

Reviewer #1

I thank the authors for taking my comments into account in their revised version. I still have some issues with the manuscript, mainly regarding the text itself, that are listed below. The five first concern the most "major" comments. Minor comments and technicalities follow. They are given following the order of the manuscript.

"Major" comments:

1) In lines 4-5 and 130-131, the authors mention their use of "idealized life-cycle experiments". However, no such experiments have been performed in this study. The authors only use the ERA-Interim reanalysis for their investigation. From the text in the conclusion, it seems that the authors refer here to the idealized eddy life-cycles of Thorncroft et al. (1993) but also of Davies et al. (1991). Please clarify those lines (in the abstract and in the introduction).

We indeed referred to the idealized life-cycle studies existing in the literature, and we can see why this was confusing. The text had been revised to fix this confusion.

2) Lines 8-9: "the sign of the storm and the sign of the upper-level breaking"
I suspect that you mean cyclone/anticyclone with "sign of the storm" and the type of wave breaking with "sign of the upper-level breaking". Please change as it is not understandable as it is. The "storm sign" expression is also present in line 632. Please adjust.

This has been fixed

3) The authors seem to call storm both cyclones and anticyclones. However, a storm is a synonym of a cyclone but is not a synonym of an anticyclone. Somehow, I did not catch this in the first review. Therefore, I suggest that the authors change all occurrences of storm/storms to cyclones/anticyclones when appropriate. Here are lines where it should be replaced (I may have missed some): 9 (x2), 13, 155, 159, 220, 259, 263, 266, 294 (x2), 306, 310, 339, 353, 355, 356, 357, 404, 406, 498, 502, 503, 573, 578, 579, 598, 633, 635, 636, 649, caption of Fig. 5 (4th line), caption of Fig. 5 (3rd, 4th, and 6th lines), caption of Fig. 7 (1st line), caption of Fig. 9 (1st line), caption of Fig. 10 (1st line), caption of Fig. 11 (3rd, 4th, 9th, and 10th (x2) lines).

We have now changed "storm" to "system" or "weather system", or to cyclone/anticyclone where appropriate, to avoid confusion (except when referring to the Lagrangian storm-tracking algorithm, which is customarily called that way, and to "storm tracks").

4) Figure 1 (and others): it is still not clear to me what the unit of the RWB frequency is. It does not seem to be a percentage of the time as it would exceed 100% in panel c (starting from $0.4 + 4$ intervals of $0.25 \Rightarrow$ frequency > 1.4). Please clarify again this aspect.

The units are the number of events per (two-dimensional) bin area, which is different in each case. We have added this information to the text in each relevant figure.

5) Figure 2: the titles of the columns are wrong: UPV \rightarrow PV250 and U200 \rightarrow U250.

Fixed

Minor comments:

- Line 4: how well do → how well

This sentence has been reworded so this no longer appears.

- Line 24: remove "flux"

Removed

- Merge paragraph 36-46 and paragraph 47-56 as they are on the same topic. As it is, after reading the paragraph I was wondering where the poleward breaking was.

Fixed

- Line 68: relative vorticity → relative vorticity anomaly

Fixed

- Lines 84 and 262: Fra → Franzke et al.

Fixed

- Line 117: One reference missing (?)

Fixed

- Line 169: e.g.Martius → e.g., Martius

Fixed

- Line 182: at its centroid → at its centroid longitude

Fixed

- Line 185: an overturning AWB (CWB) → an AWB (CWB) overturning

Fixed

- Line 186: the area of the breaking larger than $7 \cdot 10^{-4}$ (as a fraction of earth's surface area) → the area of the breaking (calculated as a fraction of earth's surface area) larger than $7 \cdot 10^{-4}$

Fixed

- Line 187: defined is → defined as

Fixed

- Line 187: is taken → should be

Fixed

- Line 188: spatial extent → longitudinal width ; Please check that is what you mean

Revised

- Line 188: chosen different → different

Fixed

- Line 188: the former are → the former is

We added "events" so this is correct now.

