

Interactive comment on “Basin-scale wind transport during the MILAGRO field campaign and comparison to climatology using cluster analysis” by B. de Foy et al.

Anonymous Referee #2

Received and published: 16 October 2007

Synopsis

This paper is about transport conditions in the Mexico City basin. It starts with classifications of upper air and surface circulation patterns based on cluster analysis of climatological data from daily rawinsonde soundings and hourly surface observations. This is followed by analyses of radar wind profiler data and surface observations collected during the recent MILAGRO field study in March of 2006. The patterns from March 2006 are then compared to the climatological patterns to determine the representativeness of the transport conditions during the MILAGRO field campaign.

The paper is generally well organized and well written. The authors did a nice job

in putting the validation of the MILAGRO field study into perspective by showing that the meteorological conditions during March 2006 was climatologically representative. The paper, however, failed to deliver new information that goes beyond what is already known about the diurnal circulation patterns in the Mexico City region from previous filed studies and a wealth of literatures on this topic. The discussions are lengthy and sometimes hard to follow. A carefully revised and shortened version emphasizing new results is needed for publication in ACP.

Specific comments:

The results and discussions are location specific and to someone who is not familiar with the topography of the Mexico City region, I found it hard to follow many of the discussions about the flow patterns in different clusters. I find myself going back and forth between Fig. 1 on Page 29 and the discussions in previous pages trying to understand what is being said. The lengthy discussions of the details of each wind patterns associated with sometimes 12 clusters (in the case of radar wind profiler data) did not help put the key message across.

The study focused on winds in the Mexico City region. Some attempts should be made to generalize the findings with respect to the relationship between meteorology in a valley or mountain basin and air pollution.

In the introduction and literature review, it mentioned that Klaus et al. (2001) carried out a study in Mexico City basin using a principal component analysis of air quality data and examined the corresponding wind fields and that the study identified four eigenvectors corresponding to north/south transport, east/west slope flows, center/periphery drainage flows and northeast/southwest precipitation flows. It would be interesting the see some comparisons between the wind flow patterns identified in the current study with those from Klaus et al.

T1, T2, and T0 were mentioned prior to Fig. 1 being first introduced, which is awkward.

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Page 14. This way, the roses for T2 were made with the data available for the times of the clusters defined by T0 and T1. I thought only profiles from T0 were used in the cluster analyses.

Page 14. A general comparison of the wind roses for T0, T1 and T2 for all the clusters shows that T0 has the most sharply defined clusters and T2 has the fuzziest ones. This result should not come as a surprise given the large distance between T0 and T2 and that only profiles from T1 were used to define the clusters.

I stared at the "calendar plots" for a long time, but still could not see any patterns. I suggest that the authors try a different type of plot instead of the "calendar" plot. Use the horizontal axis for all 31 days of March and the vertical axis for 24 hours in each day. Each hour of the day will have a colored box. This way, it will be quite easy to identify any diurnal patterns and day-to-day variations of the diurnal patterns. The discussion referred to air pollution conditions that appeared in earlier figures in the manuscript. It would be much easier for the reader to see the corresponding ozone values for each hour of the day if a time series of hourly ozone values is also plotted on top of this Day-Hour plot.

Page 21 meteorological episodes during MILAGRO. Suggest change to Meteorological conditions for ozone episodes during MILAGRO;

Summary section. Instead of pointing to the table and figures, suggest summarize in a few sentences what happened in term of ozone pollution under the humid conditions after a cold surge.

Fig. 1. Label the topography contours. Can't tell how high the region is.

Fig. 3 The horizontal axis label should be;

Fig. 4 This is not a histogram. The data points should not be connected because they are not related. It is very difficult to read this figure and make sense out of it. An alternative histogram may help.

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Fig. 8. Same problem as with Fig. 4.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 13035, 2007.

ACPD

7, S6002–S6005, 2007

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