

## ***Interactive comment on “Measurements of traffic dominated pollutant emissions in a Chinese megacity” by Freya A. Squires et al.***

**Anonymous Referee #1**

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General comment: The work by Squires et al. presents traffic related pollutant emissions in an Asian megacity. It presents novel data for a globally important region struggling with air quality. The manuscript is appropriate for publication in ACP after addressing some of the more specific comments outlined below.

Specific comments: Section 2.4: It is not entirely clear how the data treatment is done. Were the data time-shifted before submitting these to the eddy flux routine or did the eddy flux routine take account this shift and perform a covariance analysis? A better approach to deal with lag-time estimation when individual 30 min covariance functions are below the LOD (to estimate a lag time) is to average quality filtered covariance functions. This allows to obtain a study (or weekly) average lag time for each individual species. This is a more accurate approach if compounds exhibit different absorption

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and desorption properties along an inlet line.

Section 2.5: Line 6, 16: The authors should outline the changes incorporated in eddy4R that were specifically implemented and necessary for the present study (e.g. by showing a work flow diagram). Flux footprint model. The flux footprint model is based on Kljun et al., 2004 and was modified according to Metzger et al. 2012. Kljun et al. 2012 updated their original footprint model. It is not clear what the exact differences between the cross-integrated footprints between Kljun et al. 2012 and Metzger et al. 2012 are, assuming they are not the same. A clarification of this issue would be warranted.

Section 2.7: Page 9: “For this evaluation, an optimized version of the MEIC v1.3 inventory for 2013 was used that was derived by fitting the NAQPMS model with observed pollutant concentrations during the campaign periods.” What was done explicitly to optimize the MEIC inventory here. The authors cite a reference, but it would help the reader to understand the approach if more information on the procedure was given here.

Section 3.1: In this manuscript fluxes are generally reported as mg/m<sup>2</sup>/h. How was the NOx flux derived in units of mg/m<sup>2</sup>/h? The NOx channel would strictly only allow to report fluxes on a molar basis. Partitioning NOx and NO fluxes from the two channels could introduce additional uncertainty. Tower setup: at the height of the tower one would expect that the measurements are decoupled from the surface and represent the residual layer during night. How is this taken into account into the interpretation of night time data? Could this influence the storage flux calculation for night time?

Table 1: Additional measurements where BTEX fluxes were reported directly should be included in Table 1. For example, Karl et al. 2018 (10.1073/pnas.1714715115) report 24h average benzene (toluene) fluxes of 20 (82) ug/m<sup>2</sup>/h for Innsbruck. Park et al., 2010 (10.1016/j.atmosenv.2010.04.016) present BTEX fluxes for Houston with maximum daytime fluxes in the range of 0.2-0.3 mg/m<sup>2</sup>/h and 0.5 -0.7 mg/m<sup>2</sup>/h.

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Editorial comments: Page 1: line 1: fluxes? Page 2: line 12 cc PM can also be emitted by primary sources, depending on size, primary or secondary production is more relevant. As Chinese efforts to reduce primary PM are regarded successful, a reference could be given to what extent secondary aerosols are nowadays dominating in a city like Beijing Page 2: line 15 is a repetition of what was said a couple of lines earlier – it could be rewritten more concisely Page 2: line 18: “At” high concentration Page 5: line 17: ... was also. ... ! Page 6: line 7 cc: this is not a complete sentence. Page 7: line 17: Fig. A1, Fig. A2. ... Page 8: line 10: ....tower tower. ... Page 8: line 30: ... to THE measured flux ? General editorial comments. Naming and formatting of figures, tables and references should follow the ACP editorial guidelines and should be copy edited. For example many references are cited as” by (Famulari et al, 2010;)...” Probably due to the citation software used. ACP formatting guidelines however suggest to cite as following: by Famulari et al. (2010). Similarly, references to figures do not follow ACP formatting guidelines and should be corrected.

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