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Interactive comment on "Trace gas and particle emissions from domestic and industrial biofuel use and garbage burning in central Mexico" *by* T. J. Christian et al.

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Comment to paper from Christian et al.

In this paper Christian and co-workers report on the composition of emissions from biofuel use and garbage burning in Central Mexico. This is a good paper on sources that may be very important in the developing world, and that often do not receive the attention that they deserve. We commend the authors for undertaking this important research.

We do have a few comments about the estimation of the fraction of PM2.5 in Mexico City due to garbage burning, which uses our Sb data from Querol et al. (2008). Based

on a combination of their source results and our ambient results for Sb, Christian et al. report on three places (abstract, P10121, and in the conclusions on page 10130) that garbage burning may be a major source of PM2.5 in Mexico City contributing 29% to one third of the PM2.5. Although the estimate is qualified as 'crude', they are nevertheless a prominent conclusion of the paper.

In our opinion the authors should consider a few additional information for this estimate. Most importantly, it assumes that 100% of the Sb detected in Mexico City is due to garbage burning. Again in our opinion this assumption is not fully supported by current evidence.

- The average ratio of Sb/PM2.5 at T0 and T1 during MILAGRO is 240 and 370 ppm. If the main source of Sb in Mexico City was garbage burning, then one would expect that this ratio would be much lower in other cities were garbage burning is a minor source. However, the ratio in Barcelona, Spain where open garbage burning is virtually non-existent is 100-140 ppm in PM2.5 (Pérez et al. 2008, Atmos Environ). In a study by Sternbeck et al. (2002 in Atmos Environ) in traffic tunnels from Sweden gave 140-170 ppm in PM10. Dongarrà et al. (2005 in Atmos Environ) in Palermo gave 200-400 ppm PM10 in a traffic site, with a clear increase from rural background, to urban background and traffic sites. Amato et al. (2009 Atmos Environ) showed that into Barcelona city the Sb levels in deposited PM10 road dust were much higher close to the traffic lights (where braking was more frequent) than in the others segments of the same street. Finally, Schauer et al. (2006, Health Effect Institute Report), Thorpe and Harrison (2008 in Sci Tot Environ) and Amato et al. (2008 and 2009, both in Atmos Environ), Iijima et al. (2008 ES&T), among others, all shows that Sb is one of the main tracer of vehicle brake emissions in cities. Based on these data it seems reasonable to attribute a significant fraction of Sb to traffic related sources (such as brake wear) and to resuspended road dust, and not only to garbage burning.

- In Mexico City garbage burning is much less common in the city center (both from our experience there and from personal communications from local researchers) and more

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common towards the outskirts of the city and the interface with the rural areas. Sb from garbage burning should have a similar geographical distribution with lower values in the city center and increasing towards the outskirts. However, the results indicate a higher Sb levels in PM10 at CENICA and T0 (15-16 ng/m3) than at T1 (10 ng/m3).

We suggest that the above road dust and traffic emissions of Sb are considered for the quantitative estimates of source contribution to PM in Mexico City.

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