SUPPLEMENTARY INFORMATION
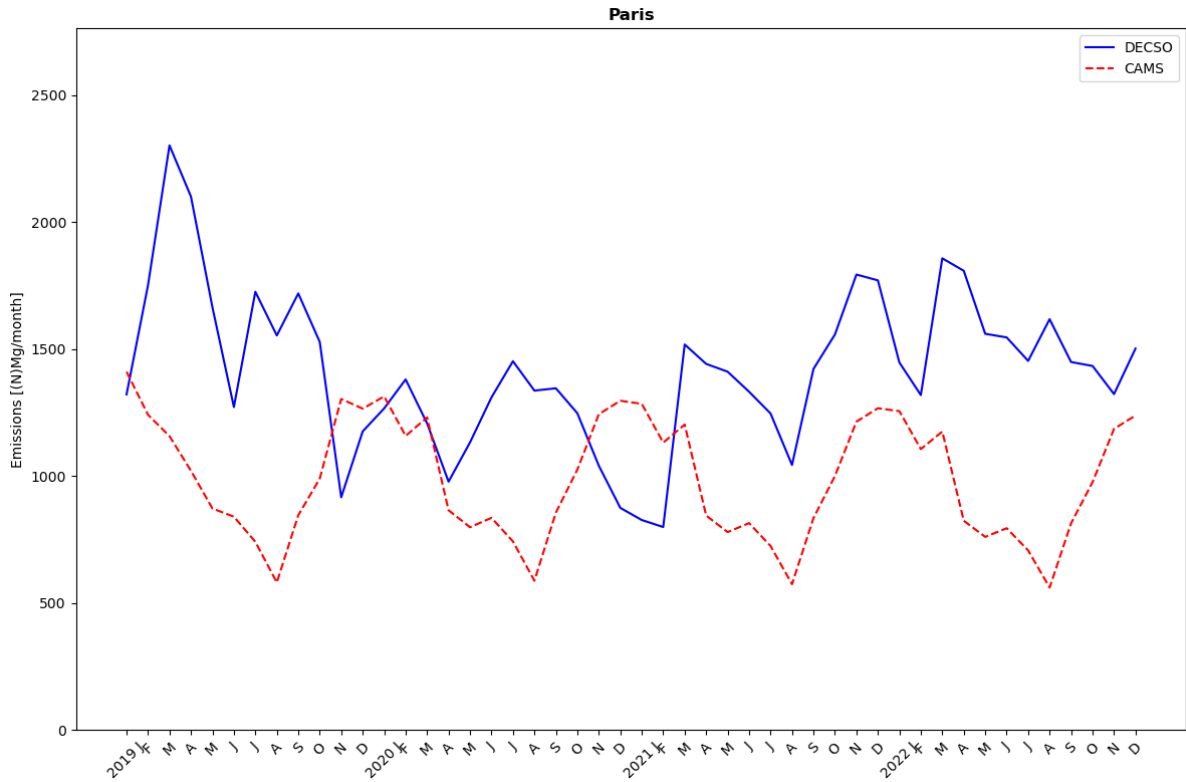
Figure S1   *Timeseries of monthly NOₓ emissions derived by DECSO for the city of Paris in the period 2019 to 2022. The dotted red line shows the CAMS-TEMPO NOx emissions for the same grid boxes.*

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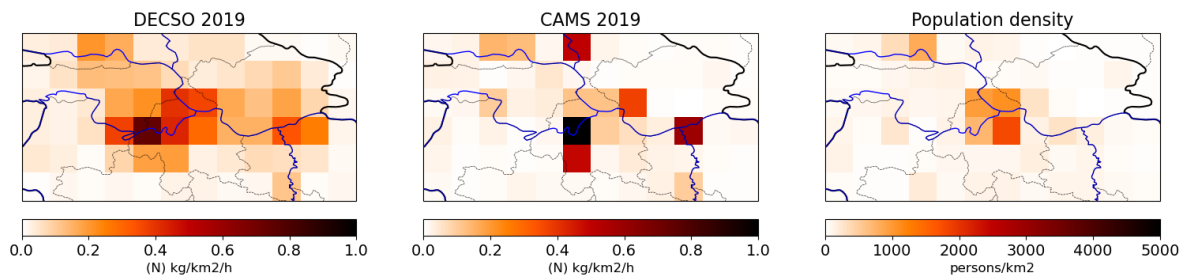
Figure S2   A map of North Serbia with NOₓ emissions of DECSO, and CAMS-REG. The population map shows especially the higher population for Belgrade. The emissions in DECSO are mainly correlated with the locations of several coal power plants (Nikola Tesla -A, -B, and -Kolubara) and a cement factory (Lafarge in Beocin) in the North-West.

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20   **Table S1 PARAMETERS set in DECSO Version 6.1-6.3.**

Parameter	Value
Time resolution transport kernel	7.5 minutes or less (depending on the resolution)
Maximum lifetime during iterations	100 hours
Minimum Lifetime	0.5 hour
Maximum Lifetime	16 hours
Smallest allowed value for matrix H elements	0.01
Alpha (Regularisation factor for lifetime fit)	0.01
Emission correlation length	0.5 km
Q_{abs} Absolute error of emissions	0.025 [1e15 molec/cm2/h]
Q_{rel} Relative error of emissions	0.026
OmF correlation length (default)	10 km
Pa_radius (Max. distance for cov. analysis)	50 km
absMsigma (absolute error of σ_R)	0.1
relMsigma (relative error of σ_R)	0.05
Tikhonov_threshold	0.01
Error of start-field Pa of emissions on day 1	0.3 [1e15 molec/cm2/h]
Maximum distance for emission-concentration relationship	150 km or less (depending on the resolution)

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24   Table S2.   Historical overview of the various DECSO versions and publications

Version	Year of release	Study using this data version
1	2012	Mijling and Van der A (2012)
2	2013	Mijling et al. (2013)
3a	2014	GlobEmission, phase 2 (East Asia, Middle East, South Africa)
3b	2015	Ding et al. (2015), GlobEmission, phase 2 (East Asia, Middle East)
4	2016	GlobEmission, phase 2 (East Asia)
5.0	2017	Ding et al. (2017a, 2017b)
5.1	2018	Ding et al. (2018)
5.2	2019	Van der A et al. (2020)
5.2-superobs	2020	Ding et al. (2020)
5.6	2022	SEEDS, first phase, 0.2x0.2 degree (project documentation)
6.0	2022	SEEDS, first phase, 0.05x0.05 degree (project documentation)
6.1	2022	Zhang et al. (2023)
6.2	2023	SEEDS, second phase, current study
6.3	2023	Same as 6.2 but with improved biogenic emissions (Lin et al., 2023)

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