OPC-sensor: PM_1, $PM_{2.5}$, PM_{10} and Equivalent Black Carbon (EBC)

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Field test: Rotterdam (October-November 2015)
urban background (Zwartewaalstraat) and traffic location (Pleinweg)

Automatic monitoring
(DCMR)

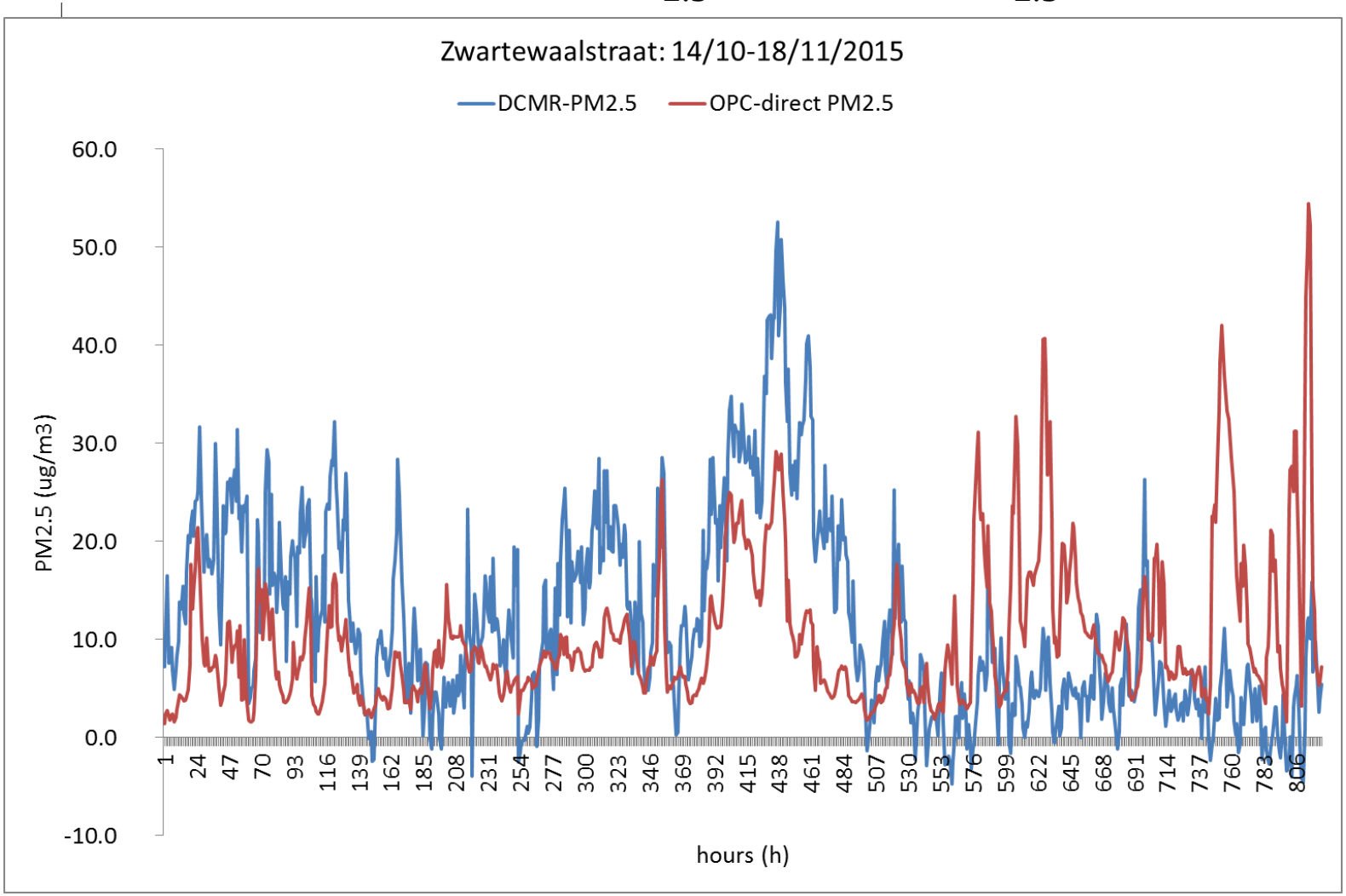
$PM_{2.5}$ and PM_{10}: β-dust monitor

EBC: MAAP monitor

hourly data

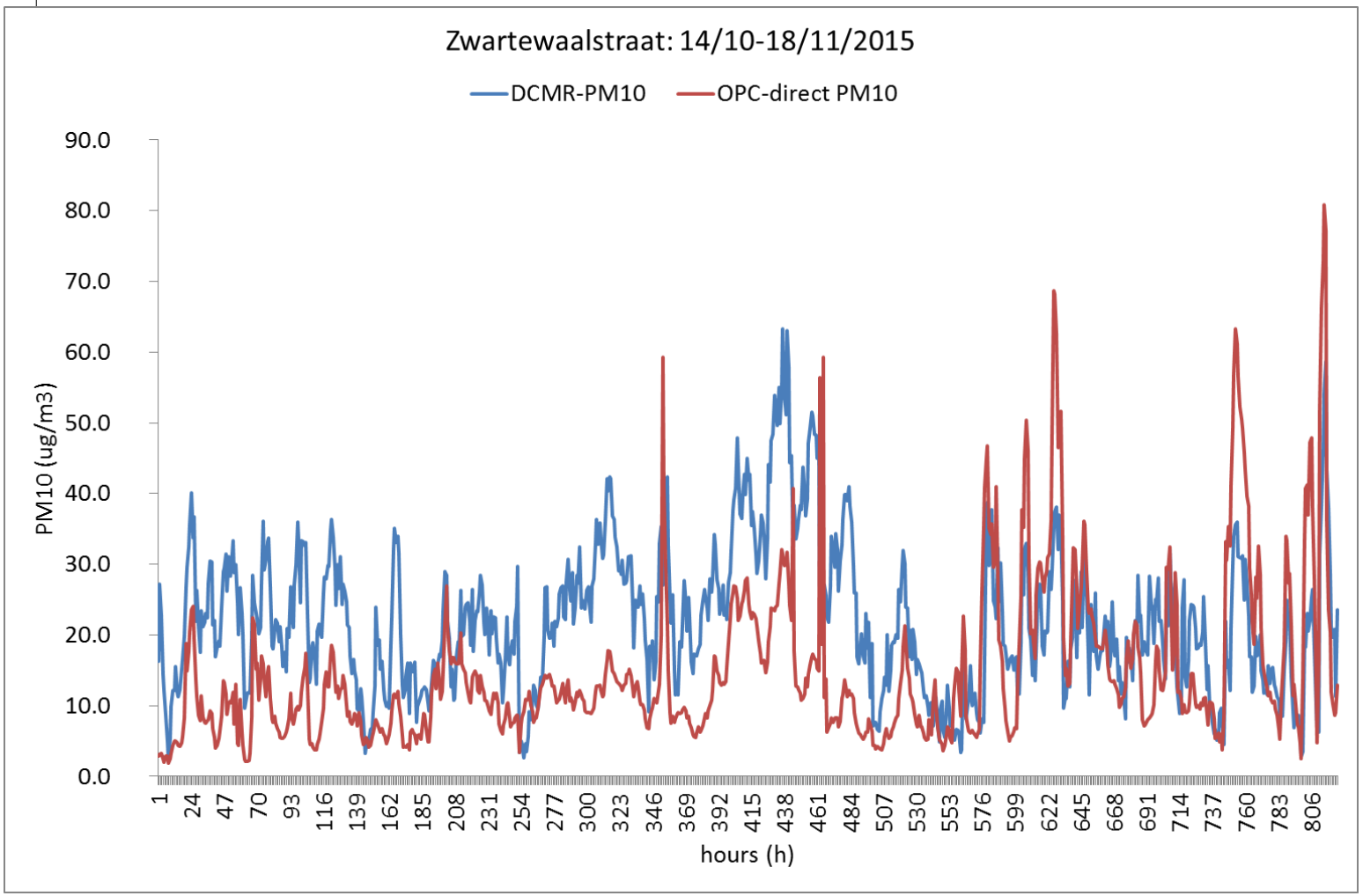
Urban background: Zwartewaalstraat

OPC (*flow 10 ml/s*): direct $PM_{2.5}$ vs β-dust $PM_{2.5}$ (825 hours)

