Atmos. Chem. Phys. Discuss., 5, S510–S512, 2005
www.atmos-chem-phys.org/acpd/5/S510/
European Geosciences Union

Atmospheric Chemistry and Physics Discussions

ACPD

5, S510–S512, 2005

Interactive Comment

Interactive comment on “Evidence for long-lived polar vortex air in the mid-latitude summer stratosphere from in situ laser diode CH_4 and H_2O measurements” *by* G. Durry and A. Hauchecorne

G. Durry and A. Hauchecorne

Received and published: 20 April 2005

Reply to referee #1:

We wrote a revised version of the paper taking into account comments of the 2 referees. Please find below our answers to your comments.

Comment 1): Indeed, there was no other instrument flown together with the SDLA as a piggy bag in the flight chain in June 2000. Furthermore, there was no other in situ instrument flown from Gap while the phenomenon was occurring (the simulations show that the vortex remnants spent approximately two days over the Gap region). The SAOZ spectrometer was flown in late June 2000, but it was too late and an examination

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of its data shows no particular structures in the remote measurements. Only the O3 data from a balloonborne electrolytic meteorological sonde launched by the CNES at the time of the SDLA flight are available. The structures can be seen in the O3 profile. We believe nevertheless that the quality of the data achieved with this sonde (some problem occurred during its flight) is not sufficient to investigate potential ozone depletion in the vortex remnants.

Comment 2): the correction is made, page 3 .

Comment 3): see comment 1) we believe that the quality of the ozone data yielded by the electrolytic sonde is not sufficient.

Comment 4): the inaccuracy in the concentration retrieval is given in page 4..

Comment 5): the few CH4 data points near 2 km are artefacts; these measurements points were taken as the motorized shutters (which protect the cell mirrors) were opening. The corresponding spectra were degraded (due to partial occultation of the laser beams). These points were removed from the profile. Regarding the structures observed below 20 km, the SDLA was flown in very difficult conditions with strong winds in the UT and the tropopause causing disturbances in the open cell; things did come back to normal as entering the lower stratosphere. The profile displayed in fig 1 is obtained from processing the raw data taken every single second; it is possible nevertheless to upgrade the accuracy by co-adding successive 1s-measurements at the cost of a lower spatial resolution but it is not needed for the matter discussed in the paper as only the stratosphere is investigated.

Comment 6): the instrument was launched at ˜ 21h00 UT. The correction is made page 4 in the manuscript.

Comment 7): the correction is made page 5.

Comment 8): the MIMOSA PV-advection -model is run independently at each isentopic level from 450 to 700 K with a 5K interval. The model is forced by ECMWF winds with a

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1 km resolution (about 25 K). As for horizontal structure, the advection technique allows retrieving vertical structures finer than the rsolution of the meteorological analysis used for the advection. We consider that structures with 10 K thickness are meaningful. The correction is made page 6 of the manuscript.

Comment 9)-10): The expected error of the model is discussed in more details in Hauchecorne, 2002 and Heese, 2001. The error in the location of the advected structures is approximately 1° for a 10-days simulation resulting in an uncertainty of 2° to 3° for the simulations reported in this paper. It is consistent with fig 5; the two structures are predicted at a latitude near 46°- 47° instead of 44° (Gap). The discussion of the model error is expanded in page 6 and 8 of the manuscript and the relevant references were added. A comment is made when reporting Fig 5 (see also comment 13) of the referee) to stress out the agreement between the location of the flight and the predictions of MIMOSA.

Comment 11-12: the corrections were made in the figures.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 1241, 2005.

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