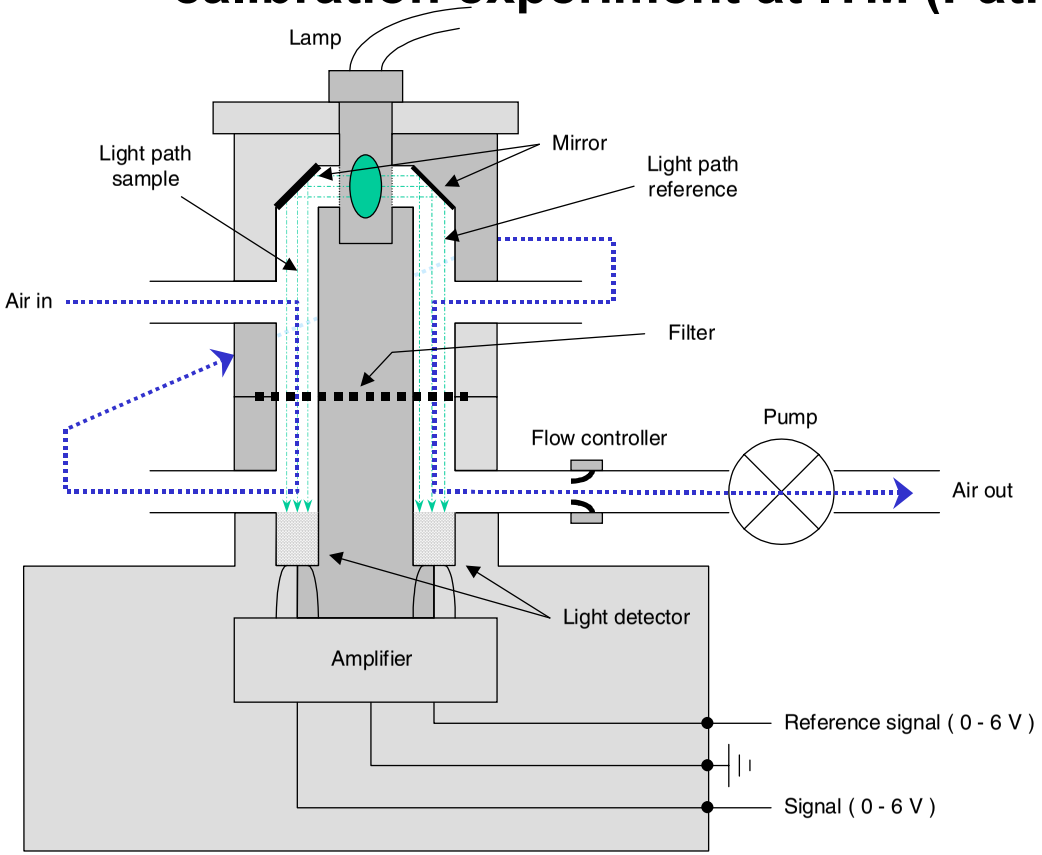
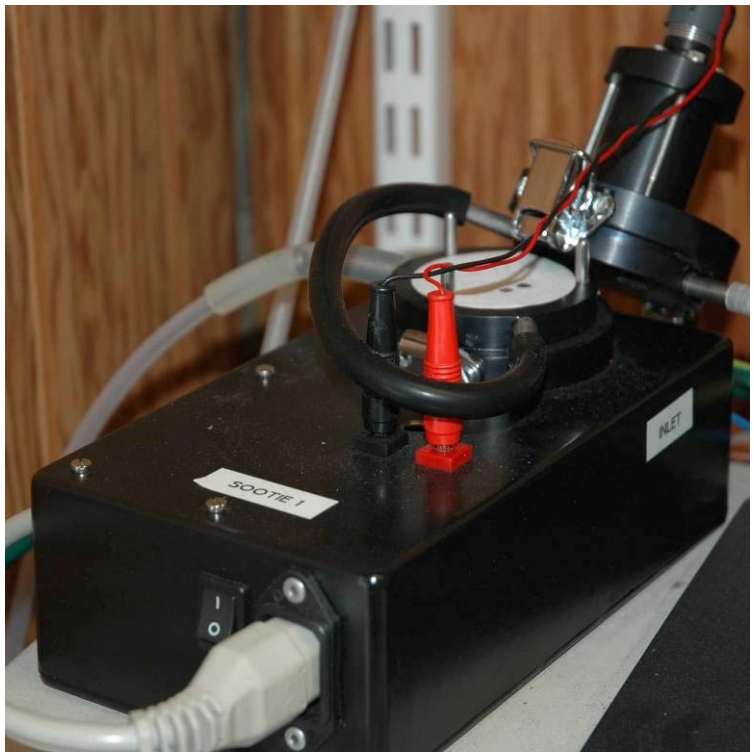
Particle Soot Absorption Photometer - PSAP

