Geophysical Research Abstracts
Vol. 18, EGU2016-12162, 2016
EGU General Assembly 2016

Evaluation of reported NO_x emission trends between 2005 and 2013 by assimilation of OMI-NO_2 data into LOTOS-EUROS

Martijn Schaap, Arjo Segers, Lyana Curier, and Renske Timmermans
TNO, CAS, Utrecht, Netherlands (martijn.schaap@tno.nl)

Consistent and long time series of remotely sensed trace gas levels may provide a useful tool to estimate surface emissions and emission trends. We use the OMI-NO_2 product in conjunction with the LOTOS-EUROS CTM to estimate European emission trends through correction of the OMI-time series for meteorological variability as well as through assimilation using an ensemble kalman filter system (EnKF). The chemistry transport model captures a large fraction of the variability in NO_2 columns at a synoptic timescale, although a seasonal signal in the bias between the modeled and retrieved column data remains. Prior to the assimilation, the OMI-NO_2 data have been analyzed to establish the spatially variable temporal and spatial correlation lengths, required for the settings in the EnKF system. The assimilation run for 2005-2013 was performed using constant 2005 emissions to be able to quantify the emission change. The assimilation reduces the model-observation differences considerably. Significant negative trends of 2-3 % per year (as compared to 2005) were found in highly industrialized areas across Western Europe. The assimilation system also identifies the areas with major emission reductions in e.g. northern Spain as identified in earlier studies. Comparison of the trends derived from the assimilation and the data itself shows a high level of agreement, both the trends found in this way are smaller than those reported.