

EMEP modeling results for ozone: emission reductions in Europe vs. reductions elsewhere

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- Description of model setup
- Global model results
- Nested results
- Preparing for new round of HTAP calculations: Model sensitivity tests

Model setup



Global

- Global model run on a 1 x 1 degrees horizontal resolution and 20 vertical layers. Top layer, above approx. 14km passive boundary layer with monthly ozone climatology from Logan (1998)
- ▶ 2010 Emissions (so far) from the ECLIPSE project.

European regional

- Horizontal resolution 0.2 x 0.2 degrees. Vertical resolution same as for the global version
- Should emphasise that the model domain is relatively large, in some ways limiting the (temporal) effects of nesting
- Nesting in 6 hourly (and monthly) boundary concentrations from the global model concentrations

Global SR calculations for ozone

Norwegian Meteorological Institute



c) 20% reduction in NA emissions c) 20% reduction in CH emissions

Global annual surface ozone in 2009. Effects off 20% reductions of ozone in North America (USA and Canada), EU (EU 27 + Norway and Switzerland) and China.

Effects of EU 27 + Norway and Switzerland, \sim 20% reductions in emissions





Effects of North American (US + Canada), 20% reductions in emissions





Effects of Chinese 20% reductions in emissions





Regional model domain





Timeseries for Mace Head, Ireland, 2008





Timeseries for Giordan Lighthouse, Malta, 2009 Norwegian Meteorological

Ozone daily max



Annual Bias Nested model versus EBAS









Sondes

Is the strat - trop exchange overestimated? The sondes does not give any clear evidence.

The vertical model resolution in the tropopause region is very coarse. We are currently experimenting with a model version with finer vertical resolution in the tropopause region.



Ne tests, including run with 30 layers, 2009





Conclusions



- Model calculations confirm that there are major trans-continental effects on ozone in Europe.
- Distance matters: North America has a much large impact on European ozone levels than China.
- Temporal resolution at the lateral boundaries: Some effects, but main features reproduced even with monthly averaged lateral boundary concentrations.
- Global model overestimates ozone in the winter and spring months. PAN is also over-predicted. We are trying to find out why.
- For the HTAP calculations we will create new sets of boundary concentrations that may be shared with other users.
- It would be good if the HTAP community could develop a strategy for for the boundary conditions in terms of temporal resolution and species selection.