MONITORING ATMOSPHERIC AMMONIA: FIRST RESULTS

Concern over atmospheric deposition of nitrogen to sensitive ecosystems has increased in recent years as it has become apparent that estimated deposition loads in Europe are frequently in excess of thresholds for environmental change. The major predicted impacts are soil acidification and nitrogen eutrophication of naturally nutrient poor ecosystems. Deposition of available fixed nitrogen occurs in two main forms: as oxidised nitrogen species (Noy) primarily from the burning of fossil fuels, and as reduced nitrogen species (NHx), which results mainly from emissions of ammonia from agricultural systems. DETR has initiated a new project to monitor NH3 concentrations across the country, coordinated by ITE Edinburgh.

Several methods were compared initially, including a new active denuder system and a modified membrane diffusion tube method. As a result of the comparison, the network has been set up with a two tier approach. The new DELTA (DEnuder for Long Term Ammonia) sampling system has been installed at many sites widely spaced across the country, while a modified application of membrane diffusion tubes has been used at clusters of sites in expected high concentration areas.

The new network consists of around 70 sites distributed throughout the UK. As part of the strategy for selecting monitoring sites, it was agreed to include the 11 ECN terrestrial sites.

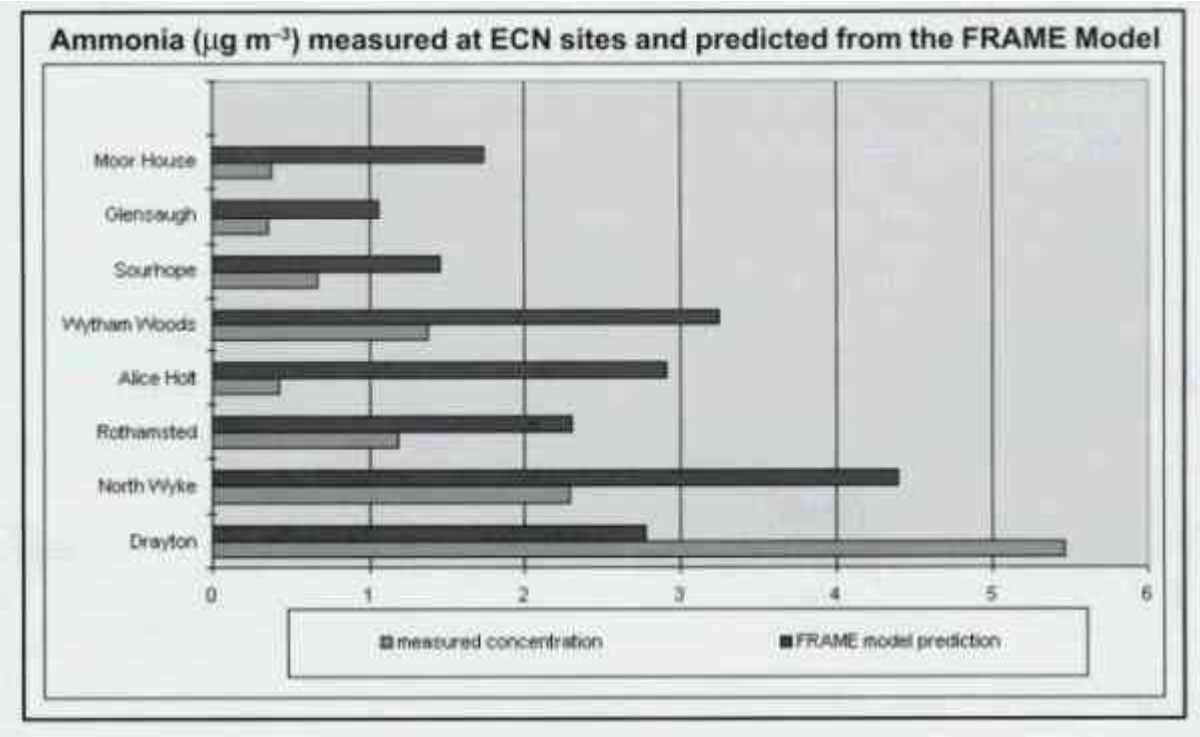
Initial Results

Many of the sites in the network have now been running for over a year. A summary of the results from some of the ECN sites is shown below. These are preliminary and therefore should be treated with caution. Nevertheless, initial trends are already apparent.

The highest concentration is at Drayton and the lowest at Glensaugh (with the exception of Moor House, for which only initial data are available). It is interesting to note that for these sites, with the exception of Drayton, the measured concentrations are smaller than those estimated for the relevant 5 km grid square by the FRAME atmospheric transport model. Although this is not seen at all the sites in the network, it appears to be a frequent feature in modelled high concentration areas (>3µg m-3). This feature is being explored in the current analysis of the data.

A partial explanation for the above may be that measurements have been made away from ammonia sources, while the model flattens out emission peaks over each 5 km grid square. One site, Alice Holt, shows a much lower concentration than predicted by the model. It is not yet certain whether this relates to initial implementation problems at the site or whether it is a real feature. If the latter, it may be attributable to monitoring in a locally isolated forest clearing. Although only initial results are available, a similar pattern may be emerging at Moor House, where the monitoring takes place on a remote plateau, downwind of the intensively agricultural Eden Valley. This highlights the point that when emission inventories

are used as an input to atmospheric models they need to be accurate at a high resolution to distinguish between such source and sink areas.



Ongoing activities

The current task is to use the results and related models to map the spatial patterns of NH3 concentrations and dry deposition across the country. This will provide the DETR with updated and more reliable estimates that can be used to underpin policy negotiations. Monitoring for this first phase will continue until Summer 1998 and then reviewed.

A meeting of 35 network site operators was recently held at ITE Edinburgh. It provided an opportunity to present the initial results of the network and receive valuable feedback from participants.

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