



Supplement of

Evaluation of a low-cost dryer for a low-cost optical particle counter

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Table S1. Summary of statistical metrics for performance evaluation.

Comparison metrics	Short name	Mathematical formula
Standard deviation	SD	$\sqrt{\frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2}$
Coefficient of determination	R ²	$\left(\frac{\sum_{i=1}^n (M_i - \bar{M})(RM_i - \bar{RM})}{\sqrt{\sum_{i=1}^n (M_i - \bar{M})^2 \sum_{i=1}^n (RM_i - \bar{RM})^2}} \right)^2$
Pearson coefficient	r	$\frac{\sum_{i=1}^n (M_i - \bar{M})(RM_i - \bar{RM})}{\sqrt{\sum_{i=1}^n (M_i - \bar{M})^2 \sum_{i=1}^n (RM_i - \bar{RM})^2}}$
Root Mean Square Error	RMSE	$\sqrt{\frac{1}{n} \sum_{i=1}^n (M_i - RM_i)^2}$
Mean Bias Error	MBE	$\bar{M} - \bar{RM}$
Mean Absolute Error	MAE	$\frac{1}{n} \sum_{i=1}^n M_i - RM_i $

Note: x_i refers to a value measured by the sensor or the reference instrument, M_i refers to a value measured by the sensor at time t , RM_i refers to a value measured by reference instrument at time t , n refers to the total number of observations

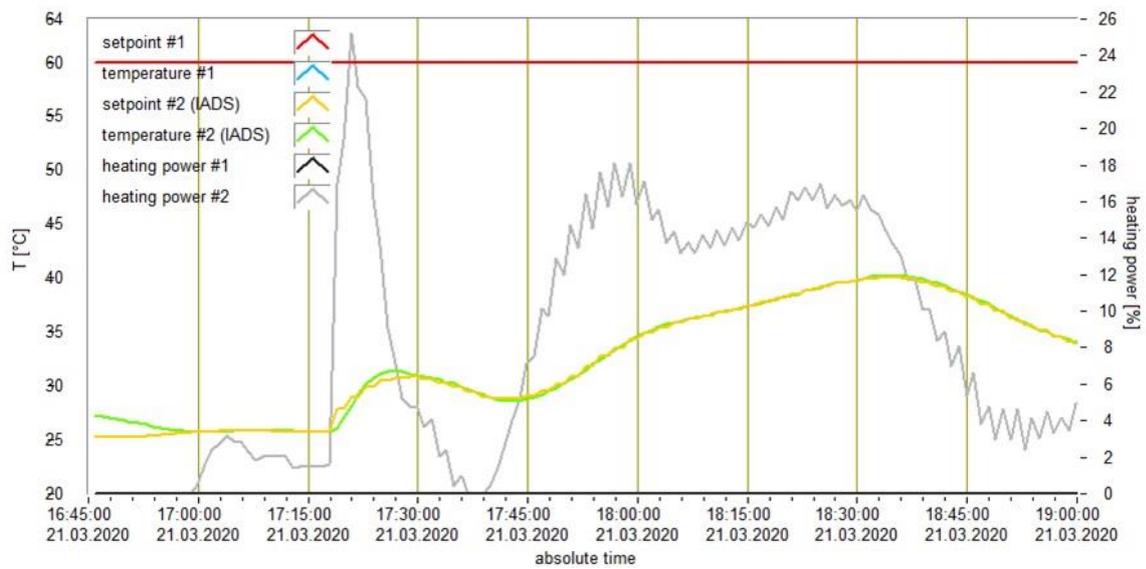


Figure S1. Temperature of the IADS (in green) and percentage of the used heating power (in grey) during the experiment with water droplets and the IADS under default settings (automatic mode) in laboratory conditions.

