

Interactive comment on “NO₂ Profile Retrieval using airborne multi axis UV-visible skylight absorption measurements over central Europe” by M. Bruns et al.

M. Bruns et al.

Received and published: 14 April 2006

We would like to thank the reviewer for his encouraging response and the constructive criticism. In our opinion it is much better paper now. Below one can find the detailed responses to the individual issues.

General Comments:

(1) A paragraph was added after I. 6 on p. 502 discussing in detail the advantages and disadvantages of three LOS setups (4 LOS @ 500nm, 4 LOS @ three wavelength regions, and 18 LOS @ 500nm) and explaining why the 4-3 setup was chosen. A figure showing the averaging kernels for these setups was also added.

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

(2) Two profiles (d and e) shown in Figure 5 have been replaced by a profile with much less tropospheric NO₂ and a clean air profile acquired over the Mediterranean Sea.

Specific Comments:

P495, L21: The Sentence was changed to 'A different method to derive vertical distributions for trace gases from AMAXDOAS data was used by Wang (2004).'

P495, The last paragraph of the introduction was moved to the beginning of the introduction.

P497, section 2.2: The phrase 'with a flight altitude ≥ 10 km' was added to the sentence in l. 13.

P498, L13: '... taken at a specific LOS and a specific ...' was replaced by '... taken at a specific LOS and in a specific...'

P498, L20: Paragraph removed starting l. 20 p. 498.

P500, L15: The sentence 'In other words the set of diagonal elements of Sa resulting in profiles having the smoothest shape was chosen.' was added.

P502, L22: We don't see the advantage of a table consisting of one column compared to a list.

P502, L18-21: The sentence was replaced by 'The averaging kernel demonstrates how much of a change in the true profile is detected by the retrieval algorithm in the retrieved profiles. For example the 9 km averaging kernel shows that the retrieval algorithm is able to detect close to 100% of the change in the true profile.'

Figure 4: Data above 15 km was removed from the plot.

P503, L10-23: This part has been rewritten: 'Two physical effects provide vertical information from the measurements: By using measurements taken simultaneously in different lines of sight, different paths through the atmosphere are probed with varying

[Full Screen / Esc](#)[Print Version](#)[Interactive Discussion](#)[Discussion Paper](#)

vertical sensitivity. In particular, the measurements pointing close to the horizon have a long light path near the altitude of the aircraft and therefore are very sensitive to absorptions at this height. The second source of profile information is the wavelength dependence of the signal. As result of increased Rayleigh scattering in the UV, the sensitivity to layers close to the surface is reduces compared to measurements at visible wavelengths. By combining retrievals at different wavelengths, some vertical resolution can be obtained even for one viewing direction (see Wang et al., 2004).'

P503, last line: Now APPROVAL is introduced in the abstract.

P504, L6: 'obtains' was replaced by 'yields'.

P505, L3: 'location' was replaced by 'locations'.

P506, L1: The sentence 'The temporal coincidence of both measurements is very good (within a few minutes).' was included.

P506, L6: The sentence was changed to 'The larger footprint of the SCIAMACHY measurements result in a higher degree of averaging over a large area. On the other hand the AMAXDOAS measurements show a large variability in boundary layer NO2 values even in the highly polluted Po valley.'

P506, L17: 'shows' was replaced by 'has'.

P506, first sentence of the conclusions: 'from an airborne platform' has been added at the end of the sentence.

P506, L27: The sentence 'The sensitivity study has shown...' was removed.

Figure captions: The phrase 'This plot shows...' has been removed.

Figure 7: 'scienes' was replaced by 'sciences'.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 493, 2006.