- simple and robust design (integrating plate), built at ITM
- 6 instruments installed in Stockholm and Copenhagen measuring at : regional, urban and kerbside locations
- MSc project: Peter Andersen (Supervision: Marianne, Matthias)
  - calibration experiment at ITM (Patricia, Gustavo, HC, Johan…)





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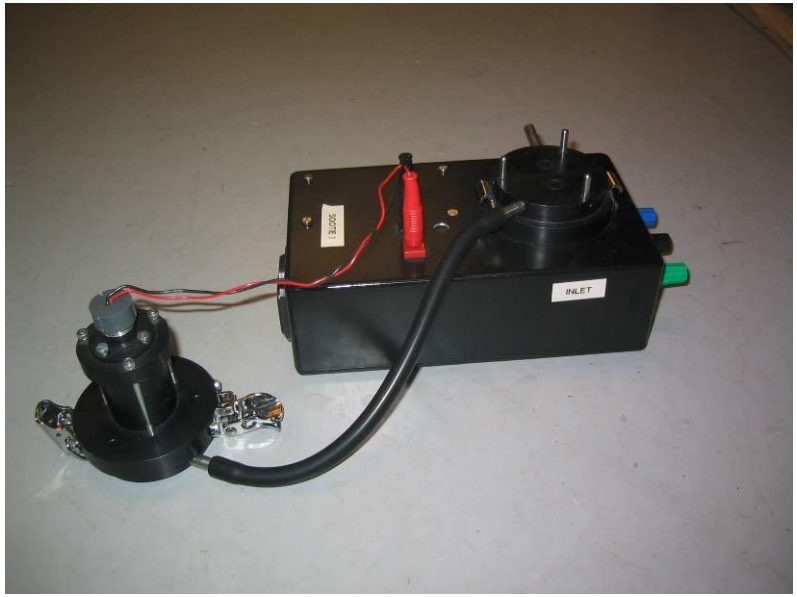
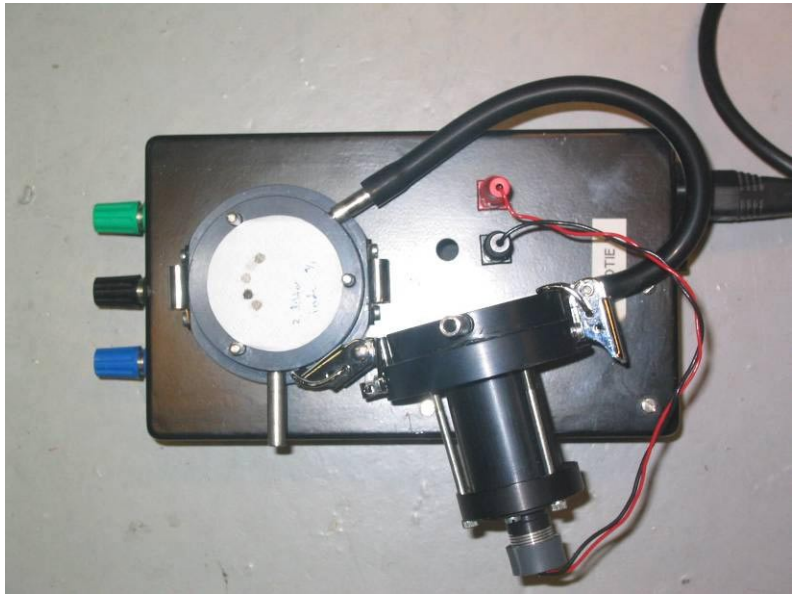
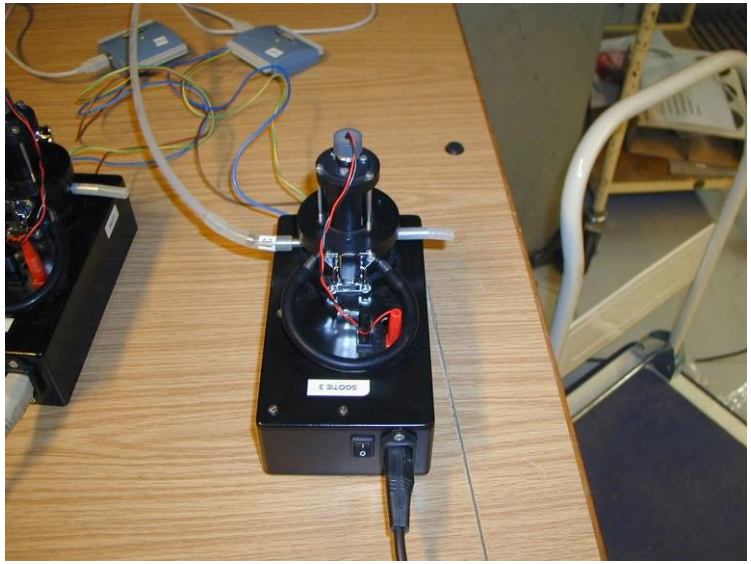


