

## ***Interactive comment on “Impacts of climate change on air pollution levels in the Northern Hemisphere with special focus on Europe and the Arctic” by G. B. Hedegaard et al.***

### **Anonymous Referee #3**

Received and published: 26 March 2008

#### Overview:

This manuscript presents a very detailed analysis of the impact of climate change on air pollution, with a particular interest for Europe and the Arctic, for three decades (1990s, 2040s and 2090s). A comprehensive validation of the experimental method is also performed. This original work helps to better understand the importance of climate change in driving chemical processes and should be published. However, in order to improve the clarity of the manuscript, I would like the following comments to be considered beforehand, paying attention to spelling.

General comments:

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Section 2.3 and Section 7: Which emissions have been kept constant for the three decades is not really clear to me, especially concerning natural emissions. Are biogenic emissions the only natural emissions to vary? I think it would be helpful to have more details about the emissions used for the different scenarios. For example, a table giving global annual emission for the three decades could be added. The authors mention that different parameters can affect biogenic emissions but how have those emissions been calculated in this study? Which inputs (vegetation distribution, leaf area index) have been used? Which biogenic compounds have been considered (this should be specified before the conclusion)?

Specific comments:

Section 1, page 1760, line 4: replace "is in the current experiment used" by "is used in the current experiment"

Section 1, page 1760, line 7: replace "is providing 21st century meteorology" by "provides 21st century meteorology"

Section 1, page 1761, line 2: replace "and depositions of chemical species" by "and deposition of chemical species"

Section 1, page 1761, line 10: replace "Hereafter the meteorological parameters that are changing due to climate change, are identified and from knowledge of the air pollution chemistry and climate change the effects" by "Hereafter the meteorological parameters that are changing due to climate change are identified, and from knowledge of the air pollution chemistry and climate change, the effects" (change comma)

Section 2.1.1, page 1763, line 22: replace "The concentrations are in the period 1860-1990 derived from observations and for the period 1990-2100, they are prescribed according to the IPCC SRES A2 scenario" by "In the period 1860-1990, the concentrations are derived from observations and for the period 1990-2100, they are prescribed according to the IPCC SRES A2 scenario"

Section 2.1.1, page 1764, line 1: replace "and from 2050 and onwards" by "and from 2050 onwards"

Section 2.4, page 1767, line 1: replace "Not all measuring sites are measuring all the validated chemical components all the time, for details" by "Not all measuring sites are measuring all the validated chemical components all the time. For details"

Section 3, page 1767, line 7: replace "and these are used" by "which are used"

Section 3, page 1767, line 8: replace "However, there are several pre-processing, which have to be carried out before the data from ECHAM4-OPYC3 climate model can be implemented" by "However, several pre-processing have to be carried out before the data from ECHAM4-OPYC3 climate model can be implemented"

Section 3.1: as there is no Section 3.2, 3.3... remove the title of Section 3.1.

Section 4.2, page 1770, line 15: remove "see table"

Section 4.3, page 1771, line 23: replace "In consistency with the ranking method used by ..., for each model characteristics and for each statistical parameter, a local ranking has been performed" by "In consistency with the ranking method used by ..., a local ranking has been performed for each model characteristic and for each statistical parameter"

Section 5, page 1772, line 10: replace "The analysis are carried out specie by specie since the model performance is different for the different chemical species" by "Since the model performance is different from one chemical species to another, the analysis is carried out species by species"

Section 5, page 1773, line 9: The verb is missing in "However, highest in the case of the MM5 setup."

Section 5, page 1773, line 23: replace "The real profile of O3 is, especially during high concentration events, very steep..." by "The real profile of O3 is very steep..., especially

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during high concentration events"

Section 5, page 1774, line 7: replace "The results of the MM5 based simulation have a tendency of overestimating" by "The results of the MM5 based simulation tend to overestimate"

Section 5, page 1774, line 14: remove parentheses in "(SO42-)"

Section 5, page 1774, line 20: replace "since the same tendency not generally is present" by "since the same tendency is not generally present"

Section 5.1, page 1776: the description given in the first paragraph is also written in the Section 4.3. Choose which one to keep.

Section 5.3, page 1779, lines 18 to 22: Rephrase the sentences which are not very clear and confusing.

Section 6.1, page 1783, line 14: replace "there were no significant changes" by "there was no significant change"

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 1757, 2008.

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