- Line 195: centeroid → centroid

Fixed

- Line 220: ceneterd → centered

Fixed

- Lines 223-224: than 2 (in units of 10^{-5} s^{-1}) → $2 \cdot 10^{-5} \text{ s}^{-1}$

Fixed

- Line 248: vorticity below and → vorticity extending below and

Fixed

- Line 256: composites → composite

Fixed

- Line 256: Fig. 2d → Fig. 2c

Fixed

- Line 256: show → shows

Fixed

- Line 257: anomaly below and → anomaly extending below and

Fixed

- Line 276: absolute values, in units of 10^{-5}s^{-1} → absolute value, in units of 10^{-5}s^{-1}

Fixed

- Line 278: Probability Density Functions (PDFs) → PDFs ; Because the acronym is already defined

Fixed

- Line 280: strong → intense

Fixed

- Line 286: stronger → more intense

Fixed

- Line 293: where do cyclones and anticyclone reside, in physical space → where cyclones and anticyclones reside, in the physical space

Fixed

- Line 294: remove "in each case"

Fixed

- Line 298: are generally spread more → are generally more spread

Fixed

- Line 300: are concentrated more → are more concentrated

Fixed

- Lines 303,304: more in → more frequently in

Fixed

- Line 315: add reference to Fig. 5h

Fixed

- Line 318: I believe it should be five days (from T-2 to T+2), not four

Fixed

- Line 333: number events → number of events

Fixed

- Line 345: the AWB frequency PDFs around cyclones are low → the AWB frequency around cyclones is

Fixed

- Lines 346-347: the CWB frequency PDFs are high → the CWB frequency is high

Fixed

- Line 349: the frequency PDFs of CWB are lower → the CWB frequency is low

Fixed

- Line 352-353: I do not understand this sentence. Please rewrite and skip what is in parenthesis.

Revised

- Line 362: around the cyclones → on the cyclones

Fixed

- Line 384: and low-level cyclone → and a low-level cyclone

Fixed

- Line 396: south → north

Fixed

- Line 418: anticyclone) . → anticyclone).

Fixed

- Line 577: I suggest to remove ", which are customarily done in studies (at least for cyclones),"

Removed

- Line 624: what do the authors mean with "to the west"? It looks to me on Fig. 9 of Thorncroft et al. (1993) that the cyclone intensifies while moving equatorward and slightly eastward.

We meant to the west of the cyclone (this has been added). The paragraph has been slightly revised for clarity. Note that it is the anticyclone (and not the cyclone) that is moving equatorward and eastward

in Thorncroft et al. 1993.

- Line 625: Which idealized simulations do the authors refer to? Thorncroft's, Davies'? Please clarify.

Added

- Line 628: I suggest to remove "Taken together".

Removed

- Line 628: from idealized life-cycle studies → from previous idealized life-cycle studies

Fixed

- Line 652: anti cyclone → anticyclone

Fixed

-References:

- Line 656: here is the failing Franzke et al. (2004) reference.

Fixed

- Line 686: Schar → Schär

Fixed

- Line 716: doi missing for Hanley and Caballero (2012)

Fixed

- Line 777: Granas → Grønås

Fixed

- DOIs missing for Methven (2015), Pfahl et al. (2015) (pages and volume also missing), Rivière et al. (2012), Shapiro and Grønås (1999).

Fixed. Note that the the latter is a book

- In many references, <https://doi.org/> is doubled: <https://doi.org/https://doi.org/> Please check.

Fixed

- Caption of Fig. 6: centered around → centered on ; (c) , → (c),

Fixed

- Supplement:

Again, "centered around" should be changed to "centered on" everywhere it occurs.

Fixed

Reviewer #2

The authors have thoroughly addressed all my previous comments and resolved all my previous concerns. I find the revisions and clarifications to the manuscript very helpful to appreciate the relevance and insight of this study much better.

I recommend accepting the manuscript for publication after noting the editorial comments below.

- L8: There is a "we" too much.

fixed

- L8-9: Reading the abstract only, it is not clear to me that future readers will understand the meaning of "sign of storm" and "sign of breaking". I suggest revising for full clarity.

revised

- L117: The "?" indicates that a reference is missing.

fixed

- I was unclear with my comment in the first review on the confusion that may arise from the terminology "storm-relative". I meant to say that I find it confusing to denote an anticyclone as a storm. Similarly, not all cyclones may constitute a storm. The authors may want to rethink this terminology.

We have changed "storm" to "system" or "weather system".