Geophysical Research Abstracts
Vol. 13, EGU2011-3365-1, 2011
EGU General Assembly 2011

Improving ammonia emissions in air quality models

Hamaoui-Laguel Lynda (1), Meleux Frédérik (1), Beekmann Matthias (2), Bessagnet Bertrand (1), and Génermont Sophie (3)

(1) Institut National de l'Environnement Industriel et des Risques, INERIS, Parc Technologique ALATA BP02, 60550 Verneuil en Halatte, France (lynda.hamaoui@ineris.fr), (2) Laboratoire Inter-universitaire des Systèmes Atmosphériques, LISA, 61 Avenue du Général-de-Gaulle, 94010 Créteil Cedex, France (Matthias.Beekmann@lisa.u-pec.fr), (3) Institut National de la Recherche Agronomique, INRA-Grignon, 78850 Thivernal-Grignon, France (sophie.genermont@grignon.inra.fr)

Agriculture is the main source of atmospheric ammonia. This compound reacts with nitric acid to form ammonium nitrate aerosols. Under specific meteorological conditions, these aerosols can contribute to high particulate matter concentrations in the low troposphere, which can be responsible for adverse health effects.

In spring 2007, the forecasts delivered by the chemical transport model (CTM) CHIMERE within the French operational platform for air quality monitoring and forecasting PREV'AIR were underestimating PM10 levels. In-situ observations on the aerosol composition suggested that was due to a lack of ammonium nitrate aerosol production.

To increase the model capability to capture such particulate episode, we have built a coupled approach between CHIMERE and the mechanistic model VOLT'AIR (INRA). This method improves the ammonia emissions by providing a high description (spatially and temporally) of the use of manure and fertilizer spreading and it then allows to get a more precise assessment of ammonia availability in soil. These new emission data are then used in CHIMERE to simulate the particulate matter levels in the atmosphere.

The set-up of this new modelling approach will be presented, with details about the input data and the modelling tools. Results of the study carried out for France from March to April 2007 show large spatiotemporal variations of ammonia emissions. Under favourable meteorological conditions, high ammonia emissions contribute largely to aerosol formation. The comparison of results with the previously used method indicates significant differences in the spatial distribution and magnitude of ammonia emissions and therefore of secondary aerosol formation.