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## ***Interactive comment on “Recent satellite-based trends of tropospheric nitrogen dioxide over large urban agglomerations worldwide” by P. Schneider et al.***

### **Anonymous Referee #2**

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The manuscript presents trends in tropospheric NO<sub>2</sub> over large urban agglomerations. The authors used a fit of SCIAMACHY NO<sub>2</sub> columns to a statistical model with a linear trend and seasonal component to derive the trend. The main innovations of the work are that the scope both in number and location of the urban agglomerations has been expanded, and a comparison of the NO<sub>2</sub> trend was made to population growth estimates.

The manuscript is well written and concise, and presents results that would be useful to the atmospheric science community. Therefore it deserves to be published. However, the manuscript would benefit from an expanded and more detailed discussion of the

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current literature on global and regional NO<sub>2</sub> trends, and some explanation for the results regarding the relationship between NO<sub>2</sub> trend and population growth. In Section 3.3, I think it is important to show examples of the fit to the NO<sub>2</sub> time series, and to include some discussion on the quality of the fit and how this could effect the trend calculations.

Below are some specific comments:

Page 24313 Line 16-25: The writer states that in the context of the MACC chemical weather forecasting framework the purpose of the work is to test whether SCIAMACHY observations could be useful for estimating trends. It's not clear how chemical weather forecasting and NO<sub>2</sub> trends from SCIAMACHY are related. SCIAMACHY stopped reporting data in 2012, therefore no new data could be available for forecasting purposes. Some explanation of this should be made here.

Page 24314 Line 15: In this section, references to the following recent papers on satellite-based NO<sub>2</sub> trends are missing: Zhou et al., Atmospheric Environment (2012). Castellanos and Boersma, Scientific Reports (2012). Curier et al., Remote Sensing of the Environment (2014).

In fact, it may be useful to include a table or a simple figure illustrating the findings of past studies, of which at this point there are many.

Page 24316 Line 25: The correct reference for the slant column assimilation in TM4, and calculation of stratospheric contribution to the NO<sub>2</sub> total column is: Dirksen et al. Journal of Geophysical Research (2011).

Page 24319 Line 16-18: Here a reference to Figure 1 should be given.

Figure 2: The sites with zero trend (white colored markers) are very difficult to distinguish. Perhaps change the color of the markers or the color of the background to make these points more apparent.

Page 24325: The correlations between population growth and NO<sub>2</sub> trend for the differ-

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ent regions are very interesting and deserve more discussion. What are the differences between the regions that could drive these distinct clusters? Is it technology? Emissions trends? Trends in regional climate? Measurement artifact?

Lamsal et al. Environmental Science and Technology (2013) recently published a similar analysis. How do the results from this work compare?

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 24311, 2014.

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