**Atmospheric
Chemistry
and Physics**
Discussions

Interactive comment on "Sensitivity of air pollution simulations with LOTOS-EUROS to temporal distribution of anthropogenic emissions" by A. Mues et al.

Anonymous Referee #1

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GENERAL COMMENT

The aim of the paper is the investigation of the sensitivity of air pollution concentrations as calculated by the chemical transport model LOTOS-EUROS on the temporal variations of anthropogenic emissions.

The study is limited to the important SNAP categories 1, 2, and 7 (combustion in energy and transformation industries; non-industrial combustion; road transport). The paper is written clearly and well organized. It is a valuable contribution to an important issue in air pollution modeling in particular with respect for the planning of air pollution

abatement strategies and mitigation studies due to possible future changes of climate. I like in particular the step by step approach in the set up of the different sensitivity runs starting with LE_const127 (chapter 4.1) leading in a consequent and clearly described way to the run LE_SNAP127 (chapter 4.5).

I recommend the paper for publication in ACP after some minor changes according to my comments below.

SPECIFIC COMMENTS

p.1, abstract: Why is the comparison with observations limited to Germany ? It might be helpful to give the information that the simulations are carried out for the complete year 2006 (Why?) with an hourly resolution and a horizontal resolution of about 25 km.

p.2, introduction:

Even if it is not in the focus of this paper: the height distribution of emissions, in particular for SNAP 1 is also a part which might be more variable as assumed in emissions as used currently in the air pollution models due to its dependency on activity/stack parameters (e.g. gas exhaust temperature) and ambient air (meteorology). One can think about to mention this at least somewhere in the text.

It is known that the NO2/NOx ratio in traffic emissions is assumed to increase which might be one explanation for the observed trends in NO2 concentrations in particular near streets. NO2 concentrations do not show a clear trend despite the decreasing total NOx (NO + NO2) emissions during the last 20 years. Are NO and NO2 emissions treated separately in the treatment of the emission data ? Or is a fixed NO2/NOx ratio used for the different source categories (SNAP 1, 2, 7). This point is of particular importance for SNAP 7 (traffic).

p.4, Method and data

How are the boundaries of the models handled, lateral and upper boundary ?

p.7, Improved emission time profiles

The sentence "Note that a single diurnal profile is applied for all days of the week" is not completely clear to me. Are there different specific temporal profiles for each day of the week, i.e. different e.g. for Monday and Tuesday, ..., or is it the same profile for all days of the week, or is there only a differentiation between working days (Monday til Friday), Saturday and Sunday.

Looking at the different vehicle and road types: Is there a difference in NO2/NOx, VOC-split expected ? How are the VOCs handled ?

p. 10, 11; SNAP 1

How is the height distribution of emissions from power plants ? Does the EUROS-LOTOS model resolve height dependencies in that case ? How ?

p.12, discussion of different model runs in chapter 4: if hourly values are available it might be interesting how sensitive the results of LOTOS-EUROS are with respect to the limit values as given within the EU air quality directives e.g. the number of exceedances of the 24h-average of 50 ug/m**3 for PM10. This might help to show directly the importance of the temporal variations of emissions on measures currently considered as relevant within the EU directives.

Why is the analysis limited to observations in Germany ?