

Referees review of:

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Dynamics, predictability, impacts, and climate change considerations of the catastrophic Mediterranean Storm Daniel (2023)

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Overview

This manuscript constitutes a multi-faceted case study for cyclone/medicane “Daniel” which, at different stages in its lifecycle, delivered extreme weather and devastating impacts in parts of both Greece and Libya, in early September 2023.

My reactions on reading the response to reviewers and the revised article were diametrically opposite, and very hard to reconcile.

Firstly, the response letters that directly referenced reviewers’ comments were excellent, and covered almost every point that was made in an entirely satisfactory manner. Likewise, improvements made to the figures and captions, which was mainly what I commented on, were almost all comprehensive. The figure and caption quality, integrity and fitness for purpose have markedly improved as a result.

Secondly, I can note that, disappointingly, there was no direct response to my initial overview comments, which are quite fundamental, and then, in part because of this, the manuscript text remains in an unacceptable state. There are far too many grammatical and English errors, and there are also numerous contradictions, factual inaccuracies and unjustified sweeping statements. For some sentences I could not disentangle what the authors were trying to say. In the parts that I have gone through in detail – the Abstract, the Introduction and the Summary and Conclusions sections – I was encountering almost one error per sentence. I am sorry but it really is not the job of a reviewer to propose corrections at this level, so I confine myself to commenting on those 3 sections alone. This is time consuming enough! In the end it is the authors that should ultimately make the paper fit for purpose, not the reviewers. I can imagine that this may be a case of having “too many” authors without one electing to take full responsibility for making the final content coherent and consistent, but clearly I cannot know that for sure.

From an English standpoint I know that creating good sentence structures may be challenging for non-native speakers but I would advise that there are many tools out there that can help – e.g. Grammarly – and maybe the authors could benefit a lot from using such a tool to put together any re-submission?

Line numbers in the points below refer to *the manuscript version which shows the corrections*, not the cleaned version.

Detailed Points

1. L35. Daniel did not form as an intense cyclone. It formed as a weak cyclone that intensified markedly several days later as you highlight in the text.
2. L40. “conducted” is better than “aim to conduct” as otherwise it sounds like you haven’t done the work.
3. L41. “Hazardous weather relevant to extreme precipitation”. To my mind extreme precipitation is hazardous weather. Reorganise the sentence.

4. L44-46. Not sure what you are trying to say in this jumbled sentence. For example what do you really think are the implications of your findings for NWP? If that's a big part then surely the abstract should give the reader some clues as to what they are. Please re-write.
5. L47. Gives the impression that this was rapid cyclogenesis from the outset, whereas it was anything but. Please rewrite.
6. L49. "Even in" is a bit odd. Implies that near to the centre there were big impacts, which I have not seen. "notably in the region of Thessaly which was actually quite far from the centre" would be much better wording to my mind.
7. L49-50. "As it intensified...it peaked after landfall..." is bad English. It developed markedly just prior to landfall, reaching peak intensity over land.
8. L51-53. Sentence reorganisation needed – e.g. Considering short lead times (around four days), cyclone formation exhibited low predictability, whilst landfall in Libya was more predictable.
9. L53-55. This statement is not correct. You highlight a shortfall in precipitation totals for the Greece case; in fact with a lead time of 2 days – useful for forewarning – the observed gauge peak was 2.5 times the ECMWF HRES forecast total (see news item by Hewson in <https://www.ecmwf.int/sites/default/files/elibrary/12024/81535-newsletter-no-178-winter-202324.pdf>). Your reference to a somewhat smaller but still notable shortfall corresponds to *analyses* which cannot generally be used to forewarn, and moreover I do not know if the values quoted were in the same location. So this doesn't really provide "crucial information on the expected severity", or at least not without much more work on cross-referencing model climates etc, which you don't discuss. Likewise, regarding the devastating floods in Derna it is very clear that for these we did not have "crucial information on the expected severity" of the riverflow (Figs 4b and 11) (never mind the dam collapse) as you acknowledge in the text.
10. L58. Is the Mediterranean not one big maritime area?? What about the high uptake over land >50%, and indeed the seemingly the very high uptake over the Black Sea, for the Greece event. It looks to me like water vapour uptake over the Mediterannean was actually pretty small in relative terms – maybe ~ 25% of the total contribution (??) – which seems to contradict what you say?
11. L58-60. Poor English, please reword. Also what about the Black Sea, given point 10 above, as that was very warm too (Fig 5)?
12. L59-61. This feels to me more like jumping on the climate change bandwagon rather than solid science. So far as I can see the main evidence for this conclusion is that SSTs in places were a bit higher than normal. Is that really enough evidence? SSTs were above average many times in the past.
13. L95. Early September might be better
14. L97. "Named the upcoming storm" would be better. You can't, strictly speaking, name a storm when it doesn't exist. But I know what you mean.
15. L98. It did not evolve into a deep cyclone that propagated southwards. It propagated erratically southwards, then turned towards the east on 8th, and then developed into a deep cyclone. That is pretty clear on Fig 1a.
16. L100. Tautology. Delete "all attributed to the same weather system".
17. L104. Southeastern would be better. And it is misleading to link this statement to Fig 1b because that does not show any flooding where this rainfall was. Expand please to provide more clarity.
18. L105. These are most definitely not eastern parts of Greece. They are about as central in Greece as one can get.
19. L109, according to Wikipedia there are only three provinces in Libya. I think that what you are referring to are governorates.
20. L110. Again you point to part of Fig 1 as evidence of this flooding, yet Fig 1 seems to show no flooding whatsoever in the Derna area. Besides which the vast majority of the place labels on Figure 1 are too small to be legible. That also needs addressing.
21. L110-111. Building destruction does not include road damage. Separate.
22. L112. I just wondered if there is anything more recent than the IOM, 2023 quote?
23. L119. "72 million were requested". What units? And as with point 22, do you have any later evidence of what was delivered.
24. L127-129. For me this description is far too vague, having no geographical references whatsoever. Then the following sentence may need to be adjusted in some way if these geographical specifics are not always applicable.

