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Interactive comment on “Characterization of on-road vehicle emissions in the Mexico City Metropolitan Area using a mobile laboratory in chase and fleet average measurement modes during the MCMA-2003 field campaign” by M. Zavala et al.

Anonymous Referee #2

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General comments: The paper by Zavala et al. is a very interesting application of a novel system to measure emissions of in-use vehicles. The authors demonstrate successfully that the use of superior technology allows to obtain interesting and new results. Despite of the fact that data evaluation does not come up to the standard of data generated, the paper still is in large parts sound and original. Therefore publication of this paper is recommended. The authors may however wish to seriously

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consider a number of issues as detailed below. Covering these issues should make the paper much more useful to a reader.

Specific comments: *) Central Limit theorem: The authors correctly point to the "central limit theorem" which indicates that, for sufficiently large samples, smooth distributions will emerge. Not accounted in the Central limit theorem is one typical feature of many datasets in environmental sciences: the impossibility of negative values, while the distribution is situated relatively close to zero. In practice this leads to skewed distributions, like a lognormal distribution. An irregular pattern in the distribution (e.g. the NO₂ distribution shown) indicates either a too small sample, or the presence of error sources/influencing sources other than random errors. A skewed distribution does not indicate that. Furthermore, the presence or absence of a skewed distribution would not allow concluding ("some evidence", p. 4704) on adequate sampling sizes. In any case, there is not much conclusions from this discussion - at least its use is not communicated clearly.

*) Colectivos (please define also in the abstract): It is an interesting result that CNG powered vehicles display a distinctive different emission behaviour (to be seen in fact from Tab. 3). Data show a couple of additional topics that could be discussed. The authors correctly refer to the difference between the emission factor used in MCMA, and the measured emission factor. They fail to refer to the source of this emission factor, and potential other measurements on CNG engines. The fraction of CNG plus LPG operated colectivos is stated (5%), but then all evaluations are done on CNG. Conclusions are presented as if CNG powered colectivos would constitute a majority of such vehicles (p.4710: " particularly CNG-powered colectivos are potentially significant contributors of NO_x ..."). In reality the contribution to total NO_x is small, as the number of CNG operated vehicles is small. The point should rather be that a change in policy, if gasoline operated colectivos were replaced, would not lead to the desired result of emission reductions. Moreover, none of the 26 individual CNG colectivos tested for emissions actually was stopped and inspected. The information that these are CNG

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powered merely derives from the routes the vehicles were observed, and from some information which routes are used by which class of colectivos. It is impossible for a reviewer to judge whether this information is reliable. Data in Table 3 proves that the class is clearly different to the rest of the colectivos. Still, if it were Diesel operated engines, the correspondence to the other data (heavy duty vehicles) would be even more striking.

*) NH₃: The authors should decide if the number of samples they have collected are sufficient for any conclusion - in that case they need not dwell on missing data. But without any measurements on PM formation, any speculation into that direction can not be the key result.

*) The authors present an impressive list of references. If analyzed, the references are mostly the authors' own publications, or those of their co-authors. This proves at one hand the unique status of the group involved in this work, on the other hand it indicates lack of interaction. Referring to existing emission factors, specifically on known differences between CNG and gasoline engines from a test bench (chassis dynamometer) could greatly increase the value of the results.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 4689, 2006.

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