Reponses to the short review by Dr. Rene Garreaud:

The work "On the relationship between low cloud variability and lower tropospheric stability in the SE Pacific" by Sun et al. is a welcome addition to our general understanding of the ocean-atmosphere coupled system in this region. The scientific merit of this work and specific criticism will be provided by the reviewers, but I offer a few additional comments that could be useful to the authors.

[reply]: We thank Dr. Rene Garreaud for his time and constructive comments on the manuscript. And we provide a detailed response below.

Figure 3 shows the 1-Point correlation map between the area-average cloud anomalies (SE Pacific box) and cloud anomalies elsewhere at interannual timescales. Figure 5 is its analog at daily time scales. In both cases, the relative high correlations are interpreted as spatially coherent cloud variability. Part of the high-correlation values, however, result from the way the calculation is done.
A more stringent test to spatial coherence will be an EOF analysis of the cloud anomalies over the SEP (at both timescales). Such analysis can be easily implemented and the leading mode (if significant) will be very informative on the cloud variability coherence.
From my own synoptic experience, I found that day-to-day variability is less geographically coherent than implied in Fig. 5. There are many coastally trapped perturbations along the north-central Chilean coast that often propagate into open ocean affecting the SE Pacific cloud deck several days later (Garreaud et al. 2003; Rahn and Garreaud 2010).

[reply]: This is very good suggestion. We have performed the EOF analysis of the cloud anomalies on both interannual and daily timescales to verify our results and incorporated the discussion into the revised manuscript, particularly in discussing the spatial coherence of low cloud variability in the SEP. We first calculated the first leading EOF mode of the low cloud variability on interannual timescales for each season of DJF, MAM, JJA and SON. The first leading EOF mode for each season explains 45%, 31%, 27% and 35% of total variance for DJF, MAM, JJA and SON separately. As a comparison, the second EOF mode explains 17%, 19%, 17% and 14% of total variance for DJF, MAM, JJA and SON individually. Here, we presented Figure A1a the leading EOF mode for DJF low cloud anomalies as one example. It shows a spatial coherence pattern in the SEP, which is consistent with the pattern shown in Figure 3 in our original manuscript. And we have tested and tuned the domain for EOF analysis and drawn qualitatively similar patterns.

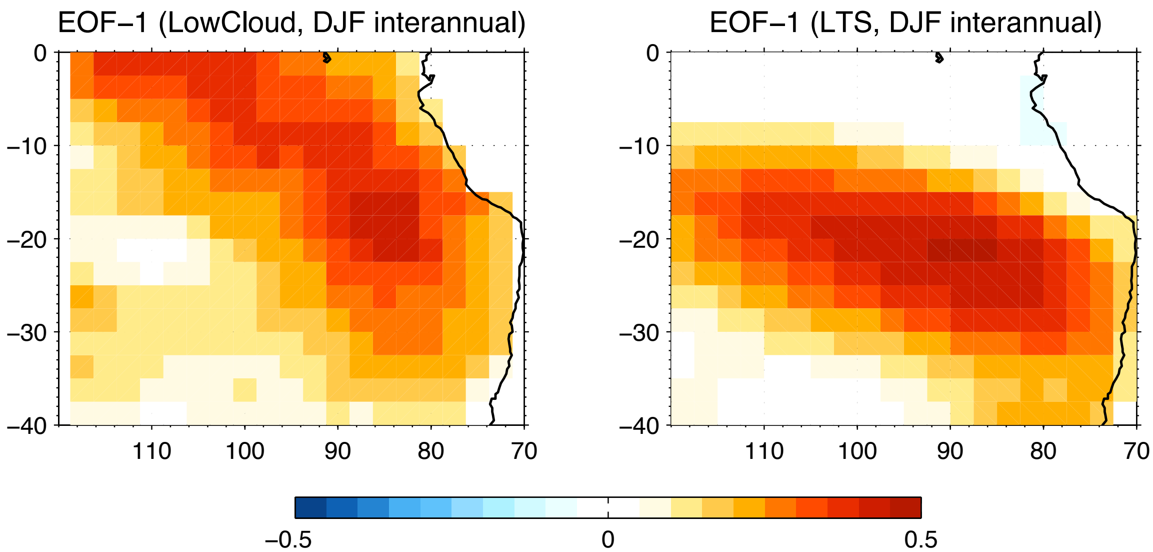

Figure A1: The first leading EOF modes of a) low cloud and b) LTS anomalies for DJF on interannual timescales.

Figure A2 shows the first and second leading EOF modes of the low cloud anomalies on daily timescales. The first EOF mode generally shows a spatial coherent pattern in the SEP. The second one presents a dipole structure between the southern Peru to central Chile coastal region and the open ocean northwest of it. Those two leading modes account for equivalent percentage of total variance. This can be interpreted as the less spatial coherence that the reviewer suggested. In our manuscript, we've addressed this point when interpreting the day-to-day cloud variability in Figure 10 in our manuscript, that the propagation pattern originating from the southern Peru-northern Chile might be important in modulating the cloud variability. We then separately calculated the EOFs of the day-to-day cloud variability in each season and found very similar patterns.

