

## Response to Co-editor's comment

Manuscript Number: egusphere-2023-1996 Assessing the skill of high-impact weather forecasts in southern South America: a study on Cut-off Lows

### Co-editor comment

Public justification (visible to the public if the article is accepted and published):

Thank you for your detailed revision and reply to the reviewers' comments, through which the quality of the manuscript has been substantially improved. Based on the second round of reviews and my own evaluation, I think the manuscript is acceptable for publication after some minor revision. Here are my suggestions on paper revision for consideration. (The line numbers in my following suggestions are based on the changes tracked version of the manuscript.)

1. I appreciate the authors' effort in adding more discussion on the dynamics underlying the prediction skills. However, I found some arguments in the discussion are with a strong tone but lacking sufficient support. I suggest the authors either add more evidence to support the arguments or revise some of their arguments in the discussion. For example: in the conclusion part (Lines 378-383), the authors argue that "In our case studies, the strength of the COLs cold core affects the thermodynamic instability patterns, potentially influencing vertical motion and precipitation formation downstream." I agree with the authors that the two case studies all suggest the deficiency of models in simulating the vertical structure especially the low-level circulations of the COLs, but you did not do further investigations on how this deficiency affects the thermodynamic instability as well as the vertical motion, though based on previous studies this is likely to happen. The authors did not discuss this point in the text when introducing their results of case studies either. I suggest the authors either add more analysis on the thermodynamic instability and vertical motion in the two cases or revise the arguments here.
2. Figures 7 and 8: The right column of the figures show the 850-300 hPa layer thickness and the 850 hPa geopotential height of reanalysis and GEFS prediction. However, the labels of the contours indicating geopotential height in these subfigures are very hard to read. The authors may need to change the contour interval, weight or color, the contour thickness or so on to make it easier to read. BTW, Line 578, it should be "850-300 hPa", instead of "850/3000 hPa". And I suggest the authors to indicate contour intervals in the figure caption.
3. The third point of your conclusion (Lines 373-392) is mainly based on the two case studies. It needs to test in the future that whether the conclusions made in the two case studies still hold in other cases. This point needs to be emphasized in the text. Meanwhile, the expression in Line 373 "Although this study is based on only two case studies, our analysis suggests that..." better be changed to "Our two case studies suggest that..."

Additional private note (visible to authors and reviewers only):

Thank you for your patience in the review process!

## Author's Response

The authors sincerely appreciate the feedback provided by the co-editor. We value your acknowledgment of our efforts to enhance the manuscript and welcome your constructive suggestions for further refinement. Below, we address each of your comments in detail:

### 1. Tone of arguments in Lines 378-383

Thank you for your feedback about the tone of our arguments in Lines 378-383. We understand the importance of being more careful with our conclusions. While prior studies suggest these connections, our analysis does not directly explore these mechanisms. To address this, we have.

- Revised the phrasing in Lines 378-383 to highlight that these links are potential rather than definitive.
- Added a statement acknowledging the need for additional research to better understand and confirm these mechanisms in the context of COLs in South America.

*Changes made in the manuscript:*

- Page 11, Lines 378-383: We have improved the wording as follows:  
  
“In particular, the errors in the location and depth of the COLs appear to be linked to the mechanism sustaining these systems. In our case studies, the strength of the COLs cold core could affect the thermodynamic instability patterns, potentially influencing vertical motion and precipitation formation downstream, even though further research would be needed to assess the actual role of the mechanisms at play. This is also further supported by the well-documented relationship between COLs cold-core and atmospheric instability response (Pinheiro et al., 2021; Hirota et al., 2016; Nieto et al., 2007; Porcu et al., 2007; Llasat et al., 2007; Palmen and Newton 1969), through which the dynamical ascent and atmospheric instability associated with the cold-core trigger and/or enhance precipitation events (Godoy et al., 2011; Nieto et al. 2007).”

### 2. Readability of Figures 7 and 8

Thank you for highlighting the readability issues with Figures 7 and 8. We have made the following adjustments:

- Increased the contour thickness and adjusted the intervals to enhance clarity.
- Specified the contour intervals in the figure captions as suggested.
- Corrected the typographical error on Line 578, changing "850/3000 hPa" to "850-300 hPa."

These modifications enhance the interpretability of the figures and ensure consistency with the overall quality of the manuscript.

### **3. Emphasis on the limitations of two case studies**

We agree with your suggestion to emphasize the limitations of basing conclusions on two case studies. To address this, we have:

- Rephrased the statement in Line 373 to reflect the scope of the study more accurately.
- Added a note in the conclusions section to highlight the need for further studies to test the generality of our findings.

*Changes made in the manuscript:*

- Page 11, Line 373: Revised the sentence:  
“Although this study is based on only two case studies, our analysis suggests that...”  
to:  
“Our two case studies suggest that...”
- Page 11, Line 392: Added the statement: “It should be noted however that these conclusions are driven by two case studies, and more research dealing with the processes associated with COL formation are needed.”

We believe these revisions address your comments comprehensively and improve the clarity of the manuscript. Thank you for your guidance and support throughout the review process.

Sincerely,

Belén Choquehuanca

On behalf of all co-authors