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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evaluation of GEOS-5 sulfur dioxide simulations during the Frostburg, MD 2010 field campaign" *by* V. Buchard et al.

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The manuscript presents an evaluation of SO2 and sulfate concentrations from the GOES-5 model with surface and aircraft observations. The authors found that correcting the injection height of power plant SO2 emissions improved the comparison of model SO2 concentrations to EPA ground-based measurements. However, there continued to be a positive bias in surface SO2 and sulfate concentration, which leads the authors to conclude that the loss of sulfate may be underestimated in the model.

Overall the manuscript is clear, concise, and appropriate for publication in ACP. The main comment is regarding the conclusion that sulfate aerosol losses may be underestimated. It's difficult to see this from the data presented because the 2005 emissions

used in the model are likely too high for 2010. This is supported by the high bias apparent in Fig 5, and the authors state this on page 21773 line 1. Could the high bias in sulfate also be attributed to the overestimated emissions - despite the high bias in SO2 lifetime? Would it be possible to scale the 2005 emissions to 2010 using CEM data? Or compare 2005 surface observations to a model simulation using 2005 meteorology? If sulfate is still overestimated then I think you will have a stronger argument.

As a minor comment, the section describing the comparison to MF-DOAS observations could use some more description. For example, it's not clear how the air mass factor is calculated to get the vertical column, what is the estimated spatial (horizontal and vertical) footprint of the observation, and what is the temporal resolution. All important factors when trying to reconcile model and measured concentrations.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 21765, 2013.