

## ***Interactive comment on “Potential and limitations of the MAX-DOAS method to retrieve the vertical distribution of tropospheric nitrogen dioxide” by T. Vlemmix et al.***

### **Anonymous Referee #3**

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The manuscript by Vlemmix and co-workers on the retrieval of NO vertical profiles using MAX-DOAS observations fits clearly into the scope of AMTD/AMT. The paper contains a useful study on sensitivities etc. and the outcome is applied to a dataset measured during the CINDI campaign. In the major parts of the manuscript the scientific methods are clearly outlined and the results support the conclusions except some issues noted below. In general, it is well written, but the level of detail in the manuscript is high, some parts of the main text could be shorter. The abstract, figures, tables, and references are adequate for this work besides some notes below. Therefore, I support the publication of a revised paper in AMT after the following issues are addressed.

## General comment:

- Each section start with "In this section ... ". In addition there is a separate subsection 1.3 which outlines the manuscript. I do not see that these lines are necessary since a (short) paper can be structured using section headers along with the argument. Therefore, I suggest to delete 1.3 and the "In this section ..." sentences.

## Specific comments:

- The concept of the elevated layer is not fully motivated and justified. It is a good point in the sensitivity study. The selection of the retrieval (with or without elevated layer) for the comparison with the LIDAR measurements should be justified by more than the value of the reduced  $\chi^2$ . Is there any indication for the additional layer? From meteorology, satellite observations, or trajectory models?
- Figure 14: I support the point made by Referee 2 on the appropriate regression method. However, the Press et al. routine directly provides the error estimates of slope and intercept.
- Section "Conclusion and outlook" should be renamed to "Summary and conclusion" or "Conclusions" since it contains mainly the findings and discussion of this study. In my opinion, the "outlook" is a minor issue here.

## Technical corrections:

Technical points of the other 2 reviewer are not repeated here.

- page 4029, line 23: "anew" should read "a new"

- Figures suffer from grayish low-res lines at the axis and error bars. Please revise.

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Interactive comment on Atmos. Meas. Tech. Discuss., 4, 4013, 2011.

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