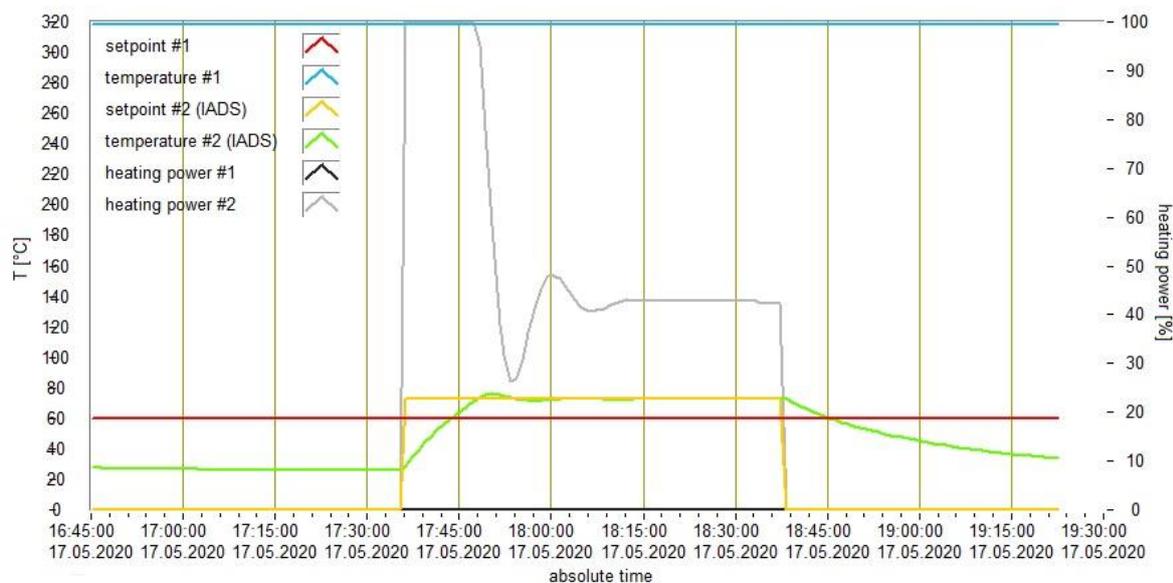


Figure S2. Temperature of the IADS (in green) and percentage of the used heating power (in grey) during the experiment with with water droplets in laboratory conditions. *Setpoint #2* (in yellow) was manually adjusted to 70 °C.

Table S2. Range of deliquescence (DRH) and efflorescence (ERH) relative humidity for the tested hygroscopic aerosols at 298 K (Peng et al., 2022).

Compounds	DRH (%)	ERH (%)
KCl	83 – 86	50 – 60
NaCl	73 – 77	41 – 51
(NH ₄) ₂ SO ₄	78 – 82	30 – 48
NH ₄ NO ₃	60 – 66	25 – 36

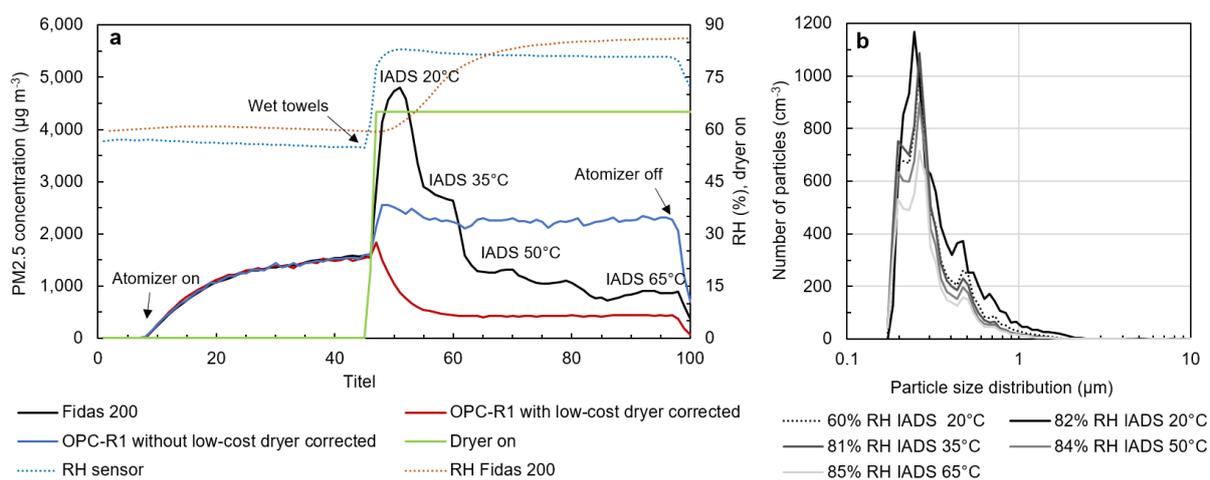


Figure S3. (a) Time series of the PM_{2.5} concentration during an experiment with NH₄NO₃ particles using different IADS temperatures, (b) particle size distribution measured by the reference instrument for different IADS temperatures before (dotted line) and after (solid lines) deliquescence.

