

## ***Interactive comment on “Meteorological observations in the Northern Chilean coast during VOCALS-REx” by J. A. Rutllant et al.***

**Anonymous Referee #2**

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This article describes about the atmospheric diurnal cycle and synoptic variability in the north of Chile during VOCALS REx (Oct–Nov 2008), with emphasis on the stations at Paposo (25S) that were established for this campaign.

The authors also put forward the hypothesis that the different timing of the diurnal cycle of temperature at sea level and at the base of the inversion is forced by the diurnal cycle in coastal subsidence driven by the enhanced afternoon upslope flow and the associated vertical thermal advection.

With respect to the latter, I have the following comments:

1) The numerical model needs validation, which can be done with the observational data presented (radiosounding, surface station, etc). For instance, a duplicate of Fig.

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2 using model output would be useful.

2) The authors have not tested the null hypothesis of dominant local heating (i.e. short-wave through sensible surface heat fluxes), which at Paposo Alto could be at least comparable to the presumed effect of vertical advection. This could be done at least in two ways: a) Compare the vertical advection term with the residual ( $= \partial\theta/\partial t + w\partial\theta/\partial z$ ) and show that it is indeed larger; b) Check whether the amplitude of the diurnal cycle of temperature maximizes near the inversion layer (compared with further inland).

3) Unless the above is satisfied, the model simulation can be not be considered to support the hypothesized mechanism proposed by the authors. Particularly, the lag in the diurnal cycle of temperature could not be considered as evidence for the hypothesized diurnal cycle in subsidence.

Minor comments:

a) Since the general reader will probably not be familiar with the region, it would be useful if the authors could provide more background regarding the temporal representativeness of the measurements with respect to the seasonal cycle and, spatially, with respect to the South Pacific anticyclone. For instance, it is normal that the alongshore wind is so weak?

b) Topographic maps for each site, indicating geographic features, would be very useful to follow the first half of Section 2.

c) The top panel in Fig. 1 would benefit from axis labels (lon/lat).

d) It would be useful to include, in Fig. 2, the mean diurnal cycle of potential temperature.

e) Considering that Paposo had no nocturnal soundings, how can Fig. 2 depict a nocturnal northerly low-level flow (lower-center panel)? Is this an artifact of the contouring scheme?

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f) The labels for the top row in Fig. 2 say "1998". Shouldn't this be "2008"?

g) I recommend flipping the lower two panels in Fig. 4 so that the left (right) column consistently refers to Paposo Alto (Bajo).

h) Fig. 7 could include diurnal temperature anomalies. This could be used to address comment 2) above if an afternoon localized maximum is found near the mean position of the inversion.

i) Fig. 7 should have larger axis labels.

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Interactive comment on Atmos. Chem. Phys. Discuss., 12, 22783, 2012.