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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Measurements of O_3, NO_2 and BrO at the Kaashidhoo Climate Observatory (KCO) during the INDOEX (INDian Ocean EXperiment) Campaign using ground based DOAS (Differential Optical Absorption Spectroscopy) and satellite based GOME (Global Ozone Monitoring Experiment) data" *by* A. Ladstätter-Weißenmayer et al.

Anonymous Referee #3

Received and published: 18 November 2006

The paper is presenting measurements of three different trace gases using three different measurement techniques: ground based dual-axis DOAS for O3, NO2 and BrO, GOME satellite measurements for O3, NO2 and BrO and O3-sondes. The presented

measurements taking place at the Kaashidhoo Optical Observatory present a very important contribution to the INDOEX campaign. The paper is well structured and well written. Therefore I recommend its publication in ACP after the authors have addressed a couple of specific issues noted below.

Specific issues and technical corrections

Title:

The title is really long, how about shorten it by leaving out the acronyms or by using the acronyms only?

Abstract:

Sentence starting in line 21: you can change "background conditions were observed most of the time" to "mainly background conditions were observed"

Next sentence: you can change "In the GOME measurements, evidence was found for..." into "GOME measurements showed evidence for ..."

Next sentence: it is not clear what "the latter" refers to. The study using measurement conditions with high and low clouds to determine the detection limits should be described in a little more detail, not necessarily in the abstract, but in Sec. 3.2.

Introduction:

Acronyms only have to be spelled out the first time they are used, INDOEX was already spelled out before, as well as KCO, DOAS and GOME.

Page 9276, line 2: please change "...enables stratospheric and tropospheric amounts of atmospheric gases to be distinguished." to "...allows to distinguish stratospheric and tropospheric amounts of atmospheric gases."

Next sentence: you can change "Specifically" to something like "In this case"

Section 2.1:

ACPD

6, S4705–S4708, 2006

What is the difference between the "absorber amount in the background spectrum (SC0) at the smallest solar zenith angle" and the zenith sky measurement?

You are saying that SC is the sum of DSC and SC0, and DSC is the "column amount of the absorber integrated along the light path through the atmosphere" minus SC0, so SC is equal to SC0, right? The whole section could need some clarification, it is not clear which values are calculated and which are measured. Do you use the zenith sky spectrum as the solar spectrum for the DCS DOAS fit, or do you perform two DOAS fits, one for the zenith sky and one for the off-axis measurement? In the first case how do you derive the total SC? In the second case you should mention which solar references you are using.

Section 2.2:

First sentence: you can leave out "second". You might want to add "and partially absorbed" after "scattered".

Sentence starting in line 21: the "-" can be replaced with ",". Please replace "influence of trace gases below the cloud layer" with "trace gases amount below the cloud layer".

Figure 3:

Since Fig. 3c suggest that the DOAS a.m. and p.m. NO2 values can be linearly interpolated to GOME overpass time, you could add interpolated ground based data points to Fig. 3b so that those points can be directly compared to the GOME data. The labels on the time axis of Fig. 3c is very confusing, does Mar-20,2 mean March 20th and 0.2*24h (plus 5 h for the time zone of the Maldives)? If that is the case the time of the DOAS a.m. measurement seems to be 8:12 instead of 6:30, the GOME overpass time 9:50 instead of 10:30 and the DOAS p.m. measurements at 13:00 instead of 17:30. I am also wondering why you are showing more than a day. All three plots are a little bit too small.

Figure 4:

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6, S4705–S4708, 2006

Please explain how the dotted line was calculated, why the sdev is not provided for all data points, and why the sonde data is sometimes outside the sdev boundaries.

Section 3:

You are mentioning ground based BrO measurements in the title, but only GOME BrO data is shown in the paper, so I suggest that you either show some ground based BrO data, or focus on O3 and NO2. Would it be possible to show more than two ground based measured values for tropospheric O3 (Fig. 4) and NO2 (Fig. 5b)?

Conclusions:

Please explain how you quantified the "theoretical errors" (line 18).

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 9273, 2006.