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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Do vibrationally excited OH molecules affect middle and upper atmospheric chemistry?" *by* T. von Clarmann et al.

Anonymous Referee #1

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General comments: The paper presents estimation of impact of vibrationally excited OH on the Ox, ozone and OH sink at the altitudes from the upper stratosphere to the lower thermosphere. The authors have used upper atmospheric OH populations and reaction rate coefficients for OH(v=0...9)+O3 and OH(v=0...9)+O to estimate the effective (i.e. population weighted) reaction rates for various atmospheric conditions. The estimations of impact of vibrationally excited OH on the Ox, ozone and OH sink is very useful, because up to 20% of OH is vibrationally excited. In correspondence with the estimations the contributions of abovementioned reactions to the sink of OH, Ox and ozone are small. Nevertheless, the paper is important contribution in the study of the middle atmospheric chemistry.

Specific comments: 1. 2.1 Effective rate coefficients, page 11453, line 12. The de-

excitation processes of OH should be considered in details: the absolute values of rate constants and also quantum yields of the products should be considered instead of relative values in comparison with ones that proposed by (Adler-Golden, 1997).

2. Conclusions, page 11462, line 26. Obviously, authors are absolutely right when they write "analysis relies on independent treatment of populations and chemistry, i.e. there is no feedback from the subsequent chemistry back to the non-LTE model used to estimate the populations of the vibrational states. While we try to complete our archive of reaction rates of vibrationally excited molecules, we still have the vision of a fully coupled time-dependent chemistry and non-LTE model, allowing accurate treatment of all feedback mechanisms." However, this valuable intention is not connected with the matter of the reviewed paper, because for this purpose it is impossible to use any "effective reaction rates" for vibrationally excited molecules and vibrational kinetics should be considered in details.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 11449, 2010.