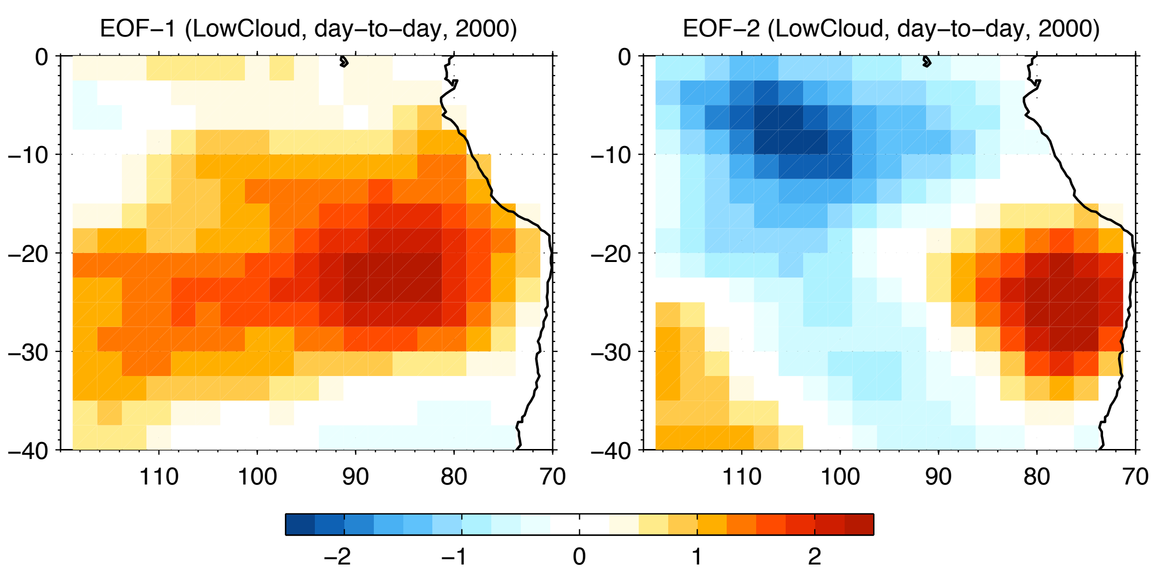

Figure A2: The first two leading EOF modes of low clouds on day-to-day timescales.

One may also wonder whether or not the LTS field is spatially coherent. This point is relevant for interpreting Figs. 4 and 8.

[reply]: We've calculated the EOFs for LTS for both interannual and daily timescales. Figure A1b shows the leading EOF pattern for interannual DJF LTS. It is clear that LTS field is also spatially coherent as shown for low clouds in Figure A1a. Moreover, this leading mode account for 63% of total variance. On daily timescales, similar spatially coherent pattern is found as shown in the first leading mode of LTS in Figure A3a, while it accounts for similar percentage of total variance as the second one shown in Figure A3b. The latter is associated with the coast to open ocean propagating pattern seen in the cloud variability.

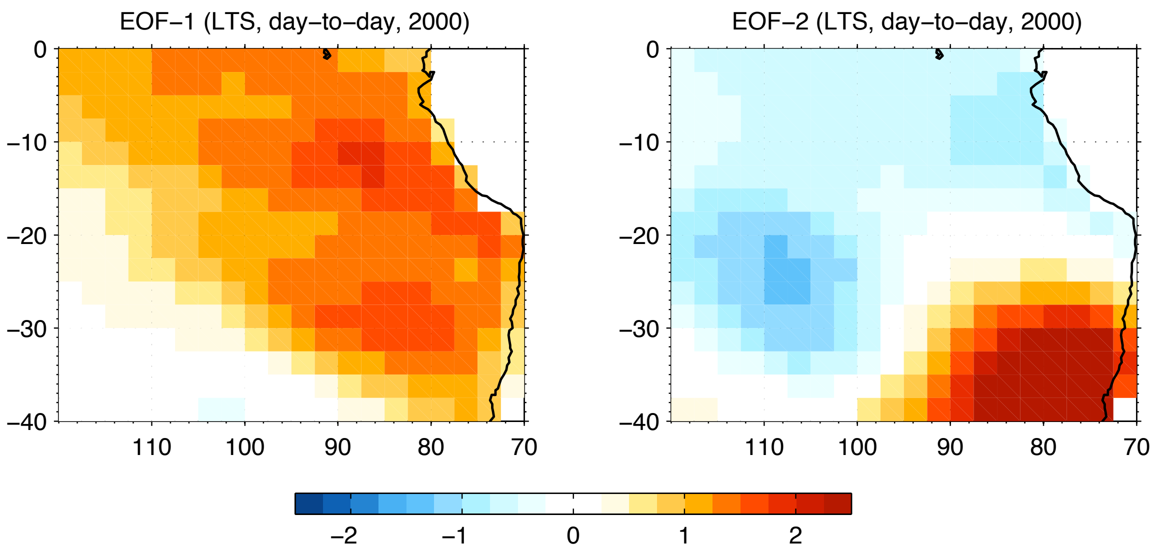

Figure A3: The first two leading EOF modes of LTS on day-to-day timescales.

Finally, I'd like to point to the works by Painemal et al. (2010) addressing the high frequency variability of Stratocumulus at San Felix Island (27_S, 80_W) and Garreaud et al. 2008 focusing in the year-to-year variability of fog and low cloud off the Chilean coast at 30_S. In both cases, the correlation between cloud anomaly and local LTS is similar to the values reported in Sun et al. work.

[reply]: Our studies based on the satellite observed cloud are consistent with in-situ observations in previous studies. We have included the discussions in the manuscript.