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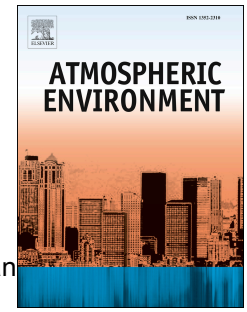

High-resolution modelling of air pollution and deposition over the Netherlands with plume, grid and hybrid modelling

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High-resolution modelling of air pollution and deposition over the Netherlands with plume, grid and hybrid modelling

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Abstract

We present high-resolution model results of air pollution and deposition over the Netherlands with three models, the Eulerian grid model LOTOS-EUROS, the Gaussian plume model OPS and the hybrid model LEO. The latter combines results from **L**OTOS-**E**UROS and **O**PS using source apportionment techniques. The hybrid modelling combines the efficiency of calculating at high-resolution around sources with the plume model, and the accuracy of taking into account long-range transport and chemistry with a Eulerian grid model. We compare calculations from all three models with measurements for the period 2009-2011 for ammonia, NO_x, secondary inorganic aerosols, particulate matter (PM_{10}) and wet deposition of acidifying and eutrophying components (ammonium, nitrate and sulphate). It is found that concentrations of ammonia, NO_x and the wet deposition components are best represented by the Gaussian plume model OPS. Secondary inorganic aerosols are best modelled with the LOTOS-EUROS model, and PM_{10} is best described with the LEO model. Subsequently for the year 2011, PM_{10} concentration and reduced nitrogen dry deposition maps are presented with respectively the OPS and LEO model. Using the LEO calculations for the production of the PM_{10} map, yields an overall better result than using the OPS calculations for this application. This is mainly due to the fact that the spatial distribution of the secondary inorganic aerosols is better described in the LEO model than in OPS, and because more (natural induced) PM_{10} sources are included in LEO, i.e. the contribution to PM_{10} of sea-salt and wind-blown dust as calculated by the LOTOS-EUROS model. Finally, dry deposition maps

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