

The manuscript "Observations of the boundary layer, cloud and aerosol variability in the southeast Pacific coastal marine stratocumulus during VOCALS-REX" documents the structure of the cloud topped boundary layer off the coast of Northern Chile, as depicted by measurements made during VOCALS-REX, satellite data and meteorological reanalysis. Though generally clear and well-written the paper could be improved by addressing a few minor issues before being published in ACP. Apart the specific points noted below, the paper would benefit from an assessment (or at least mention) of the typical biases of the various in-situ measurements that are discussed.

Abstract

The abstract is a bit too detailed. For e.g. is it really necessary to mention the Nd-CCN relationship here? It could be made more concise by leaving out non-essential information. Also, the last point, i.e. that the LWP does not only depend on CCN but that it also largely depends on meteorology, decoupling should be made more clearly.

Introduction

pp 15422 L24: Mention that the aircraft data are the ones collected by CIRPAS Twin Otter.

Section 2

pp 15423 L14: Aren't there 5 hours difference between Chile time and UTC?

pp 15424 L28: How does QuickSCAT divergence compare to reanalysis?

Section 3

pp 15426 L16: By composite you mean the average or the median of the distribution?

pp 15426 L18: Didn't you mean "the continental cyclone"?

pp 15427 L15: What satellite measurements are you referring to? The statement made here about the diurnal cycle is misleading. Normally the maximum of the diurnal cycle of LWP is during nighttime, but as the measurements probably don't cover the night period, the maximum appears at dusk and dawn. Also, why would the narrow band of high LWP be the only part of the region affected by the diurnal cycle?

pp 15427 L22: Why are you comparing the LWP of these two points?

Section 4

pp 15430 L22: Did you mean "combined with the higher 700hPa geopotential height"?

pp 15431 Eq 1 and 2: How are z_i^- , z_i^+ defined?

pp 15433 L9: The latent heat flux moistens the atmosphere.

pp 15433 L20-24. Doesn't this suggestion that in this case the BL is more decoupled than in DYCOMS contradicts your earlier statement that the observed BL is very well mixed except for a few days?

Section 6

pp 15441 L21: "yielding a mean value"

pp 15442 L7: Above is mentioned that only 4 days are affected by cirrus clouds.

pp 15442 L10-20. This discussion is not clear. The point you are probably trying to make is that in precipitating cases the large droplets sediment and the maximum radius is not at cloud top (the cloud is not adiabatic). But this message is not clearly conveyed.

pp 15442 L23 : What do you mean by the fact that GOES and MODIS agree at the overpass time? Do they have the same overpass time?

pp 15442 L26: The way this is phrased it sounds like the in-situ measurements of Re are completely reliable. What is the typical measurement error? Even if the measurement error is small, the first statement in this paragraph is true only for adiabatic, and unbroken clouds.

pp 15443 L2: use rather algorithms instead of models used in retrievals.

pp 15443 L15. It is confusing to discuss how the LWP was computed in the middle of this subsection. These two phrases would fit better in line 9, after "in Fig. 16".

pp 15443 L25: The fact that the LWP is higher on days with higher CCN concentration, does not necessarily mean that the LWP is higher because of higher CCN concentration even for days when the BL is well-mixed. Indeed, very fine variations in the thermodynamical state of the boundary layer (a few tens of degree or g/kg) are enough for doubling the cloud water content or for leading to its complete dissipation. This is also clear from Fig. 6. This point should be made more clearly.

Figures

Fig. 1: It is hard to distinguish the low and the high pressure systems. Also, the coast line is difficult to separate from the pressure contours, and the diamonds showing Point Alpha are barely visible.

Fig. 4: The trajectories start or end at 500/2000m?

Fig. 5: Reference should be made to the black/red lines.

Fig. 8: What do the black points represent?

Fig. 10: What is the time lag between MODIS overpass and the flights?