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Comment on wcd-2021-55

Tim Woollings (Editor)

Editor comment on "Mediterranean cyclones: current knowledge and open questions on dynamics, prediction, climatology and impacts" by Emmanouil Flaounas et al., Weather Clim. Dynam. Discuss., <https://doi.org/10.5194/wcd-2021-55-EC1>, 2021

This paper provides a thorough review of Mediterranean cyclones, covering many different aspects of the topic and ending with a very useful summary of open research questions. The authors are to be congratulated for synthesising a large literature into a coherent and readable review paper. Consistent with the views of the anonymous referees, I believe the paper should be acceptable for publication in WCD after some minor revisions.

Having been through the paper myself, I am inclined to agree with referee 3 that the climatology section would be useful to read before the dynamics section, so I invite the authors to consider this. In addition, I have some further comments for the authors to consider:

1. The need for interdisciplinary work is highlighted in several places, including the abstract, but I wonder if the authors could be more specific regarding which disciplines they are thinking of. Does this refer to the weather and climate communities, or others?
2. Cyclogenesis is deemed 'exceptionally frequent' and 'one of the highest in the globe', with several references to Petterssen. This feels a little strong, and potentially not a consensus view across studies. For example, the Hoskins and Hodges (2002) climatology shows several regions of more frequent cyclogenesis around the hemisphere.
3. The role of baroclinic instability is noted in section 2.1, but can more be said about the potential for this. Eg how strong is the lower tropospheric baroclinicity compared to the main storm tracks? Why is this not expected to significantly affect the surface cyclone (line 105)?
4. The negative relationship in Figure 3 is very interesting - can more be said about the reasons for this? Presumably it is not just an artefact of the method of cyclone selection?
5. Section 2.4: Have any studies quantified the fraction of cyclones which depend on the orography? In figure 7 there seem to be many cyclones located away from orography.
6. The discussions on medicanes vs other cyclones are interesting. Could the seasonality be used more here, given the comparison to tropical cyclones which have quite distinct seasonality compared to extratropical cyclones?

7. Figure 5 is just mentioned briefly. Could more be said about what the reader should take from it?

8. The predictability sections are very useful but I wonder if a clearer distinction could be drawn between the intrinsic predictability of the cyclones and the realised predictive skill of the forecast systems (Eg pages 8-10). If an event is not captured by many ensemble members beyond a certain lead time, is that because of model error or just because it is an uncertain situation in reality?

9. It might be nice for the climatology section to connect briefly with the storm track perspective of the general circulation. For example, does the Mediterranean storm track emerge from filtered variance analyses such as of eddy kinetic energy, and is it thought to play any role in the global circulation? Eg do Mediterranean cyclones achieve much poleward heat transport?

10. Section 4.3 is rightly focused on winter, but is there also any literature on links between cyclones and the summer NAO?

11. In section 4.4 it might be nice to note any relevant summary statements on Mediterranean cyclones from the recent IPCC AR6 report.

12. 'Contrasting results' are noted in line 584, but is this too negative? From the following text there seems to be good agreement on an overall reduction in cyclones.

13. The material on projected future trends should be accompanied by a brief review of climate model biases and fidelity in simulating the cyclones.

14. Is the 'grand majority' of natural hazards on line 638 justified? What about droughts and wildfires, for example?

15. In the impacts section, is there any literature on impacts to shipping?

16. In Figure 7 the white and grey bars give quite different impressions on the seasonality - can this be explained?