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## ***Interactive comment on “Air quality over Europe: modeling gaseous and particulate pollutants and the effect of precursor emissions” by E. Tagaris et al.***

### **Anonymous Referee #2**

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This manuscript presents model results from a CMAQ air quality simulation for Europe for 2006, with comparison to observations from the same period. While the CMAQ model application itself seems reasonable, the comparison to observations is overall weak, with only qualitative assessments provided outside of Table 1. It would be more useful to reader for authors to provide more evaluation detail in the main text, instead of just saying ozone is overpredicted here and underpredicted there. One suggestion would be to provide seasonal spatial maps of Error/Bias (based on comparison to observed data) for ozone and/or PM<sub>2.5</sub>. Previous studies have provided such figures, and they are useful for quickly identifying areas of large error/bias, and can be com-

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pared to previous studies as well. I think the manuscript could benefit greatly from an improvement in section 3.1. Regarding section 3.2 (Effects of precursor emissions on air quality), simply applying a factor to the emissions based on the ratio of observed to predicted values is unconvincing. Such an application does not take into account other effects, such as meteorology, advection, etc. The authors should consider using a more robust method for adjusting the emissions, such as inverse modeling. Otherwise, the results from section 3.2 are not all that useful for other modeling exercises, and would not be applicable beyond the current study. As such, it might be a better use of the authors time to expand and improve the model evaluation portion of the manuscript, wherein providing detail on where the emissions inventory may be in gross error. Overall, in their current forms, sections 3.1 and 3.2 do not provide enough information to the reader to be useful. Finally, the manuscript is in need of good deal of proof editing, as the grammar is in many instances poor. I think if the authors could address these issues, the manuscript would be improved and provide more information to the reader.

#### Specific Comments:

When referring to ozone, SO<sub>2</sub>, NO, etc., these are mixing ratios, not concentrations.

Section 2 (pg 6684-6685; Ln 22-1): Remove the two sentences starting with MM5. This doesn't provide any real substance to the manuscript.

Page 6691, Line 3: I object to the describing the model as having "built-in biases". This implies that the model is designed intentionally to have biases, which is obviously not correct. There may be a lack of detail in some of the model parameterizations (such as chemistry), but no where are biases built-in to the model.

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Interactive comment on Atmos. Chem. Phys. Discuss., 13, 6681, 2013.

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