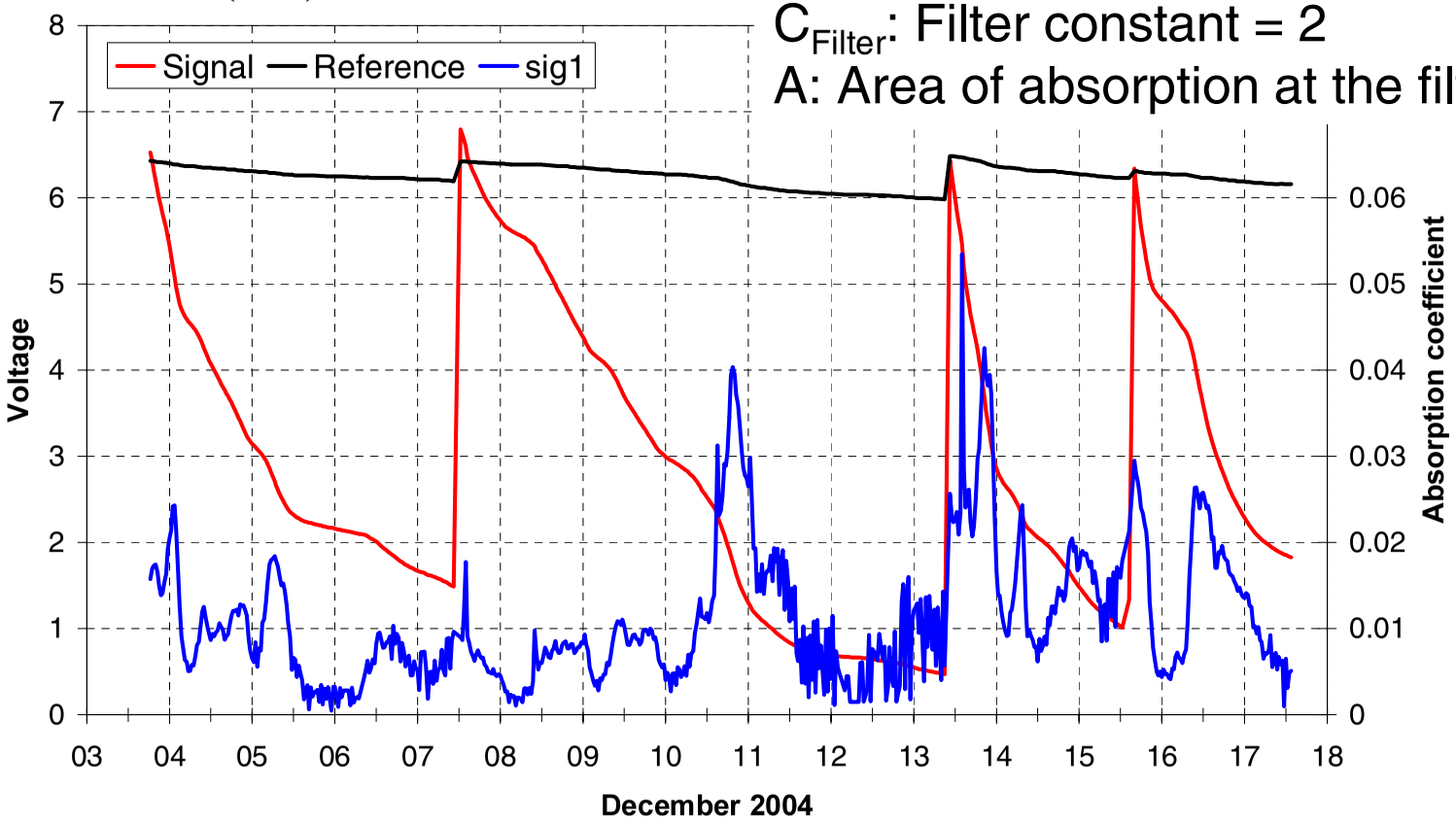




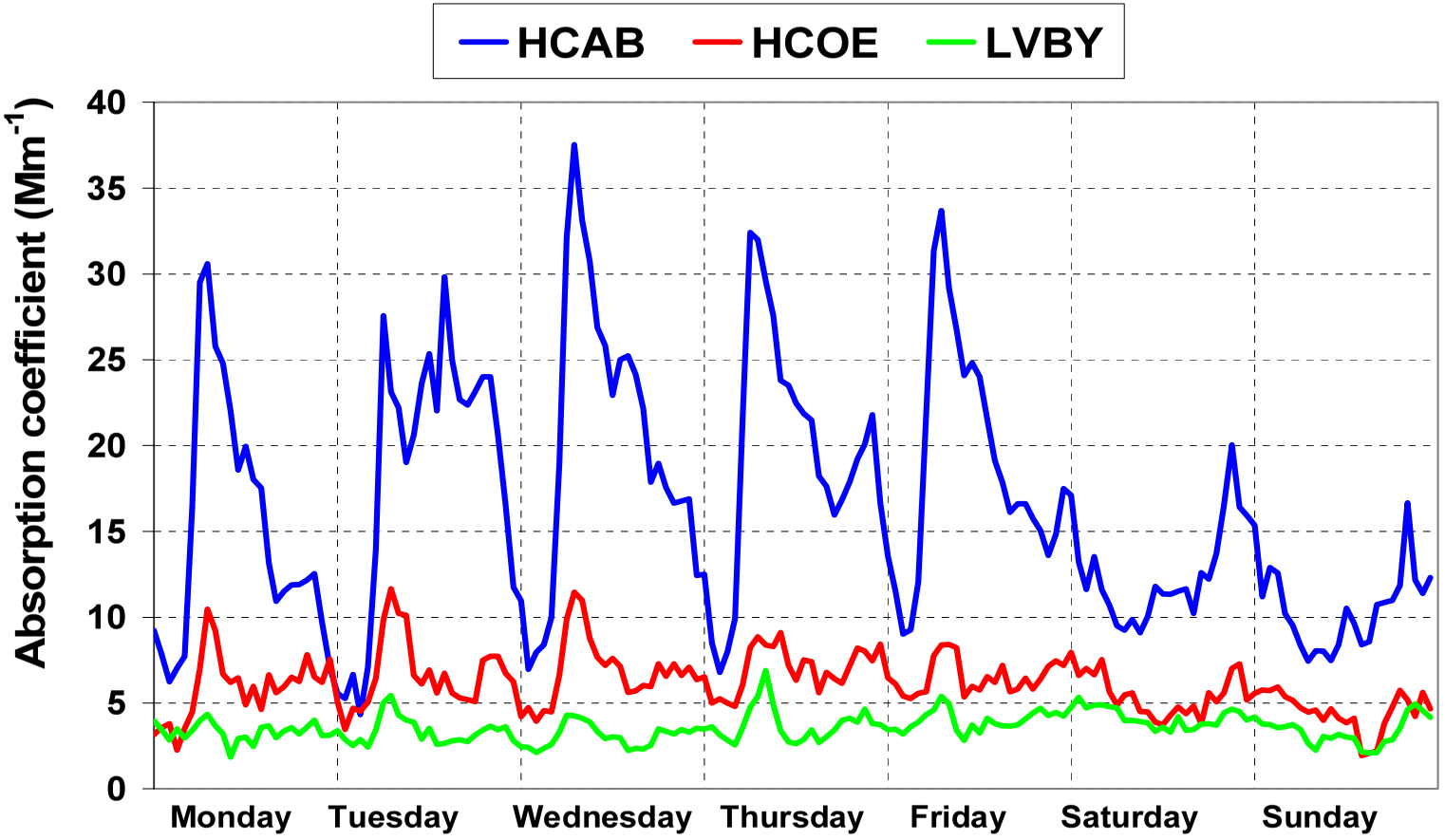
Measured Signal / Conversion

$$\sigma_a = \ln\left[\frac{\left(\frac{S}{S_R}\right)_t}{\left(\frac{S}{S_R}\right)_{t+\Delta t}}\right] \cdot \left(\frac{A}{C_{Filter} \cdot Q \cdot \Delta t}\right)$$

σ_a: Absorption coefficient (m^{-1})
S: Detected signal (voltage)
S_R: Detected reference signal (voltage)
Q: Air flow through the filter (ml/min)
Δ_t: Time between the measuring points (min)
C_{Filter}: Filter constant = 2
A: Area of absorption at the filter (m^2)

