



Assimilation of satellite-derived NO₂ data into a chemical transport model

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The Danish Eulerian Hemispheric Model (DEHM) is a three-dimensional chemical transport model that can simulate emission, transport, diffusion, chemistry and deposition processes of air pollutant species in the atmosphere. A data assimilation (DA) module was added to DEHM, to assimilate estimates of tropospheric NO₂ concentrations. The observations were obtained from the Ozone Monitoring Instrument (OMI) aboard the NASA satellite Aura. The assimilation scheme was based on statistical interpolation.

We conducted several experiments, modifying the parameterisation of the background and observation error covariance matrices. Results from these experiments were compared with an independent data set: ground-based measurements of NO₂ and O₃ from the European Monitoring and Evaluation Programme.

Despite the simplicity of the DA scheme, it substantially improved the accuracy of predicted ground-level concentrations compared to those calculated without DA. Furthermore, after applying the DA module, temporal variation in NO₂ concentrations was more accurately modelled by DEHM.