

Interactive comment on “Modeling natural emissions in the Community Multiscale Air Quality (CMAQ) model – Part 1: Building an emissions data base” by S. N. Smith and S. F. Mueller

Anonymous Referee #2

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General comments: The paper addresses the issue of natural emissions and presents an extended natural emission database that can be used for US air quality modeling studies that are based on the use of the CMAQ model. In the paper, a wide range of natural emission sources are described. Emission data, which are not widely accounted for in air quality studies, are quantified, temporally resolved and spatially disaggregated. For most of the sources, emission data from existing databases are processed and existing models and calculation formulas are applied. A new methodology is introduced only for NO_x lightning emissions. In the paper, a comprehensive research work is presented that can be useful to other scientists interested on the quantification of natural emissions and their potential impact on atmospheric chemistry.

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However, the following specific comments must be answered:

1. Section 2.1: Additional references should be added other than NAPAP (1991) describing previous US anthropogenic and natural emission inventories (e.g. Guenther et al., 2000, Atmos Environ). How do they compare with the results of the present study or with the results of the studies already mentioned in the paper?
2. Section 3.2.2: Which land use data base did you use for the calculation of coastal wetland emissions? Provide thorough the paper more information on the land use databases used.
3. Section 4.2 (line 10): Do you probably mean western Canada instead of Eastern Canada?
4. Table A3: The split factors presented in the table shouldn't they be spatially resolved?
5. It would be interesting to show also a figure (similar to Figure 10) that presents the comparison between anthropogenic and natural emissions for January 2002. In addition, the spatial distribution of the ration between anthropogenic and natural emissions could be shown and used to identify the areas where natural emissions exceed the anthropogenic ones.
6. In order to increase the temporal resolution of emissions from some sources, the default SMOKE temporal profiles (diurnal and seasonal) were used. Weren't there any alternatives published in the literature?
7. A paragraph discussing the uncertainties of the emissions quantified or used should be added. What are the uncertainties in the seasonal results (January and July 2002) presented in tables 1 to 5 given the fact that for many emission sources there was no seasonal emission variation (e.g for sulfur sources)?