

Supporting Information - Particle number size
distribution evaluation of Plantower PMS5003
low-cost PM sensors – A field experiment

Alexandre Caseiro¹, Seán Schmitz¹, and Erika von Schneidemesser¹

¹Research Institute for Sustainability – Helmholtz Centre
Potsdam, Potsdam, Germany

August 23, 2024

S1 – Time series of raw particle counts

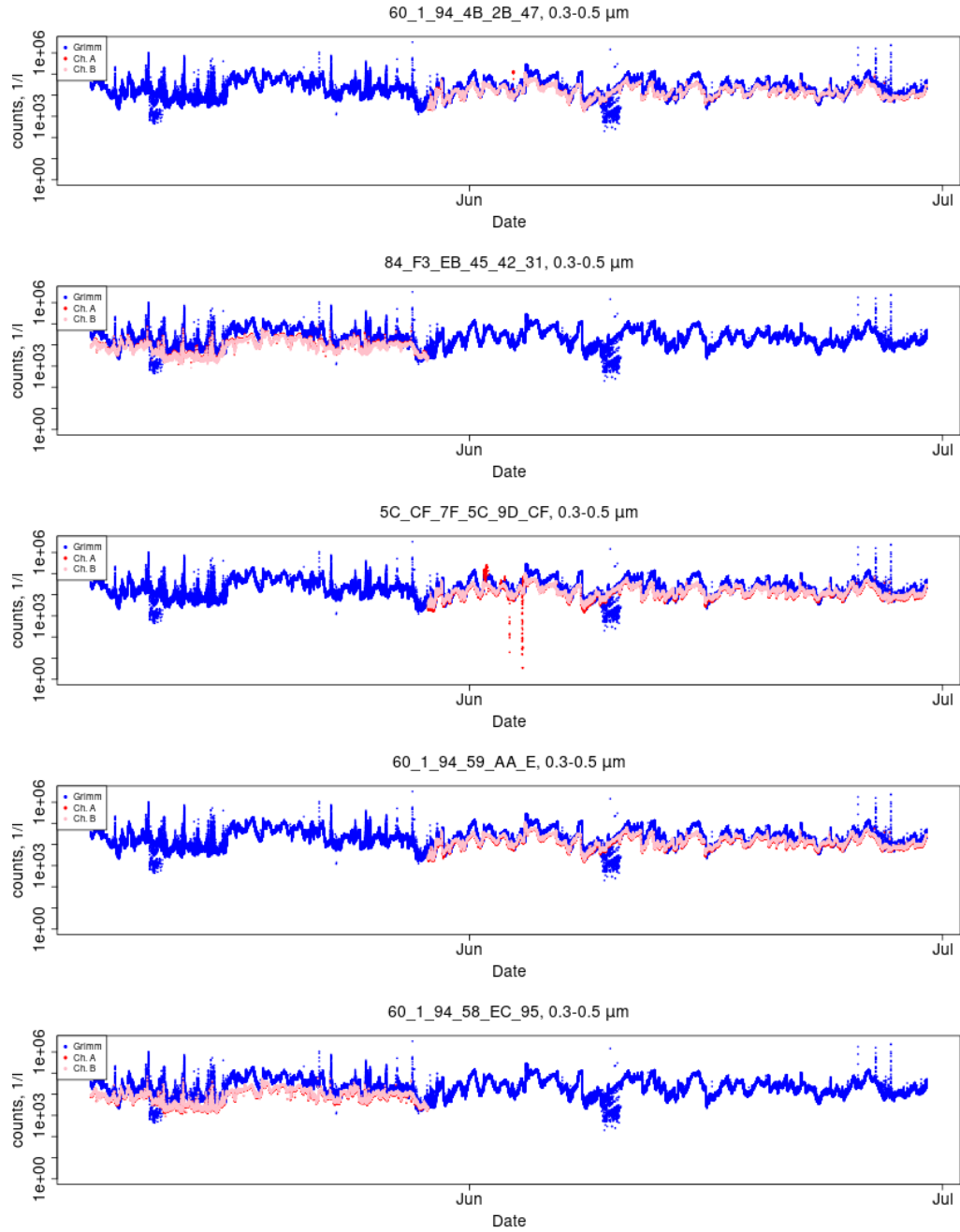


Figure S1: Time series of raw particle counts for the size bin 0.3–0.5 μm

