1st TERRABITES Symposium
Hamburg, Germany, 9-11 February 2010
TERRABITES-48

Nitrogen deposition on regional and local scale – examples from a coupled model system

C. Geels, C. Ambelas Skjøth, K. M. Hansen, L. M. Frohn, P. Løfstrøm, O. Hertel, S. Gyldenkærne, J. H. Christensen, J. Brandt, and T. Ellermann

National Environmental Research Institute, University of Aarhus, Roskilde, Denmark (cag@dmu.dk)

Atmospheric nitrogen is an important component in atmospheric chemistry as well as for aquatic and terrestrial ecosystems. The atmospheric deposition of nitrogen to natural surfaces has for decades been a problem and the deposition exceeds the critical load of nutrients for many European ecosystems. This land-based deposition to sensitive ecosystems of nutrients may lead to a shift in plant community towards more nitrophilic species. However, the spatial distribution of the deposition is highly heterogeneous due to the complex nature of sources and especially deposition processes.

In order to assess the atmospheric deposition of nitrogen related to local, regional and international emissions, the National Environmental Research Institute (NERI) has over the years developed the Danish Ammonia Modelling System (DAMOS). DAMOS is a coupling between the long-range transport model DEHM and the local-scale model OML-DEP and both models have been updated to include an advanced dry deposition module; based on the module applied in the EMEP model. Regional scale emissions for Europe are obtained from EMEP. For Denmark high resolution and time dependent emissions down to farm and field level are obtained from a detailed ammonia emission model developed at NERI. This high spatial and temporal resolution emission model is currently being extended to cover most of Europe and is in this context under implementation in the EMEP model.

The model system is e.g. used to study the long-term development of nitrogen over Europe based on model runs for the time period 1989 to 2006. For selected areas in Denmark, the local-scale model results on high resolution (e.g. 400 m x 400 m) are used for detailed studies of deposition rates to sensitive nature located in agricultural intensive regions. Examples of such high resolution deposition assessments will be given on the poster. Such data may be used by ecosystem models that operates on local scale e.g. for plant community studies. Furthermore, the model results can potentially be used as input to regional scale ecosystem models, where especially mapping of long term nutrient deposition in remote areas are relevant as this can be obtained with high spatial resolution or as time trends.