

## Review of egosphere-2024-3606

**Title:** Impact of Convectively Coupled Tropical Waves on the composition and vertical structure of the atmosphere above Cabo Verde in September 2021 during the CADDIWA campaign

### General comment

The manuscript discusses the impacts of convectively coupled tropical waves on the atmosphere in the eastern Atlantic regions. This study analyzed the interaction between these waves in detail. However, the current manuscript is somewhat dense and difficult to follow. Some viewpoints would benefit from further elaboration and discussion. I recommend a major revision, as revising or reorganizing the content would help readers better understand the significance of this work. My detailed comments are below.

### Specific comments

1. The authors should explain why these four events (Larry, Pierre Henri, Peter, and Rose) are discussed in this study and how they are defined. This could be clarified further in Section 2. In addition, ‘Larry’ is not labeled in any figure (it only appears in the caption of Figure 9). Furthermore, if the authors primarily focus on the time period of these events, presenting only the time range from September 1 to September 21 (or September 25) in Figures 7–9 may make the results clearer.
2. In Figures 5 and 6, the ER waves strongly drive the AOD variance south of the AEJ ( $10^{\circ}\text{N}$ – $15^{\circ}\text{N}$ ), where their contribution to the TCWV variance is relatively weak. Is this because ER waves typically have strong zonal winds south of the maximum TCWV anomalies (Figures 3a and 3b)? The impact of wind anomalies on AOD variance may also be worth discussing in the main text.
3. I got lost many times while reading Sections 5 and 6, perhaps because many figures are discussed interchangeably without clear figure references. Additionally, in Figures 11–13, I am curious whether the differences between the phase composites for MRG-TD waves (ER waves) could also be influenced by ER waves (MRG-TD waves). Since multiple wave activities coexist simultaneously (Figure 7), the phase composites of the sounding raw data would be affected by all of these waves (Figures 11–13).

## Minor comments

1. Line 30: “Kiladis et al. (2006) *showed...*”
2. Line 40: “...by *Kelvin* waves (...”
3. Line 121: There should be a space between “..twice a day” and “(at 0000UTC and 1200UTC)”
4. Line 129: “...(see *Figure 1a*)”
5. Line 131: “...coupled waves (*Wheeler and Kiladis, 1999*)”
6. Line 135 and Figure 1: The MJO is not labeled in the Figure 1.
7. Line 167: “*Fig. 1a* for a ...”
8. Line 181: “...shown on *Figure 2...*”
9. Line 250: “(*Figures 5 and 6*)...”
10. Lines 267-271: This paragraph discusses the results from Figures 5d and 6d. Thus, I would suggest labeling 'Figure 5d' and 'Figure 6d' to make the text clearer for readers. In addition, in Line 271, I believe the authors meant to refer to MRG-TD1 rather than MRG-TD2 waves (at 3°N).
11. Lines 276 and 431: I would suggest that ER waves are the main driver of TCWV variance near the equator and “*north of 20°N*”, because one of their peaks is observed within 20°N-25° N (Figures 5b and 6b).
12. Line 281: According to Figure 5b, I suspect the authors meant to refer to “except for *TCWV* north of the AEJ above the continent in September 2021”
13. Line 287: It is for ER event, so it should be “(see *Figure 7c*)” rather than *Figure 7a*.
14. Figure 7 caption: I think that the shadings are TCWV “anomalies”, which should be noted in caption. In Lines 3-4 of Figure 7 caption, it should be “but for MRG-TD1 and MRG-TD2 waves (*black and magenta contours*)”
15. Lines 344-345: How do we know TS Larry less than 300NM south of Cape Verde? Perhaps it needs to be marked as “not shown”
16. Line 347: “...(Figure *9a*)..”
17. Line 351: “...of a *Kelvin* wave on...”
18. Line 477: “...; Duvel (2021); ?...” is it missing the reference?
19. Figures 11-13. Line labels below the panel a and b are different. (Below panel b) Dashed lines should be dew point, right?