



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

### **Anonymous Referee #2**

Received and published: 19 January 2010

#### General comments

Despite the success of the retrieval of tropospheric NO<sub>2</sub> from satellite measurements, it is always been a challenge to separate the stratospheric and tropospheric signals from the total column measurement in many regions. Techniques applied so far only offer a relative retrieval, thus for absolute measurements of the tropospheric columns a priori information was needed. SCIAMACHY clearly offers the potential for a separation based only on measurements. While this capability was shown in case studies the application to a larger data set, i.e. monthly global averages capturing the annual cycle

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has always been missing despite the long time since the launch of the instrument.

In this aspect this paper presents new valuable information which is important for the retrieval of tropospheric NO<sub>2</sub> from satellite measurements.

The paper is written clearly and well structured. The authors describe the applied methods and analyse uncertainties and deficiencies thoroughly. Hence I recommend the publication of this paper without additional revisions (apart from those already made by Referee 1).

However I do have two comments / questions:

Specific comments

1. In 2.4.2 the sensitivity of the limb measurements to tropopause variations is estimated with 5% of the stratospheric vertical column. In places where the stratospheric column is equal or higher than the tropospheric column this error should become significant.

2. How large is the spatial sensitivity range of the limb measurements along the satellite track? How strong are the limb measurements affected by strong latitudinal gradients of stratospheric NO<sub>2</sub> (e.g. the step around 25°S in October or close to polar vortex edges)? Is it possible to quantify these uncertainties?

Technical comments

No additional technical comments.

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Interactive comment on Atmos. Meas. Tech. Discuss., 2, 2983, 2009.

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