

Compensation points

- Effect of N deposition on compensation points (Γ values)
- Lack of information on compensation points of semi-natural vegetation outside Europe

Issues regarding DELTA sampler

- Difference in deposition velocity of fine NH_4NO_3 and coarse NO_3^-
- Models don't get ratio of fine and coarse nitrate right
- DELTA system does not distinguish
- How can we get two different values?
- What does the DELTA measure
 - Characterise cut-off $\rightarrow$ CEH
 - Theoretical calculations of transmission (inlet & tubing) $\rightarrow$ Martin Ferm
 - Comparison with EMEP filter packs (sampling 2 mins. out of each hour; at remote sites)
 - Comparison against $\text{PM}_{2.5}/\text{PM}_{10}$ GRAEGOR/MARGA at CEH EMEP Supersite
 - Comparison at Spanish site against $\text{PM}_{2.5}$ & PM_{10} samplers
 - Use of cation for comparison with filter pack (no gas-phase interference)
 - Compile meta database on aerosol measurements collocated with DELTA sampler
 - NO_2 artefacts on K_2CO_3 denuders (showing up as HNO_3)
 - Test extended sampling train NaCl, followed by NaCO_3
 - Test in high NO_x , high RH environment (Edinburgh?)

High end measurement systems

- Ammonia flux measurement approaches
 - Need to go beyond wet chemistry
 - Some new approaches (TDL, photo-acoustic, Mo-converter & chemiluminescence) potentially suffer aerosol interference
 - With inlet can only achieve about 1 Hz
 - TDL not quantified for aerosol interference
 - UoZ developing photo-acoustic system
 - Initially for gradient measurement (atmospheric pressure, no filter, no inlet line)
 - Later aiming at open-path, fast response sensor
- Aerosol measurement
 - Good progress by aerosol mass spectroscopy (fine NO_3^- only, not coarse NO_3^- or NH_4^+)
 - UoZ photo-acoustic system for aerosol instrument
- Methods
 - Simple measurements; derive flux by comparison of concentration above field vs. background

People & instrumentation

- Photo-acoustic:
 - Maria Jose Sanz: NOVA
 - CEH: Pranalytica
 - UoZ: own development
- TDLs
 - CEH
 - UoM
 - ECN
 - CNR
- AMS's
 - CEH
 - UoM
- GRAEGOR's
 - CEH
 - MPI Mainz

Alternative Flux Measurement Approaches

- Concentration enhancement + background + dispersion modelling
- Surrogate surface collectors (NO_3^- & NH_4^+)

Processes

- Example from Braunschweig – comparison of different emission potentials
 - Suggests emissions over grassland does not derive from leaves
 - Leaf litter & soils are much more important than previously thought
 - Emissions after cut due to exposure of leaf litter to air (no recapture, higher temperature)
 - Need more plant physiological work on leaf litter
 - Models need better treatment of soil and leaf litter pools
 - Soil cuvette measurements
 - Extent of N remobilisation in autumn is important for emissions
 - In-canopy profiles
 - Requirement to identify importance of leaf litter for other systems

Uncertainties in modelling NH_3 exchange

- Derive simplified, generalised compensation points for range of vegetation
- No data on stomatal compensation points for semi-natural vegetation outside Europe
- Uncertainty in chemistry effects on cuticular uptake resistances
 - How will they change with changing atmospheric composition

Advection

- Advection error induced by field itself, even if fetch sufficient according to footprint model.
- Not considered for any compound (inc. NH_3)