

Summary:

Leko et al. (2026) evaluates the diurnal cycle and zonal average biases of frozen water path (and precip and high cloud) by comparing ERA5 and DYAMOND to observations from CCIC. The motivation of this study is to improve models, but specifically how their work will do that is unclear. The methods are technically sound but discussion surrounding the results needs more consideration. I recommend this study for major revisions.

Major revision

1. Is frozen water path the same thing as ice water path? If yes, change FWP to IWP throughout the paper and discuss why you are evaluating. If no, discuss what the difference is between FWP and IWP.
2. In the introduction, add a discussion about why looking at FWP/IWP matters and what insights can be made evaluating this variable over the diurnal cycle that we previously haven't been able to make.
3. This paper should have a clear motivation and clearly discuss their specific novel contribution to the field.
4. The introduction should guide the reader to the question or the point this paper is addressing. Perhaps restructure to something like: ESM model deficiencies -> km model deficiencies -> why looking at IWP can give insight to these... and tie into precipitation and high cloud.
5. The result section discusses ITCZ and storm track regions. These areas (and their model biases) should be discussed in the introduction.
6. The literature review in the introduction should be expanded upon (suggested studies to consider: Eliasson et al., 2011; Elsaesser et al., 2022).
7. If supplementary figures are heavily discussed or mentioned in the main body of text, they should also be in the main body of the text. The discussion section should primarily discuss the figures in the main body of text.
8. The authors should review the manuscript for grammatical errors (i.e., line 44 – “CICC is the first datasets”, line 52 – “such a multivariable analysis allows to connect”, line 56 – “allowing to simulate”).
9. The organization of the paper should be re-evaluated. For example, sections refer to figures not yet introduced or explained. (i.e., citing figure 8 in line 236 after introducing and discussing Figure 1). Figures should be referenced in the order they appear.
10. The results use vague language like in line 308 “we see good agreement” or in line 329 “considerably stronger”, or in line 343 “similarly good agreement”, but there is no metric that these “goodness thresholds” are based on. Rephrase to be clearer

(i.e., instead of “we see good agreement” say “there are small differences between CICC and ERA5 (~ difference value/metric) (Figure X)”).

11. Section 5.2 only has two citations (Line 514/515). This discussion section only includes your results. It should contextualize them with other studies and discuss their relevance to the field.

Minor revisions

Line 14: This is not novel contribution or concept.

Line 19: What specifically peaks too early? All convective variables?

Line 22: Add citations to this claim and clarify if you mean over ocean or land or both (Dirmeyer et al 2012, G. Chen et al., 2023).

Line 28: “In contrast...”, this sentence is not clear. Many studies over tropical oceans find the average precipitation peak to be between 0400-0600 LST (Including Christopoulous and Schneider, 2021). Include more citations here or discuss in more detail the regionality shown in Watters et al. 2021.

Line 30: Currently, your explanation of Wessinger et al., (2025) is incorrect as they did not observe bi-modal diurnal cycle precipitation. Wessinger et al. (2025) found two peaks in deep convective system initiation (a nighttime and a daytime peak) over tropical oceans. Their study shows that deep convection initiated in the overnight peak contributes the most precipitation to the 0600 LST precipitation peak. This paper is relevant to this study and could be useful in the discussion section for tropical oceanic regions to connect deep convection to diurnal cycles of FWP, precip, and high cloud.

Line 33: Add citations to back up your claim about “most studies”.

Line 38: What is a “diurnal sample”?

Line 45/46: Give examples of prior datasets that allowed “mostly daytime analysis”.

102: Why are you specifically excluding ENSO?

Line 129: “vertical axis”? Is this referring to vertical resolution?

165-170: This section should be clarified. I think this section is describing the criteria to include the t_{peak} of a grid cell from equation 3 into the analysis (?).

Figure 1a. The colormap (using black, navy blue, and dark grey) makes reading the figure difficult. Maybe make the discussed upper and lower bounds a shaded region instead of adding their lines to the figure.

Line 203: “Missing convectively formed hydrometeors”. CICC doesn’t include those? Or do you mean how ERA5 doesn’t? This should be rephrased for clarity.

Line 214: What does “conditioned on the FWP underestimation of ERA5” mean?

Line 344-317: Supplementary figures are discussed more than figures in the main body of text, unless you just mean Figure # instead of Figure S#.