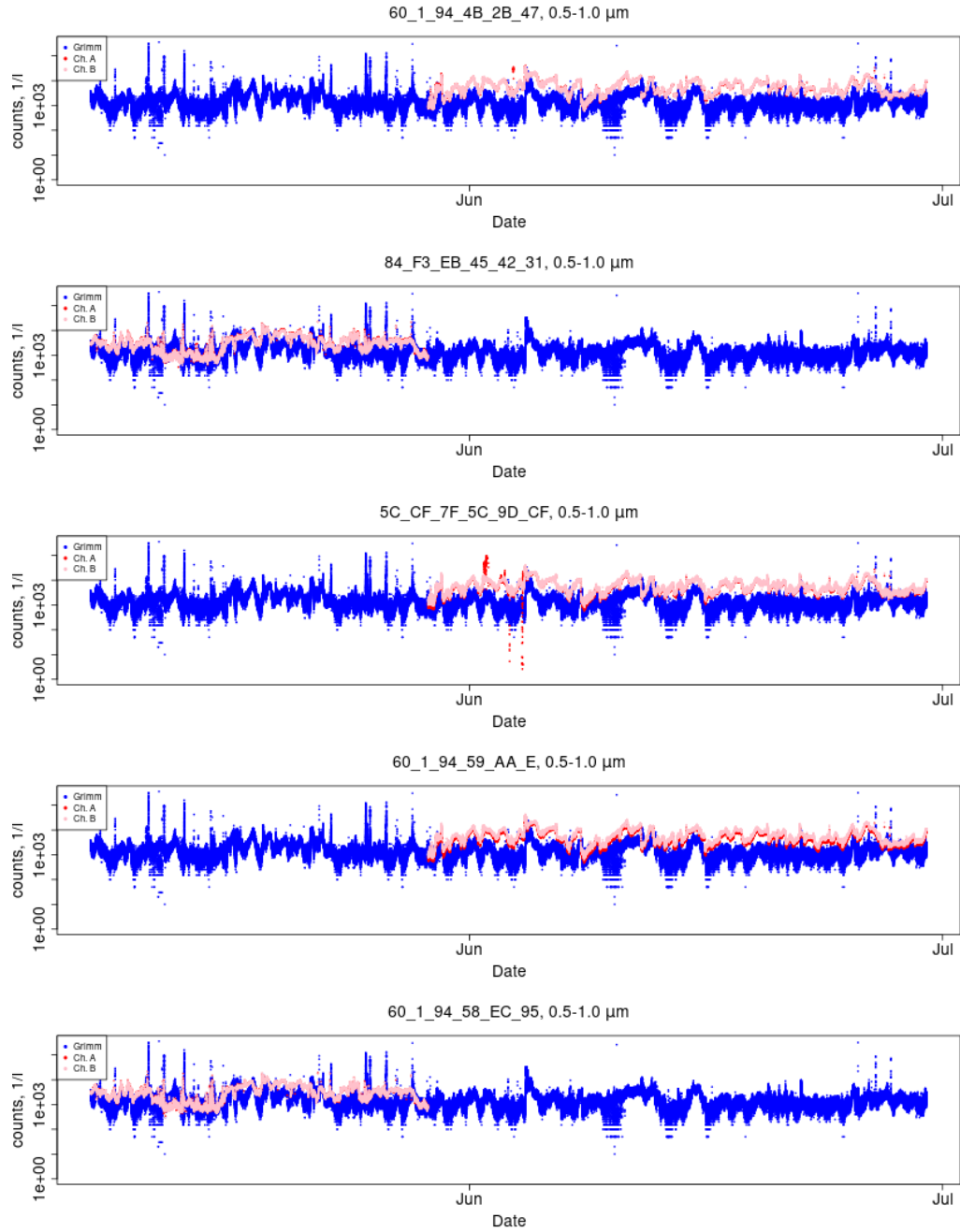


Figure S2: Time series of raw particle counts for the size bin 0.5–1.0 μm

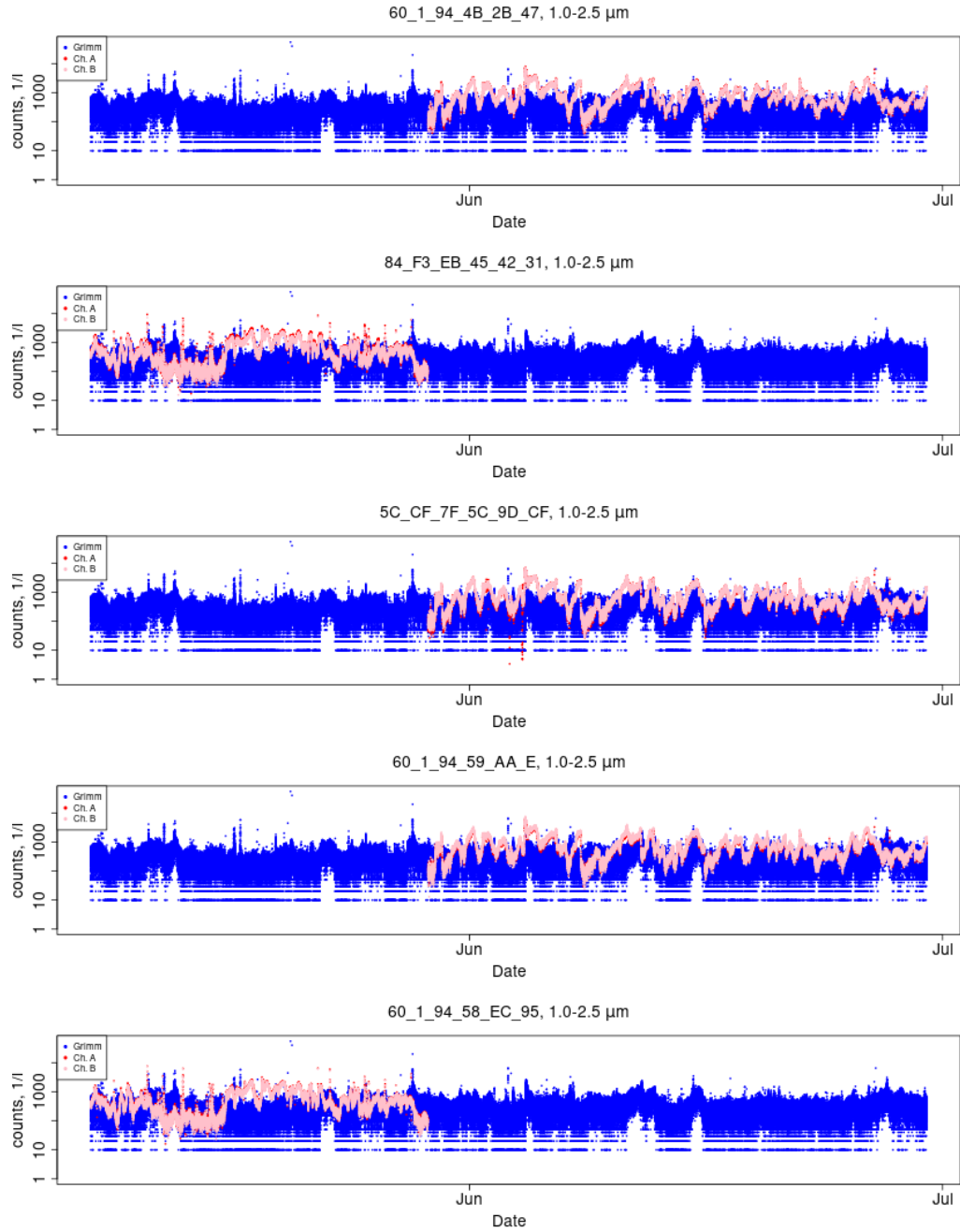


Figure S3: Time series of raw particle counts for the size bin 1.0–2.5 μm

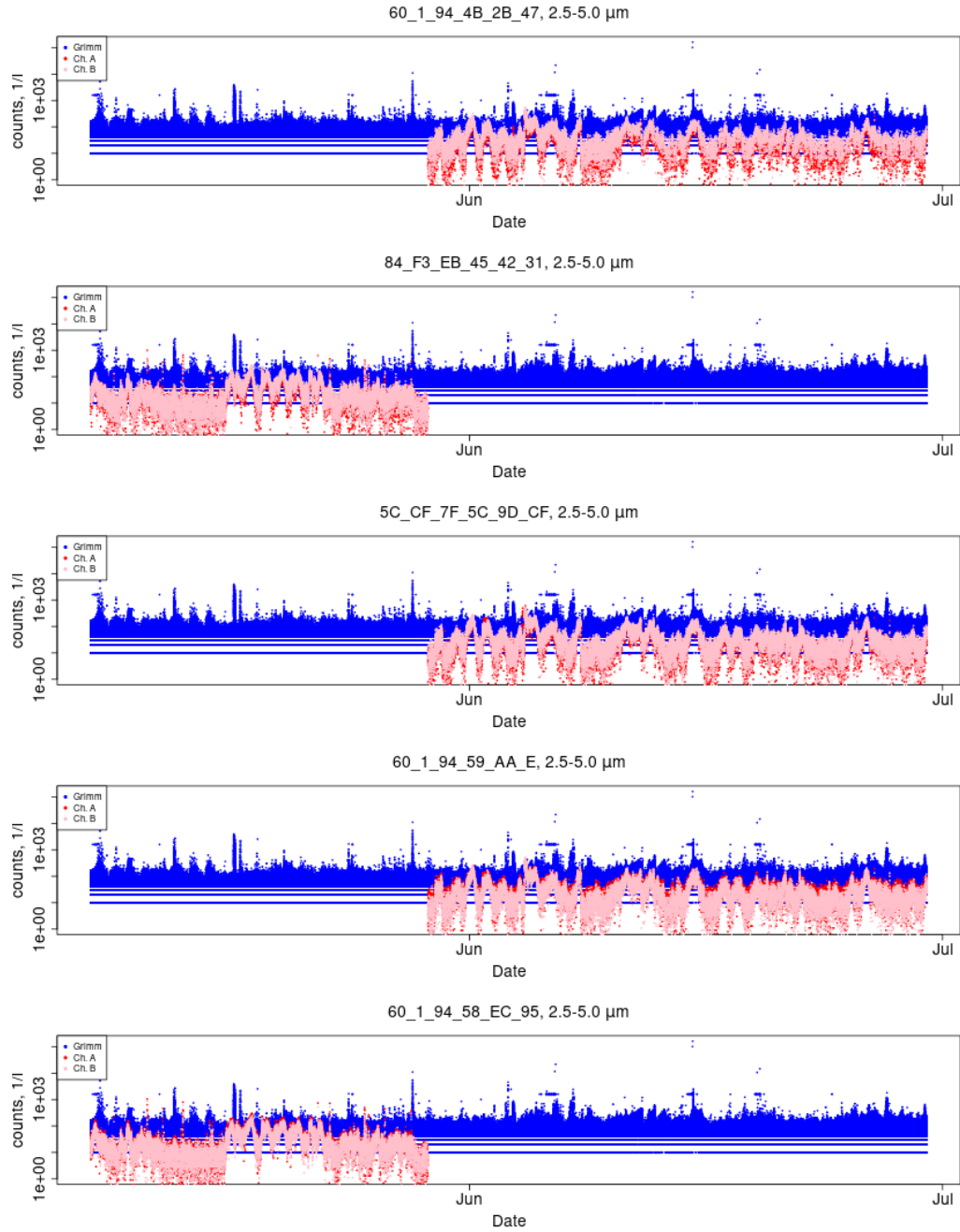


Figure S4: Time series of raw particle counts for the size bin 2.5–5.0 μm

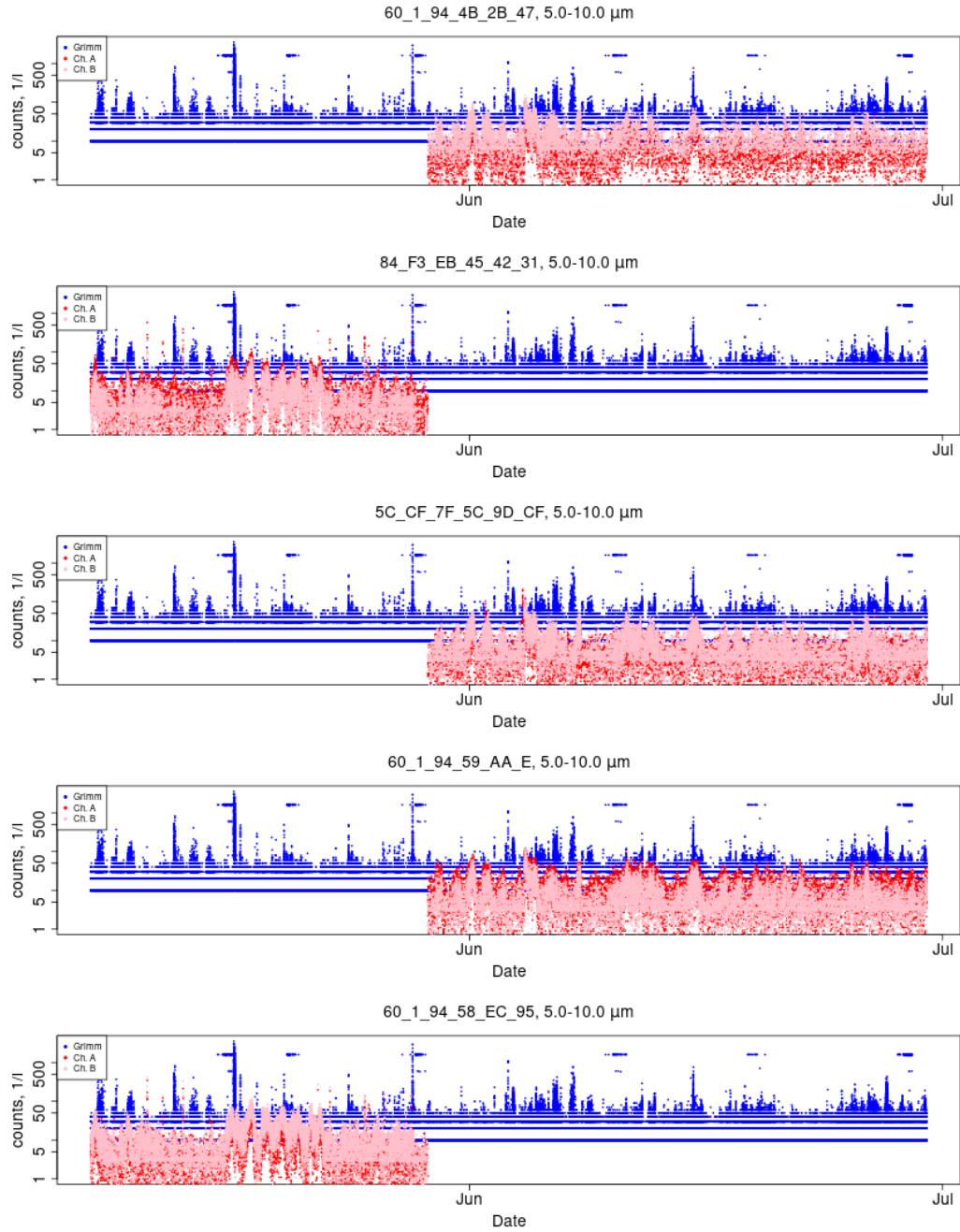


