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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Measurement from sun-synchronous orbit of a reaction rate controlling the diurnal NO_x cycle in the stratosphere" *by* J. C. Walker and A. Dudhia

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1 Replies to general comments

We thank the reviewer for their comments which we have found very useful. In response to Referee #2's general comment that '*Anyway, the authors should be more ambitious: it is a little bit frustrating that the large amount of available satellite data is only reduced to single curves. It would be interesting for each pixel, to use the temperature to calculate the reaction rate from JPL values, and to repeat the same calculation by their method, allowing to draw maps of correlation between both (or other statis-*

tics) and to infer where/when the agreement fails, probably opening new questions', the authors are in agreement that a synoptic analysis of the stratospheric NOx chemistry would be interesting. However, in this study the analysis was performed in terms of zonal means, which assumes that the aspects controlling the diurnal cycle such as stratospheric temperature and rate of photolytic decay of N_2O_5 have much stronger latitudinal than longitudinal dependencies, which is reasonable at extra-polar latitudes in the stratosphere. Difficulties in performing a synoptic analysis arise due to the limited spatial and temporal sampling available from satellite measurements alone. This is especially acute for diurnally varying species since the day and nighttime measurements are never geographically coincident for a particular pixel for any given cycle. However, performing the analysis in the zonal mean averages enough measurements together to overcome this problem. A synoptic analysis would require the involvement of a global CTM in addition to the satellite measurements. Although this would be very interesting, it is beyond the scope of this paper.

2 Replies to specific comments

The following corrections have been made to the manuscript.

Enlarge figures (especially 3 to 8) to make them readable. Figures have been made more legible by making the text larger and easier to read.

p24597, Li 17: remove 'where M is any molecule'. Already defined. Done.

p 24602, li 21: the study from Cox and Coker (1983) should be cited as in Table 1. This is now cited in both the text as well as in Table 1.

p 24609, li 14: remove double . Done.

from p24609 to p 24611 (references): each reference ends with a dummy code or several. Remove. Done.

p 24609, li 27: replace 'Ravishnkara' by Ravishankara'. Done.

p 24611, l 28: add 'May R. D.' among the authors.. May R. D. has been added to the paper by Toumi et al.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 24595, 2010.