Air Quality Improvement in Urban Street Canyons: An Assessment of the Effects of Selected Traffic Management Strategies Using OSPM Model

Robert Oleniacz *, Marek Bogacki, Mateusz Rzeszutek, Paulina Bździuch

Department of Environmental Management and Protection; Faculty of Geo-data Science, Geodesy and Environmental Engineering; AGH University of Science and Technology; Mickiewicza 30 Av., 30-059 Krakow, Poland
* Correspondence: oleniacz@agh.edu.pl

Supplementary Materials

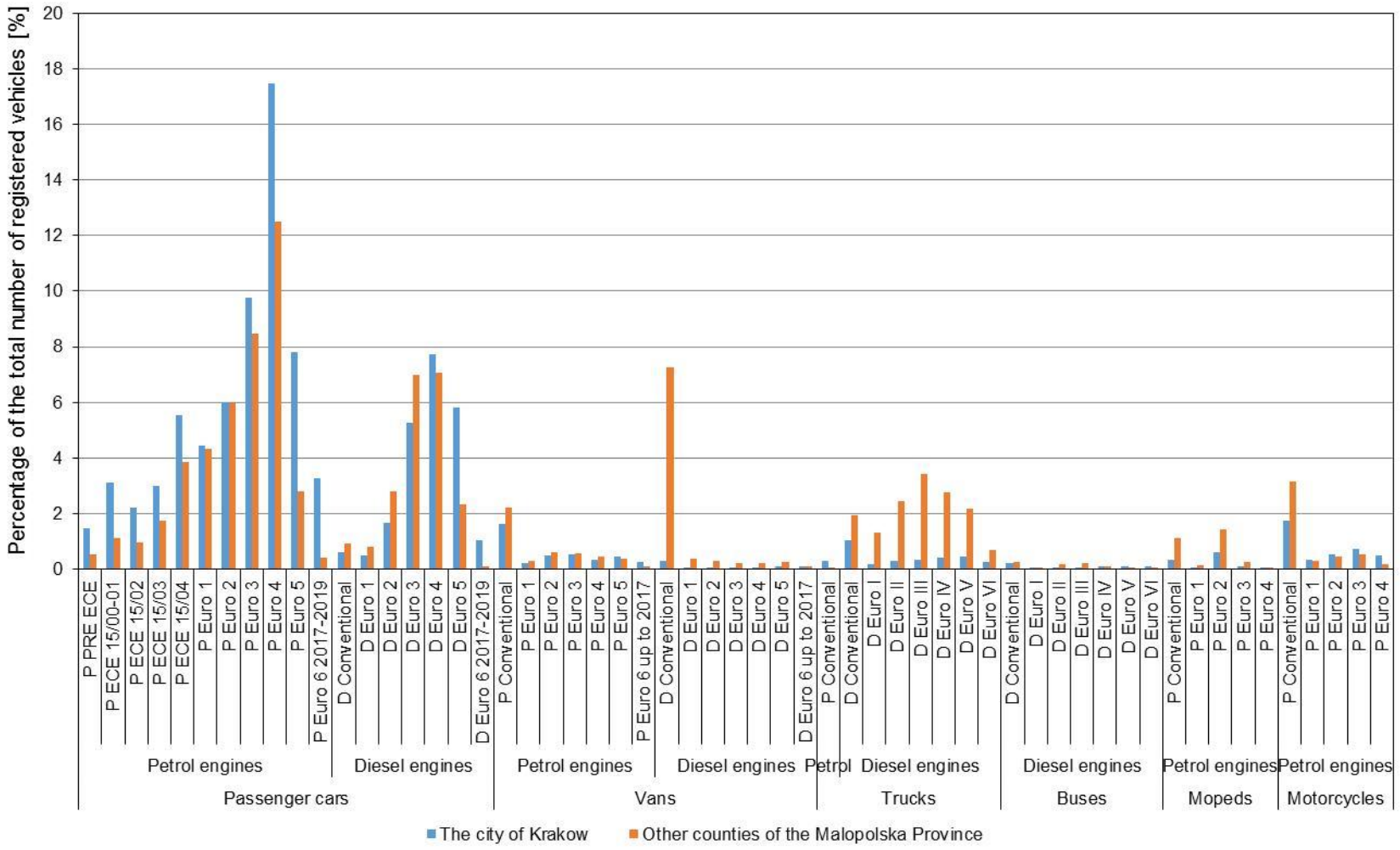

Figure S1. Detailed data on vehicles registered in the city of Krakow and other counties of the Malopolska Province in the analyzed period.

Table S1. Comparison of the total annual (y), daily average (d) and hourly average (h) traffic volumes of vehicles predicted for individual street canyons and variants. Daily average and hourly average values are estimated, rounded to the full number of vehicles.

