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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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Several source profiles were used as input for the CMB model and their individual contributions were grouped into 6 categories for an easier interpretation on the figures. For example, the solvent category was composed by the sum of contributions of sources with similar processes, such as graphic arts and printing. The gasoline category included the tunnel, crossroad and evaporative contributions.

Regarding the sensitivity analysis, a series of runs were performed varying the profiles used as input for the CMB. The simulations presented on the manuscript are those which showed the best fit.

Most of the vehicular profiles were obtained from tunnel and crossroad measurements

where the number and model of vehicles were also taking into account. For example, tunnel measurements were composed by 87% of light gasoline vehicles, 9.5% of heavy gasoline vans and 1.1% of heavy duty vehicles. On the other hand, for the diesel source profile, emissions from diesel were also determined inside an intercity buses terminal and trailer parking lots. In addition, for gasoline source profile, evaporative and cold start emissions were also measured inside light duty parking lots (Vega et al., 1999). Ambient concentrations were not subtracted as they were considered negligible. The evaporative gasoline profile was always used for the CMB, although its contribution was small, it was included on the ‘gasoline category’.

Uncertainties of Source Profiles Source categories for NMHC were identified by means of cluster analysis using STATISTICA v 5.1. The software was also used to calculate the variations between similar source profiles. Samples of each group were averaged to obtain the fraction of each NMHC in the profile. Uncertainties were calculated, as they are explicit inputs to the CMB model to calculate the standard error of the source contribution estimations and also to give less weight to those values that are near the detection limits. The uncertainties reported in this paper were calculated as the standard deviations from averaging the results obtained for each source profile and their replicates (Watson, 1984).

Modification:

Uncertainties of Source Profiles Source profiles for NMHC were derived by calculating both average fraction and standard deviation for each compound on the samples. A cluster analysis was applied to identify possible differences among samples from same source. Uncertainties were calculated, as they are explicit inputs to the CMB model to calculate the standard error of the source contribution estimations and also to give less weight to those values that are near the detection limits. The uncertainties reported in this paper were calculated as the standard deviations from averaging the results obtained for each source profile and their replicates (Watson, 1984).

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Fitting species and source categories Main fitting species used for modelling were: propane, butane, i-butane, acetylene, pentane, hexane, toluene, xylenes, MTBE, 2,2,4,trimethylpentane, 2methylpentane and 3methylpentane since they are usually above minimum detectable limits (MDLs) and also because they are tracer of specific emission sources. The abundance of these species should be different at each source. This difference is used by the model to apportion the contribution of emission sources at a specific receptor site. A total of 33 source profiles were grouped into six source categories to aid in the interpretation of results: 1) Liquefied petroleum gas (LPG), 2) degreasing processes using toluene, m,p-xylenes, pentane and hexane (DEGREA), 3) solvents used in paint, offset and graphic arts (PAINT), 4) light duty vehicle exhaust emissions, which were determined in tunnels, crossroads and dynamometer (GASOLINE), 5) heavy duty vehicle exhaust emissions, which were determined in tunnels, crossroad and parking lots (DIESEL) and 6) non-identified sources (OTHER) (table 1, please refer to Vega et al., 1999 et al., Vega et al., 2000 for more detail about profile composition).

Modification:

A table is included in the manuscript showing the individual source profiles for each category. It is worth to mention that some sources showed no contribution at all, such as ASFAL, ASFAL1, TINPER, TINTO, RELLPRA, RGL1, RGL2, RGL3, GASNOVA, so they were not included for the categories on table 1.

The total C2-C12 mass concentration was used to normalize the individual proportion for each NMHC. Certainly, we mention only the main fitting species, however other species such as i-pentane, n-pentane, t2pentane, c2pentane, octane and 1,2,4-trimethylbutane etc were important when obtaining the best fit to ambient data. The 12 species mentioned are those usually selected to apply the model, and also these species account for 80% of the source profiles, but the selection of the fitting species depends upon the processes affecting the air quality each day. On the other hand, it should be noticed that although the fitting species have more weight for calculation,

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the remaining species also are taking into account to calculate source contribution. In addition, the CMB also weighs the uncertainty, as they are explicit inputs to the CMB model to calculate the standard error of the source contribution estimations and also to give less weight to those values that are near the detection limits.

In regards to the toluene/benzene ratio, we would like to mention that this ratio is the most common use in the literature. On the other hand, as we are using the MILAGRO data, Velasco et al, 2007, previously reported this ratio determined at one site, and in this work we are using the same ratio at six different sites to complement the reported results.

As suggested, the section on photochemistry was removed from the text.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 13561, 2007.

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Interactive Comment