Greenhouse gas management in European land use systems

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Deliverable D1.4			
Title	Complete improved driver maps and monthly time series for reduced and oxidised wet and dry N deposition for European scale for past, present and future		
Delivery date from Annex I (project month)	18		
Actual delivery date	29/06/2011 (month 18)		
Lead participant	WP	Nature	Dissemination level
MPG (4)	1	R	RE

Deliverable Description

The charge of Task 1.2 was to provide a complete, improved set of driver maps at monthly time scale for reduced and oxidised wet and dry N deposition for European scale for past, present and future. The first step to construct this data set was to obtain deposition fields from several atmospheric chemistry and transport models (CTMs) in order to provide the possibility to assess the effects of uncertainties in the modelling of the atmospheric transport and chemistry, as well as alternative emissions inventories as input for European greenhouse gas fluxes. Since running a systematic experiment was not possible within the scope of the GHG-Europe project, existing simulations from a range of CTMs were obtained. These are the NCAR CTM (Lamarque et al. 2010, Lamarque et al, in press), TM5 (Dentener et al. 2006), the average of the N deposition model intercomparison project ACCENT (Dentener et al. 2006), as well as regional scale output of the EMEP model (Simpson et al., pers. comm.). Since IIASA did not deliver driver fields for scenarios they will be derived from projections by the RAINS model under EMEP/CLRTAP and UNECE (pers. comm. Michael Obersteiner, 15.06.2011). To provide the capacity to assess the effects of future N deposition changes, simulation results from EMAC (ECHAM5/ MESSy1, Pozzer et al. pers. comm). Future scenario runs with the high-resolution EMEP model were requested, but did not become available at the point in time when this report is written. These data will be added to the data base when they become available.

The obtained fields were downscaled to the common 0.25° by 0.25° grid resolution using bilinear interpolation from the CTM model grids (varying between 1°x1° and 4°x5° for the global models) and 50km x 50km for the EMEP model runs. In the case of the EMEP grid, as it is not a regular grid, the data were first projected to a regular longitude-latitude grid, and then degraded to the common grid resolution. Those parts of the domain not covered by the EMEP grid were filled with deposition values from the NCAR CTM, as both simulations rely on the same terrestrial emission input.

Not all models reported N deposition in similar categories. To provide consistent and easy to use data for all 5 CTMs, the reported fluxes were aggregated into monthly deposition velocities for

reduced and oxidised reactive nitrogen deposition. TM5, EMEP and the ACCENT data base only report annual values, therefore for these models, monthly data were generated by assuming a constant deposition rate throughout the year. There is an obvious low bias in EMEP NOy deposition that is currently under investigation.

The time periods covered are 1850-2005 (NCAR), 1860-1997 (TM5), 2000 (ACCENT), 1900-2000 (EMEP), 2005-2050 (EMAC). Within their time-domain, monthly oxidised and reduced Nr deposition fields were interpolated linearly in time using the annual trends in monthly deposition velocities. The time-scale of the data set produced is 1900 to 2050. It is to be stressed that future deposition values are not part of the deliverable associated with Task 1.2, and that the deliverable exceeds the proposed time-frame of 1900-2006 into the-future.

Deliverable D1.4 is available at:
ftp://ftp.bgc-jena.mpg.de/pub/outgoing/szaehle/ghg_europe/ndep_t1.3/deliver/