# Supplement to: Measured and modelled air quality related effects of a noise barrier near a busy highway

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## Data coverage

**Table S1: Usable data (data used) for the different measurement poles and months for measured variables. The unavailable data was either not measured at all or removed based on data quality analysis.**

| Measurement pole | Month | $PM_{10}$ (%) | $PM_{2.5}$ (%) | $NO_2$(%) | LDSA (%) | PNC (%) | BC (%) |
|---|---|---|---|---|---|---|---|
| O10m | March | 82 | 100 | 100 | 46 | - | 49 |
| | April | 99 | 100 | - | 56 | - | 11 |
| | May | 98 | 100 | - | - | - | - |
| O20m | March | 83 | 100 | 100 | 99 | 99 | 59 |
| | April | 98 | 100 | - | 100 | 100 | 22 |
| | May | 97 | 100 | - | 97 | 97 | - |
| O40m | March | 82 | 100 | 100 | 100 | 100 | 59 |
| | April | 99 | 100 | - | 99 | 99 | 11 |
| | May | 98 | 100 | - | 100 | 100 | - |
| NB10m | March | 81 | 99 | 100 | 46 | - | - |
| | April | 98 | 100 | - | 55 | - | - |
| | May | 97 | 100 | - | - | - | - |
| NB20m | March | 82 | 100 | 100 | 98 | 98 | 59 |
| | April | 98 | 100 | - | 99 | 99 | 11 |
| | May | 96 | 100 | - | 97 | 97 | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| NB40m | March | 81 | 100 | 100 | 98 | 98 | - |
| | April | 98 | 100 | - | 100 | 100 | - |
| | May | 95 | 100 | - | 100 | 100 | - |

**Statistical accuracy indicators**

The statistical formulas used in the evaluation of model performance have been introduced in this section. First, we define a couple of useful variables for the statistical formulas as follows:

$P_i$ = Predicted hourly concentration [µgm-3]

$\bar{P}$ = Mean predicted hourly concentration over $N$ data points [µgm-3]

$O_i$ = Observed hourly concentration [µgm-3]

$\bar{O}$ = Mean observed hourly concentration over $N$ data points [µgm-3]

**Factor-of-two** (FAC2) varies between 0 and 1. A value of 1 indicates that the model predictions are always lower or equal to double the observed value, and at least half of the observation value. F2 is defined as follows:

$$\frac{1}{N}\sum_{i=1}^{N} f(P_i, O_i)$$

where $f(P_i, O_i) = 1$ when $0.5 \leq \frac{P_i}{O_i} \leq 2$, otherwise $f(P_i, O_i) = 0$

**Pearson Correlation Coefficient** (PCC) is a correlation coefficient used in linear regression. The formula returns a value between -1 and 1, where 1 indicates a strong positive relationship, -1 indicates a strong negative relationship. A value of zero indicates no relationship at all. PCC is given by:

$$\frac{\sum_{i=1}^{N}(O_i - \bar{O})(P_i - \bar{P})}{\sqrt{\sum_{i=1}^{N}(O_i - \bar{O})^2 \sum_{i=1}^{N}(P_i - \bar{P})^2}}$$

