

Interactive comment on “Significant concentrations of nitryl chloride sustained in the morning: Investigations of the causes and impacts on ozone production in a polluted region of northern China” by Yee Jun Tham et al.

Anonymous Referee #1

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Tham et al. present a comprehensive set of measurements and analysis focusing on ClNO₂ formation at a ground site in Northern China. I thought this was a well written manuscript which should be published after my suggestions below have been considered.

Minor issues.

pg 2 line 12. (R5) please use the proper chemical symbol for a reversible reaction (the symbol used denotes resonance)

pg 5 - section 2.2. What were the response factors for N₂O₅ and ClNO₂ at m/z 235

and 208 when the Corona discharge and the 210Po were used?

It may be worthwhile to add more detail about the calibration here, and add a figure of an example calibration sequence to the supplemental. The Wang et al. (2016) describes results from a different study, where there was a CRDS N₂O₅ instrument.

Was the humidity in the CIMS inlet controlled?

I am concerned about the measurement of N₂O₅ using m/z 235. Can you comment on potential interferences arising from clustering of iodide with organic acids?

Is m/z 210 consistent with the relative isotopic abundance of ³⁷Cl?

pg 7, line 30 - the ClNO₂ cross-sections were remeasured in 2008 by Ghosh et al. (JPC A 116, 6003 (2012)). Please indicate which cross-sections were used in this work.

pg 9 line 29. The homogeneous hydrolysis rate by Wahner et al. is likely incorrect (see, e.g., Brown et al., Science, 2006). Consider omitting it.

pg 11 line 15. His last name is spelled Riedel.

pg 12, equation (6). There may also be "loss" of ClNO₂ due to entrainment upwards from the residual layer (not just downward mixing). Hence, the levels in the residual layer could be higher than calculated here.

pg 12 line 19 "This result suggest that elevated ClNO₂ may always present in the residual layer of this region." One cannot logically conclude from some observations to "always" as there may be the odd exception. Suggest rephrasing to "frequently" or similar.

pg 15 line 27- many references are incomplete (missing doi, volumes, page numbers, etc.).

pg 22 (Table 1). Please state the uncertainties for each of the measurements.

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General. There are a few minor grammatical errors scattered throughout the document. I would suggest asking a native English speaker to read through the manuscript a couple of times and make corrections where warranted.

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