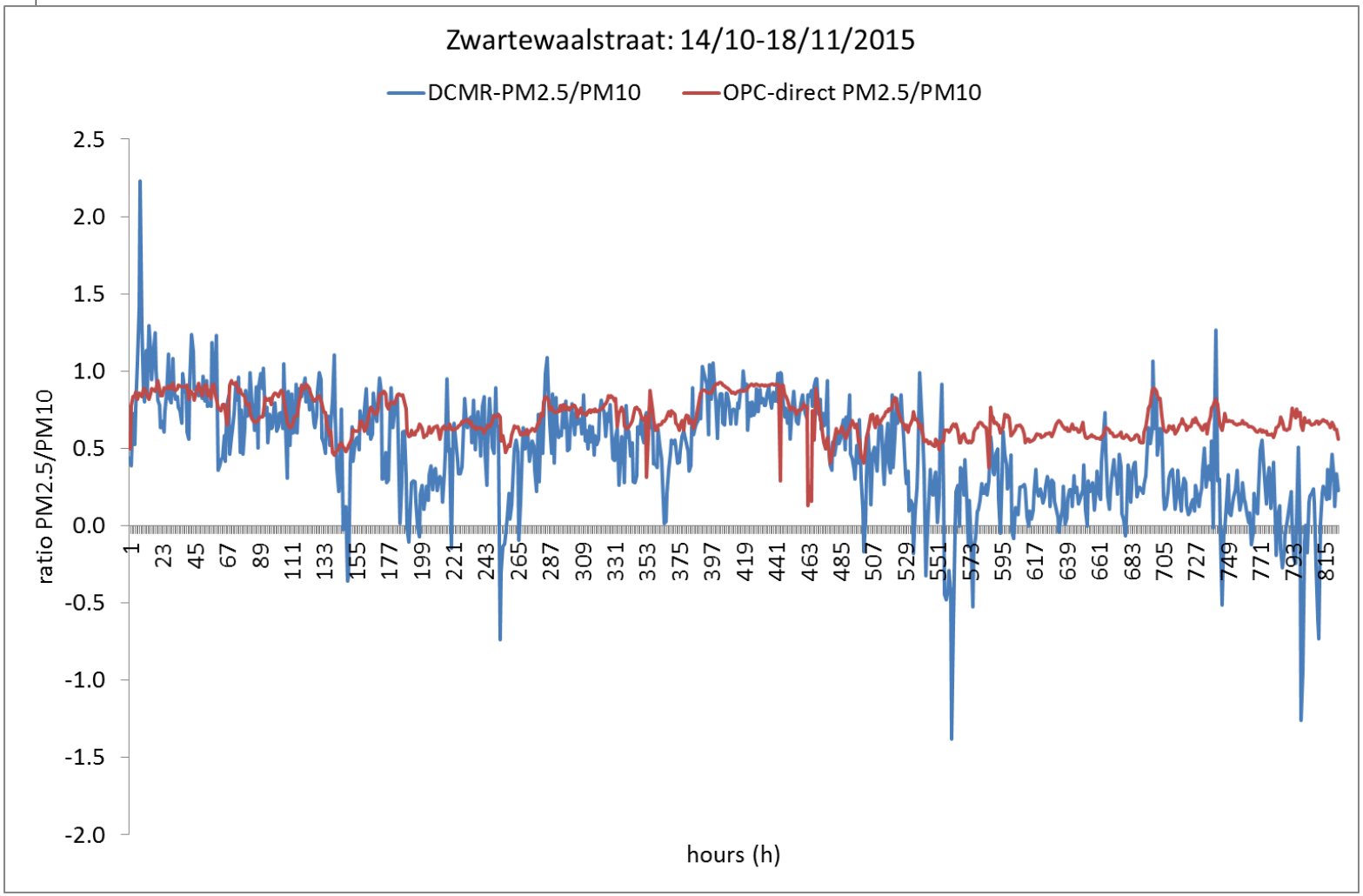


Urban background: Zwartewaalstraat

OPC (*flow 10 ml/s*): direct PM_{10} vs β-dust PM_{10} (825 hours)

