



*Supplement of*

## **Measured and modelled air quality related effects of a noise barrier near a busy highway**

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## 15 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 <sub>10</sub> (%)	PM <sub>2.5</sub> (%)	NO <sub>2</sub> (%)	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

20 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 [ $\mu\text{gm-}3$ ]

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

$O_i$  = Observed hourly concentration [ $\mu\text{gm-}3$ ]

25  $\bar{O}$  = Mean observed hourly concentration over  $N$  data points [ $\mu\text{gm-}3$ ]

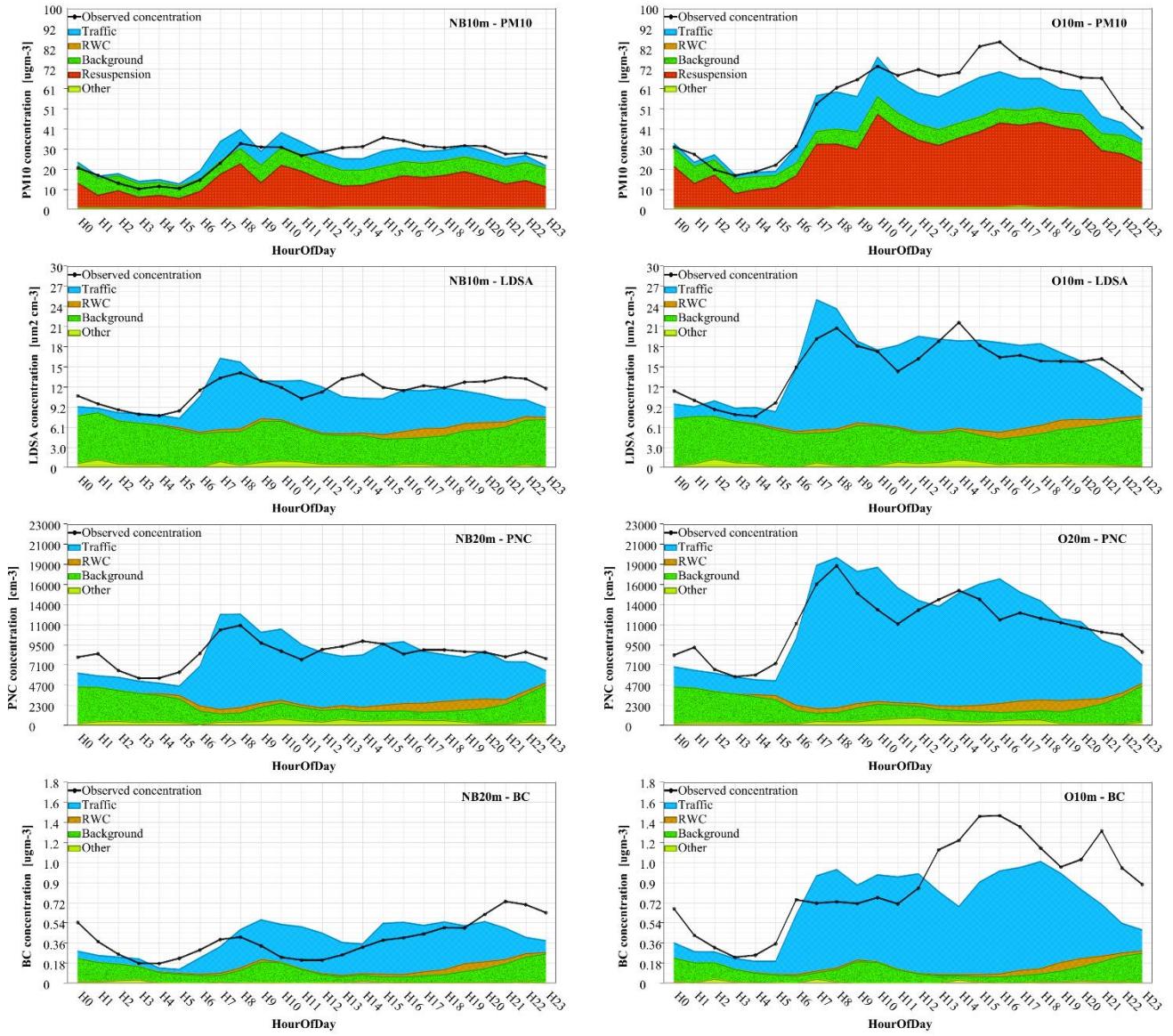
**Factor-of-two** (FAC2) varies between 0 and 1. A value of 1 indicates that the model predictions are always lower or equal to double the observed value, and at least half of the observation value. F2 is defined as follows:

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

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

30 **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<sub>10</sub> 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 PM<sub>10</sub> 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

45 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 concentration at all the poles are seen to 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  
50 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.