

## ***Interactive comment on “” by***

gbraathen@wmo.int

Received and published: 16 June 2010

Major Comment: In large parts of the paper the authors compare the ozone and temperature profiles on a statistical basis. In the interpretation, especially of the figures 4, 8, 12, and 14, the standard deviation of the means of the data sets is associated with an observational error. In section 3.1 and 3.3 the standard deviation of the means is compared with the experimental error e.g. from photon statistics. But the authors mention only in side notes that in addition to the instrument error this number also includes every kind of real variation within the 13-day data set. At least for the temperature the natural variability from night to night and within a single night is comparatively high as can be seen from lots of publications e.g. from the OHP group. Therefore the authors should take the natural variability of the data more carefully into account for the interpretation of deviations between the instruments and between different nights. For the comparison and validation of the instruments another calculation is strongly recommended instead: The differences between the GSFC and CNRS profiles of a single night, the mean value and standard deviation of these differences should be more informative and better associated with the instrumental error.

C4096

Reply: This is basically the same criticism as the one given by Howard Roscoe. The authors have changed the error analysis accordingly and the all equations used in the error analysis have now been given in the paper. This major comment has therefore been taken into account in the revised paper.

Minor comments: Page 5304 / line 2-9: Some major results of the intercomparison should also be mentioned in the abstract. Answer: A new abstract has been written that now includes some major results.

5308/7-8: The model for temperature initialisation should be named because it is a major source for differences above 70 km (as admitted later by the authors). Answer: Section 2.1.2 (GSFC lidar algorithm) has been rewritten and the model for temperature initialisation has now been named.

5311/26-27: Is there an influx of the MSIS-temperature on the calculated temperature and temperature variability by this method of SIN-reduction? The climatological MSIST may differ by some ten Kelvin from the true temperature. Answer: A sentence has been added here to address this question.

5315/12-13: The statistical error contributes only partly to the standard deviation as calculated here. The natural variability (day to day) should also be mentioned. Answer: This is explained in more detail in the revised paper.

5316/9-12: What kind of temperature has been used for the comparison of section 3.1: CNRS-lidar or NMC? Answer : The authors agree that the text is not very clear here. The following sentence has been added: The CNRS ozone lidar group uses composite temperature profiles computed from nearby radio soundings performed in Nîmes and the CIRA model (see 2.2.1).

5316/24: For non-specialists on ozone retrieval from lidar data it would be nice to quantify the dependence of the ozone concentration on the temperature.

Answer: The following sentence has been added after line 14 of 3.2: The dependence

C4097

of the retrieved ozone concentration to temperature is linked to the dependence of the ozone absorption cross-section to the temperature and to the evaluation of the differential Rayleigh and Raman extinction term. Above 15 km, the dependence of ozone absorption cross-section to the temperature dominates and is of the order of 0.2% / K (Godin-Beekmann et al., 2003).

5318/4: The term “real error” should be avoided. “Total variability” may fit better to the meaning of the red curve. The authors are right if they attribute the large differences between red and green curve below 20 km to the atmospheric variability. They should do the same above 20 km, where the atmospheric variability may represent up to 50% of the total variability. Answer: The authors agree that the red curves correspond to the total variability, but are not sure that the atmospheric variability represents 50% of the total variability above 20 km. It is not possible from the measurement to separate both terms. The only thing that can be said is the following: If we suppose that the atmospheric variability is negligible, the mean standard deviation (equation 2) gives a good evaluation of the error of the lidar measurements.

5328/Table 2: If possible, the individual periods of observation should be mentioned to get an impression on the length of the sounding and on the time distance between the ozone soundings. Answer: New columns have been added to Table 2, so that the start and end time of each measurement is visible.

Section 5, general: Has there been any progress in data analysis or instrument design since the measurements in 1997? Answer: For the ozone lidar, no significant change has occurred since 1997.

---

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 5303, 2004.