Atmospheric
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Discussions

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Interactive comment on "Impact of updated traffic emissions on HONO mixing ratios simulated for urban site in Houston, Texas" *by* B. H. Czader et al.

Anonymous Referee #1

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In this manuscript, the authors investigate the impact of elevated measured HONO/NOx emission ratio (ER) from direct traffic emission in the Houston area and update the NOx emission inventory. They then apply the WRF-SMOKE-CMAQ modeling system to investigate the impact of the new ER on simulated HONO levels compared to measurements.

The authors should address the following issues before the Manuscript can be considered for publication.

Major concnens:

One of the major issues here is the lack of continuous or sufficient HONO measurements. I can hardly count 6 diurnal cycles of HONO measurements in Fig. 6, which

is properly not adequate to discuss model-measurements comparison. From Fig. 6, HONO simulations seems to be improved only during the early morning and most apparently during the Sep. 12th. Figs 4 and 5 are shown only for Sep 12th, what about the other days?

Also from Fig. 6 (since it is the only figure that show several days of HONO diurnal cycles), it seems that HONO was much better simulated with the (N) scenario on Sept. 11th, 19th and 26th, which are significantly overestimated by the new (NH) scenarios. HONO simulations seem to be improved only on the Sep. 12th, 18th.

The authors should also plot the Measured vs Simulated HONO for both scenarios (N and NH) and for each complete diurnal cycle and for the mean simulated period (thought statistical mean is shown in table 3), so that we can get a clearer picture if the new ER (NH scenario) would consistently improve HONO or only under certain conditions. Why it is only improved on the 12th?

The statistical mean in table 3 is misleading because the overestimated and underestimated HONO cancel each other resulting in slightly improved mean simulated HONO. So here also, the authors should show the results for each diurnal cycle (not the mean).

On the days 23-25th, HONO measurements are still significantly underestimated, especially during the afternoon time. This underestimation should also be discussed in more details. In fact, most of the HONO unknown sources are reported during afternoon hours (e.g., Kleffmann et al., 2005; Elshorbany et al., 2012). During the early morning, the so called [HONO]pss (zero net OH source), which account for the known gas phase HONO formation from OH+NO and loss through photolysis and reaction with OH, accounts for most of the early morning peak.

Why these high emission ratios, Could the authors try to shed some light on the type of fleet in Huston Metropolitan Area, compared to other cities in the US or to the fleet in Europe, does the fleet type and quality changed over time (Benzene, diesel, natural gas, hyprid cars,....etc), why are ER are different that reported before?

At the end, more scientific discussion of the results is still required. For example, why OH is only enhanced by $\sim$5% though HONO is enhanced by 35% (Table 3) on Sep. 12th. What is the contribution of HONOpss to the total simulated HONO?. Here also Fig. 7 should include all other simulated cycles, i.e. not only one single event.

Technical corrections

Page 21317, line 9: HONO photolysis during the early morning was first reported by Perner and Platt (1979) and Harris et al. (1982). Add these references before Czader et al., (2012) and write (e.g.,) at the statement's beginning.

Page 21325, line 18: 12 September.

Page 21325, line 22: 12 September.

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 21315, 2014.