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Evaluating lateral boundary conditions in MATCH using retrieved observations from satellites

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The role of hemispheric transport has gained large attention in regional chemical transport models due to its impact on both climate, air quality and visibility. The hemispheric transport in regional models are represented by the lateral boundary conditions (LBCs), where the inflow boundary specifies the domain beyond the model region and the outflow region will impact the stability of the advective transport solution.

This study focuses on evaluating and implement LBCs from global chemical transport models for two important atmospheric tracers: carbon monoxide (CO) and ozone (O_3). LBCs are derived from the hemispheric European Monitoring and Evaluation Programme (EMEP) model and the Model for Ozone and Related chemical Tracers (MOZART-4) over the time periods 2006-2012 and 2011-2012 respectively.

Evaluation is done with observational data retrieved from the satellite sensors Measurements Of the Pollution In The Troposphere (MOPITT) and the Ozone Monitoring Instrument (OMI). The implementation of the LBCs is done in the regional chemical transport model Multiple scale atmospheric transport and chemistry (MATCH), developed by the Swedish Meteorological and Hydrological Institute (SMHI). The MATCH model is mostly used in simulations of the air quality over Europe on both on regional and local scales. In this study the model the domain is set over Europe.

The LBC evaluation is done for the tropospheric column by smoothing the LBCs using satellite averaging kernels and a priori information. By retrieving the average profile for each month and lateral boundary, possible biases and also what global model that might be better suited for the LBCs in MATCH. The implementation will show how these biases proliferate through the MATCH model, and it will possibly be compared to satellite retrieved data from the sensor Atmospheric InfraRed Sounder (AIRS) inboard the satellite Aqua.