The focus of the paper is to study the impact of i) model resolution ; ii) the resolution of the anthropogenic emissions inventory ; and iii) the inventory itself on the contributions of different emission sources through a source apportionment method. This is done by several simulations, where a different factors is modified each time in an effort to disentangle the effects. Modelled results are compared between simulations to understand the sensitivity of the system to each factor. Lots of very interesting points are raised in the analysis of the results. However, before publication, I think that the paper needs to attend to several issues. There are also, many errors in the English that create confusion and even make it impossible to understand certain sentences.

General Comments

Several simulations are conducted to try and disentangle the different effects. I am not convinced that the set-up of the model experiments is the most appropriate to thorough investigate the issues raised here. The results should read more like suggestion of potential effects rather than quantified impacts. Moreover, to make their points clear, the authors need to restructure the presentation of their results. The analysis of the different simulations should follow a more systematic pattern. This would help the reader understand which effect is studied at each section by comparing which simulations?

More specifically, all results in section 3 are based on comparisons between the EMAC and CM50 grids. First of all, the difference between these tow resolutions is huge (300km vs. 50km). To properly investigate the effect of the resolution, as done in the papers cited by the authors, intermediate grid resolutions should be used in my opinion. Furthermore, why do results of the CM12 simulation are not discussed in section 3 (Table 3) ? One would expect a more meaningful comparison between the CM50 and CM12 model resolutions, where meteorology is more consistent. Why EVEU simulations between CM50 and CM12 are never discussed?

The effect of the resolution of emissions is studied, but no explanation is provided on how emission inventories are applied over different resolution grids. What proxies are used, what assumptions are made? It would make much more sense to apply a first projection of emissions on the finer grid (CM12) with whatever proxies and then just add up emissions to the coarser grids with no further assumptions. This is not what is done here. Moreover, a different emission inventory is applied for the EVEU simulation but the authors don't discuss nor show at all in what this inventory is more accurate.

The authors suggest that the enhanced overestimation of ozone at CM50 compared to coarser resolutions is due to enhanced vertical mixing during night-time. Wouldn't it be interesting instead of averaging so much in time to look at how well or bad the diurnal cycles are represented?

Some important points need to be discussed more. Ozone formation requires both NOx and COV and the ozone production depends on the ratio between these concentrations in a non-linear way. NOx and COV are emitted by different sources (road transport is mainly responsible for NOx emissions while COV are largely emitted by biogenic activity). It is therefore, not straightforward how the source apportionment works to simulate the contributions of these sources to ozone formation. Of course this is explained in previous publications but still, in my point of view, a brief explanation would improve the understanding of the presented work.

I think that the concept of using lateral and top boundary conditions for the contributions to ozone production needs to be discussed in more detail. It does not seem straight forward to me how boundary conditions of source apportionment could be applied. The contribution of an emission source to ozone production should depend on the chemical regime (i.e. the ration of NOx over COV emissions). These ratios depend strongly on the size of the grid cells as well as what sources happen to be included in the corresponding volumes. They are very resolution dependent. Imagine a large city: one grid configuration may have a grid-cell including the entire city another configuration may cut it in two and dilute the cities emissions with "cleaner air" from rural areas. The ozone production will be radically different in the two configurations. If we add ozone production from the different configurations over the same areas covering the city and the surrounding rural areas the ozone production over the same areas will not match. Consequently

source apportionment will not give the same contributions. How then could contributions estimated over larger grid cells are applied as boundaries for smaller grid-cells. I am sure reasonable assumptions are done here. They should be discussed in the paper in my opinion.

Specific Comments

-Some possible reasons for the differences in the results of the simulations are mentioned in the paragraph ln 10 of page 8. It is not clear if ozone concentrations or contributions or both are discussed here?

-I know this issue was raised at the previous phase of the review but I still find the terminology unnecessarily confusing. In a few lines at the introduction we see all these models.

page 2 ln 24: MECO(n) = MESSy-fied ECHAM and COSMO shouldn't it be "or COSMO"
Page 2 ln 26: EMAC = ECHAM5/MESSy
Page 2 ln 27: COSMO/MESSy

What is the difference between MESSy-fied ECHAM and ECHAM5/MESSy?
A few lines later the terms COSMO-CLM/MESSy appears (what is CLM?), MESSy2 and ECHAM5.

If I understand correctly the idea here is that for global-scale modelling the ECHAM climate model is coupled (on-line) with the chemical mechanism of the MESSy chemistry transport model and the result is called EMAC. For regional-scale modelling the regional scale model MESSy is coupled on-line or forced (please specify) with the regional scale meteorological model COSMO.

The coupling of both systems I.e ECHAM and COSMO/MESSy is called MECO.

A figure showing all this might be helpful.

-The number of vertical layers is provided for CM12 and 50 (40 layers up to 22km) and EMAC (31 layers up to 10hp). It would be helpful to provide both heights on the same unit (either pressure or height or both). It would also be important to provide the first layer's thickness since ground level ozone is of interest here.

-S4: Figure caption goes up to k sub-plots but the figure only has up to h sub-plots.

-There are lots of spelling and grammar errors in the manuscript. I suggest some corrections bellow but they are not exhaustive.

Page 1, Ln 19: a large difference
Page 1, Ln 20: role
Page 3 ln 22 This especially… The sentence is incomplete
Page 4 ln 2: CM12 not C12.
Page 8 ln 3: The set-ups of… (were applied) is varied… There is some problem here.
Page 8 ln 13: don't all three EMAC, CM50 and CM12 have the same emissions in ET42?
Page 10 ln 2: root mean square error
Page 10 ln 2: over an area
Page 15 ln 25 the numbers of relative contributions given here for EMAC and CM50 do not match Figure 7b.
Page 17 ln 13: as for the mean values
Page 19 ln 14 ..stays similar