

***Interactive comment on* “Light induced conversion of nitrogen dioxide into nitrous acid on submicron humic acid aerosol” by K. Stemmler et al.**

Anonymous Referee #2

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The paper presents the evaluation of a hypothesis on HONO formation on submicron humic acid aerosol based on the results of carefully designed laboratory experiments. The conclusions drawn from the study are correct, the paper is well structured and written, and certainly deserves publication after some corrections. However, there are a few important questions which need to be answered.

1) The authors declare (Page 4038, line 11) that they selected Aldrich Humic Acid which had a tenfold higher photoreactivity towards NO₂ in the visible range than that of a Suwanne River fulvic acid, in spite of the fact that the latter is admittedly more similar to aerosol HULIS. Why did they select the Aldrich HA then in their experiments evaluating atmospheric significance of these reactions? If they did select Aldrich HA, why did not they refer back to this fact in their conclusions on atmospheric implications?

In fact, this is not a major issue since atmospheric HONO production was found to be marginal anyhow.

2) The authors define HONO production on aerosol as a sort of "excess" formation above the zero aerosol case (Page 4041 Line 19). Since gas phase formation produces significant background (150-900 ppt) and large aerosol concentrations are applied, it would have been desirable to run the same experiments with "neutral" aerosols (e.g. ammonium-sulfate or NaCl) as a control sample. In this case, the effect of aerosol particles on optical path lengths (due to multiple scattering, for example) could have been filtered out. Without this control, it is also possible that excess production of HONO is partly due to enhanced gas-phase rates caused by modified light propagation in the flow tube caused by the scattering of (any) particles.

3) The hypothesis at the very end of the paper is very brave in the light of the major findings of the paper: one could hardly imagine a situation in which humus in the soil is directly irradiated with visible light in any way, but certainly not to the extent comparable to that in suspended particles in a reactor tube. Therefore the estimated HONO source strength of 700 ppt h⁻¹ (Page 4052, Line 29) seems to be a gross overestimate, most probably the assumed source is also negligible. This, however, would not make the paper less valuable.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 4035, 2007.

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