**Atmospheric
Chemistry
and Physics
Discussions**

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

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The authors should be applauded for undertaking the initiative to develop a database for natural emissions. This will help improve air quality modeling for the US. My comments and suggestions are summarized below:

p. 1770-1771: Section 3.4 describes gaseous HCl and ClNO2 and sea-salt aerosol emissions from oceans. Knipping and Dabdub (2003) suggested that interaction of sea-salt aerosols with gaseous species can also release molecular chlorine (Cl2) emissions from coastal areas. If authors think that Cl2 can also be emitted from oceans, then such emissions can be estimated and included in the database.

Chlorine emissions from oceans are estimated; however, the article does not include any discussion on possible chlorine emissions from the Great Salt Lake. If authors think that chlorine can be emitted from the Great Salt Lake, then such emissions can be estimated and included in the database. If authors think that chlorine emissions are not released from the Great Salt Lake, an explanation can be included in the article.

Annual total HCl and ClNO2 emissions from oceans were taken from the GEIA Reactive Chlorine Emissions Inventory. It would benefit readers to explain how these emissions were spatially allocated (spatial distribution) into grid-cells for the CMAQ model. Similarly, the procedure used for spatial allocation of reduced sulfur from oceans can also be described.

p. 1779: "There is a need to update existing aerosol modules in models like CMAQ to more accurately simulate the dechlorination of sea salt particles and the subsequent release of reactive chlorine to the atmosphere. Changes are also required in CMAQ so that its chemistry modules can simulate oxidation reactions involving reactive chlorine". The chemistry module in the released version of CMAQ_v47 already includes oxidation reactions involving reactive chlorine.

Figure 10. Relative proportions of anthropogenic and natural emissions are compared for July. It would be informative to include such a comparison for January also. It is not clear about the anthropogenic chlorine emissions used for the comparison for July. The 2002 NEI includes emissions of HCl and Cl2; total HCl emissions 563,568 tons and Cl2 emissions = 12, 568 tons, (Table − 4.4 in ftp.epa.gov/EmisInventory/2002v3CAPHAP/documentation/volumeiii_hap_main_07may2008 Anthropogenic chlorine emissions should include these emissions.

Figure A7. Temporal profile shows ClNO2 is zero during most of the nighttime. ClNO2 is released from the interaction of N2O5 and sea-salt aerosols both of which can be present at night. Thus, ClNO2 can be present during nighttime. It will benefit readers to explain reasons for using zero ClNO2 emissions at night. Recent study of Thorn-

ton et al. (A large atomic chlorine source inferred from mid-continental reactive nitrogen chemistry - vol 464, 11 March 2010, doi:10.1038/nature08905) also suggests that ClNO2 can be emitted at night (Figure 3).

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