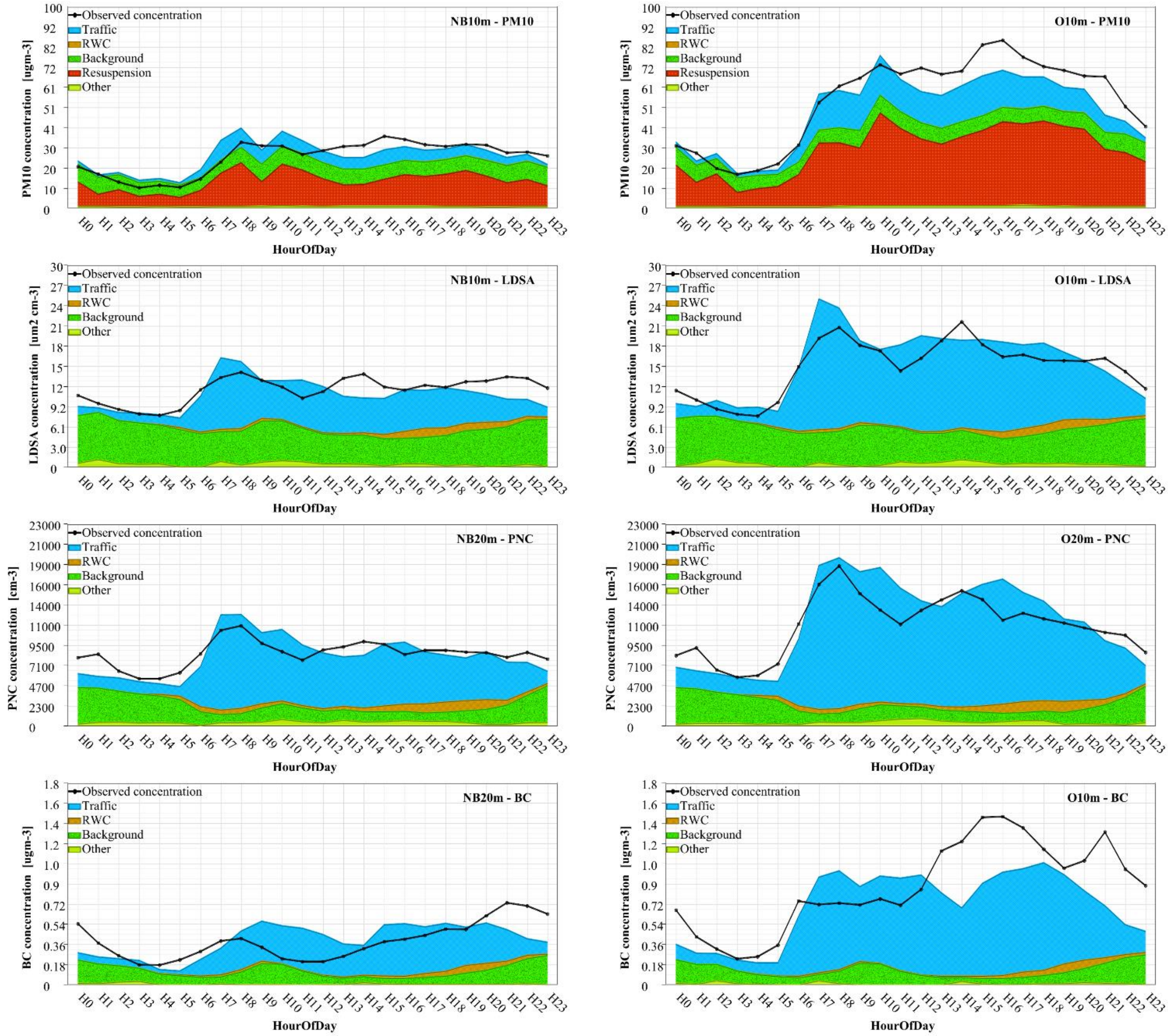


**Figure S1: Modelled contributions of different sources to PM10, LDSA, PNC and BC at different poles as a function of hour-of-day (working days).**

In Figure S1 the contributions of different sources to the LDSA, $PM_{10}$ and PNC concentration at the selected poles are presented as a function of hour-of-day (local time) while the weekends (Saturday and Sunday) have been ignored. For LDSA and PNC, the most notable emission sources according to the model are traffic emissions and regional background; minor contributions are associated with power plants (as a part of "Other") and residential wood combustion (RWC, during the evenings). The traffic contributions have distinct morning and evening rush hours. For PM10 the most notable source of emissions is the resuspension of dust, which is being underestimated by the model at later hours of the day. Furthermore, the morning and evening rush hours are less evident in the diurnal profile of measured and modelled PM10. The contributions of different sources to the PNC concentration at the NB20m and O20m poles are presented. The main contributors to the concertation at all the poles are seen you be the traffic and background with the traffic contribution greatly increasing during the daytime. Contributions from other emission source categories (e.g., shipping, power plants and aviation) are low at the campaign site. The contributions from households (RWC) are slightly higher during the evening and from power during the daytime. The contribution from other sources is almost non-existent. Overall, in the case of particle number concentrations, the observed and modelled contributions seem to agree well with having similar concentrations and diurnal profiles.