25. L133. I think of an intrusion as a place where the stratospheric intrudes 'underneath' tropospheric air. Yet you have shown no evidence of that for this case. I can understand troughs and cut off lows being characterised by a lower tropopause, but to say more than that you have to present evidence in my view.
26. L134. My 'classical' interpretation of baroclinic instability is based on thermal gradients and geostrophically-related wind shear within the troposphere. Your usage seems to be much more focussed on upper level gradients. So maybe you can add a bit of clarification here? I also feel that "trigger" may be the wrong word here. I see the cyclone formation here as more of an event driven by ascent forced by advancing upper level structures, in the Pettersen Type B category, say, but in this case in the absence of any pronounced low level thermal gradient. So in the end a bit like "Type C" in this paper (<https://rmets.onlinelibrary.wiley.com/doi/abs/10.1256/00359000260498806>), albeit not at high latitudes and without the comma cloud.
27. L140. "...factors that modulate cyclone intensification..." would be better wording. Or drive instead of modulate.
28. L142. "in" not "by".
29. L144. Without any direct connection to the current work this sounds just like an advert for this paper. Why include this one in particular? I am sure there are other medicane studies that could be cited.
30. L150. Why do you imply that we have to have a moisture transport towards the Mediterranean when it is perfectly capable of providing its own! In fact this seems to contradict your conclusion that the high SST anomalies in the Mediterranean were somewhat fundamental.
31. L149-156. The sentiments expressed here seem to be rather jumbled up and don't really make sense to me. You say the Mediterranean is enclosed by high mountains which tends to stop external moisture getting in, but then you say that moisture that does arrive is really important. And what about the Black Sea as mentioned above?
32. L157-159. How can quantifying the water sources help one to understand socio-economic impacts? I don't get this and I really don't think this point is addressed in the paper.
33. L161-162. Jumbled English. "From a climatological standpoint cyclones are the weather features that lead to most of the wind and precipitation extremes within the Mediterranean" would be rather better.
34. L163. I don't recognise the word "compoundness". I have never seen it before. "in compound high impact weather events" would be much better in my view.
35. L164. It is clearly completely wrong to imply that a system has to make landfall to deliver storm surges and sig high waves.
36. L167. What do you mean by PV streamers as a proxy for Rossby wave breaking? Sentence order could also be improved.
37. L169. How does intense water vapour transport favour *development* of a deeper cyclone. To me it seem that intense water vapour transport is more likely to be a consequence than a cause, given that winds increase as a low deepens.
38. 170-171. I do not know what socio-economic impact on a weather scale is. Nor on a climate scale. This is very clunky wording. Moreover why do we need to understand both features to predict socio-economic impacts. The connection seems a very loose one to me. Surely it's much more important to understand societal vulnerabilities and how they relate to weather extremes if one wants to predict socio-economic impacts. This is like point 32.
39. L173. I can see how one can quantify past trends, but not future ones. One can provide *estimates* of what they might be, and these are likely to have large error bars associated.
40. L179. ...than would have been expected in... is better English.
41. L186-187. Woolly sentence that doesn't mean much to me.
42. L188. "concerning" means "according to"? And then what sort of "specific conditions" are you talking about? This is very vague.
43. L189-191. Again a poorly worded sentence. I object very strongly to the terminology "to attribute its intensity to climate change". You should too. I hope this is clumsy wording because as it stands it makes it sound like you are looking for all manner of reasons to attribute an event to climate change, which is not scientific at all. And this is not the only place that this message is conveyed. Even the title of Section 5.2 is in this vein, which I find very worrying. These things really have to be toned down and corrected and made scientifically sound.

