

Revision of “MESMAR v1: A new regional coupled climate model for downscaling, predictability, and data assimilation studies in the Mediterranean region” by Storto et al.(2023)

REVIEWER 2

We thank the reviewer for the encouraging comments and for the suggestions to improve the quality of the manuscript. Below, we provide a point-by-point reply (reviewer in bold, our answer in light font). All coauthors concur with the proposed changes. We refer to the revised version of the manuscript in answering the questions.

Minor Points:

1) Sections 2.1 and 2.2: Have you considered the possibility of using non-hydrostatic core under the current resolution setting? Especially for the cyclone study, the non-hydrostatic process is important for the atmosphere.

Our WRF implementation uses a non-hydrostatic core. We state it clearly in the revised version, as this information was missing. Thanks.

2) The resolution for the ocean reanalysis is too coarse. Have you tried higher-resolution products? Such as The GLORYS12V1 product (the CMEMS global ocean eddy-resolving, 1/12° horizontal resolution, 50 vertical levels).

Within preliminary runs, we compared all the CMEMS reanalyses, but we did not find any significant difference in terms of the impact of the lateral BCs, except (as already mentioned in the manuscript) the positive impact of using ORAS5 on the SSH skill scores (due to barotropic transport at the Atlantic boundaries). We do use GLORYS12 as initial conditions, as specified in the paper, as it provides better spatial detail. We modified the text (line 125) to explicitly refer to this.

3) Line 195: It is better to introduce all the observation and reanalysis products in the Data Section.

Thanks, we moved the description of the verification dataset at the end of section 2.5.

4) Line 227: s-1 should be s-1. Please check similar mistakes in other parts of this manuscript.

Corrected thanks

5) Line 228-229: A little explanation for the wetter problem?

It is quite difficult to disentangle the impact of all parametrizations. We tested a large combination of options in a long preliminary series of sensitivity experiments. The interactions between microphysics, radiations, PBL, etc. are not linear and do not allow a robust answer to the Reviewer’s question. We now refer to results in the literature to speculate about the reasons.

6) Line 299: What is the nudging time scale for the SST and SSS, respectively?

We are not sure to understand the question: the sentence reads “The relaxation time scales are set equal to 15 and 300 days for SST and SSS, respectively” so it already contains the nudging time scale. We have kept the sentence unchanged.