

Interactive comment on “Development of a chlorine chemistry module for the Master Chemical Mechanism” by L. K. Xue et al.

Anonymous Referee #2

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General Comments

A mechanism of chlorine chemistry has been added to the renown Master Chemical Mechanism (MCM) to address the MCM's lack of chlorine comprehensive chemistry. The authors have tested the new chemical scheme in a box model by looking at sensitivity studies in model runs with and without chlorine chemistry. They then discuss what impact the chlorine chemistry has on the role of nitryl chloride chemistry in the polluted environment. The paper adds new and much needed knowledge to the current understanding of chlorine chemistry and its impact on air quality and deserves publication subject to just a few minor revisions.

Specific comments

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- (1). The addition of chlorine chemistry to the MCM is both timely and obviously of much benefit to air quality models. What is the status with respect to the other halogens? Is their chemistry not as significant?
- (2). If I am right, the box model conditions under which these studies have been performed do not consider wet deposition. Would the authors comment on the impact of wet deposition on these newly added chlorine-substituted intermediates?
- (3). Page 4826 line 17: Please indicate how many additional new chlorinated products in the new MCM scheme are involved in these 199 reactions. And also, with the additional 199 reactions, can the authors indicate the increased cost of running the model with the new reactions?
- (4). Page 4826: The authors have used conditions with observed maximum of 1997 pptv for ClNO₂. Can the authors explain the likely impact on chemistry under low ClNO₂ conditions? High ClNO₂ conditions are unlikely to be prevalent in normal atmospheric conditions.
- (5). Page 4833 lines 8-10: Please revise the sentence.
- (6). Page 4847 Figure 4: What does the vertical dotted line stands for? Is it to mark maximum ClNO₂? An explanation for the reader would be appreciated.

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