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Atmospheric Measurement Techniques Discussions

AMTD

5, C381–C384, 2012

Interactive Comment

Interactive comment on "Validation of ACE and OSIRIS ozone and NO_2 measurements using ground-based instruments at 80° N" *by* C. Adams et al.

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Thank you for your comments, which have helped us improve the manuscript. We respond to each of the points below, with the referee's comments given in italics.

General comments:

The paper is an extensive report on the validation of ozone and NO2 measurements of ACE (FTS and MAESTRO) and Osiris. The paper is technically well written and covers the topics very thoroughly. This paper is, however, not very enjoyable reading and getting good overview of results is somewhat difficult. The reason is that the authors *have decided to study almost all possible combinations between the participating 9 instruments. The other way to do these comparisons could be that you select one satellite and one ground based instrument as reference instruments.*

We would like this to be a useful resource for various data users at Eureka/PEARL. Therefore, we chose to present all measurements combinations, instead of selecting a single reference dataset, providing an assessment of each pair of instruments.

Minor comments:

Sec. 4, line 8: Absolute can be misleading word here.

We defined "mean absolute difference" with an equation to make sure that our use of the term is clear. This terminology differentiates "absolute differences" from "relative differences" and is based on conventions used in other validation papers, e.g.,

Adler, R. F., and Negri, A. J.: A Satellite Infrared Technique to Estimate Tropical Convective and Stratiform Rainfall, J. Appl. Meteor., 27, 30-51, 1988.

Cortesi, et al., S.: Geophysical validation of MIPAS-ENVISAT operational ozone data, Atmos. Chem. Phys., 7, 4807-4867, 2007.

Dupuy et al.: Validation of ozone measurements from the Atmospheric Chemistry Experiment (ACE), Atmos. Chem. Phys., 9, 287-343, 2009.

Sec. 4.1, line 9: It is good that you acknowledge the differences in geolocation definitions. Please, translate these differences to distances in km.

We will add the following text to clarify the horizontal distances over which the OSIRIS and ACE instruments measure:

"ACE solar occultations typically have ground tracks of 300-600 km (Dupuy et al., 2009), while OSIRIS limb measurements have ground tracks of 500 km."

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Sec. 4.3, line 24: "midday-measuring instruments (OSIRIS...)". At least originally OSIRIS equatorial crossing times were 6 am and 6 pm.

The local solar time and SZA are shown below for OSIRIS measurements within 500 km of Eureka (blue) and GBS column measurements at Eureka (magenta) in 2007. The DOAS instruments (GBS/SAOZ) column measurements are calculated for larger SZAs than OSIRIS for most of the year. This, in part, is because at 80°N, OSIRIS samples closer to noon (e.g., 9:00-16:00 LST). Furthermore, for much of the sunlit part of the year, Eureka experiences 24-hour sunlight. Therefore, the DOAS instruments' columns are calculated near 24:00 LST.

We will add a panel with measurement SZAs to Figure 3 to clarify this, along with the following text:

"The instruments compared in this study sample NO2 at different times of day, or different parts of the diurnal cycle, as shown in Fig. 3b. Instruments that measure columns at larger SZAs (GBS, SAOZ and ACE) tend to measure more NO2 than instruments that measure columns at smaller SZAs (OSIRIS and Bruker FTIR), as can be seen in Fig. 3c."

Fig.2; Subfigures are very small.

The original figure was larger. We will work with AMT to make sure that it is larger in the final version.

Figs. 7, 8, 12: Text and plotting symbols are quite small. It is difficult to retrieve information from these plots.

We will increase the font size of these figures.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 517, 2012.

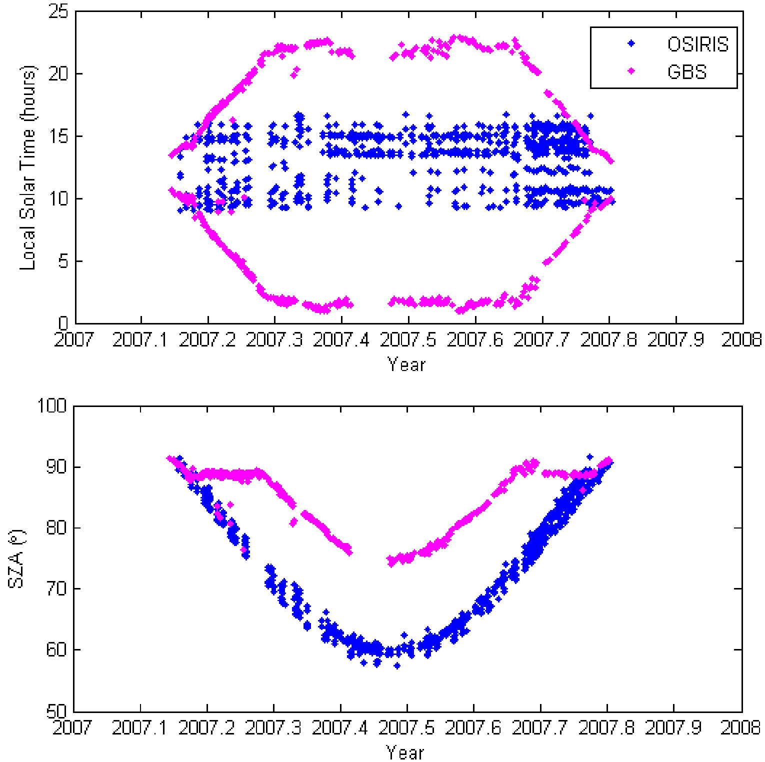

Fig. 1.