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Discussions

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Interactive comment on "Near-surface and path-averaged mixing ratios of NO$_2$ derived from car DOAS zenith-sky and tower DOAS off-axis measurements in Vienna: a case study" *by* Stefan F. Schreier et al.

Anonymous Referee #1

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General Comments

This paper presents near-surface and path-averaged mixing ratios of NO2 derived from car DOAS zenith-sky and tower DOAS off-axis, measurements performed in Vienna city during several days on 2015 and 2016. This paper provides an useful intercomparison between tower DOAS, mobile DOAS and in-situ observations.

Specific Comments

Section 2 - Instrument and car journeys, in this section you should add few info about

the in-situ instruments (type, error, etc.). Also please add a map (a new Figure) or include in Figure 1 the location of the in-situ monitoring stations and also the location of the DOAS tower instrument.

Please describe the tower DOAS instrument, I suggest you to introduce a Table with the technical characteristics of the two instruments (tower DOAS and mobile DOAS).

Figure 2. Could you explain the very low peak of intensity? Is it related to a tree, tunnel, or a bridge? Did you filter all the DSCDs function of RMS and O4?

Figure 3, please introduce the DSCD error. Also please introduce the error of each DSCD presented in the manuscript.

3.2.1 Temporal resolution and computation of horizontal NO2 gradients- Could you specify the exposure time for the mobile DOAS instrument? (or this info could be included on the suggested Table for the two DOAS instrument).

3.2.2 Stratospheric NO2 columns, Could you specify the error of Bremen 3d CTM (B3dCTM) model?

3.2.3 Conversion to tropospheric NO2 vertical column densities SCDref, could you specify why you don't have a SCDref for each day? SCDref is quite important if you want to have qualitative data. I suggest to the authors to introduce more details about SCDref calculation, e.g. exact time of the selected SCDref. SCDref having 1.3×10^{15}, 1.1×10^{15}, and 2.2×10^{15} molecules/cm2 as tropospheric contribution could be realistic. Considering that SCDref contain stratospheric and tropospheric contributions, did you cancel the stratospheric contribution? why do you refer to SCDref as having only tropospheric contributions?

A chapter to describe the AMF calculation (using NO2 profiles, albedo, geometry, PBL, etc.) is mandatory for this study, I suggest to the authors to use a table. Figure 6 should be part of this section and should include the AMF calculations for several days which are presented in this study.

The authors should give more details about the error calculation of tropospheric NO2 VCD, or a section of errors would be more appropriate.

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Discussion paper