1 Short Gaps

1.1 Black Carbon

	Time (s)	R^2	**RMSE**	$\boldsymbol{\sigma_{RMSE}}$	**MAE**	$\boldsymbol{\sigma_{MAE}}$
SDEM	7.03	0.494	0.364	0.038	0.25	0.019
$SDEM_{w\_gl}$	114.2	0.536	0.349	0.039	0.229	0.016
$SDEM_{w\_st}$	104.6	0.549	0.344	0.043	0.224	0.019
ALG-1	38	0.427	0.388	0.048	0.253	0.019
ALG-2	52.4	0.43	0.387	0.048	0.252	0.019
ALG-3	54.5	0.423	0.39	0.048	0.253	0.019
MOD-4	34.3	0.458	0.378	0.048	0.244	0.018
MOD-5	90.8	0.52	0.356	0.043	0.235	0.022
ALG-4	64.5	0.46	0.377	0.049	0.243	0.02
MOD-GWR(10sim)	876	0.507	0.352	0.038	0.225	0.018

Tabella 1: Risultati relativi alle simulazioni dei gap brevi.

- **ALG 1:** $BC_t = s(time) + BC_{t-1} + BC_{t-24} + BC_{t-168} + PM10_t + PM2.5_t + Type$
- **ALG 2:** $BC_t = s(time) + BC_{t-1} + s(BC_{t-24}) + BC_{t-168} + PM10_t + PM2.5_t + Type$
- **ALG 3:** $BC_t = s(time) + BC_{t-1} + BC_{t-24} + s(BC_{t-168}) + PM10_t + PM2.5_t + Type$
- **MOD 4 (1 solo modello):** $BC_t = s(time) + BC_{t-1} + BC_{t-24} + BC_{t-168} + PM10_t + PM2.5_t + Type$
- **MOD 5 (1 modello - RF):** $BC_t = time + BC_{t-1} + BC_{t-24} + BC_{t-168} + PM10_t + PM2.5_t + Type$
- **ALG 4:** $BC_t = s(time) + BC_{t-1} + BC_{t-2} + BC_{t-3} + BC_{t-4} + BC_{t-5} + PM10_t + PM10_{t-1} + PM10_{t-2} + PM10_{t-3} + PM2.5_t + PM2.5_{t-1} + PM2.5_{t-2} + PM2.5_{t-3} + Type$

1.2 PM2.5

	Time (s)	R^2	**RMSE**	$\boldsymbol{\sigma_{RMSE}}$	**MAE**	$\boldsymbol{\sigma_{MAE}}$
SDEM	9.6	0.65	5.48	0.565	4.038	0.366
$SDEM_{w\_gl}$	151	0.661	5.388	0.674	3.845	0.408
$SDEM_{w\_st}$	153.9	0.72	4.896	0.553	3.419	0.347
ALG-1	69	0.546	6.258	0.793	4.326	0.495
ALG-2	102	0.58	6.018	0.779	4.175	0.489
ALG-3	82.4	0.58	6.016	0.768	4.18	0.479
MOD-1	74	0.71	4.98	0.608	4.468	0.374
ALG-GWR	403	0.667	5.339	0.672	3.721	0.406
MOD-2	79.16	0.817	3.934	0.608	2.475	0.299
MOD-GWR	774	0.835	3.747	0.443	2.446	0.238

Tabella 2: Risultati relativi alle simulazioni dei gap brevi per l'imputazione di PM2.5.

