Geophysical Research Abstracts, Vol. 9, 06604, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-06604

Impacts of climate change on air pollution levels in the northern hemisphere

G. B. Hedegaard (1,2), J. Brandt (1), J. H. Christensen (1), L. M. Frohn (1),

C. Geels (1), K. M. Hansen (1), M. Stendel (2)

(1) National Environmental Research Institute, University of Aarhus, Denmark, (jbr@dmu.dk), (2) Danish Meteorological Institute, Denmark.

The fate of a selected number of chemical species is inspected with respect to climate change. The coupled Atmosphere-Ocean General Circulation Model ECHAM4-OPYC3 is providing future meteorology for the Chemical long-range Transport Model DEHM-REGINA. Three selected periods (1990's, 2040's and 2090's) are inspected.

The 1990's is used as a control and validation period. In this decade an evaluation of the output from the DEHM-REGINA model with ECHAM4-OPYC3 meteorology input data is carried out. The model results are tested against similar model simulations with MM5 meteorology and against observation from the EMEP monitoring sites in Europe. In the validation period the emissions are held constant at the 1990 level in all simulations in order to extract the effects from climate change. It is concluded that running a chemical long-range transport model on data from a "free run" climate model is scientifically sound!

The absolute dominating impact from climate change on a large number of the chemical species is found to be the predicted temperature increase. The temperature is by the ECHAM4-OPYC3 model predicted to increase 2-3 ˚C on a global average with local maxima in the Arctic of 11 ˚C. As a consequence of this temperature increase, the temperature dependent biogenic emission of isoprene is predicted to increase significantly over land in the DEHM-REGINA model. This leads to an increase in the ozone production and in the number of free *OH* radicals. This again leads to a significant change in the typical life times of many species, since the hydroxyl radicals are participating in a large number of chemical reactions. It is e.g. found that more sulphate and nitrate will be present in the future over the already polluted areas and this

increase can be explained by an enhancement in the conversion of sulphur to sulphate.