

## ***Interactive comment on “CHIMERE-2016: From urban to hemispheric chemistry-transport modeling” by Sylvain Mailler et al.***

### **Anonymous Referee #1**

Received and published: 7 November 2016

This manuscript details the recent updates made to the CHIMERE chemical transport model to extend its capability to include urban and hemispheric modeling. As pollution concentrations have fallen in many areas in the past couple decades, the problem of air pollution has expanded from being primarily a local/regional issue to a more hemispheric/global issue. Therefore, having air quality models capable of simulating the hemispheric to local scale are becoming more important. This work attempts to detail the vast number of updates made to the CHIMERE modeling system in order to create a more versatile modeling system. The authors and developers of the model should be commended on what was surely a very large undertaking to update almost every aspect of the modeling system. The manuscript also includes a section that attempts to evaluate the performance of the new modeling system, which in my opinion is the weakest section of the manuscript.

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My general comment on the evaluation of the CHIMERE-2016 modeling system is that it really only provides model performance metrics for a very coarse modeling domain (0.5 X 0.5 degree). In addition, wherever the model performance is poor, the authors simply seem to blame the emissions for the poor performance. While emissions certainly can/do contribute to model performance issues, they are far from the sole cause of poor model performance. In my opinion, the evaluation provided does little to provide real faith that the new modeling system can accurately simulate air pollution across a multitude of scales. Also, the volcanic ash case study simulation provided seems only to establish that the model physics does not fail while traversing the southern hemisphere. No evaluation of the actual particle concentrations for the case study is really provided, so it's not clear whether the model can actually simulate the fate of the emitted ash particles (e.g. effects of particle transformation and deposition) with any real accuracy.

It would be very useful to have a much more detailed evaluation of the modeling system, including simulations at various horizontal grid resolutions and domain sizes (e.g. urban at fine grid resolution, regional at moderate grid resolution, and hemispheric at coarse model resolution). This may be too much to add to this manuscript, so perhaps it would be better if the authors tackled this as a Part I/Part II series, with Part I describing the updates to the modeling system (as has been done), and Part II providing a detailed model evaluation of the system. I think this would end up being a much more useful set of papers to potential CHIMERE users in my opinion. As it stands, I don't feel like the evaluation in the manuscript provides enough support for the amount of work that was done in updating the model.

I've provided a number of specific comments in the PDF provided with this review.

Please also note the supplement to this comment:

<http://www.geosci-model-dev-discuss.net/gmd-2016-196/gmd-2016-196-RC1-supplement.pdf>

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