

## ***Interactive comment on “Glyoxal vertical columns from GOME-2 backscattered light measurements and comparisons with a global model” by C. Lerot et al.***

**Anonymous Referee #2**

Received and published: 1 November 2010

The paper by C. Lerot et al. “Glyoxal vertical columns from GOME-2 backscattered light measurements and comparisons with a global model” reports on a retrieval of glyoxal from the satellite instrument GOME-2. It presents and discusses the retrieved glyoxal vertical column densities and compares them with columns calculated from the IMAGESv2 model. The retrieval benefited particularly from the use of a liquid water cross-section, which improved the quality of the fit over the oceans. The paper meets the focus of Atmospheric Chemistry and Physics. It is well organized, clear and written in detail. I recommend the publication after the following questions are addressed:

page 21152 line 2/Table 1: The HITRAN data base was updated 2008 leading to sig-

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nificant improvements. Why didn't the authors use a water vapor cross-section from the HITRAN 2008 data base?

page 21153 lines 16-18: In the 405-490 nm wavelength range window, a significant NO<sub>2</sub> absorption can be expected. What are the reasons that no NO<sub>2</sub> cross-section was included? The liquid water cross-section is very broad-banded. What is the impact of the degree of the fitted polynomial to the value of the liquid water optical density?

p. 21153 line 19: typo: “betwen” → “between”

Figure 5: Can the authors provide a physical explanation for the liquid water distribution shown in Fig. 5? Can the authors comment on the reliability of the glyoxal retrieval in case the distribution does not have a physical explanation?

page 21163 lines 1-2 and page 21166 lines 22-23: I agree with the editor in terms of the claimed consistency between the ship measurements and the retrieval described in this manuscript. How can a glyoxal layer in the lowest 700m be consistent with the assumed profile shape used in the retrieval?

page 21166 lines 5-6: “In this error budget, the neglect of absorbing aerosols has not been considered.” Can the authors rephrase this sentence since it is confusing?

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Interactive comment on Atmos. Chem. Phys. Discuss., 10, 21147, 2010.

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