Unit	Variant	Forecast vehicle traffic volume in the canyon			
		BROD	SOLI	LIMA	KRAS
veh·y^{-1}	v0	2,234,645	3,521,622	8,641,101	24,299,303
	v1	2,005,549	3,419,242	4,768,033	23,098,511
	v2	1,233,045	3,187,803	2,806,552	13,408,001
	v3	725,793	1,943,180	1,838,202	7,892,196
veh·d^{-1}	v0	6,122	9,648	23,674	66,573
	v1	5,495	9,368	13,063	63,284
	v2	3,378	8,734	7,689	36,734
	v3	1,988	5,324	5,036	21,622
veh·h^{-1}	v0	255	402	986	2,774
	v1	229	390	544	2,637
	v2	141	364	320	1,531
	v3	83	222	210	901

Table S2. Average vehicle speeds determined for individual street canyons and variants.

Time period	Variant	The assumed average vehicle speed in the canyon [km·h^{-1}]			
		BROD	SOLI	LIMA	KRAS
24-hour average	v0	40.3	40.5	34.3	39.3
	v1	33.1	38.2	34.3	32.2
	v2	40.3	33.4	34.3	39.3
	v3	40.3	40.5	34.3	39.3
7:00 a.m. - 7:00 p.m.	v0	24.1	27.3	21.3	24.6
	v1	19.7	25.8	21.3	20.2
	v2	24.1	22.5	21.3	24.6
	v3	24.1	27.3	21.3	24.6

