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## HONO Comment on acp-2020-1266

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Community comment on "Opinion: Papers that shaped tropospheric chemistry" by Paul S. Monks et al., Atmos. Chem. Phys. Discuss.,  
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I commend the authors for leading this nice effort and inspired by the call for contributions, I have a few suggestions. I am missing a discussion on nitrous acid (HONO) which has emerged as a major source of OH radical during the last 15 years.

Here is a relevant draft summary:

HONO photolysis is a major OH source, especially during the early morning, which was first identified by Perner and Platt (1979):



During the daytime, photolysis of HONO has been shown to be the most important OH initiation source under urban high NO<sub>x</sub> conditions (e.g., Elshorbany et al., 2009a, 2009b) and was found to have a significant impact on ozone photochemical formation (Elshorbany et al., 2010). HONO was also demonstrated to have large global impact on gas phase (Elshorbany et al., 2012) and aerosol formation (Elshorbany et al., 2014).

HONO is now recognized as an important species that is being measured routinely during field measurements. Attempts are currently underway to detect it from space, which is being challenged by its low near-surface concentrations but was recently detected in biomass burning emissions.

HONO research is driven by unexpected high daytime values of HONO (e.g. Neftel et al., 1996, Zhou et al., 2002; Kleffmann et al., 2002; Acker et al., 2006a, 2006b, Elshorbany et al., 2009). Several photochemical HONO sources have been proposed (Kleffmann, 2007), some of which have been identified in the laboratory (e.g., Zhou et al., 2003; George et al., 2005; Stemmler et al., 2006, 2007; Bejan et al., 2006; Li et al., 2008, Gustafsson et al., 2006; Ndour et al., 2008). HONO sources in the atmosphere are not yet well understood. While the dark heterogeneous conversion of NO<sub>2</sub> on humid surfaces (Finlayson-Pitts et al., 2003) is commonly accepted as the dominant HONO sources during night (Alicke et al., 2002), the exact mechanism is still unclear:



In addition, recent studies showed that the heterogeneous reaction of NO<sub>2</sub> with adsorbed hydrocarbons are also important under atmospheric conditions (Ammann, et al., 2005).

NO<sub>2</sub> + Organics(red) □ HONO + Organics(oxi.)

For HONO daytime sources, five photochemical mechanisms were recently identified. Three of them dominate under high NO<sub>x</sub> urban conditions, namely heterogeneous conversion of gaseous NO<sub>2</sub> on photosensitized solid surface organic compounds (George et al., 2005; Stemmler et al., 2006), photocatalytic conversion of NO<sub>2</sub> on TiO<sub>2</sub> (Gustafsson et al., 2006; Ndour et al., 2008) and the photolysis of the gaseous nitroaromatic compounds (Bejan et al., 2006) and should correlate well with  $j(\text{NO}_2)$ . Under low NO<sub>x</sub> rural conditions, the photolysis of nitric acid (Zhou et al., 2003) adsorbed on solid surfaces (including vegetations) may dominate and would better correlate to  $j(\text{O}^1\text{D})$ , caused by the much lower wavelength range of the nitric acid photolysis.