44. L193. What does “apply a comprehensive framework” mean? Then the idea that you are “using” Storm Daniel as a centrepiece sounds almost novel, when it is nothing of the kind. It is crystal clear to any synoptician, and indeed from previous news items and publications, that this cyclone played a crucial role.
45. L194. I don’t know why there is a reference at the end of this sentence when this is supposed to refer to what you set out to do.
46. L202. “...in relation to imminent hazards...” is again clumsy wording.
47. 209-210. “section 5 is devoted to Daniel’s attribution to climate change” is again terrible wording in my view. I am sorry but using terminology like this provides wonderful ammunition for climate change deniers.
48. **Sections 2,3,4,5. Please revisit these very carefully, checking every word in every sentence. There are lots of errors similar to those highlighted above, and as stated earlier it is really not the role of a reviewer to correct all this. That is just too much.**
49. L946. “Besides fatalities” would be a better start to the sentence.
50. L947. What does “the climate acts as a risk multiplier mean” please?
51. L948-949. I don’t see the point of saying “and at a regional level therein”.
52. L949. “has been highlighted by the” is tautological. “is the” would be better.
53. L953. “by linking” not “which links”.
54. L955. “atmospheric dynamics are used here to understand the performance of NWP...” is a curious statement. How have you understood the performance using atmospheric dynamics? Please elaborate.
55. L956. Sea state is not an impact. Even for Libya. And “have also been analysed concerning” is bad English.
56. L957-960. Sentence makes no sense to me.
57. L962. “processes governing Daniel” is a strange phrase. Please rewrite.
58. L963. What do you mean by intrusion? Where is the evidence?
59. L964-965. Again the idea that Daniel developed into a deep storm that propagated southwards is not correct. It is not what is shown on Fig. 1 and it is not what is written in the main text of the paper.
60. L965-966. More clumsy wording in the same sentence: “while it was turning into...”???
61. L966-967. “Well-distinct” should be “distinct”, then why is the first stage “relevant to cyclogenesis”. Surely cyclogenesis should be the stage itself?
62. L968. Not sure how you define maturity but I would be inclined to go with the time of lowest pressure, which is after landfall.
63. L969. The primary floods, that killed 5000+ people, in Derna were clearly on 11 Sep, not 10th.
64. L970-976. Very jumbled and somewhat unintelligible. Please rewrite.
65. L978. Change “relatively remotely” to “in regions that were quite remote from”.
66. L980-981. Again sentence does not make sense and needs rewriting.
67. L982. Change “the predictability of the” to “predictions of”.
68. L983. Why particularly the ECMWF EPS?! I guess that’s not what you mean. Therefore please clarify.
69. L985. Occurrences or genesis? It may be the former, but I am just checking.
70. L986-988. Aside from the fact that this sentence needs re-ordering are you really sure that getting a modest cyclogenesis event correct was critical for getting the remote moist inflow from the Aegean, that drove the floods, correct too, given how far away that was?
71. L989-990. Once again there are errors in the manuscript timings, which for a reviewer is pretty frustrating! Daniel did not make landfall in Libya “within a few days”. It was much sooner than that.
72. L990. Predictions of not the predictability of.
73. L992. “more prone to an erroneous predictability of” is again bad English. Please correct.
74. L993-994. How about “correctly predict its location” instead of “correctly predict correctly its evolution in terms of location”?
75. L998. Floods are not responsible for high discharges. It’s the other way round.
76. L998. Largely??! Unprecedented means bigger than anything that happened before, not just in the last 20 years!
77. L999-1001. The discrepancy in resolution is pretty important here. This should be discussed/addressed.
78. L1001-1002. “exceptional potential for information to the public..”. Bad English again.
79. L1002-1005. Gobbledegook. Besides which return periods are not exactly new.

80. L1006. "the grounds"? not sure. As stated above the main evidence seems to be SST and to me that's not much. And that's hardly rocket science. Then a slightly later comment about it being September seems to imply by chance rather than by climate change.
81. L1014-1017. Grandiose words but it is not clear to me that you have really done this in any convincing way. Once all the text gets tidied up I might be in a better position to judge. But in any case whilst the words "socio-economic impacts" are used a lot, there is little of substance behind them, it seems, so I remain sceptical.
82. L1017. Linking not bridging?
83. L1018. What does eventually mean here?