Vtl > 0$? If not, how do you define MWCT for the cyclones that don't satisfy the condition?

P5-L18: do you find that the the 10 cyclones that enter the composite come more often from some specific 24 domain-shifted ensemble members, or are they uniformly distributed across the ensemble? This is related to general comment 1 above, as it could give some indication on atmospheric patterns that influence the cyclone evolution.

P5-L22: is tropical transition defined as any number of time steps where the cyclone is classified as a medicane or there is some minimum duration of the transition?

P6-L10-19: does the presence of two separate maxima also indicate that the cyclones that have a tropical transition to the west of Sardinia temporarily lose their tropical nature while crossing the island and have a second transition after moving on the sea again?

P6-L24: just looking at the figure, it doesn't look obvious to me - taking into account the error bars - that linearity can be excluded, did you do any statistical test?

P7-L5: "they diverge when MWCT is approaching to reach a minimum at MWCT". The meaning of this sentence is not clear.

Figure 6 and Fig. 8: it seems that the minimum of mslp and the maximum of VTL are reached at MWCT for DeltaSSTs of +1 and larger, but not for negative SST anomalies. Maybe also an indication that the coherent warm core structure is lost when SST is

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decreased?

Figure 10: I find it would be clearer if the panels are arranged in two columns, with time increasing from left to right as as in Fig 9

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