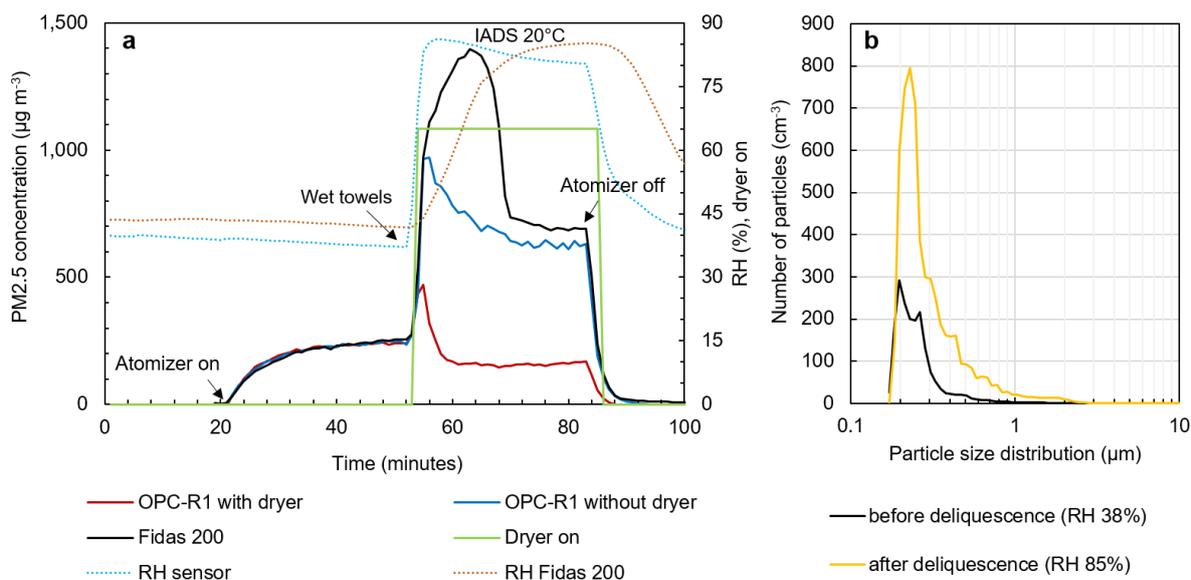


Figure S4. (a) Time series of the PM_{2.5} concentration during an experiment using a mixture of (NH₄)₂SO₄, NH₄NO₃, KCl and NaCl (20 g l⁻¹ each compound) and the IADS system at 20 °C, (b) particle size distribution of the reference instrument before and after deliquescence.

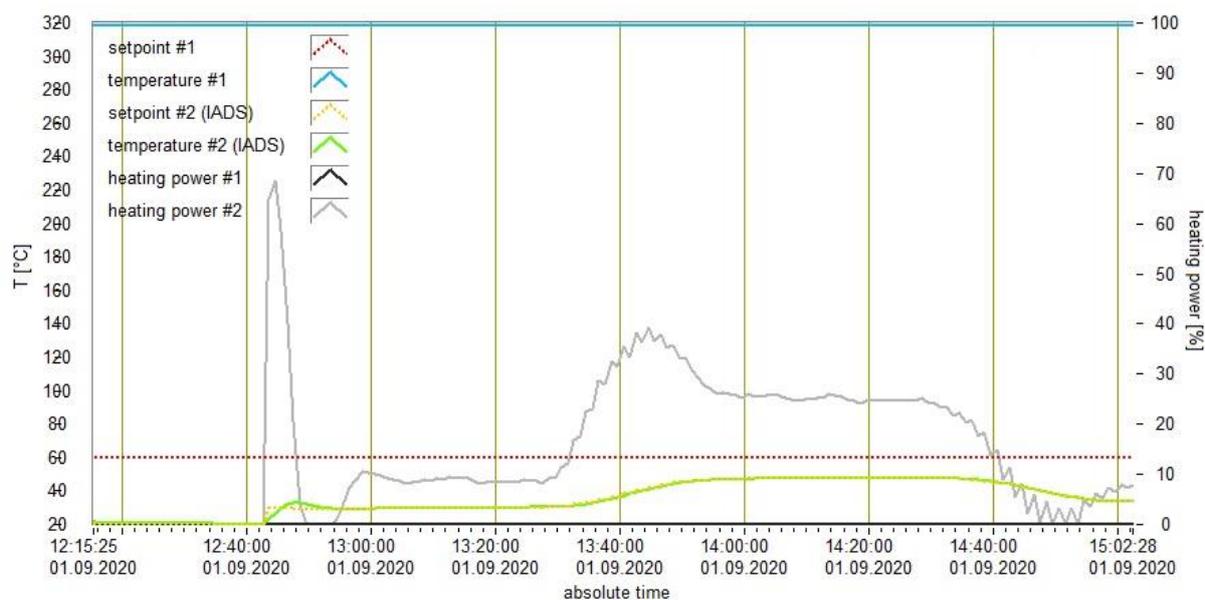


Figure S5. Temperature of the IADS (in green) and percentage of the used heating power (in grey) during the experiment with (NH₄)₂SO₄ particles in laboratory conditions.

