

Supplementary material

A comparison of geostatistical and non-spatial machine learning methods in NO₂ modelling: prediction accuracy, uncertainty quantification, and model interpretability

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Constrained refined Delaunay triangulation

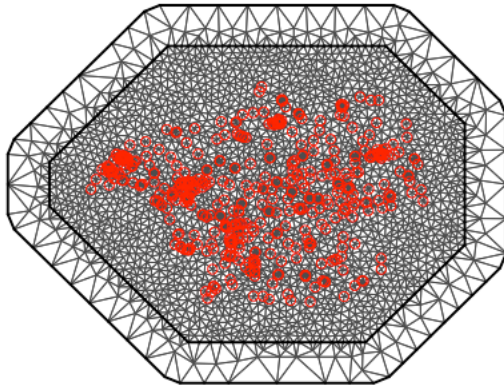


Figure 1, the mesh that is used in the INLA model.

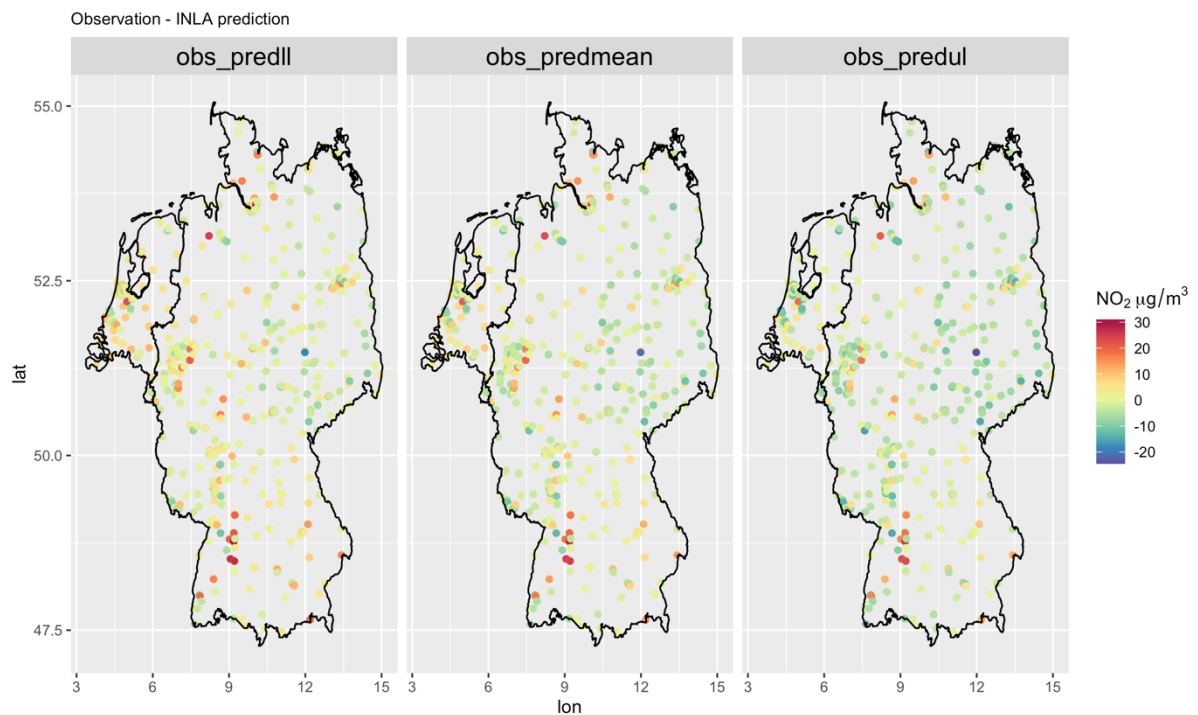


Figure 2. Differences between INLA predicted NO₂, from left to right, at lower quantiles (0.025), mean, higher quantiles (0.975) and the observed NO₂. The differences (dif) is calculated as subtracting predictions (pred) from the observations (obs), i.e., $dif = obs - pred$.

	mean	sd	0.025quant	0.5quant	0.975quant	mode
b0	23.5421808	0.7205909	22.1274179	23.5421605	24.955763	23.5421808
nightlight_450	1.1030018	0.5002857	0.1207723	1.1029878	2.084412	1.1030018
population_1000	0.7216388	1.1402192	-1.5169959	0.7216067	2.958405	0.7216388
population_3000	3.0788035	1.1112047	0.8971339	3.0787722	5.258652	3.0788035
road_class_1_5000	1.0814514	0.4678802	0.1628449	1.0814383	1.999291	1.0814514
road_class_2_100	4.3738653	0.3384439	3.7093857	4.3738557	5.037790	4.3738653
road_class_3_300	3.0032378	0.4363490	2.1465376	3.0032255	3.859223	3.0032378
trop_mean_filt	1.8785136	0.6307894	0.6400613	1.8784958	3.115932	1.8785136
road_class_1_100	1.6289975	0.3221239	0.9965598	1.6289885	2.260908	1.6289975

Figure 3. Fixed effect of the INLA model, normalised covariates

	mean	sd	0.025quant	0.5quant	0.975quant	mode
b0	23.7017783	0.3297375	23.05439250	23.7017690	24.348624	23.7017783
nightlight_450	0.9059301	0.5096811	-0.09474568	0.9059158	1.905771	0.9059301
population_1000	1.4058910	1.1554203	-0.86258856	1.4058585	3.672477	1.4058910
population_3000	2.9322563	1.0983599	0.77580556	2.9322254	5.086907	2.9322563
road_class_1_5000	1.1623392	0.4566880	0.26570668	1.1623263	2.058223	1.1623392
road_class_2_100	4.3587053	0.3478583	3.67574222	4.3586955	5.041098	4.3587053
road_class_3_300	2.8790419	0.4492860	1.99694197	2.8790293	3.760406	2.8790419
trop_mean_filt	1.6057803	0.4139275	0.79310106	1.6057687	2.417781	1.6057803
road_class_1_100	1.6613238	0.3365823	1.00049927	1.6613143	2.321597	1.6613238

Figure 4. Fixed effect of the INLA model without fitting the spatial random field, normalised covariates.

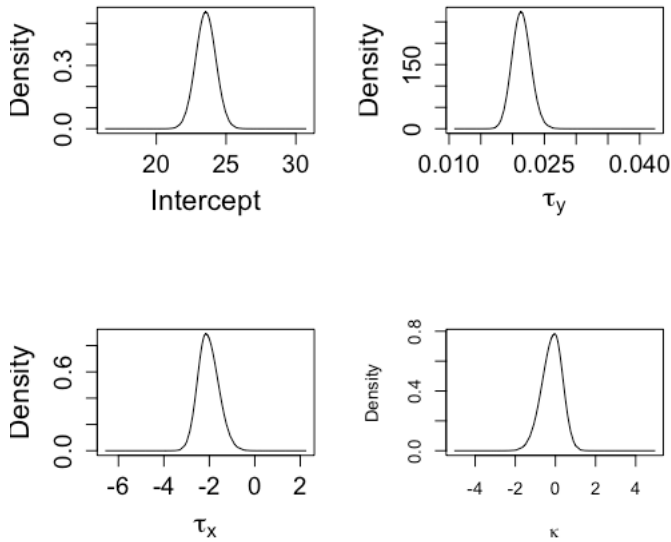


Figure 5. Posteriors of the hyperparameters.