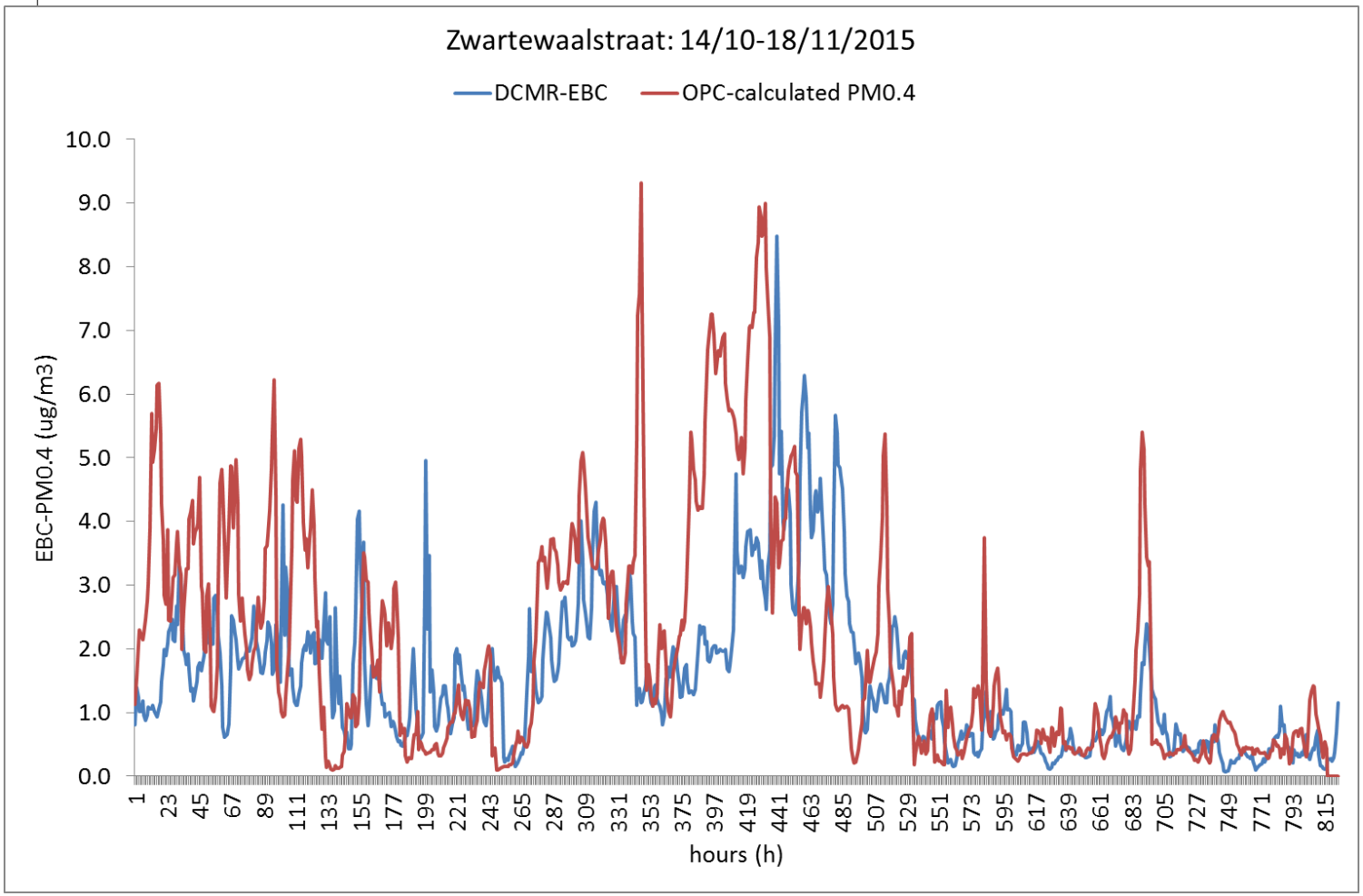


Urban background: Zwartewaalstraat
OPC (*flow 10 ml/s*): ratio $PM_{2.5}/PM_{10}$ (825 hours)



