

Interactive comment on “Rapid ventilation of the Mexico City basin and regional fate of the urban plume” by B. de Foy et al.

Anonymous Referee #2

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This manuscript is the third of a series of papers by this group describing the meteorology and transport of the Mexico City plume during the MCMA-2003 field campaign. The paper contains will be very useful in the interpretation of surface observations that were made during the MCMA 2003 campaign. Comparison of the current analysis with meteorological analysis of the earlier MARI and IMADA will contribute to the understanding of the general transport patterns that control the air quality over Mexico City during the springtime.

It is a challenge to represent the complex transport patterns over Mexico City. The paper comes up with novel analysis tools and approaches, however, I had a hard time grasping the implications of parts of the descriptions and illustrations.

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Specific comments:

Pg. 845 lines 8-10: Observed mixing heights were calculated using gradient method, identifying heights at which the vertical gradient of potential temperature exceeded a threshold of 2.5 K. I assume this is supposed to read 2.5 K/km?

Pg. 845, line 18-20: "There is good agreement between the two showing that the model correctly ...". Which "two" are meant here?

Fig. 4: The maxima of the PBL heights of 3 to 4 km above ground that are observed over Mexico City are remarkable and it should be emphasized that the model does a very good job of capturing these, although the model seems to systematically underestimate the PBL heights a bit.

Fig. 5: The model captures the transport directions on the three days reasonable well, but seems to underestimate the wind speed in particular for the 10:00 CDT releases. The meaning of the figure caption "Note that horizontal transport is exaggerated by a factor of 8 is a bit confusing."

Result section:

I had difficulties following the descriptions and illustrations in this section.

Pg. 848 Line 1-2 defines the residence time "as the time span between the release time and the final exit from the domain". This definition is easy to follow.

Pg. 848 Line 9-10: "For particle paths, "residence time fields" were constructed by counting particle positions every hour in a single grid." I can not quite follow what is described here.

Pg. 848 Lines 23-28, and Fig. 7: I found it difficult and somewhat confusing what the authors want to show here.

Pg. 849 line 2: What are "recirculation fractions"?

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Fig. 8, 9, 10: Why do column concentration fields (Fig. 8), basin outflow residence times (Fig. 9), and column residence time fields (Fig. 10) all have the same unit (Number per cell per day)?

Fig. 9 The size of the graphs and the color scale do not allow a clear depiction of all the salient points described in the text.

Fig. 10: What do the “residence time fields” present?

Conclusions:

Pg. 855, lines 23-24: “Forward and backward trajectories were simulated corresponding to urban primary emissions and to “breathable” air in the basin.” What is meaning of “breathable” air in the basin?

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 839, 2006.

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