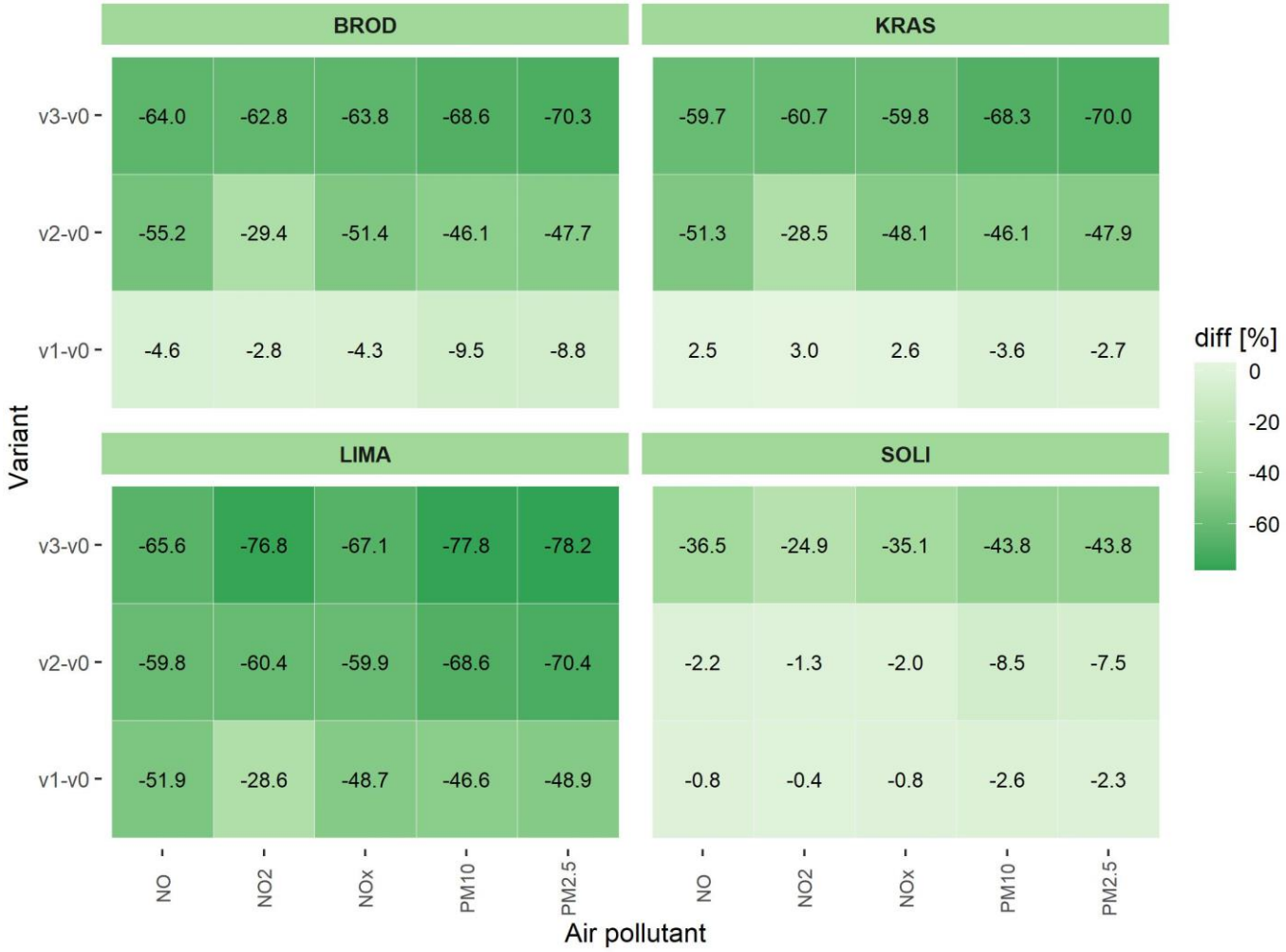

Figure S2. The matrix of percentage changes in the mean annual emission factors of the analyzed pollutants from individual street canyons obtained for variants v1, v2 and v3 compared to variant v0.

