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Atmospheric Measurement Techniques Discussions

Interactive comment on "Design and performance of an automatic regenerating adsorption aerosol dryer for continuous operation at monitoring sites" *by* T. M. Tuch et al.

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I enjoyed reading this manuscript. It gives a useful solution to an ongoing problem faced by the aerosol community particularly those interested in bringing about or maintaining comparability of measurements between different sites and networks.

While diffusion drying is relatively simple for short measurement programs continuous measurement programs require an efficient dryer capable of operating unattended, often for extended periods. This system clearly meets the need; it would be good if it could be further developed to reduce power requirements down from a three-phase compressor but despite this limitation it is still a very nice solution. Inclusion of the

mesh details for the diffusion tubes would help others wishing to replicate the system. The use of stainless steel throughout is excellent, but the reason given, for reducing losses due to image charges (p1146, l18), may be a little inaccurate. Conducting surfaces such as stainless steel will still image a charged aerosol enhancing diffusive transport to the wall, non-conducting surfaces that support surface and body charges need to be avoided to prevent unwanted fields arising from tribo, piezo or other charging activity (that are slow to dissipate). In the description of the experimental verification of transmission efficiency it would be good to mention whether the dryer was loaded with desiccant for the tests, and if so how any effects due to difference in relative humidity of the two sample streams were avoided in deriving the transmission efficiency. It would be good to see the transmission efficiency at larger sizes also verified, at least up to the 50% cut point since loss mechanisms for these larger particles will be biased more towards inertial processes than for the range so far tested, although I consider the verification work so far is sufficient to justify inclusion of this form of dryer design for the majority of practical monitoring programs.

Technical corrections, language etc:

P1144 L2 delete therefore L10 replace “below 3nm” with “smaller than 3nm” L12 replace drier with dryer L12 for English readers it would be better to use Amazon (rather than the Spanish Amazonas) L13 We present data from this monitoring site for the first 6... L25 change “to avoid” to “avoiding”

P1145 L2 change “like” to “such as” L7 Consequently, in the past, comparison of aerosol parameters from different measurement sites with different humidity conditions has been difficult. L9 change “like” to “such as” or “particularly” L12 Because significant aerosol growth typically starts at relative humidity levels greater than about 50%, a common... L20 ...heat the aerosol, although the temperature must be kept low to minimize evaporation, e.g. up to .....evaporates from.....

P1146 L7 change “with respect to” to “specifically for” L7 dryers L8-9 Change to: Often

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this is not feasible at remote. . .. L18 – see comments on image charge elsewhere in report L19 and elsewhere, should SI units be used instead of imperial units? L 20 delete “actual” L 27 . . .. . .pressure by dry air, with a very low dew point temperature, supplied by a large compressor.

P1147 L2 . . .shut at the top. . .. L7 replace “employment” with “deployment” L12 The temperature and humidity. . .. L19 delete “,” L20 delete “been longer ago than the” add “has exceeded a” L21 delete “(“ & “)” L21 This minimum time. . . L22 . . ..initiated the magnetic. . .. L25 . . .fully open, the

P1148 L1 Temperature and humidity values. . . L8 3 week L15 see comments elsewhere on humidity differences in the 2 streams L18 are the error bars +/- 1 standard deviation? This should be stated. L24 “Paul Baron’s Aerocalc” I’m note sure about this form of referencing. It could be useful to reference the actual equations as they appear in Baron and Willeke noting that AEROCALC is a spreadsheet implementation. L24 delete “Both”

P1149 L 2 delete “experimentally” L8 from figure 6 the flow appears to be between 5 and 10 l/min L8 Lower flow rates should only be used with this dryer if nanopaticles are not being measured. L9 . . . shifts towards smaller particles but at the expense of decreased drying performance. L13 Amazon L14 delete “off” insert “from” L19 delete “Note that”

P1150 L1 delete “look at” insert “examination of” L3 . . .minimum time) but this time was insufficient. . .. L6 ..operation of the dryer close to its limits, the set point.. L7 . . .40% and the minimum. . . L9 “adequately” sounds a bit negative, did it operate “well”? L9 delete “and we did not encounter” insert “ with no”

L16 We have designed a new automatically regenerating aerosol diffusion dryer that performs well under adverse environmental. . .. L18 The operating parameters of the drying system need to be set to the specific site requirements, but little routine maintenance is required making it ideal for use at remote continuous monitoring sites. L24

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. . .flow rate, aerosol. . .. L24, . . .over the size range. . .. L25 delete “below” insert “smaller than” L26 delete “one” insert “value”

Fig 2 caption: Delete “schematical” insert “schematic”.

Fig 5, are these data derived directly from those in Fig 4?

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