

Task Force on Measurement and Modelling Workshop on the low-cost DELTA system (DENuder for Long-Term Atmospheric sampling).

14-15 July 2005

Summary Report of the Workshop to the Chairman of TFMM

1. A workshop was hosted on 14-15 July 2005 by the Centre for Ecology and Hydrology (CEH Edinburgh) under the auspices of the CLRTAP-TFMM on the low-cost denuder method. The workshop was attended by 20 experts from 15 countries, including a representative of the EMEP Chemical Coordinating Centre, Mr Jan Erik Hanssen.
2. The workshop was opened by Mr Mark Sutton (UK), who explained how the workshop was a contribution toward implementing the new EMEP Monitoring Strategy. Under the monitoring strategy, there is a dual focus on:
 - i. advanced monitoring methods (at Level 2 and Level 3 sites) to collect high temporal resolution data to help the understanding of processes, source attribution etc. and
 - ii. practical monitoring methods (at Level 1 sites) to establish long-term temporal trends with a good regional spatial coverage.
3. The low-cost DELTA system, as developed by CEH (DENuder for Long-Term Atmospheric sampling), provides a contribution to the second of these objectives, as it allows long-term time-integrated measurements that speciate between reactive gaseous components (NH₃, SO₂, HNO₃, HCl) and fine aerosol components (NH₄⁺, SO₄²⁻, NO₃⁻, Cl⁻, base cations). Mr Sutton explained that the ambition was to encourage the establishment of measurements across the EMEP area, mainly through national contributions. In addition, a new EC integrated project, NitroEurope IP (starting 2006), will provide DELTA measurements for over 4 years at 50 sites across Europe.
4. The workshop included a series of presentations from Ms Sim Tang (UK) on the practical details of low-cost denuder measurements: design of the DELTA system, theory of denuder sampling, how to build and run DELTA systems. These included sessions on coating of denuders and preparing post-denuder filter-packs, chemical analysis, calculations and QA/QC approaches. The workshop finished with a field trip to the proposed EMEP Level 2/3 supersite at Auchencorth Moss.
5. The workshop provided the opportunity for a valuable sharing of information with the experts. In particular, this included presentations from Ms Eva Seitler (Switzerland) on the results of their tests with long-term mini-denuders and from Mr Martin Ferm (Sweden) on the theoretical basis of denuder sampling, including issues of aerosol collection efficiency.
6. Feedback from the experts indicated satisfaction that the workshop had met their expectations for practical information on implementing the low-cost denuder approach. The discussions also highlighted the priorities for further testing and refinement. Key issues included the potential for NO₂ interference using carbonate coated denuders in urban areas, the need to improve the characterization of the particle size cut-off (as with the EMEP filterpack method), the effect of running denuders in series or parallel for ammonia and acid gas sampling, the quantitative relevance of temperature correction in measurement of air volumes, the most suitable denuder acid coating for different climates, the need for radiation protection for denuder enclosures in hot climates and the need to standardize sampling measurement height (e.g. 1.5 – 2 m above short grass). It was agreed that, with an increasing number of laboratories taking up the method, there was a good prospect to assess the importance of these points and feed back the results to the Task Force and EMEP.

(Mark Sutton, Sim Tang and Jan Erik Hanssen)