Responses to reviewer 2 (Dr. Clive Dorman)

General Comments

Review Summary:

This article is general presentation of mostly the meteorological setting for an interesting Chilean upwelling field experiment. It is successful in presenting the essential meteorological aspects of this coastal area. Many of the figures nicely present complex results in a succinct and engaging manor. In addition, the manuscript includes a review of the recent meteorological publications along the Chilean coast which would be helpful for those not familiar with the area. If there is a short coming of this manuscript, it is the almost total lack of direct recognition of the similar conditions and previous publications in other geographical areas. By similar conditions, I am thinking of the meteorology and oceanography on the eastern side of the oceans near the subtropics. This traditional practice is helpful for newer investigators and non-specialists searching out on what has been done. However, there is no need to disrupt the flow and focus of this manuscript. This duty could be handled efficiently with a table of the key reference/review(s) for of the worlds main three other geographical areas and a single sentence in the text body. Otherwise, I only have some small suggestions. I recommend publication.

Many thanks for your general comments on our paper. Following your advice, in the revised version we tried to put the Chilean coast and CUpEx in context. We acknowledge that CUpEx is yet another field experiment designed to advance our knowledge of coastal meteorology & oceanography in upwelling, subtropical regions. Right at the end of the 1st paragraph of our introduction we added the following text:

The objectives, methodology and platforms used in CUpEx are coincident with field experiments conducted in other eastern boundary upwelling systems (summarized in Table 3; see also Smith 1992), especially along the west coast of North America.

Please take a look at table 3 (new version) summarizing 11 experiments (including key references) in chronological order. Then, we begin the 2nd paragraph of our introduction with the following text and two key references:

The lower-troposphere / upper-ocean off north-central Chile exhibits the archetypical structure of the eastern boundary of subtropical oceans (e.g., Bakun and Nelson 1991; Klein and Hartmann 1993) and is part of the Humboldt upwelling system along the west coast of South America.

Specific comments

We altered the text according to your suggestions and a few typos were corrected. Page and lines of new text are relative to the revised-version in word format sent to ACP.

Abstract, Page 26438, Line 18: southerly winds - winds from the south

Abstract, Page 26438, Line 21: northerlies - winds from the north
Section 1 or 2: State that wind direction is expressed as from in the meteorological convention.

To avoid confusions, in the abstract we refer to equatorward flow (southerly wind) and poleward flow (northerly wind). We then added a footnote in page 3 to indicate that "In this paper wind direction is always expressed as from in meteorological convention. For instance, southerly winds (southerlies) indicate wind blowing from the South (equatorward flow in the SH)."

Section 1: Almost no reference is made to other eastern boundary current meteorology. A key summary reference for each would be helpful for interested readers are not aware of the literature. This could be in the form of a table.

Suggestion taken. See our response to the general comments and first 4 lines, 2nd paragraph of the new introduction.

Page 26489, Line 14, here and elsewhere: "and a more synoptically active region to the south." I know what is meant, but might this be better expressed as " the zone of eastward migrating systems".

Text added accordingly (lines 24-26, page 2)

Page 26489, Line 15: "edge of the SEP stratocumulus (Sc) deck is "and Fig. 1. Caption and figure - suggest change "Deck" to "layer" as is more formal. Use "overcast layer" if cloud layer is solid.

Here we kept the words "cloud deck" as is widely used in meteorological literature.

Fig. 2. Nice presentation of topography, station location, radar coverage and bathymetry.

Thanks.

Fig. 2. Is there a difference between pLdV and LdV? If not, they should be the same throughout the manuscript.

Fig. 3 (a) caption. Choros (Ch) should be Cho to match figure. Fig. 3(b) figure - labels on figure are a little small to read. Fig. 3(b) figure - add the arrow and LdV and Cho labels Fig. 3(b) figure - could the low cloud frequency be noted for the lowest and highest values?

We altered figs. 2-3 and their captions, so we use LdV and Cho consistently. Caption of fig. 3c also include the range of cloud frequency.

Page 26443, Line 20. Section 3 Synoptic Variability. It might make sense to have the mean warm/upwelling season climatology either here or, even better, in section 1 to orient the reader to the basics. This could be the mean sea level pressure (Fig 6), surface wind and cloud occurrence (Fig.3).

Suggestion taken. Fig. 3 now includes a panel with spring-summer mean SLP and 10-m wind to put context to panels b (wind speed) and c (cloud cover). Text modify accordingly (2nd and 3rd paragraph in Introduction).

Fig. 6. Nice presentation of sea level pressure and 500 hPa plots to represent the synoptic scale. I would not have guessed that the 500 hPa height climatology south of about 35 S would not have reflected the presence of the Andes mountains. The difference between the SLP in b) - strong winds from the south and d) relaxation - seems relatively minor. Perhaps it is the structure aloft, represented by the 500 hPA height that is making the key difference? Just wondering, I am not implying anything negative here. Of course, the difference between a) and c) or b) and c) is so extreme that it is easy to appreciate a wind "relaxation" occurring.
Fig.6. Lat and Lon labels are a little small.

Thanks for the comment on Fig. 6. The Andes doesn't alter the 500 hPa geopotential height because it is a quite narrow mountain range (typical width less than 200 km). We guess that reanalysis data has been smoothed a little bit (and its resolution is 2.5° lat-lon). We also agree that there is, visually, not much difference in the coastal SLP field between panels b and d, but we verify that the actual meridional SLP gradient is a very good indicator of coastal wind at synoptic time scales. Lat-lon grid increased in 15%.

Fig. 12. Figure works well for presenting the essentials of a complex case.

Page 26448, lines 23-28. Fig. 13 I believe that it is unusual to obtain such a clear presentation of the diurnally varying ocean current and a measured wind. The authors are to be complemented.

Page 26449, lines 1-17, Fig. 14. The profiles with only two sounding stations is effective in characterizing the lower atmospheric response.

Thanks for your comment. Note that in Fig. 12 we added the wind at station "Quebrada Seca" about 50 km south of Tongoy in the arid valley east of the coastal barrier. This station clearly detects the sea breeze arriving in the morning until the general southerly flow establish by midday.

One important feature depicted in Fig. 12 is the near-coastal jet just north of point LdV. At the time of writing the first version of the manuscript, this feature was only supported by anecdotal evidence, the rather coarse QuickScat data and the model simulations in Rahn et al. (2010). A few weeks ago we conducted a research flight over the Tongoy-Coquimbo bay and we obtain a quite "vivid" evidence of this near-coastal jet. We decided to include a figure with the data from this mission (new Fig. 13) that replace original Fig. 15 (also based on flight data but from a much weaker case).

Fig. 15. Caption: (5' up and 5' down) - change to "(sounding up or down took 5 min.)"

We eliminate original Fig. 15. New fig. 13 (see above) also illustrates research flight data but is clearer in detecting the near coastal jet just north of point LdV.

Page 26450, line 23/24. "expansion fan" - This should be referenced. For an economic use of text space, you could site Koracin et al 2004 as source for observations, theory and modeling on expansion fans. Ref: Koracin, D and C. E. Dorman and E.

Reference added (line 17, page 12). Thanks for pointing this reference.