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Interactive comment on "A process-based anatomy of Mediterranean cyclones: From baroclinic lows to tropical-like systems" *by* Emmanouil Flaounas et al.

Anonymous Referee #1

Received and published: 6 October 2020

Title: A process-based anatomy of Mediterranean cyclones: From baroclinic lows to tropical-like systems Authors: Flaounas et al. RECOMMENDATION: Minor revisions

The mature stage of 100 intense Mediterranean cyclones is analyzed by means of PV budget diagnostic and piecewise PV inversion applied to WRF model simulations. In this way, the relative contribution of different processes leading to cyclone intensification is investigated. Results show that the cyclones mostly develop due to a combination of diabatic and baroclinic processes. The paper is very well written and organized; e.g., the authors were able to explain the Equations in Section 2.2 in an effective way. Results are relevant for the topic of Mediterranean cyclones, and in particular they

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Discussion paper

shed new light on the mechanisms of development of Medicanes from a PV perspective. Thus, I recommend its publication almost in the present form. A few minor points are indicated below.

Line 100: “subjectively excluding cyclonic circulation features that did not present clear enclosing mean sea level pressure contours”: could you identify a more objective method? Then, why Case-75 (See Supplementary material) has been included?

Line 110: 34 vertical levels are below standard: did you check if the number of levels affected the simulation results?

Line 120: please, provide a reference to Eqs. (1) and (2);

Line 121: the Coriolis parameter is not shown explicitly in the Equations;

Line 191-192: if my interpretation is correct, I suggest to rephrase as: “has already been applied in past studies to upper-tropospheric PV anomalies in order to separate the advective contributions of upper-tropospheric and low-tropospheric PV and potential temperature anomalies”;

Line 219: I do not see many cases in the eastern Mediterranean;

Line 231: do you mean 1000-1005 hPa, 995-1000 hPa and 985-990 hPa?

Figures 1-3: are the fields extracted from ERA-5 or are WRF model outputs?

Line 326: 5d -> 5c

Line 337: you may consider (it is not necessary) to show the expansion of Eq. (4) in three terms in an Appendix;

Line 484: 16c -> 16b

Line 590-591: while the effort of the Authors to provide a definition of Medicanes is appreciable, no quantitative criteria are provided, which indicate that additional studies should be performed to reach this task.

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