The authors examined the relationships between low-level cloud amount and the various proxies by low-level cloud types. This is worth studying and this study investigated the relationship extensively. In addition, the authors successfully showed advantages of their proxy ELF. I basically admit the scientific values of the results and the discussions. However, I have some concerns. It will be acceptable after concerns are addressed.

Major Comments:

1. Sizes of figures and characters in figures

Sizes of figures and characters in figures are too small to see. Figures 2, 3 and 4 should be much larger. I recommend the authors to move panels of z_{LCL}, z_{inv}, α, and $1-\beta_2$ in these figures to supplement, and to divide Figs. 2 and 3 further in order to make the panels larger. Sizes of characters in Fig. 6, 7 should be larger. It is also desirable that sizes of tic marks of color bars in Fig. 1 and sizes of characters in Fig. 8 are larger.

2. Labels for cloud types

Cloud types are labeled as CL11, CL6, CL5, … I understand that they are labels based directly on the WMO classification and they have some advantages. However, it is very complicated when we read the manuscript because readers cannot easily remember the labels. Could you relabel them as, for instance, Fog, St, Sc, … or FOG, ST, SC, …, or CL_Fog, CL_St, CL_St, …?

3. Short physical explanations are needed in many parts

In many parts in the text, physical explanations that attribute the results to the characteristics of proxies are not enough. I guess they are helpful for readers even if they are just one or a few sentences. For example:

P6L22-23:

> "both LTS and EIS increase, particularly over the far northern continents and Arctic area."
>
> Please provide a suggestion of the reason why LTS and EIS increase in the situation.

P6L32-33:

"undesirable negative anomalies of LTS and EIS over the far northern continents including Arctic area get worse from CL11 to CL6 and CL7"
Please provide an interpretation of the reason why LTS and EIS show negative anomalies.

P7L5-7: "over the Arctic, Asia, and deserts areas, LTS/EIS shows negative anomalies opposite to the increased LCA, which worsens and extends to other continents from CL5, CL84 to CL12 and CL39"
Please provide a suggestion of the reason why LTS/EIS shows negative anomalies over the areas.

P7L22: "LTS and EIS, which have strong ocean-land contrasts (in particular, EIS) and seasonal cycle over land."
Please explain why ELF does not have strong ocean-land contrasts and seasonal cycle over land but LTS and EIS have them.

P7L24: "with a larger ELF during the night"
Please explain why ELF is larger during the night.

P7L34: "with systematically higher proxy values"
Can you guess why night slopes have systematically higher proxy values?

P7L34-35:
"both ELF and $1-\beta_2$ tend to have steeper regression slopes during the night than during the day"
Can you guess why regression slopes are steeper during the night than during the day?

Fig. 5c: The CL0 plots in Fig. 5c are against our simple tuition from previous studies (e.g., Wood and Bretherton (2006), Kawai et al. (2017)). This may confuse readers. Please briefly explain the reason of the apparent difference between CL0 plots in Fig. 5c and conventional figures.

P8L15: "The frequency of CL0 increases as LTS and EIS increase"
This is against our simple intuition, at least, over the ocean. What causes this increase over the ocean? Mainly where? In what season and what situation?

P8L32: “The freezedry factor substantially contributes to the improved correlations of CL0 with ELF from β_2”

Please briefly explain the physical meaning (for example, where and in what situation the factor mainly contributes to the improvement of the correlations).

P8L33-34:

“the frequent occurrence of CL0 on the west coast of the major continents and equatorial SST cold regions”

I guess that people do not expect that the occurrence of CL0 is frequent on the west coast of the major continents. Please add a little more explanation or note.

4. Target areas of LTS, EIS, and ECTEI

Please emphasize repeatedly in the text for fairness that the target areas of LTS, EIS, and ECTEI are over the ocean without sea ice and it is not intended to be used over land and sea ice.

5. Comparison of EIS and LTS

It is well-known that EIS is an index much better than LTS over the ocean. However, it is not so clear in the author’s study. I guess readers will be confused. Please discuss a little why the superiority of EIS to LTS over the ocean is not clear in this study.

6. Discuss pros and cons of ELF compared with LTS/EIS/ECTEI.

Pros are very clear, I guess. Cons of ELF could be, for example:

* LTS/EIS/ECTEI tend to represent optically thick stratocumulus. It is important for earth radiation budget. Can ELF be directly used for discussions related to radiation budget?
* LTS/EIS/ECTEI are based on very simple concept. ELF and the proposed idea for improvement of ELF seem to be very empirical.

(* Discussion utilizing ELF or improved ELF could be complicated to understand LCA or LCA changes.)

(* LTS/EIS/ECTEI are very simple and easily calculated.)

7. Section 3.5

I'm afraid that proposed idea for improvement of ELF is too much empirical and complicated, although I understand the value of the challenge. Is it needed to construct a unified proxy for LCA by making a tremendous effort, even though the cloud regimes and mechanisms that produce LCA are quite different? Please discuss it a little.

8. Short discussion on cloud feedback

In the first paragraph of the introduction, the manuscript mentions an importance of the impact of low-level clouds on the Earth's climate including cloud feedback and climate sensitivity. However, there are no descriptions or suggestions on cloud feedback later in the manuscript, although this is a critically important topic now. Although the manuscript does not discuss it at all, proxies LTS, EIS, and ECTEI cause quite different estimation of cloud feedback. LTS causes strong negative cloud feedback, EIS suggests weak negative feedback, and ECTEI suggests positive cloud feedback over the ocean (models and observations imply positive cloud feedback, that is, a decrease in low-cloud in warmer climates). Could the authors add a short discussion or comments on cloud-feedback based on ELF?

Minor comments:

Somewhere:

Is a variable β_2 defined somewhere?

P1L8-9: "the decrease in LCA when CL0 is reported and the increase of LCA when CL12 is reported"

Are "decrease" and "increase" appropriate? It is not easy to understand, especially if readers don't read the contents yet, I guess.

P1L13: "the dissipation of LCA"

Is the word "dissipation" appropriate?

P7L31: "a high EIS located outside of the plotting range"

Can't you widen the range of the figure?

P8L5: “Figure 6 is the cumulative plot”

Caption in Fig.6: “Cumulative FQ”

Is Fig. 6 a cumulative plot? I though this is just a percentage plot.

Caption of Fig. 5:

Explain the difference between open and filled symbols.

Fig. 6c, 6e:

Why do LTS (and also EIS) have a large difference between daytime and night time over the ocean? It is understandable that there is a large difference over land (LTS and EIS is smaller in daytime). But why over the ocean also? I thought diurnal variations of LTS and EIS is negligible over the ocean because the SST diurnal variation is very small.

Fig.6e: Please briefly explain the reason why the black line is very insensitive to EIS over the ocean. I guess many readers will be embarrassed because they often see the very clear relationship between LCA and EIS over the ocean in several papers (e.g., Wood and Bretherton (2006), Kawai et al. (2017)). Please clarify the cause of the differences.

Caption of Fig. 6:

100 -> 100 %