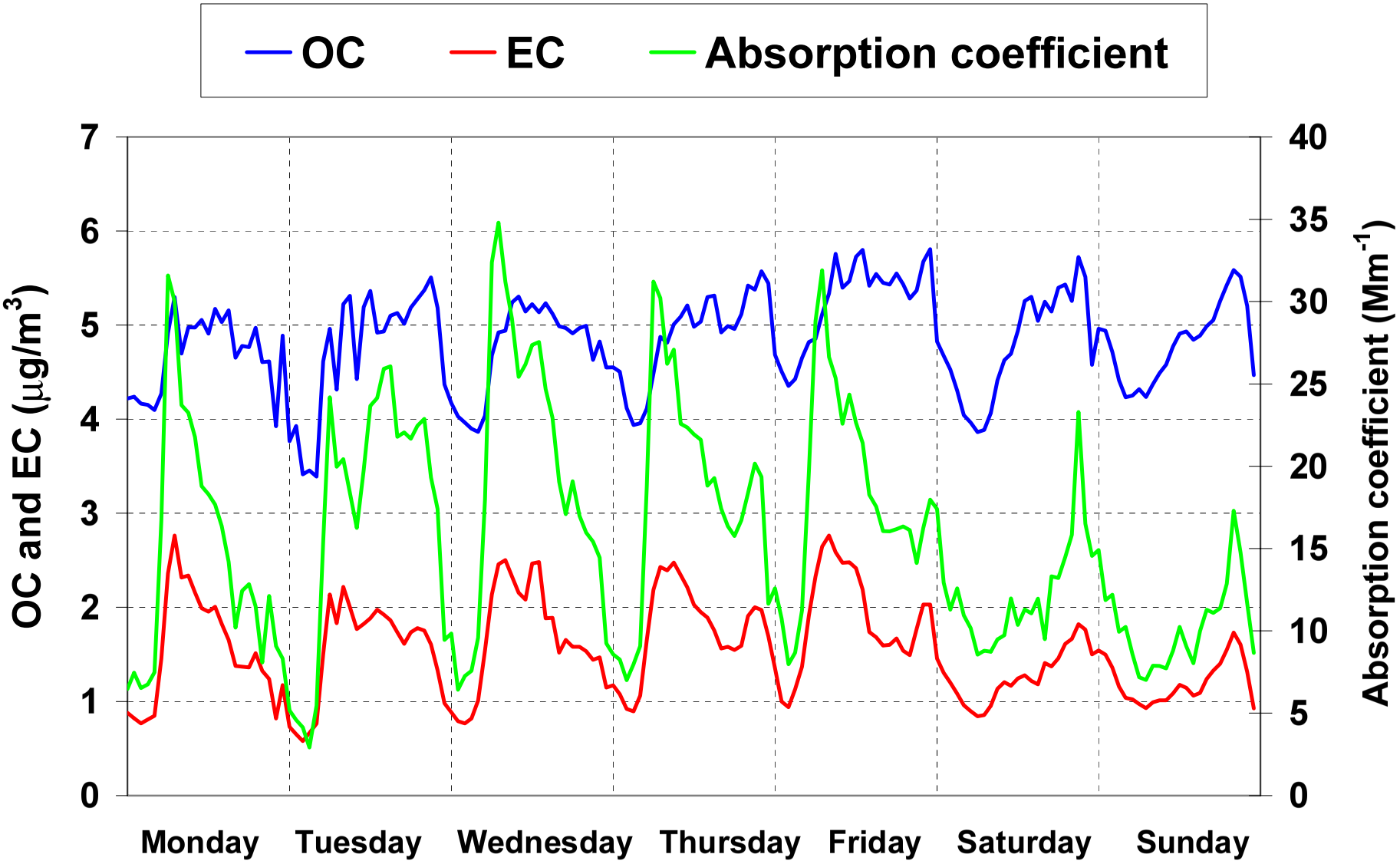


Average week - Absorption coefficient



	Average
HCAB: H. C. Andersens Boulevard (Busy street in Copenhagen)	16 Mm^{-1}
HCOE: H. C. Ørsteds Institute (Urban background in Copenhagen)	6 Mm^{-1}
LVBY: Lilly Valby (Regional background)	4 Mm^{-1}

Comparison with ACPM at kerbside (HCAB)



