

## ***Interactive comment on “Retrieval of tropospheric column densities of NO<sub>2</sub> from combined SCIAMACHY nadir/limb measurements” by S. Beirle et al.***

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### General Comments:

This paper represents a significant advance in the usefulness of SCIAMACHY data for tropospheric measurements, by neatly bypassing some deficiencies in SCIAMACHY results. Although these deficiencies (shown in Figure 3 of the manuscript) are minor for the main product of stratospheric NO<sub>2</sub>, they assume major importance for the residual tropospheric NO<sub>2</sub>, hence the necessity for a relative rather than absolute limb correction. The paper should clearly be published after some minor revision.

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### Specific comments:

1. In the SCIAMACHY data processing, are both room temperature and low-temperature cross sections of NO<sub>2</sub> fitted? The manuscript makes no mention of this.
2. The analyses ignore variations in tropopause height. This will be serious for an operational scheme. Some sentences about how to implement this in the future would be useful.
3. A lot of effort goes into improving the tropospheric product at 50degS, then later the manuscript asserts that there is so little NO<sub>2</sub> there that the remaining discrepancies are not important because 50 degS could be ignored. This is contradictory, and in any case if the product ever became good enough to see the emission of NO<sub>2</sub> from the Antarctic snowpack in summer it would add yet more value to SCIAMACHY data.

### Technical comments:

Throughout – the acronym soup of RMS, RLC, ALC, SES, LVCD is distressing. Some can be spelled out

Throughout – some acronyms are re-introduced, some several times

p2984 l3 – insert “the” after “As”

p2986 l17 – replace “no” by “not”

p2991 l26 – by “some percents” do you mean “only a few percent” ?

Eqtns 2, 4, 6, 7 – contain a colon before the equals sign

p2993 l26 – insert “a” before “function”

p2994 l20&23 – there is a contradiction in sigma-longitude. Is it 10deg or 20deg?

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