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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impacts of HONO sources on the photochemistry in Mexico City during the MCMA-2006/MILAGO Campaign" *by* G. Li et al.

Anonymous Referee #1

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This paper reports on the contribution of different HONO sources to the photochemistry, using the WRF-CHEM model, in Mexico City, as investigated during the MCMA-2006/MILAGO Campaign. In addition to the reaction of NO with OH , four sources are considered i.e., secondary HONO formation from NO2 heterogeneous reaction with semivolatile organics, NO2 reaction with freshly emitted soot, NO2 heterogeneous reaction on aerosol and ground surfaces.

It is shown, among other, that HONO accelerates ozone accumulation and secondary aerosol formation.

This manuscript is well written and documented. The topic fits perfectly in the scope

of ACP. I therefore recommend this manuscript for publication once the authors have commented following points.

The interaction of NO2 with soot producing HONO has been recently revisited, finally showing that it is catalytic (see Monge et al, PNAS, 2010). How would these recent findings alter the outcome of this modelling study? Would the HONO impact still increase?

Kleffmann and coworkers also showed that the photochemistry of some gaseous aromatic compounds do produce HONO. This is not discussed here, why? Maybe you could justify slightly more the HONO sources you selected. Would this gas phase photochemistry be the artificial photolytic HONO source that had to be introduced to improve the HONO simulations during daytime?

The authors mention the study of Ndour et al (2008) which is related to dust chemistry. Does this mean that the impact of dust has been considered here? Finally, going one step further, building and roads are covered of dust – would the interaction between NO2 and this road- or building-dust be an additional HONO source?

Finally, I'm slightly confused about the distinction made of the four additional sources. In fact, the semivolatiles studied by Gutzwiller et al. were derived from soot particles. Therefore, how does this differs from HONO being produced from soot directly?

Also light enhancement seems to apply both to soot (see Monge et al, PNAS, 2010) and to the semivolatils (George et al., 2005). As the latter is one of the major sources, would a light enhancement be significant here?

The authors should point out which S/V values (aerosol surface) they are using in their simulations. As this is a key point for the importance of heterogeneous chemistry.

How are these findings limited to Mexico City? Can these findings be transposed to moderately polluted locations? Would the author state that simulating urban quality (in general) would require implementing these HONO sources in all air quality models? Is

there an NOx concentration threshold which activates the importance of these HONO sources?

How sensitive are the HONO levels to the input parameters, which are partly unknown or have been highly parameterized?

On page 4161, the authors should explain more how they parameterized the SOA formation. It is unclear to me which conditions have been used here.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 4143, 2010.