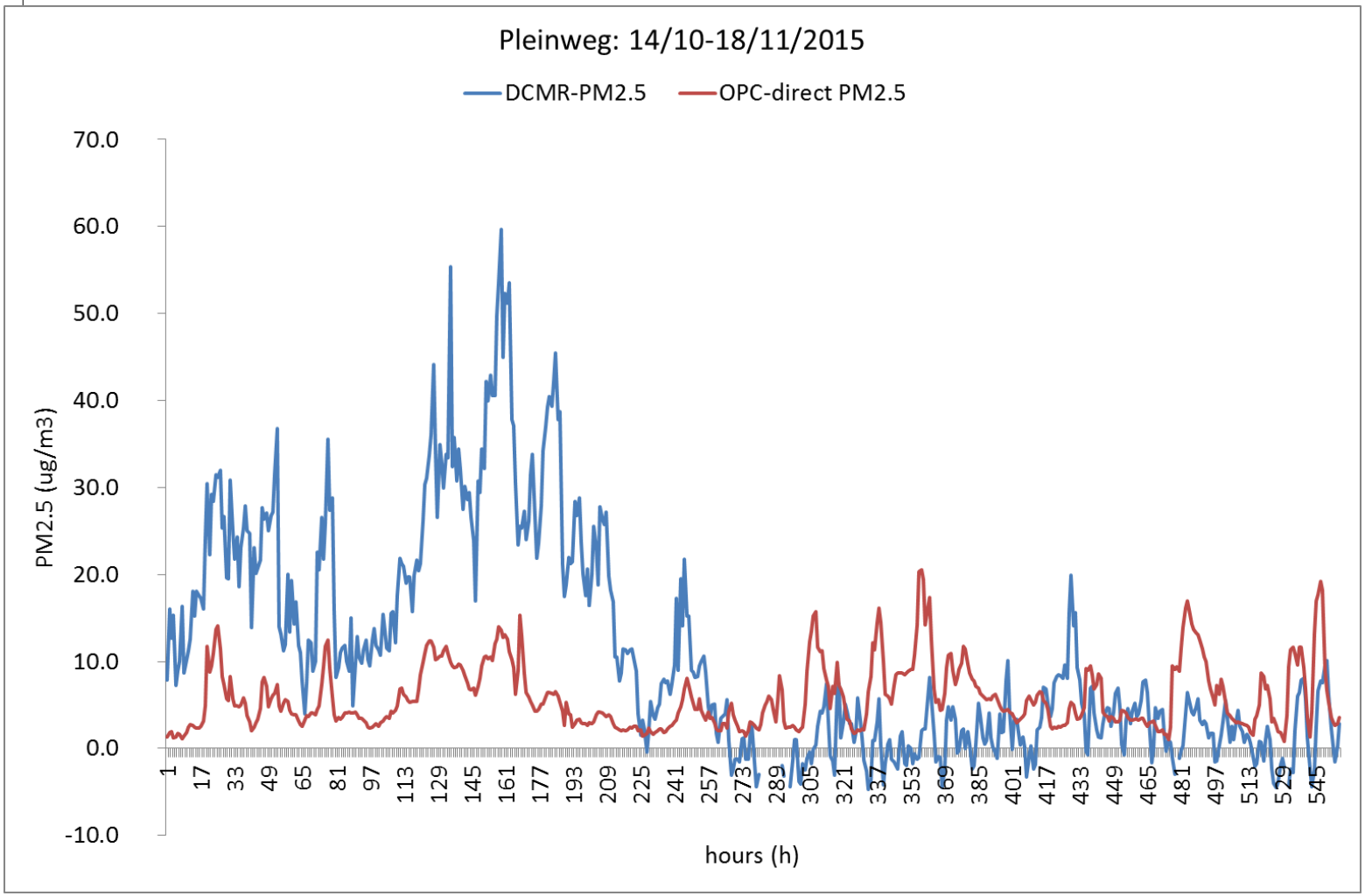
Urban background: Zwartewaalstraat

OPC (*flow 10 ml/s*): calculated $PM_{0.4}$ vs MAAP EBC(825 hours)



