

# ***Interactive comment on “Top-down quantification of NO<sub>x</sub> emissions from traffic in an urban area using a high resolution regional atmospheric chemistry model” by Friderike Kuik et al.***

## **Anonymous Referee #3**

Received and published: 14 January 2018

The authors discuss the well-known problem of the underestimation of simulated day-time NO<sub>x</sub> concentrations in urban areas. WRF-Chem is applied at a 3 km x 3 km horizontal resolution for Berlin for the whole year 2014. The impact of a possible underestimation of traffic emissions is investigated. Spectral decomposition of observed and modelled time series and error apportionment suggests that an underestimation in traffic emissions is likely one of the main causes of the bias in the modelled NO<sub>2</sub> concentrations.

The paper is well written and can be accepted after minor revision. In addition to the reviewer comments 1 and 2 I just have to add some minor comments – in particular

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related to the simulation setup.

Page 4, line 29: 'top' should be added after 'model layer'. With a lowest layer depth of 30 m the near surface profiles are not well resolved. How does this affect the simulated near-surface  $\text{NO}_x$  concentrations?

Page 5, lines 1 – 4 and page 10, line 8: This fix of the too weak vertical exchange during nighttime seems quite arbitrary. Is this fix only applied only to pollutant concentrations? Enhanced nocturnal mixing would also affect the thermal stratification which could in turn affect the vertical exchange of pollutants. Therefore, the applied fix should be commented more critically.

Page 5, line 21: Why is a 4-day spin-up required for the simulation of the last 6 month of the year?

Page 6, line 9: Please mention also the heights and not also the layer numbers.

Page 6, line 23: Why is the same diurnal cycle applied for weekdays and weekends? The traffic counts show certainly a different course for weekdays and weekends.

Page 10, line 3: The linking between  $\text{NO}$ ,  $\text{NO}_2$  and  $\text{O}_3$  is also true for offline models.

Page 10, line 25: Please add some details about the 'misrepresentation of the diurnal cycles'.

Minor issues:

Page 6, line 28: Does the percentage refer to  $\text{NO}_2$  mass? Please clarify.

Page 8, line 25: The equation for MQO should be inserted already here.

Page 13, line 9: This is the case for all simulations with a grid width of only 3 km.

Eea and Wmo should be capitalized

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2017-1037>,

2017.

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