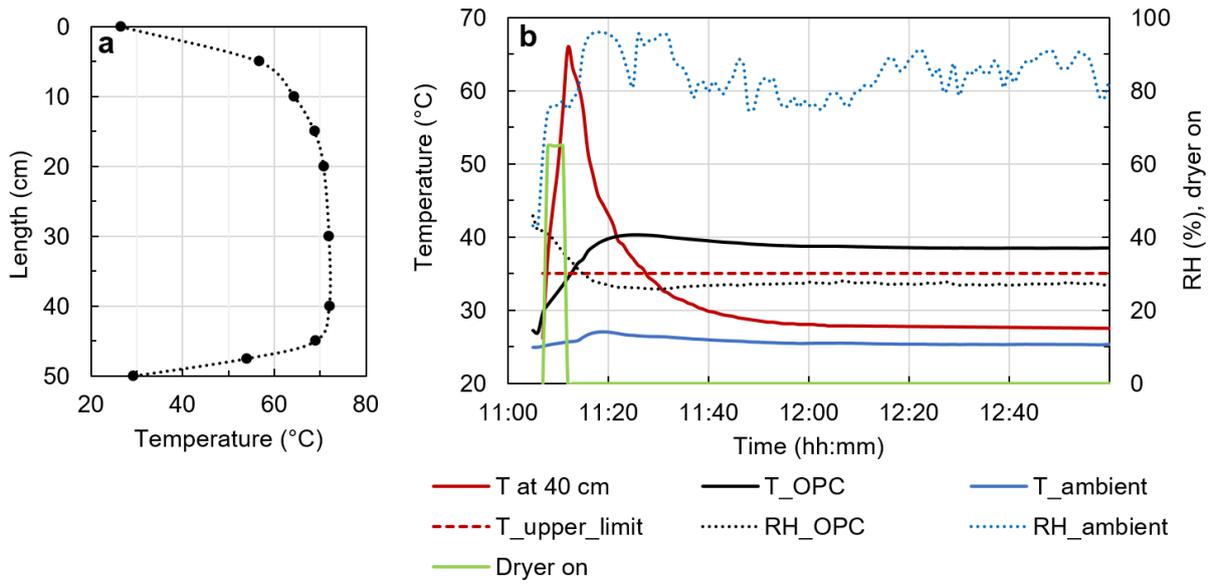


Figure S6. (a) Temperature profile at the inner wall of the dryer, (b) Time series of the air temperature inside the dryer at 40 cm, T_{OPC} and the ambient temperature, as well as RH_{OPC} , the ambient RH and the time when the dryer is on.

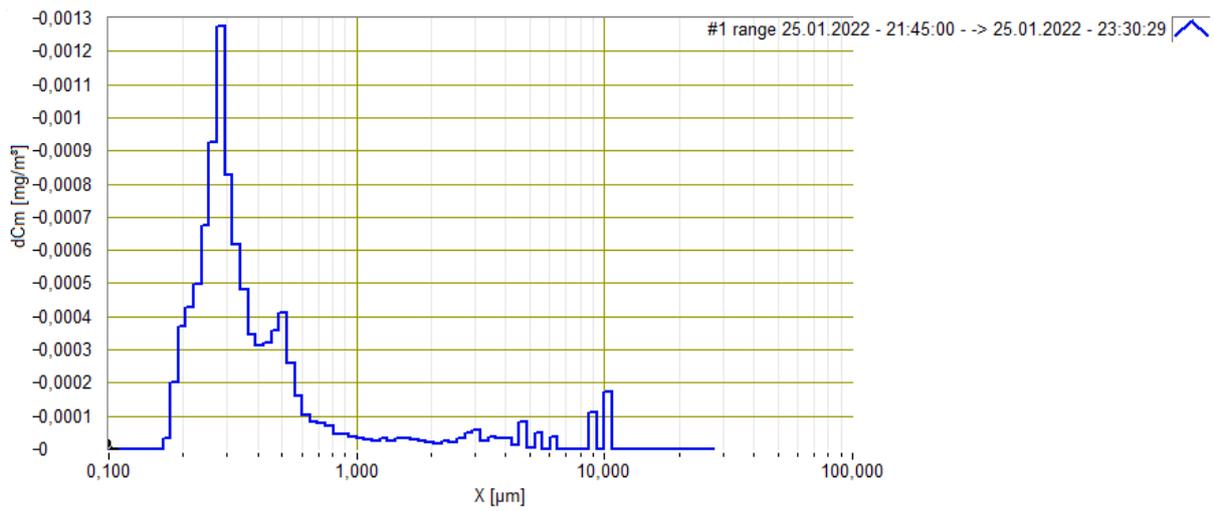


Figure S7. Mass concentration as a function of the particle diameter during the phase II of field measurements (fog event) measured by the reference instrument (Fidas® 200).