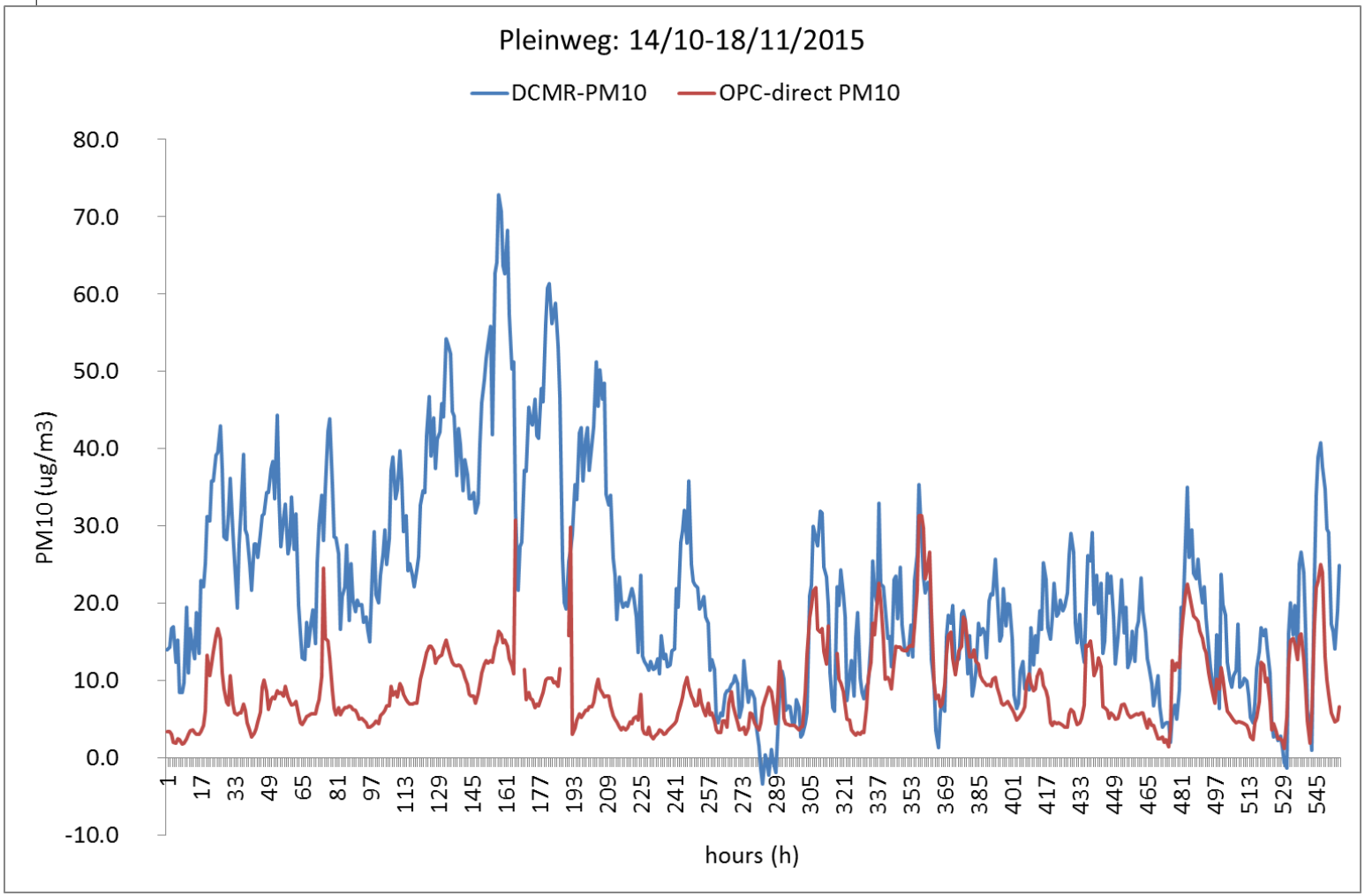
Traffic location: Pleinweg

OPC (*flow 30 ml/s*): direct $PM_{2.5}$ vs β-dust $PM_{2.5}$ (825 hours)

