

Interactive comment on “Observations of high rates of NO₂ – HONO conversion in the nocturnal atmospheric boundary layer in Kathmandu, Nepal” by Y. Yu et al.

Anonymous Referee #3

Received and published: 25 February 2009

This paper reports the observation of HONO in Kathmandu using DOAS. Very high HONO concentrations and [HONO]/[NO₂] were found, and various possible sources of HONO formation were discussed. The paper reports significant correlations between [HONO]/[NO₂] and aerosol surface, ground surface as well as relative humidity and concludes that heterogeneous reaction of NO₂ on the reactive surface is the major source for HONO formation. Throughout the experimental section and the results and discussion section, a number of observation results and evidences are not consistent and do not support the main conclusions of the paper, a major revision is needed.

In page 190, line 13-16, It says, "Nevertheless, the retrieval results of aerosol surface

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



and volume agree well with the trends seen in our PM10 data (Fig. 2)". However, if we look carefully at Figure 2, we can find their trends actually did not agree. The aerosol surface and volume had sharp peaks, while PM10 mass concentration had much broader peaks, and their maximum values appeared at different time.

Table 2 lists HONO measurements in Asia. This information does not relate to the section 3.1, and it better fits in introduction section.

Section 3.2, page 192-193, NO₂ in the ambient is mainly from the conversion of NO, so the correlation between HONO and NO₂ should not be used as an indication of direct emission from the same source.

Section 3.3, page 193-194, and Fig. 5, a close look at figure 5, one can see that PM 10 had sharp peaks and lasted less than five minutes while HONO had broad peaks and lasted more than 15 peaks. These shows HONO and PM10 might come from different plume. The DOAS observation has 1 km distance between DOAS and the mirror, a sharp peak of PM10 suggest a narrow plum passed through the light path, which passed through low buildings, roads, and some bare fields. In Fig 5, NO had similar sharp peaks as those of PM10, suggesting that the sharp increase of PM10 and NO was caused by a narrow plume from a combustion source. Therefore, this observation should not be used as an evidence for the heterogeneous formation of HONO on PM surface.

Page 196, line 14- page 197, here the authors concluded that "the NO₂ heterogeneous reaction on the ground reactive surface was a major source of HONO in Kathmandu atmosphere". This is contradicting to the discussion in section 3.3. The ground surface may correlated well with HONO concentrations, but this does not necessary mean ground surface was the major source of HONO, because they may be controlled by different process and coincidentally have similar diurnal trends. It is interesting to see from Fig 6, that [HONO]/[NO₂] correlated well with the total surface of aerosol and ground, while the aerosol and ground surface were at similar levels. This suggests that both

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



aerosol and ground may contribute to the HONO formation with similar importance. More discussion is needed.

Page 196, line 22-24, the constant value of ground surface at 3 am-6am is due the way how boundary height was calculated.

Page 198, line 12-35, here the authors used the results to discuss the production and destruction reaction probabilities of HONO on ammonium sulfate, this is contradicting to the section 3.3 where the authors suggest the reaction of NO₂ on the surface of soot may be the major source of HONO.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 183, 2009.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

