# Variability and Trends in tropospheric NO2: evaluation with GOME observations and projected changes for 2030

T. van Noije, H. Eskes, F. Boersma and **P. van Velthoven**

Royal Netherlands Meteorological Institute, De Bilt, Netherlands (noije@knmi.nl)

Introduction

A large number of chemistry transport models have performed calculations for the Air Quality and Climate Change model exercise, aimed to contribute to the Fourth Assessment Report (AR4) of the IPCC. In this exercise new emission scenarios from the International Institute for Applied Systems Analysis (IIASA) have been applied in addition to the more pessimistic A2 scenario from the IPCC Special Report on Emissions Scenarios (SRES). As part of the exercise a detailed comparison has been made between the modeled tropospheric NO2 columns and GOME observations for the year 2000.

Results

Sampling of the model results at the clear-sky pixels along the track of the satellite is shown to be an essential element of this evaluation, as it leads to significantly lower monthly columns in polluted regions compared to the actual monthly mean at crossing time (10:30 local time). Errors in the tropospheric NO2 columns retrieved from the satellite instrument have recently been systematically estimated. The differences between the model results and retrieval products were investigated for the different world regions. In polluted regions, such as over East Asia, most models give smaller columns than observed. The pattern of biomass burning in equatorial Africa is well simulated by the most recent model versions. Estimates of the changes in the global distribution of tropospheric NO2 to be expected by the year 2030 will be presented for the different scenarios.

Conclusion

The tropospheric NO2 columns derived from satellite observations through their global coverage allow a detailed evaluation of tropospheric chemistry models including spatial and temporal variability on a range of scales. The differences between models and observations provide important information about the quality of emission inventories.