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Using OMI data to improve air quality forecast - does it work?

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What benefits can we obtain from using data assimilation of remotely sensed air quality parameters into the CTM?

This work presented aims to compare an air quality forecast with and without the use of satellite data, and to quantify the improvement gained from satellite data.

The air quality forecast used is the Danish O3 operational warning system. Forecast are generated for each hour, for a 50km grid over Europe.

O3 can irritate lungs and airways and can cause inflammation in the respiratory system. It can also trigger other diseases like asthma or bronchitis. O3 is a very important parameter in the CTM as it is highly reactive.

The forecast is based on DEHM "Danish Eulerian Hemispheric Model" that is a CTM “Chemical Transport Model” designed to forecast air pollution. DEHM is part of the Thor model system.

The satellite data used is the OMI NO2, Near Real Time data stream (DOMINO) from KNMI.

The model was run for a reference year 2005, both with and without the use of Data Assimilation of OMI data. The results were each compared to reference measurements from ground stations in the European EMEP network. Many stations do not report hourly, but daily values. The validation uses the highest available resolution, temporal ans well as spatial.

The present project is not entirely completed. However, expectations are that data assimilation of remotely sensed air quality parameters will increase the accuracy of the air pollution forecasts.