

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



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## **Recent (version 13.2-13.3) updates**

- Updated offline dust emissions (Jun Meng; Yanshun Li)
- US NEI 2016 emissions as an option (Barron Henderson, Lyssa Freese, Melissa Sulprizio)
- Updated volcano emissions (Christoph Keller)
- CEDS v2 emissions through 2019 (Patrick Campbell)
- Updated LAI for 2000-2019 (Jenny Fisher)
- Updated sea salt, sea salt bromide emissions (Lyatt Jaegle)
- Offline BVOC and soil NO<sub>x</sub> emission data re-processed with new MODIS LAI data up to September 2020 (Hongjian Weng, Yanshun Li, Jintai Lin, Randall Martin)

## **Updates in progress / in queue**

- Climatologies for fires, lightning (Melissa Sulprizio, Lee Murray)
- Updated Rn-222 emissions (Bo Zhang)

## To be prioritized

- Updated canopy physics for BVOC (Sam Silva)
  - Hasn't been prioritized b/c standard model uses offline BVOC emissions
  - Advocate including this now
  - Can be used with current (MEGAN2.1) or updated (MEGAN3) EFs, land cover
- Future fire / dust emissions (Loretta Mickley; Yang Li)
  - 2006-2100 wildfire BC/OC emissions from LPJ-LMfire dynamic vegetation model from Li et al. (2020). RCP 4.5 & 8.5, western US domain.
  - Similar set of LPJ-LMfire emissions for dust from Li et al. (2021). Global domain, but data validated and shared for southwestern US
- Methane: Canada emissions, global oil/gas/coal (Tia Scarpelli; C Working Group purview)

## Upcoming

- Aircraft emissions (Seb Eastham, Thibaud Fritz)
  - AEIC\_2019, daily temporal resolution and gridded at 0.5x0.625 degree. Total fuel burn is 258 Tg
  - HEMCO Extension to process the AEIC emission inventory to include plume-scale effects
  - Year-2019 with simple annual scaling for 1990-2019
- Updated APEI anthropogenic emissions for Canada (A. van Donkelaar; work ongoing)
- Emissions for 2019 rocket launches and re-entry ablation (Rob Ryan, Eloise Marais)

# Questions and Considerations

- Lightning produced oxidants; direct source of HOx + O<sub>3</sub> (Brune et al., Jingqiu Mao et al.)
  - Mechanism well-supported but magnitude uncertain
  - Agreement in Emiss/Dep + Chem working groups to implement plumbing for this in standard model for user testing, sensitivity studies, etc
- MEGAN3 (Sam Silva)
  - Code developed and ready
  - Theoretically more accurate land cover, emission factor computation. But may exacerbate some existing biases (e.g., HCHO, O<sub>3</sub> over SE US)
- Soil NOx (Jun Wang, Yi Wang)
  - Soil NOx continues to increase past 30C (vs staying flat in current scheme)
  - In accordance with field data, better agreement with satellite NO<sub>2</sub> over central US where emissions are large
  - Published; only tested over US
- Concerns about lack of transparency / unclear provenance for species properties relevant to deposition (Hstar, f0 values, which species deposit and which don't) (Tess Carter; Colette Heald)