Figure S5: Time series of raw particle counts for the size bin 5.0–10 μm

S2 – Influence of temperature

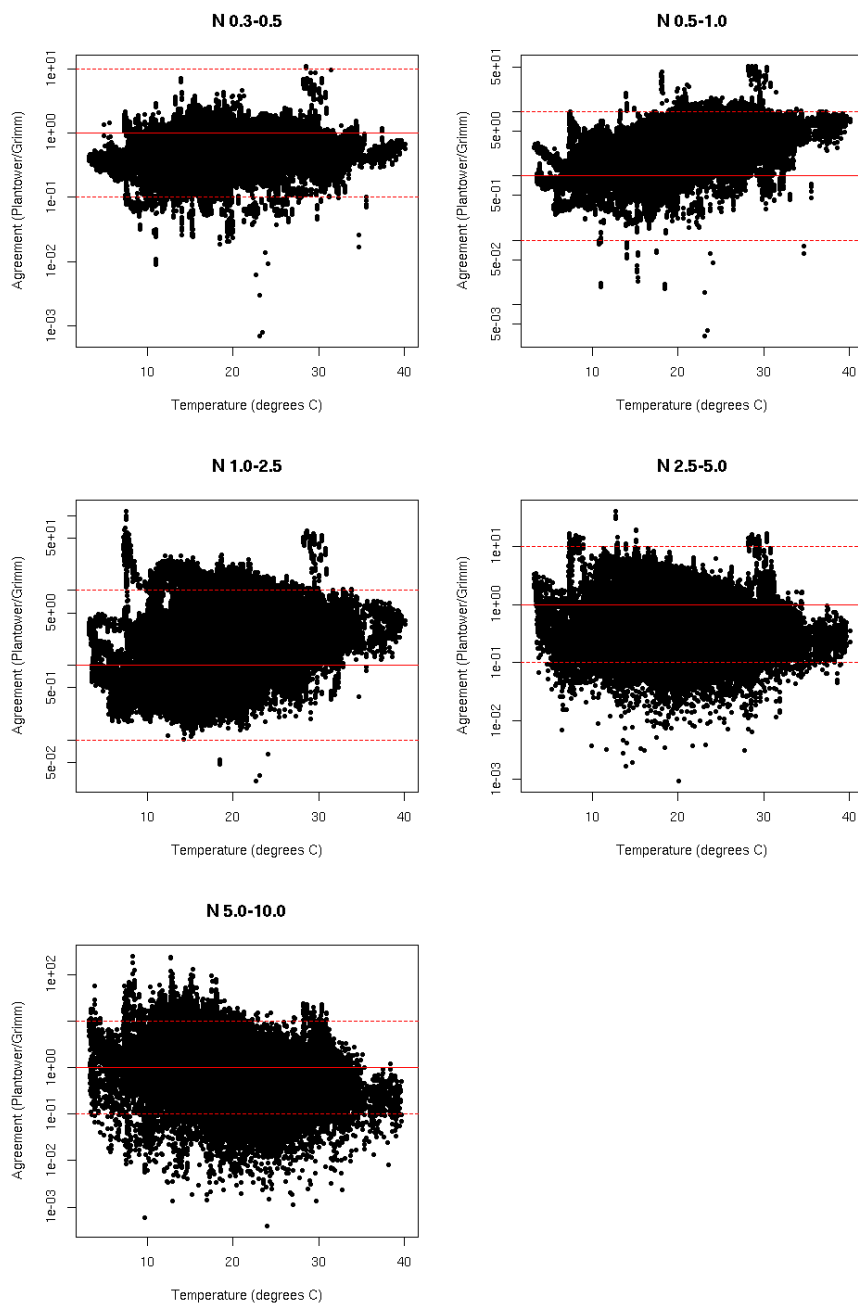


Figure S6: Agreement (ratio of Plantower number concentration to Grimm number concentration) for the five size bins as a function of the ambient temperature.

S3 – Operations performed to obtain comparable datasets

The goal of these operations is to obtain size classifications that are comparable between both instruments.

