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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Atmospheric pseudohalogen chemistry" *by* D. J. Lary

Anonymous Referee #2

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D. J. Lary reintroduces, obviously stimulated by stratospheric HCN observations from the ATMOS/ATLAS missions, pseudohalogen species, whose possible implications have usually been overlooked or neglected in atmospheric chemistry, in particular ozone photochemistry and studies related to lightning and ionization processes. He argues that in the upper troposphere and lower stratosphere the HCN abundance is comparable to that of NOy and thus should not be neglected. Indeed, by discussing existing observations and likely sources and sinks of HCN and relating these to recent laboratory work, he comes up with an interesting and stimulating view that HCN and the other pseudohalogen species might well have an impact on ozone and the atmospheric oxidation capacity.

It is well known that HCN is produced by biomass burning. Aliphatic amines emitted from animals are considered to be precursors of HCN, and CN containing substances are released from various anthropogenic sources as well. Perhaps the most interesting

pathway of CN radical production is provided by lightning, through large scale high temperature ionization. As HCN is a long lived species with low solubility, its loss via rainout is small. Lary thus suggests that HCN may be an effective tracer for lightning activity. He points out that the lightning effect can be seen in the HCN profiles shown in figure 1, as well as from the scatter diagram of HCN and NOx shown in figure 2.

Unfortunately this does not appear that obvious: Although the observations in figure 1, for 3 different years, are distinguished by color, no single profiles can be identified which, from a characteristic shape, would make the lightning plausible. It is recommended to show an additional figure in which relevant single profiles are displayed.

The scatter plot in figure 2 is more conclusive as high HCN VMRs correlate with those of NOx. The few points, however, and the enormous error bars, do not appear convincing.

All in all, this paper presents an interesting and in many aspects new insight into pseudohalogen chemistry and its possible impact. The scientific questions addressed are well within the scope of ACP.

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