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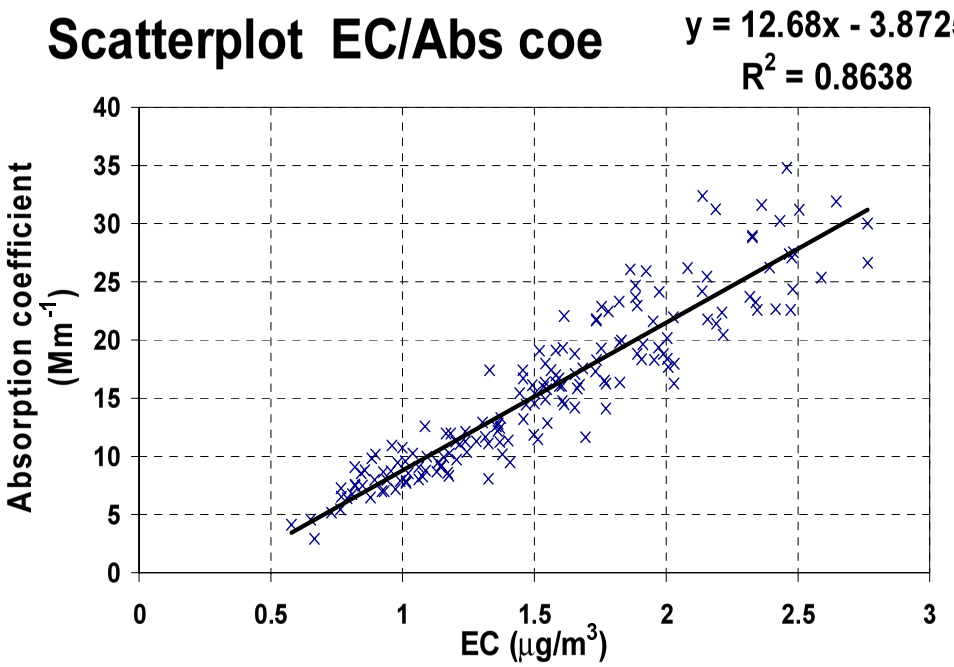

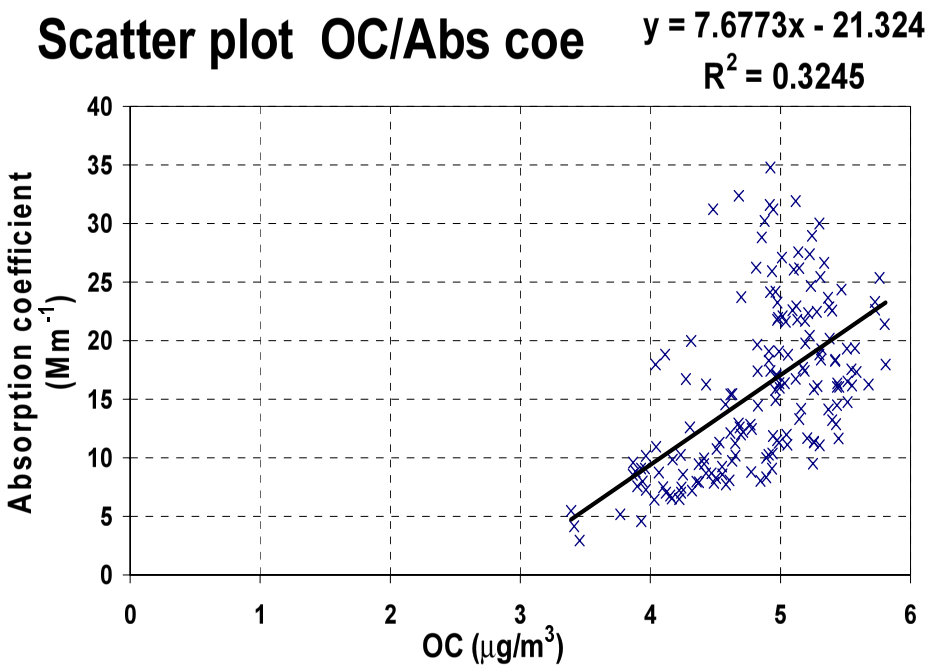

$$\mathrm{EC}\,(\mu\mathrm{g/m^3}) = \frac{\text{Absorption Coefficient}\,(\mathrm{Mm^{-1}}) + 3.8}{12.7}$$

$$C_{\mathrm{Soot}}(\mathrm{g/m^3}) = \frac{\sigma_a(\mathrm{m^{-1}})}{\sigma_{\mathrm{specific}}(\mathrm{m^2/g})}$$

In the literature found in the range 2 to 20