$$\begin{aligned} N_{0.3-0.5, PMS5003} &= N_{>0.3, PMS5003} - N_{>0.5, PMS5003} \\ N_{0.3-0.5, GRIMM} &= N_{0.3-0.35, GRIMM} + N_{0.35-0.4, GRIMM} + N_{0.4-0.45, GRIMM} + \\ &N_{0.45-0.5, GRIMM} \end{aligned}$$

$$\begin{aligned} N_{0.5-1.0, PMS5003} &= N_{>0.5, PMS5003} - N_{>1.0, PMS5003} \\ N_{0.5-1.0, GRIMM} &= N_{0.5-0.58, GRIMM} + N_{0.58-0.65, GRIMM} + N_{0.65-0.7, GRIMM} \\ &+ N_{0.7-0.8, GRIMM} + N_{0.8-1.0, GRIMM} \end{aligned}$$

$$\begin{aligned} N_{1.0-2.5, PMS5003} &= N_{>1.0, PMS5003} - N_{>2.5, PMS5003} \\ N_{1.0-2.5, GRIMM} &= N_{1.0-1.3, GRIMM} + N_{1.3-1.6, GRIMM} + N_{1.6-2.0, GRIMM} + \\ &N_{2.0-2.5, GRIMM} \end{aligned}$$

$$\begin{aligned} N_{2.5-5.0, PMS5003} &= N_{>2.5, PMS5003} - N_{>5.0, PMS5003} \\ N_{2.5-5.0, GRIMM} &= N_{2.5-3.0, GRIMM} + N_{3.0-3.5, GRIMM} + N_{3.5-4.0, GRIMM} + \\ &N_{4.0-5.0, GRIMM} \end{aligned}$$

$$\begin{aligned} N_{5.0-10.0, PMS5003} &= N_{>5.0, PMS5003} - N_{>10.0, PMS5003} \\ N_{5.0-10.0, GRIMM} &= N_{5.0-6.5, GRIMM} + N_{6.5-7.5, GRIMM} + N_{7.5-8.0, GRIMM} + \\ &N_{8.0-10.0, GRIMM} \end{aligned}$$

S4 – Location of the sampling site



Figure S7: Map showing the location of the sampling site within the city of Potsdm and the location of the instruments with respect to the traffic zone.