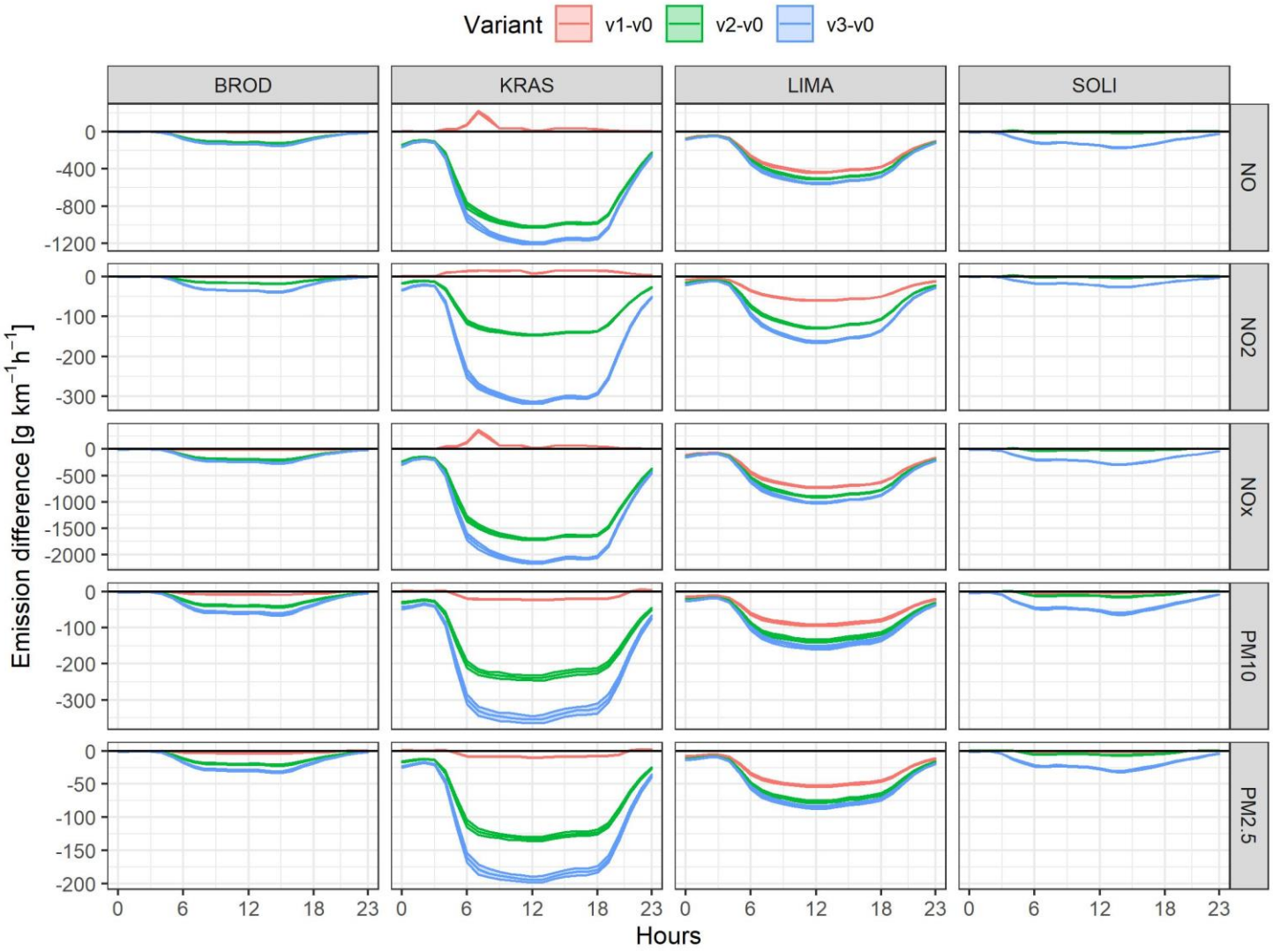

Figure S3. Daily variability of differences in the average 1-hour emissions of pollutants into the air from the analyzed canyons obtained for variants v1, v2 and v3 in relation to variant v0 (with 95% confidence intervals).

