

The REDMAAS 2015 intercomparison campaign (CPC+ long/nano-SMPS+UFPM): First results

F. J. Gómez-Moreno^{1*}, E. Alonso¹, B. Artíñano¹, J. Rodríguez-Maroto¹, E. Rojas¹, M. Piñeiro Iglesias², P. López Mahía², N. Pérez³, A. Alastuey³, V. Archilla⁴, G. Titos^{5,6}, L. Alados-Arboledas^{5,6}, E. Borrás⁷, A. Muñoz⁷, T. Tritschen⁸, E. Filimundi⁸ and E. Latorre⁹

¹Department of Environment, CIEMAT, Madrid, E-28040, Spain

²Grupo de Química Aplicada, Instituto Universitario de Medio Ambiente (IUMA), Centro de Investigaciones Científicas Avanzadas (CICA), Departamento de Química Analítica, Facultad de Ciencias, Universidade da Coruña, Campus da Coruña, 15071 A Coruña, Spain

³Institute of Environmental Assessment and Water Research (IDAEA-CSIC), Barcelona, E-08034, Spain

⁴Turbojet Test Centre, INTA, Torrejón de Ardoz, E-28850, Spain

⁵Andalusian Institute for Earth System Research, IISTA-CEAMA, Granada, E-18071, Spain

⁶Applied Physics Department, University of Granada, Granada, E-18071, Spain

⁷Fundación CEAM. Parque Tecnológico, Paterna, Valencia, E- 46980, Spain

⁸TSI GmbH, Aachen, D-52068, Germany

⁹Álava Ingenieros, Madrid, E-28037, Spain

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*Presenting author email: fj.gomez@ciemat.es

The Spanish Network on environmental DMAs (Red Española de DMAs Ambientales, REDMAAS) is currently formed by seven groups involved in the measurement of atmospheric particle size distributions by means of Differential Mobility Analyzers (DMAs) (Wiedensohler et al., 2012). These groups are: IUMA-UDC, IDAEA-CSIC, INTA, IARC-AEMET, University of Granada, CEAM and CIEMAT. The REDMAAS was established in 2010 (Gómez-Moreno et al., 2015) and its main objective is the cooperation between the groups to solve common problems and to optimize their facilities and protocols. The main activities developed in the network include: DMA calibration; CPC (Condensation Particle Counter), SMPS (Scanning Mobility Particle Sizer) and UFPM (Ultrafine Particle Monitor) intercomparison; among others. In this work, the main results obtained during the 2015 long/nano-SMPS+UFPM intercomparison campaign are shown. In this campaign several other groups were invited to participate and their results are included in this work. Another novelty is the intercomparison of nano-SMPS, not done previously in the network.

The field intercomparison exercise was performed during September 2015 in the CIEMAT facilities (Madrid). There were 6 complete SMPS systems (6 long DMAs and 3 nanoDMAs), an UFPM and four additional CPCs. After calibrating all the flow rates, a CPC intercomparison was performed for 4 TSI CPC 3772, 5 TSI CPC 3775 and 1 TSI CPC 3785. All of them use butanol as condensation liquid except CPC 3785, which uses water. Ambient air was sampled from a common flow splitter, which was connected to an external probe. A diffusional screen was installed to remove the smallest size so all the CPC could measure in the same size range. The results for this intercomparison can be found in figure 1. Most of the time, all the CPCs are in the average $\pm 10\%$ band, so they can be considered in the correct values.

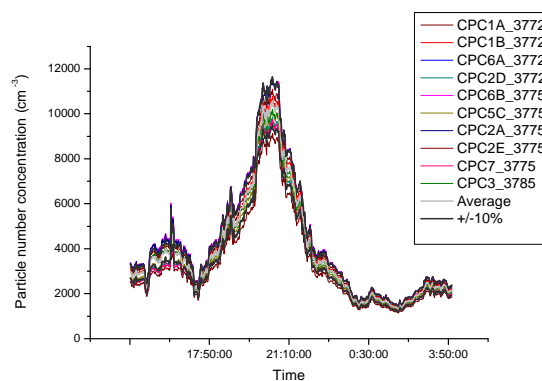


Figure 1. CPC intercomparison.

The UFPM was also intercompared with the CPCs. In general, the UFPM underestimated the particle number concentrations although the agreement between the UFPM and CPCs was within 20%.

As in previous intercomparisons, the SMPS calibrations were checked with latex particles (80 and 200 nm) obtaining good results in the $\pm 5\%$ band. There were two SMPS intercomparisons: one using the long DMAs and in the second case using the nanoDMAs. The measurements showed similar results to those obtained previously (Gómez-Moreno et al., 2015).

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Gómez-Moreno et al. (2015) *Aerosol Science and Technology*, **49**, 777–785.

Wiedensohler et al. (2012) *Atmospheric Measurement Technique*, **5**, 657–685.