

Interactive comment on “Non-methane hydrocarbons source apportionment at different sites in Mexico City during 2002–2003” by E. Vega et al.

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One of the objectives of this study was to determine the effect of wind patterns over the concentrations of VOCs and their relationship. It should be mentioned that the focus was stress on the 2003 campaign since the information on meteorology was available in more detailed and also with a better spatial coverage. Based on the defined wind patterns by de Foy et al. (2005), we examined the VOCs concentrations and their dependence on wind flow circulation. As stated in the manuscript, there is a trend of increment on the toluene/benzene ratio with continuous wind flow (i.e. the ratios were higher on the north or south of the city depending on the wind flow pattern). We also noted a weekly cycle on VOCs concentrations and differences on weekday and weekend days, as emissions are stronger during weekdays. Even though the 2003

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data base was determined in more detail, still it is not enough for statistical purposes and therefore no categorical conclusions could be drawn and a first approximation of the relationship between wind flow and the toluene/benzene ratio on the urban scale was stated.

The use of profiles determined in 1997 and ambient data for 2002 and 2003 as input for the CMB model has created doubts about their applicability. The use of these profiles is supported by the fact that emissions from Magna and Premium gasoline are practically the same (Shifter, et al., 1999) for the chemical species used in the CMB model. Besides, the fit measures (r^2 , χ^2 , standard error and T stat, etc) were carefully observed to ensure the best performance of the model. On the other hand, sensitivity test were carried out with the available source profiles prior selecting the best fit. We found no differences in the model's performance for the 1997, 2002 and 2003 simulations. However, an important limitation for the source apportionment studies in Mexico is the lack of industrial processes that use diesel as a fuel which may bias the mobile sources to be over estimated. Currently we are trying to determine such profiles so we can improve the CMB results in the near future.

The sensitivity analysis varying the combination of sources showed that diesel was the most important source, although the standard variation was high compared with 2002 and 1997 field campaigns: (see table 4)

Asphalt, degreasing and dry cleaning showed large error in their contributions for the 1997 campaign. Their contribution was no longer detected in the following field campaigns, since some control strategies were implemented to improve air quality such as asphalt processes using organic solvents were shifted to water based application and dry cleaning process using naphthas were modified to use perchlorethylene and also the use of better sealed dry cleaners to reduce emissions. The food cooking profile could be bias with LPG compounds since some of the cooking processes use it as a fuel and therefore colinearity was present. When those cases were observed, a second sensitivity analysis was performed to select the best source profile.

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Regarding vehicular contributions: the vehicles powered by gasoline and diesel have been the main contributors to the NMHC concentrations, accounting for more than half of the total NMHC. In general, the higher contribution of diesel was related to both conditions in ambient air, high concentration of toluene and low concentration of n-pentane. Figure 1 (not included in the text) shows the comparisons between days with high diesel contribution (high diesel) and days with high gasoline contribution higher than diesel (high gasoline) for the 2002 and 2003 field campaigns. Additionally, in the 2003 sampling campaign, a reduction of gasoline powered vehicles travelling in the City was observed during the holy-week, and therefore an increment in diesel contribution was determined. See Table 1 in answers to referee 3.

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