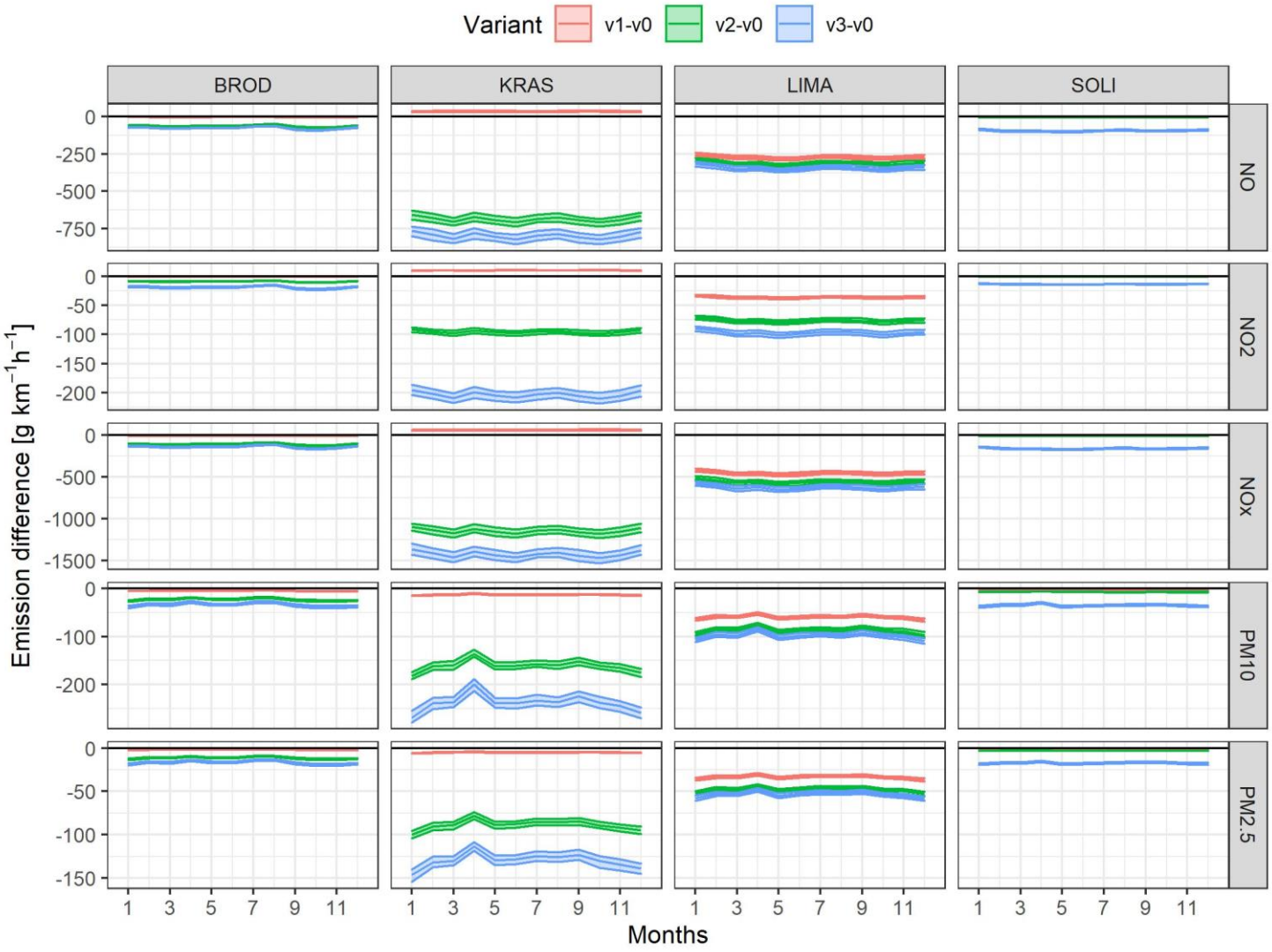

Figure S4. The annual variability of differences in the average monthly emissions of pollutants to the air from the analyzed canyons obtained for variants v1, v2 and v3 in relation to variant v0 (with 95% confidence intervals).