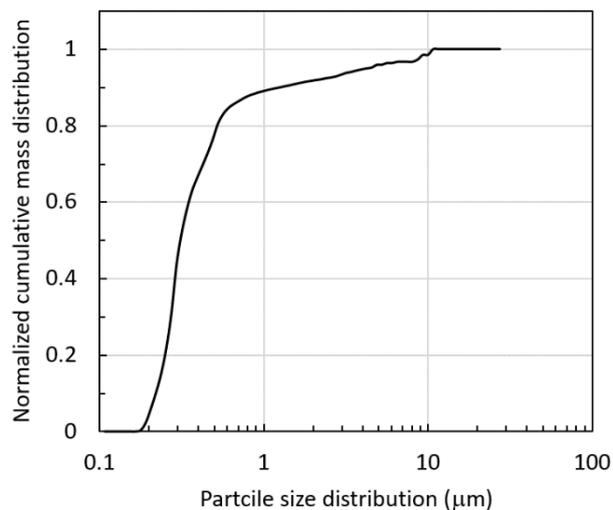


Figure S8. Normalized cumulative mass concentration as a function of the particle diameter during the phase II of field measurements (fog event) measured by the reference instrument (Fidas® 200).

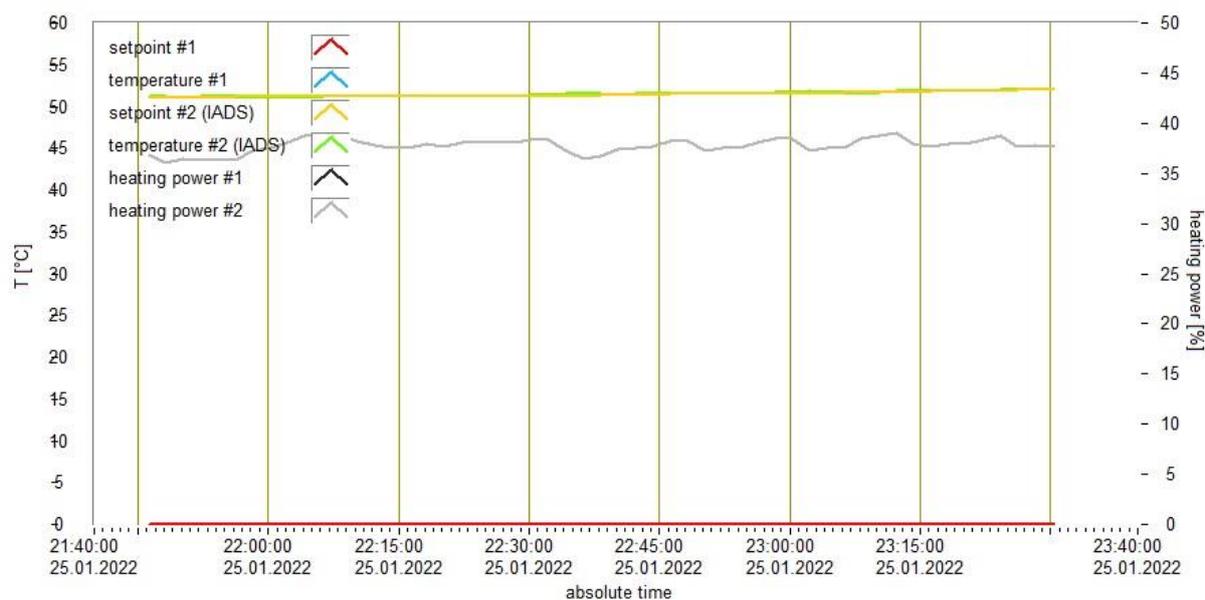


Figure S9. Temperature of the IADS (in green) and percentage of the used heating power (in grey) during the phase II (fog event) of the field measurements.

References

Peng, C., Chen, L., and Tang, M.: A database for deliquescence and efflorescence relative humidities of compounds with atmospheric relevance, *Fundamental Research*, 2, 578–587, <https://doi.org/10.1016/j.fmre.2021.11.021>, 2022.