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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "The $H_2O$–$O_2$ water vapour complex in the Earth's atmosphere" *by* Y. Kasai et al.

**Anonymous Referee #2**

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The FTMW of the H2O-O2 complex has been recorded to determine its structure. Previously determined Kp values for the complex were used to assess its abundance in the Earth's atmosphere. It is my impression that there is not sufficient new material in this paper.

The FTMW structure is determine to be C2v. Previous ab initio calculation (Robinson 2003, Sabo 2004 &2005) agree that the minimum on the ab intiio surfaces is Cs with the O2 attached to an H atom. The observation of the C2v structure in the MW is explained as the average and is a reasonable explanation.

However, this has already been mentioned in the conclusion of Sabo 2005 "The feasible feature of the disrotatory vibration is responsible for the C2v symmetry of the complex inferred from the FTMW spectrum". Thus, I'm not sure what is new here?

If these are new FTMW spectra they should be published in a suitable spectroscopy journal.

The Kp values are taken from Sabu 2005, which are better than earlier harmonically determined values, as also stated in Sabu 2005. Again, no new information is added. Also, both harmonic and anharmonic methods are probably not very accurate, and as far as I know no experimental values for Kp of this complex has been measured yet – thus there is still significant uncertainty in Kp.

The result that atmospheric VMR depends strongly on water concentration (which depends strongly on temperature) is as I would expect.

Minor comments: p. 10077, line 13, I don't understand the second half of this sentence "This corresponds very well to the water vapour distribution, whereas the temperature is highest at Northern high latitudes"

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 10069, 2011.