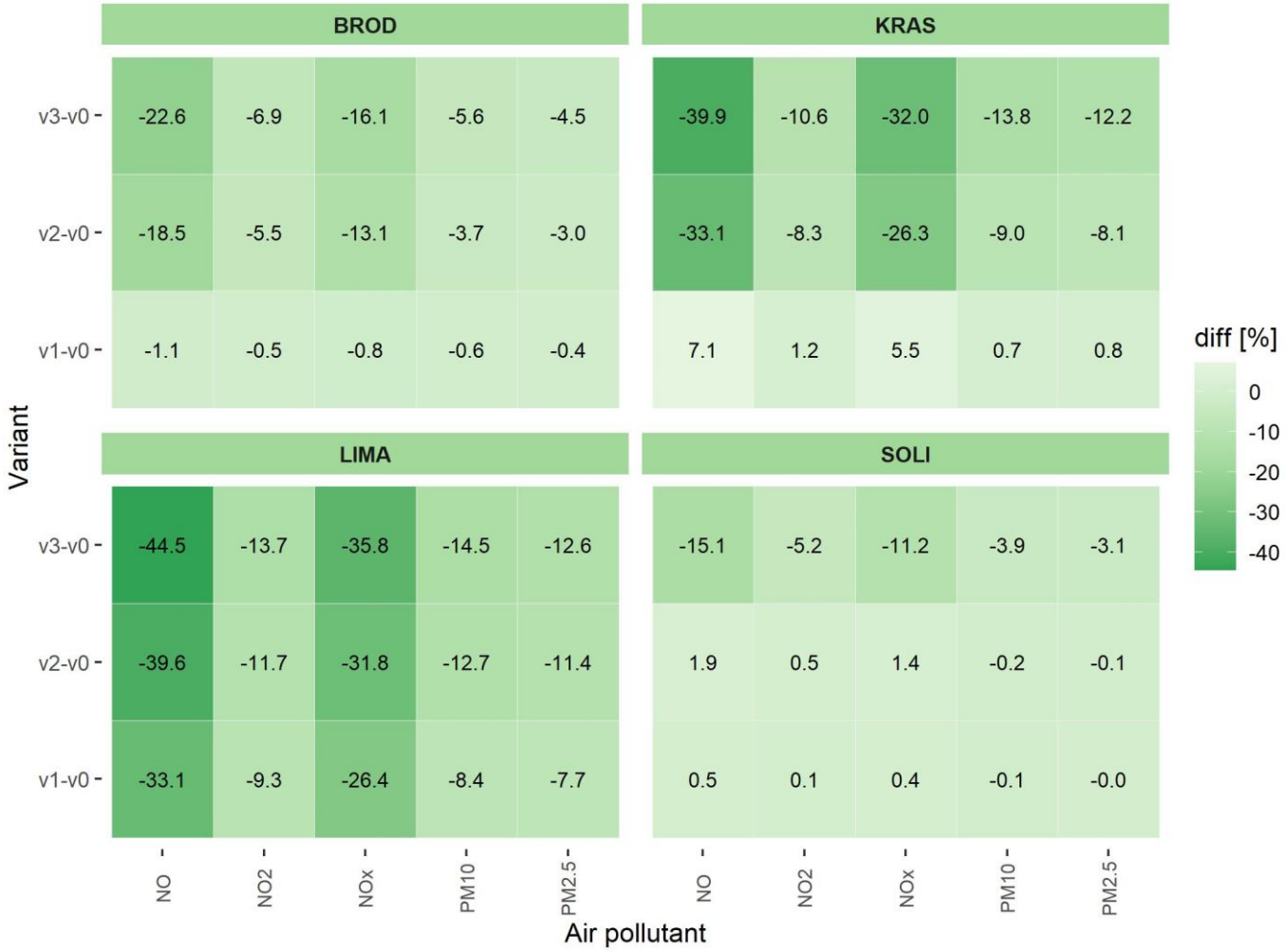

Figure S5. The matrix of percentage changes in the mean annual concentrations of the analyzed air pollutants in individual street canyons obtained for variants v1, v2 and v3 compared to variant v0 (including background pollution). The percentage reductions in concentrations specified as -0.0 represent a level of reduction in concentrations that is less than 0.05 %.

