

This paper describes measurements of nitryl chloride and associated species at a site in the North China Plain (NCP), and presents model estimates of the impact of this active chlorine compound on ozone formation in that environment. The measurements are very interesting and the associated analysis makes some important points about ClNO<sub>2</sub> in the residual boundary layer of the polluted NCP. The presentation of the work is quite well done, it is concise and well organized and the important aspects are well explained. There are only a few issues for the authors to address to make this paper acceptable for publication.

#### General Comments

In general the English in the paper is quite good, however there are a number of instances disagreements between the noun and the verb (e.g. singular when it should be plural, etc.). The authors briefly mention measurements of gas-phase HCl, but since this is an important fraction of the chloride available for activation, it deserves more details. Also, the morning time source of Cl atoms will have a corresponding source of HCl, as most Cl + VOC reactions produce HCl.

#### Specific Comments

Page 2, Line 31: While ClNO<sub>2</sub> is not as well studied as N<sub>2</sub>O<sub>5</sub>, there are loss mechanisms for ClNO<sub>2</sub> at night. Kim et al., [2014] show that ClNO<sub>2</sub> can be deposited on water surfaces. Roberts et al., [2008] showed that ClNO<sub>2</sub> can be taken up on low pH surfaces (and will make Cl<sub>2</sub>). It is fair to say that because of its low aqueous solubility [Sander, 2015], ClNO<sub>2</sub> losses are likely much slower than N<sub>2</sub>O<sub>5</sub>, and to a first approximation can probably be neglected.

Page 4., Lines 8&9. When you say “tropospheric ozone” that implies a broad scale, really you are talking about ozone in the Beijing urban area.

Page 5, Line 12. Did you see any evidence of Cl<sub>2</sub>, at the mass of the cluster ion I(Cl<sub>2</sub>)<sup>-</sup> ?

Page 7, Line 28, “constrained into” is the wrong expression, a model can be ‘constrained by’ observations.

Page 14, Line 29, “less’ should be ‘lesser’.

Figure 2. The yellow color is hard to see.

#### References

Kim, M. J., Farmer, D. K., and Bertram, T. H.: A controlling role for the air–sea interface in the chemical processing of reactive nitrogen in the coastal marine boundary layer, *Proc. Natl. Acad. Sci.*, 10.1073/pnas.1318694111, 2014.

Roberts, J. M., Osthoff, H. D., Brown, S. S., and Ravishankara, A. R.: N<sub>2</sub>O<sub>5</sub> oxidizes chloride to Cl<sub>2</sub> in acidic atmospheric aerosol, *Science*, 321, 1059., 2008.

Sander, R.: Compilation of Henry’s law constants (version 4.0) for water as solvent, *Atmos. Chem. Phys.*, 15, 4399-4981, 10.5194/acp-15-4399-2015, 2015.