

Interactive comment on “Measurement Report: Sulfuric Acid Nucleation and Experimental Conditions in a Photolytic Flow Reactor” by David Roy Hanson et al.

David Roy Hanson et al.

hansondr@augzburg.edu

Received and published: 27 October 2020

We have discovered an error in the mixing ratio of HCl, and thus HONO, listed in Figure 2's caption; also in the body of the manuscript. The main effect of this error is how it affects the value of the derived first-order photolysis rate coefficient for HONO. This was evaluated by comparing the modeled growth rates based on H₂SO₄ concentrations to the measured growth of nanoparticles. Basically, the HONO level increased by ~35 % and thus the re-evaluated photolysis rate decreased by ~ 35 %.

The mixing ratio obtained from the slope of the NO_x data in Fig. 2 is 18 ppmv. There were a number of measurements proximal in time to those depicted in Fig. 2 and the

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average of all these NO_x mixing ratios is 17 ppmv. The 12.8 ppmv value was taken from a set of NO_x measurements that were performed 9 months earlier (the fraction that was NO was different also). We think that these changes are due to changes in the HCl level from our HCl-source, possibly due to small temperature excursions that may lead to a collection, then a later evaporation, of HCl-H₂O droplets on glass surfaces above the main liquid level. Also, the NaONO(s) was exchanged with fresh NaONO(s) powder in Nov. of 2019, that might have helped decrease HONO decomposition to NO etc.

We ran simulations using the higher mixing ratio for NO_x (with 80% as HONO, and 10% for each NO and NO₂), and found that a photolysis rate of 4.2×10^{-4} results in H₂SO₄ levels within a few percent of those calculated previously and shown in Fig. 3 (blue line). We think this is the appropriate photolysis level to use for data presented in the paper. This does not substantially affect any conclusions in the paper. The data-model comparisons in Figs. 5 and 6 will be run again with the appropriate HCl mixing ratio and proper k_{phot} and we expect very little change in the quantitative results.

Included is a plot of our periodic NO_x and NO measurements for the last 15 months. We plan to show and discuss this figure in the Supplement of a revised version of this paper. We will also model H₂SO₄ with conditions for 2019: 13 ppm NO_x with 22 % of it present as NO and 22% as NO₂ – thus HONO to 56 %.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-800>, 2020.

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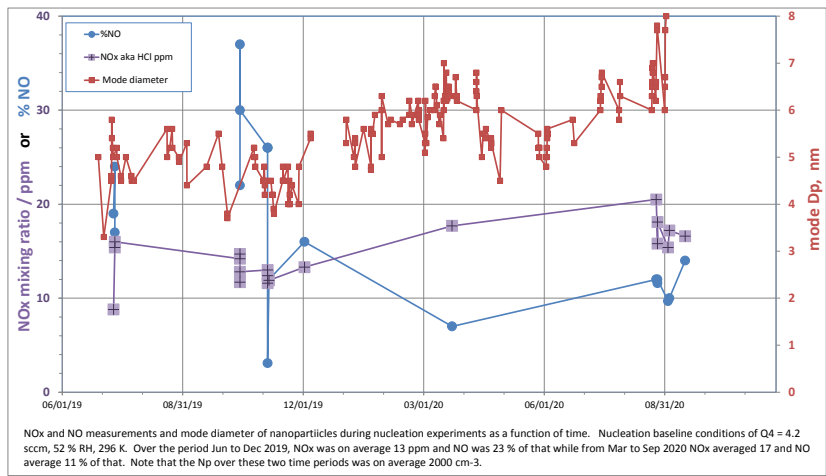


Fig. 1. Plot of NOx, NO, and Dp over time.