

Updates and Perspectives from the GEOS-Chem Emissions and Deposition Working Group



Dylan Millet¹, Emily Fischer², Jintai Lin³, Eloise Marais⁴

¹ University of Minnesota, ² CSU Fort Collins, ³ Peking University, ⁴ University College London



Recent (version 13.0) updates

- Updated default anthropogenic emission inventory is the CEDS GBD-MAPS inventory submitted by Erin McDuffie (Dalhousie/WUSTL):

<https://github.com/geoschem/geos-chem/issues/447>

<https://essd.copernicus.org/preprints/essd-2020-103/>

(ethane and propane from separate inventory)

- Retire use of carbon emissions for VOCs. Use compound molecular weight by default:

<https://github.com/geoschem/geos-chem/issues/309>

Updates on the Horizon

- China: update to MEIC (Lu Shen, Harvard; Gongda Lu, Birmingham)
- China: diurnal variability of power plant emissions (Jintai Lin, Hongjian Weng, Peking University)
- US: NEI 2016 (Patrick Campbell, NOAA; Barron Henderson, USEPA; Lyssa Freese, MIT)
- Africa: charcoal production and use emissions (Alfred Bockarie, U. Birmingham; Eloise Marais, UCL)
- Vertically resolve anthropogenic emissions (Barron Henderson, USEPA)
- MEGAN3 + updated canopy treatment (Sam Silva, MIT). Ready to go in.

Concerns, Issues, and Considerations

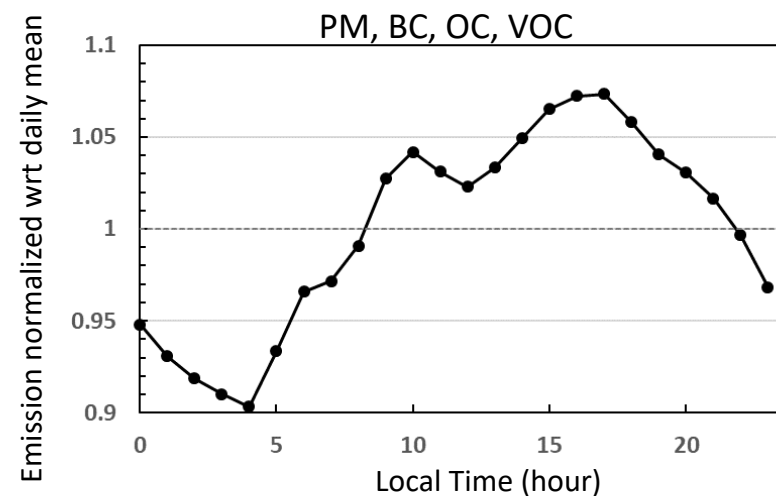
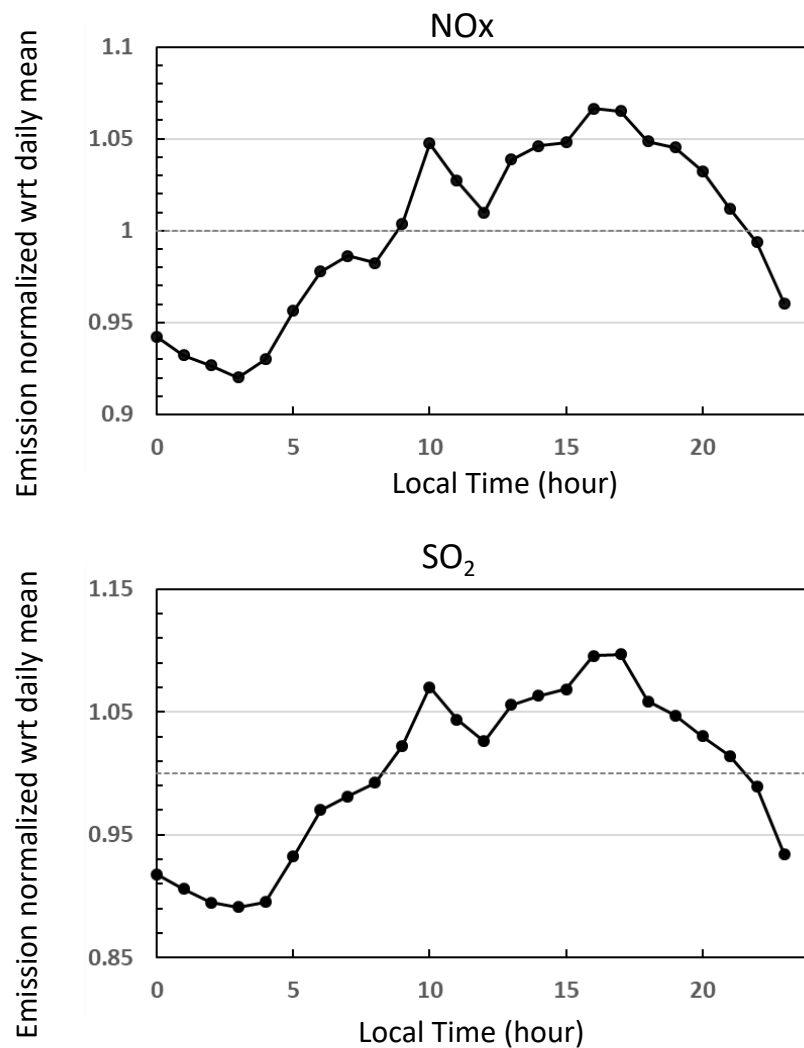
Emissions:

- Future emissions: is RCP still the best to use?
- Aircraft emissions are for 2005. How to deal with these becoming increasingly outdated?
- Natural NH₃ emissions not from seabirds is from 1997. Are these still appropriate?
- Ongoing issues with alkane emissions (and chemistry)
- Incorporate lessons/findings from major fire-focused field campaigns
- Ocean exchange/emissions summary needs to be conducted to assess whether this needs to be updated in the model
- Recently published EDGAR emission inventory with consistent global temporal scaling factors: <https://www.nature.com/articles/s41597-020-0462-2>
- NH₃ bidirectional flux: should it be in the standard version of the model?
- How to represent emissions due to pandemic lockdowns?

Other:

- Neaten up Working group wiki: do we need “Current Projects” and “Ongoing Developments” entries?
- Recommended inventories table needs to be updated to match benchmark
- What’s the best approach to update other aspects of the model that rely on emissions (complex and simple SOA schemes)

Diurnal Scale Factors for Power Plant Emissions in China



Liu, X., Gao, X., Wu, X., Yu, W., Chen, L., Ni, R., Zhao, Y., Duan, H., Zhao, F., Chen, L., Gao, S., Xu, K., Lin, J.-T., and Ku, A.: Updated Hourly Emissions Factors for Chinese Power Plants Showing the Impact of Widespread Ultralow Emissions Technology Deployment, *Environmental Science & Technology*, 53, doi: 10.1021/acs.est.8b07241, 2019.