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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Isotope modeling of nitric acid formation in the atmosphere using ISO-RACM: testing the importance of NO oxidation, heterogeneous reactions, and trace gas chemistry" *by* G. Michalski and F. Xu

Anonymous Referee #2

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The reviewer apologizes to the authors and editor for being late. After the critical and extensive review (which is a credit to any manuscript, as it can only help) by reviewer 1, reviewer 2 was curious about an equally extensive reply. Clearly, when a reviewer puts in much serious work, whether we like it or not, we as authors are oblidged to carefully consider all points raised, and use these to improve the value of the paper. Reviewer 1 was kind enough to ask for "a significant effort" but reviewer 2 means that an effort is not waht is asked, it is the improved end result that counts.

However the reply was meagre, which somehow amidst of all things happening made

me loose interest in the matter, and the use of the expression "hypocritical" made me shy away, it sounded not scientific to me, and how would my comments become qualified?

Apart from underscoring the points raised by reviewer 1, I have a few remarks. I also hope that the authors communicated with reviewer 1 during the EGU meeting (or by email), as reviewer 1 mentioned he presented some results there.

It is an interesting paper and well readable; it gave me insight into the various reactions that must beconsidered, and hope that 17O may be useful for these applications.However, like some isotope papers, it uses incorrect formulations, it sound often sloppy and then one wonders, how accurate are all calculations? Only two examples, Caption Fig 3,"produces delta 17O", 6832 L 16, "alpha is the % of NO" Please rid the manuscriopt of all incorrect formulations. It becomes pseudo science. In particular when mathematical modelling is the basis of the paper one expects excact formulations. I also was astounded at the error in the first formula, from a conceptual and mathematical point of view.

Concerning 17O, there are recent papers (Assonov, or Kaiser, IUPAC?) that give proper definitions of Cap delta 17O, please include these. The old day of 0.5 time 18O are long over. The author's dillemma clearly is that they must simplify on the one ahnd, and remain correct on the other. The latter hand is the most important one..

The atmosphere in the box becomes very acid (I hope the discussion not). Even if there were -no- fractionation in the removal, and indeed MIF is excluded, and when isotope exhange does not occur, one could leave the sink term out. But then one asks how realistic the atmosphere in the box is. The results of many model runs performed all are pertaining to a certain "age" or run time. How long was this? Why this time period? If on lets nitrate accumulate enough, its "signature" (do not use this word, or only sparingly in the mansucript) will not change . I also make the point that it is nitrate, not HNO3. To give the reader a better impression, perhaps Figure 2 could have

one more panel (it must remain legible) with other species, for instance ozone. What happens to ozone levels and turnover. Figure 8 and 9 can be changed, one cannot allocate what moves where, perhaps fewer, but typical runs shown, and the change would help more than the current presntation. Or skip these figures and summrize there meaning in the test.

My recommendation is to accept this paper, not after an effort has been made, but only after a serious successful effort.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 6829, 2010.