

Weather Clim. Dynam. Discuss., referee comment RC1
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Comment on wcd-2022-40

Anonymous Referee #1

Referee comment on "Origin of low-tropospheric potential vorticity in Mediterranean cyclones" by Alexander Scherrmann et al., Weather Clim. Dynam. Discuss.,
<https://doi.org/10.5194/wcd-2022-40-RC1>, 2022

Title: Origin of low-tropospheric potential vorticity in Mediterranean cyclones

Authors: Scherrmann et al.

RECOMMENDATION: Minor Revisions

The purpose of the study is the analysis of the processes responsible for changes to the lower-tropospheric PV anomalies around the Mediterranean cyclones. The Authors propose the application of an innovative technique to disentangle "cyclonic" from "environmental" PV and, in the latter, to identify the PV production near the mountains. Together with ERA-5 reanalyses, the investigation of IFS simulations allows to identify the processes responsible for PV generation and removal. I found the paper very interesting and well organized; I recommend publication after some minor revisions.

MINOR POINTS:

- Line 15 and elsewhere: "large-scale microphysics": since microphysics occurs at small

scales, the expression appears rather contradictory: please use a different term to represent these processes;

- Line 32: About PV tower in the Mediterranean, please consider also Miglietta et al. (2017):

Miglietta M.M., D. Cerrai, S. Laviola, E. Cattani, V. Levizzani, Potential vorticity patterns in Mediterranean "hurricanes", *Geophysical Research Letters*, 44, 2537-2545, 2017, <http://dx.doi.org/10.1002/2017GL072670>;

- Line 75: some additional indications should be provided about the way the monthly simulations are forced; for example, how is the deviation of the numerical simulations from real conditions prevented?
- Line 93: I guess "large" stands here for wide horizontal extent, not reaching high values, right? Please explain better;
- Line 144: The choice of the threshold of 0.75 PVU appears rather arbitrary: did you check with other thresholds, for example did you try how would the results change using 1 PVU?
- Line 196: please remove "of orographic PV", I think it is confusing here;
- Line 199: I think "environmental PV" is more appropriate than "orographic PV" here;
- Line 250-251: "By design the ratio of the cyclonic and environmental contributions is the same when considering the total lower-tropospheric PV or the PV anomaly": please clarify this sentence;
- Line 254: please change into "have **at the same time** 50%";
- Line 265: ... **are** less frequent ...
- Line 279-281: Another hot spot region is central-eastern Alps and the northern Adriatic Sea: some comments on that area?
- Line 297: the remaining 25% **of anomaly is** ...
- Figure 9 caption: from the text the mature stage is at 0400 UTC on 13 December 1988, not at at 1300 UTC on 12 December 1988;
- Line 359-360: Since it is not possible to reproduce the results of Fig. 7, why should one trust the results of Fig. 13? I think this part should be removed or better motivated.
- Line 371-372: please explain better this point;
- Line 395: present or dominant?