Review of "OMI NO$_2$ column densities over North American urban cities: the effect of satellite footprint resolution" by Kim et al.

The manuscript addresses an innovative way of enhancing the spatial resolution of OMI NO$_2$ columns for studies of the urban plumes in the US by adopting the spatial distributions of the NO$_2$ columns from the CMAQ model. Another important point the manuscript emphasizes is careful ways of processing the satellite retrievals and model results for quantitative comparisons that were often neglected. The IDL-based routine developed in this study (Figure 3) will be useful for many users of OMI retrievals. I suggest the authors to share this routine with potential users through the GMD journal.

I recommend publication of this manuscript at GMD after minor revision points listed below are taken care of.

* Page 8457, Figure 4: An interpolation routine should be applied to make plots in Figure 4 from Figure 3. I suggest the authors to explain this part. It would be helpful if the names of cities in the text are given on the map.

* Page 8459, line 17-19: I think the emission problems are large and that certainly affect the spatial distribution of the plumes. In addition to wind errors, the impact of emission inventory errors from various sectors can be large (see Figures 8 and 10 in the manuscript). Potential problems stemming from this error source need to be written clearly. And which emission inventory was utilized for the model simulations? This may determine the limit of the methodology developed in this study.

* Page 8460: I think it is best to show the comparison results for other days (May 7, May 16 etc.) and discuss the causes for agreement or disagreement. Was P3 data averaged for comparison with OMI data (at a model resolution)? Was averaging kernel applied to P3 data?

* Page 8462: For Figure 9, the period of analysis needs to be given in the main text. The results in this manuscript are based on a short-term analysis. Please mention this clearly in the many plots and analyses in the manuscript. Explain the differences in Figure 9d. Which points show large discrepancies between the OMI data and the model results in Figure 9d?

* Page 8463, line 5-6: it is not clear that the recent shale-gas development is a significant source of NO$_x$. One even assumes zero emission from this source. I could not find a reference (Chang et al., 2015) in the reference section.

* Figure 10: Discuss causes for the differences between the OMI data and the model results.

* Acknowledgements: The P3 data from the CalNex campaign and related scientists should be acknowledged.