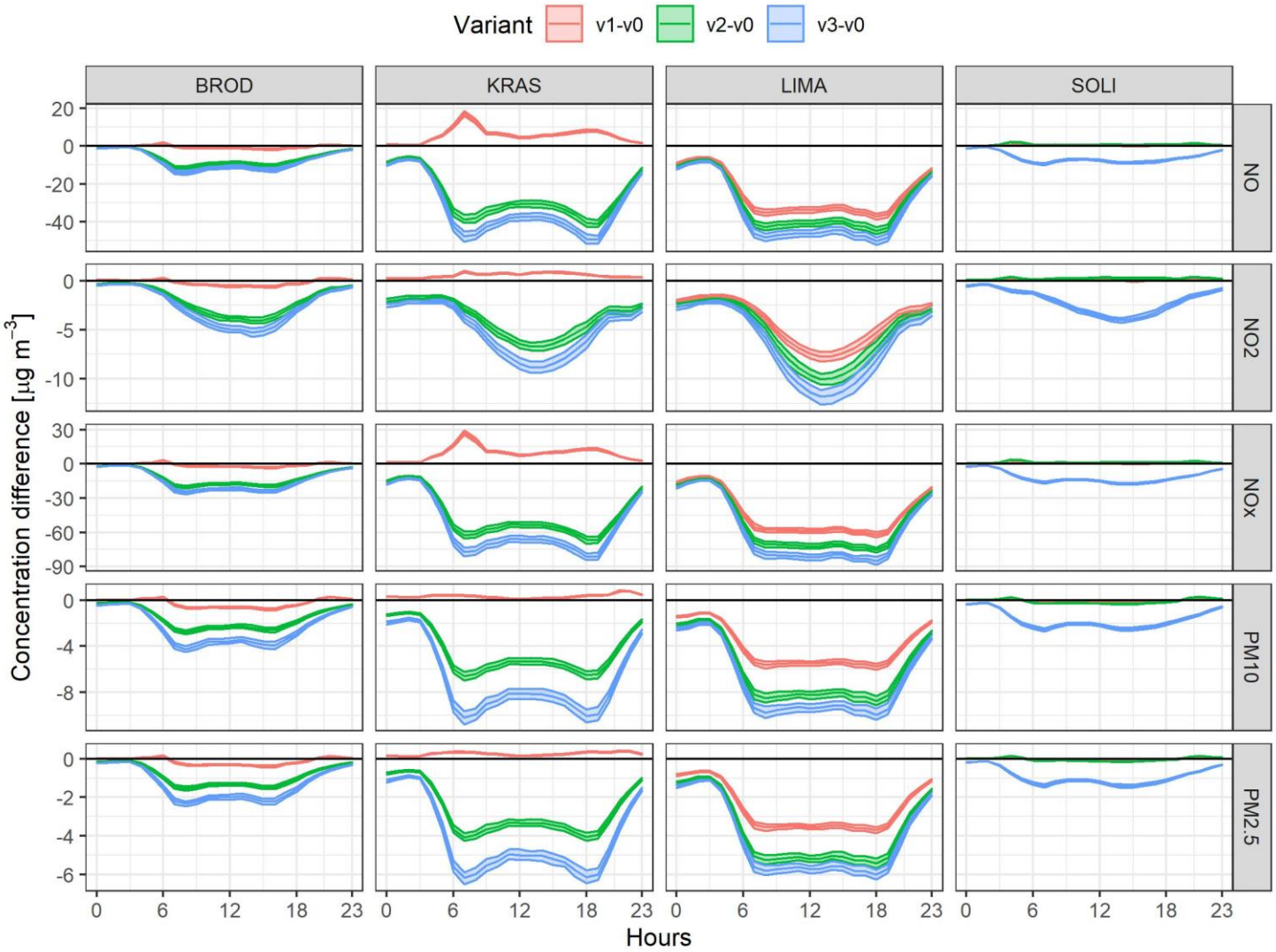

Figure S6. Daily variability of absolute differences in the mean 1-hour pollutant concentrations in the air in the analyzed canyons obtained for variants v1, v2 and v3 in relation to variant v0 (with 95% confidence intervals).