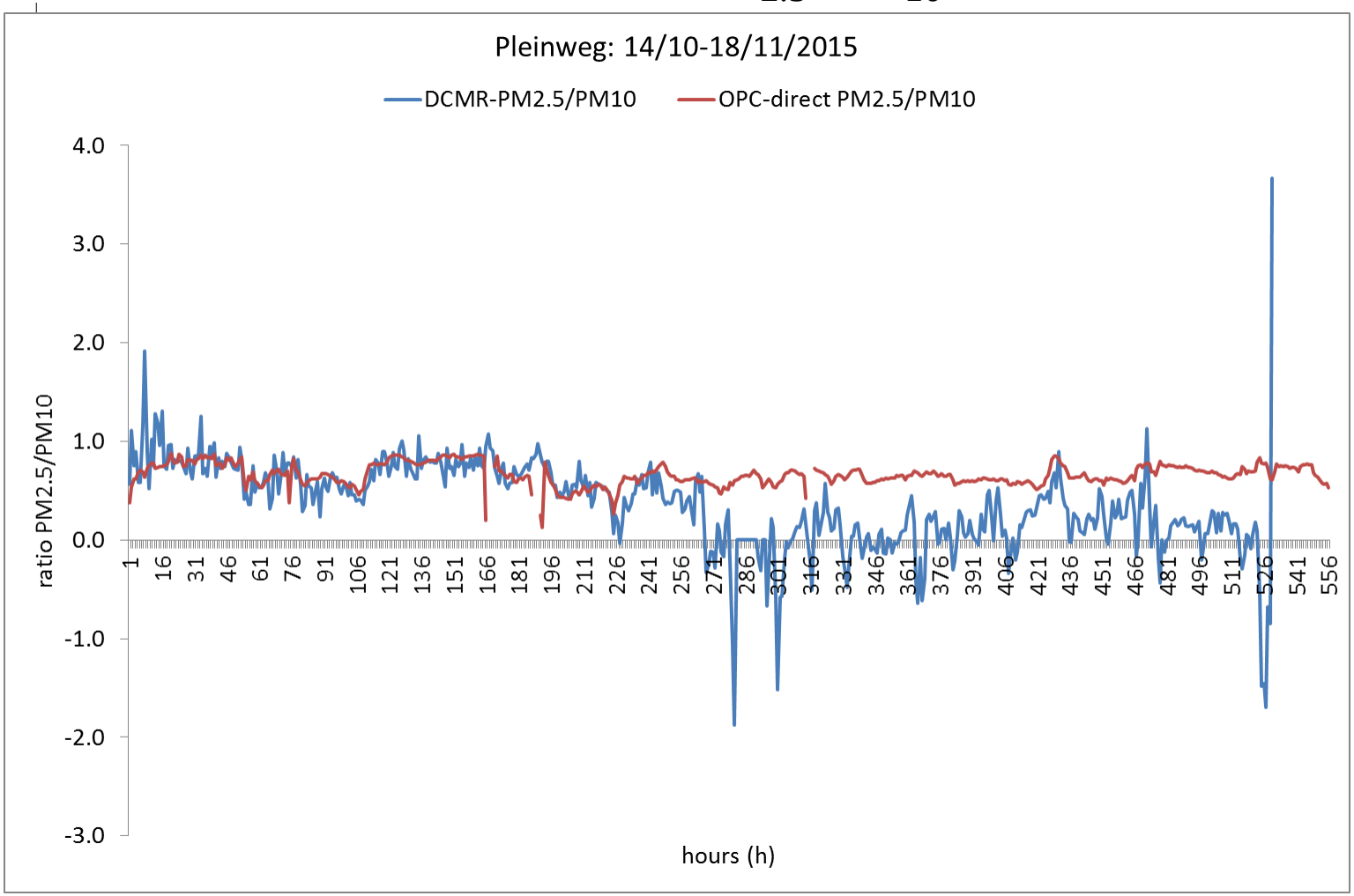


Traffic location: Pleinweg

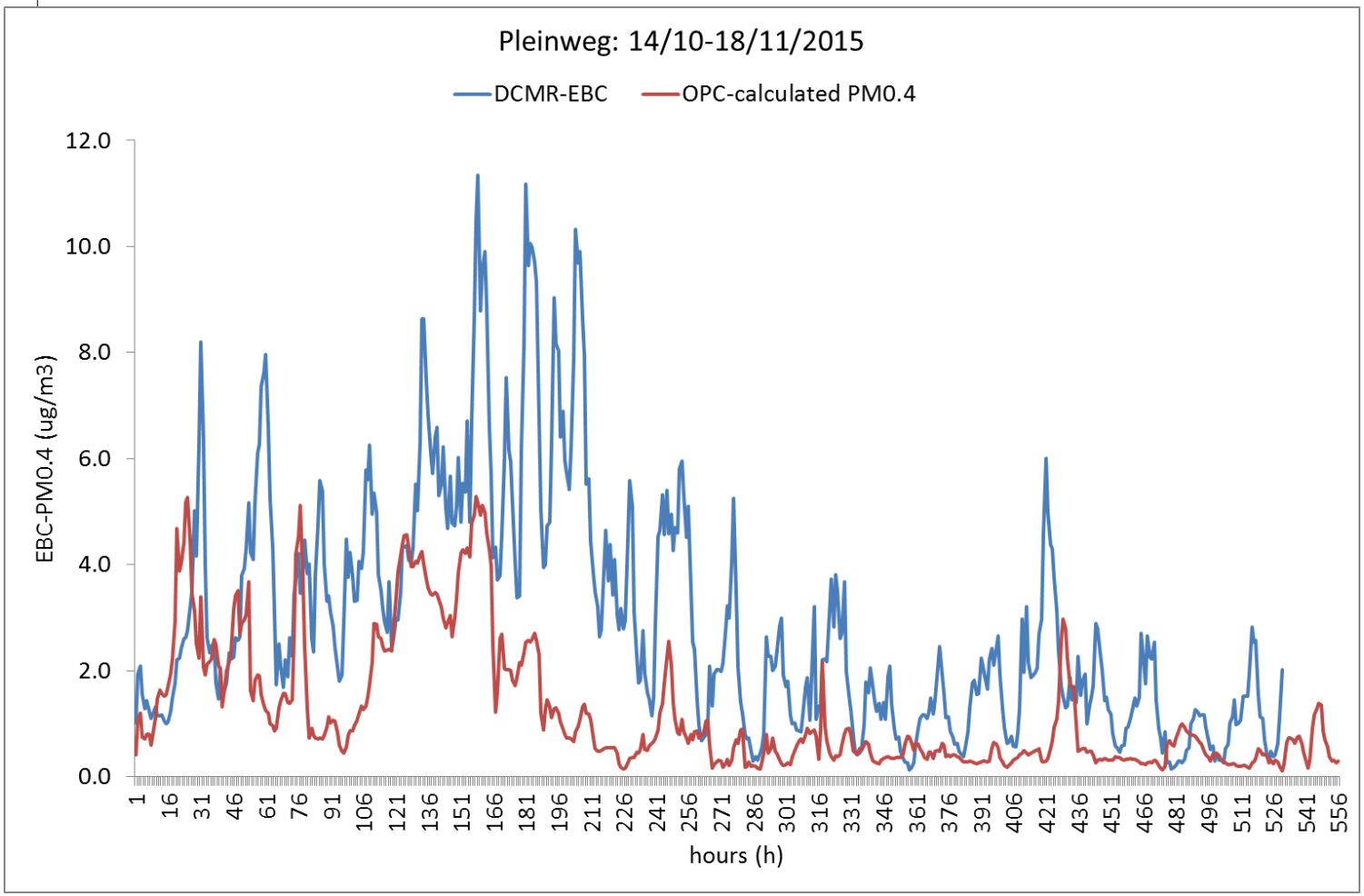
OPC (*flow 30 ml/s*): direct PM_{10} vs β-dust PM_{10} (825 hours)



Urban background: Zwartewaalstraat
OPC (*flow 30 ml/s*): ratio $PM_{2.5}/PM_{10}$ (825 hours)



Urban background: Zwartewaalstraat
OPC (*flow 30 ml/s*): calculated $PM_{0.4}$ vs MAAP EBC(825 hours)



$PM_{2.5/10}$ and EBC (N = 825 hours)
(field test at Rotterdam: October-November 2015)

14/10-18/11/2015	PM2.5	PM10	EBC
Rdam urban			
- reference	15.6*	22.1	1.5
- OPC**	8.6*	14.9	0.7
- hour-to-hour R	0.74*	0.47	0.48
Rdam traffic			
- reference	11.0	22.3	2.8
- OPC**	5.9	8.7	1.2
- hour-to-hour R	0.22	0.39	0.56

*: 1-543 hours (DCMR not correct > 543 ?)
**: flow 3* (urban) and 10* (traffic) higher than default: multiply by two?

- **Follow-up**:

1.) Heating housing OPC (RH > 80%: condensation optical parts!)?

2.) Stabilize/increase flow rate (or flow rate independent?)

3.) Calibration OPC by field comparison at specific locations ~factor 2?

- **Application**:

1.) Improve spatial and temporal resolution monitoring networks?

2.) EBC?

3.) Personal exposure?

4.) Early warning fugitive PM emissions (harbours, smelters, power plants)?