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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Global stratospheric hydrogen peroxide distribution from MIPAS-Envisat full resolution spectra compared to KASIMA model results" *by* S. Versick et al.

Anonymous Referee #2

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1 General remarks

The paper introduces satellite data on hydrogen peroxide with a new retrieval algorithm, including a comparison with chemical transport model results using different rate coefficients for its formation reaction. The paper is a useful contribution for ACP, especially for atmospheric chemists, since measurements of hydrogen peroxide are rather rare in the stratosphere. To get H_2O_2 from MIPAS is especially valuable because of the large suite of simultaneously measured trace gases which helps to understand budgets, but also to identify problems in laboratory data. The presented data are consistent with other chemical circulation models if the laboratory data of Christensen et al (2002) are

used.
The paper is generally well written, except for chapter 7.1 which needs revisions for clarification. It is also puzzling that in the text a much longer period of data is mentioned than the one shown in the figures. For the full period the results would be more significant.

2 Specific comments

On page 33513 also heterogeneous processes on cloud particles should be mentioned (scavenging).
In section 6.3, concerning $ClONO_2$, it should be distinguished between day and night. At daytime there is almost no $ClONO_2$ in the upper stratosphere due to photolysis.
Section 7.1 should be rearranged. A run using an outlyer of laboratory data (due to artifacts, known since 2003 in the model community) cannot be a 'standard model run'. In this section also Sander et al (2011), including the discussion therein, should be cited, their recommendation for the H_2O_2 is closer to Christensen et al (2002) than the other sources. There are also changes in sink reactions. An additional sensitivity study might be useful to be included in Fig.7. The mesospheric values appear to be rather high compared to other studies, was that based on Christensen et al (2002) as stated in the sentence before? Is there a hint on it in the older retrieval scheme mentioned?
In section 7.3 the spatial and time difference are inconsistent. 250km should correspond to about 10 minutes (1h is more than 1500km at equator). The description of Fig.11 is only valid for equinox conditions, here more details are needed. It might be also useful to show a figure with the latitudinal dependence of the diurnal cycle for 2 seasons.

3 Technical corrections

Page 33515, line 26: grammar.
Page 33516, line 17: better write CF_4 (is that meant?).
Page 33524, line 28: which JPL?
Page 33530, line 3: incomplete, typos.
Page 33527, line 5; page 33529, line 8: subscript!
Figure 5, caption: define symbols and colors.
Figure 11, caption: which latitude and season?

4 References

Christensen, L. E., Okumura, M., Sander, S. P., Salawitch, R. J., Toon, G. C., Sen, B., Blavier, J.-F., and Jucks, K. W.: Kinetics of $HO_2 + HO_2 \rightarrow H_2O_2 + O_2$: Implications for Stratospheric H_2O_2, Geophys. Res. Lett., 29, 1299–1302, 2002.
Sander, S.P., Friedl, R. R., Abbatt, J.P.D., Barker, J.R., Burkholder, J.B., Golden, D. M., Kolb, C. E., Kurylo, M. J., Moortgat, G. K., Wine, P.H., Huie, R. E., and Orkin, V. L.: Chemical kinetics and photochemical data for use in atmospheric studies. Evaluation number 17, Pasadena, CA, Jet Propulsion Laboratory, JPL Publication 10-6, 2011.

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