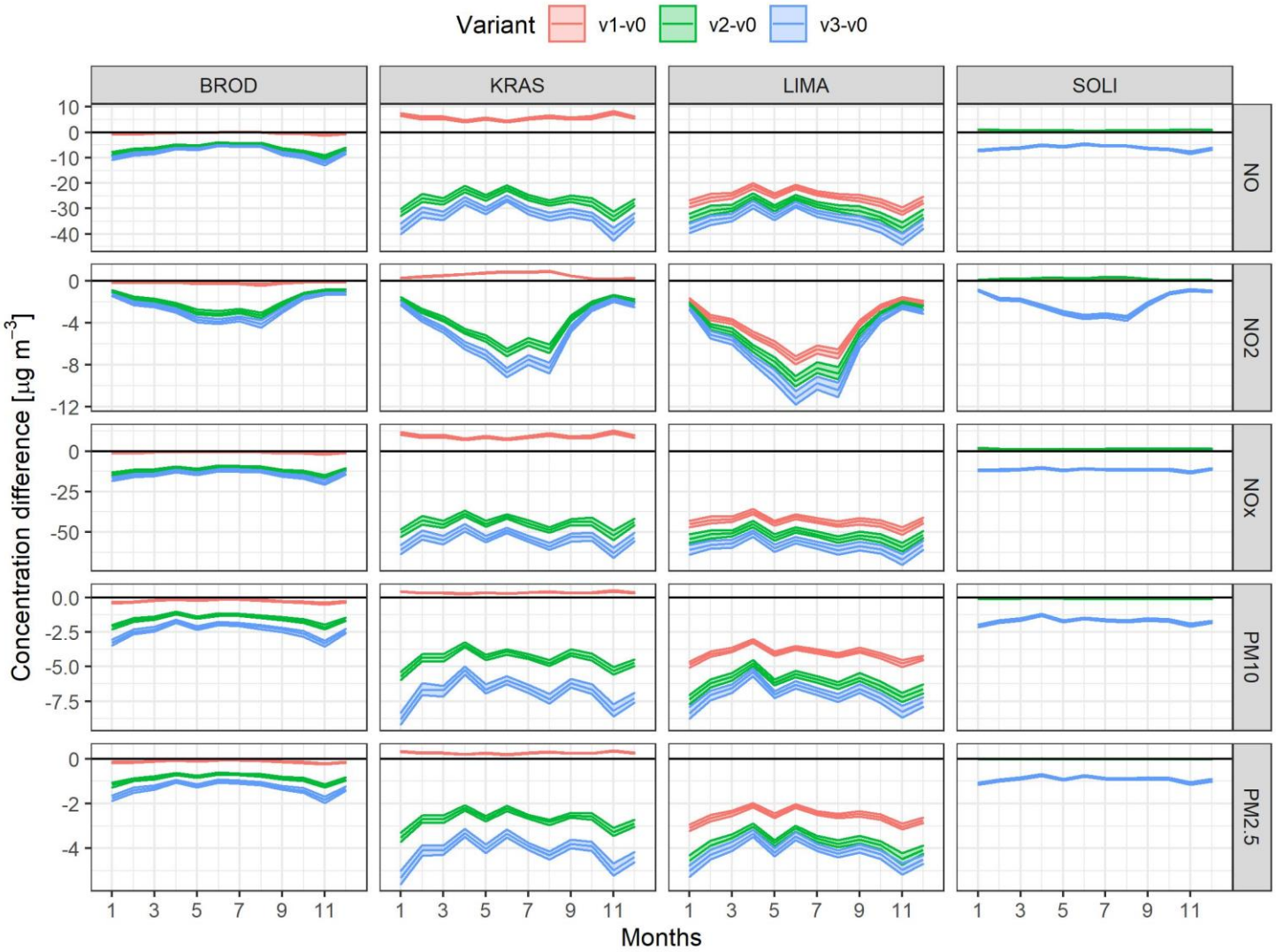

Figure S7. The annual variability of absolute differences in the mean 1-hour pollutant concentrations in the air in the analyzed canyons obtained for variants v1, v2 and v3 in relation to variant v0 (with 95% confidence intervals).