- **ALG 1:** $PM2.5_t = s(time) + PM2.5_{t-1} + PM2.5_{t-24} + PM2.5_{t-168} + PM10_t + BC_t + Type$

$$PM2.5_t \sim Gamma$$

- **ALG 2:** $PM2.5_t = s(time) + PM2.5_{t-1} + PM2.5_{t-2} + PM2.5_{t-3} + PM2.5_{t-4} + PM2.5_{t-5} + PM10_t + PM10_{t-1} + PM10_{t-2} + PM10_{t-3} + PM10_{t-4} + PM10_{t-5} + BC_t + BC_{t-1} + BC_{t-2} + BC_{t-3} + BC_{t-4} + BC_{t-5} + Type$

$$PM2.5_t \sim Gamma$$

- **ALG 3:** $PM2.5_t = s(time) + PM2.5_{t-1} + PM2.5_{t-2} + PM2.5_{t-3} + PM2.5_{t-4} + PM2.5_{t-5} + PM10_t + PM10_{t-1} + PM10_{t-2} + PM10_{t-3} + PM10_{t-4} + PM10_{t-5} + Type$

$$PM2.5_t \sim Gamma$$

- **MOD 1:** $PM2.5_t = PM2.5_{t-1} + PM2.5_{t-2} + PM2.5_{t-3} + PM2.5_{t-4} + PM2.5_{t-5} + PM10_t + PM10_{t-1} + PM10_{t2} + PM10_{t-3} + PM10_{t-4} + PM10_{t-5}$

$$PM2.5_t \sim Gamma$$

  Unico modello mensile, stazione per stazione

- **ALG-GWR:** $PM2.5_t = PM2.5_{t-1}+PM2.5_{t-2}+PM2.5_{t-3}+PM2.5_{t-4}+PM2.5_{t-5} + PM10_t + PM10_{t-1} + PM10_{t2} + PM10_{t-3} + PM10_{t-4} + PM10_{t-5}$
- **MOD 2:** $PM2.5_t = PM2.5_{t-1} + PM2.5_{t-2} + PM2.5_{t-3} + PM2.5_{t-4} + PM2.5_{t-5} + PM2.5_{t+1} + PM2.5_{t+2} + PM2.5_{t+3} + PM10_t + PM10_{t-1} + PM10_{t2} + PM10_{t-3} + PM10_{t-4} + PM10_{t-5} + PM10_{t+1} + PM10_{t+2} + PM10_{t+3}$ (se presenti, altrimenti MOD 1) Stazione per Stazione
- **MOD-GWR:** $PM2.5_t = PM2.5_{t-1}+PM2.5_{t-2}+PM2.5_{t-3}+PM2.5_{t-4}+PM2.5_{t-5} + PM2.5_{t+1} + PM2.5_{t+2} + PM2.5_{t+3} + PM10_t + PM10_{t-1} + PM10_{t2} + PM10_{t-3} + PM10_{t-4} + PM10_{t-5} + PM10_{t+1} + PM10_{t+2} + PM10_{t+3}$ (se presenti, altrimenti MOD 1) Stazione per Stazione

2 Modelli solo imputazione

	Time (s)	R^2	**RMSE**	$\boldsymbol{\sigma_{RMSE}}$	**MAE**	$\boldsymbol{\sigma_{MAE}}$
SDEM	9.6	0.65	5.48	0.565	4.038	0.366
$SDEM_{w\_gl}$	151	0.661	5.388	0.674	3.845	0.408
$SDEM_{w\_st}$	153.9	0.72	4.896	0.553	3.419	0.347
MOD-2	79.16	0.817	3.934	0.608	2.475	0.299
MOD-GWR	774	0.835	3.747	0.443	2.446	0.238

Tabella 3: Risultati relativi alle simulazioni dei gap brevi per l'imputazione di PM2.5.

3 Modelli Previsione

	Time (s)	R^2	**RMSE**	$\boldsymbol{\sigma_{RMSE}}$	**MAE**	$\boldsymbol{\sigma_{MAE}}$
ALG-1	69	0.546	6.258	0.793	4.326	0.495
ALG-2	102	0.58	6.018	0.779	4.175	0.489
ALG-3	82.4	0.58	6.016	0.768	4.18	0.479
MOD-1	74	0.71	4.98	0.608	4.468	0.374
ALG-GWR	403	0.667	5.339	0.672	3.721	0.406

Tabella 4: Risultati relativi alle simulazioni dei gap brevi per l'imputazione di PM2.5.