

**GEOS-Chem Steering Committee Telecon
September 7, 2017 5:30-7:00pm Eastern**

Attending/Missing:

Becky Alexander, Kevin Bowman, Sebastian Eastham, Mathew Evans, Emily Fischer, Jenny Fisher, Jeff Geddes, Colette Heald, Barron Henderson, Daven Henze, Chris Holmes, Lu Hu, Daniel Jacob, Dylan Jones, Prasad Kasibhatla, Christoph Keller, Hong Liao, Jintai Lin, Hongyu Liu, Jingqiu Mao, Eloise Marais, Randall Martin, Dylan Millet, Andrea Molod, Lee Murray, Jeff Pierce, Amos Tai, Jun Wang, Yuxuan Wang, Bob Yantosca, Fangqun Yu, Lin Zhang

1. General Update (Daniel)

- Welcome to Seb Eastham as co-chair of GCHP WG
- V11-02c one month benchmark approved. All issues resolved except diagnostic issues and some minor mass tracking. Still one item open is tracking of SOA in complex scheme. All these remaining issues, with all be tackled in 1 year benchmark
- Need a volunteer to replace Colette as note taker for these telecons. Jenny Fisher volunteered.

2. Engineer's Report (Bob)

- V11-02c approved and moving on to one year benchmark
- V11-02d primarily halogen chemistry and updates to netcdf diagnostics and other small structural changes
- V11-02e: big update will be the standardization of flux diagnostics using radon tests
- After v11-02e will look to the GCSC for priorities of future versions
- Harvard data archive will be copied over to Amazon web services in the near future. This will enable GEOS-Chem running on the cloud (it works now, but the bottle-neck is the data availability). Stay tuned. A question was raised about whether users would have to pay to download data.
- Netcdf diagnostics based on MAPL GCHP structures
- Putting together a new python data visualization package (GCpy) that will work on both lat-lon and cube-sphere grid output as an open-source tool. Survey was sent out by the development team to get a sense of needs for GCpy.

3. GMAO Update (Andrea, Christoph)

- Next release of FP at native grid output, intention is also to release software (python) to read and visualize the cube-sphere. Will no longer release native resolution lat-lon grid data, but probably a coarse grid version on lat-lon. Andrea will provide 1 week of testing data (tbd, offline with Kevin Bowman)
- Note that MERRA2 will stay on lat-lon
- FP system is due for a change at the end of year timeframe. Main difference is the use of smooth cartography (may have implications for horizontal transport). Christoph and Clara Orbe working on testing the impact of these systems on chemistry simulation.
- Comparisons of GEOS-Chem UCX and GMI Strat-Chem. Identified a few fixes and additional diagnostics. Overall comparison is a work in progress but going well.
- Composition daily forecasts at $\frac{1}{4}$ deg. Would like to have capability to compare against data to ensure that forecasts generally match the composition benchmarks. Jenny recently

provided an update on surface CO data for benchmarks. Welcome others providing data. Perhaps Eric Sofen's O3 database?

4. Working Group Reports

a. Adjoint model and data assimilation (Daven, Jun)

- A couple of conference calls this summer to discuss updating the adjoint to work with GCHP. Taking a bit of time getting GCHP up and running on Colorado machines (and others). Also on-going discussion with GMAO on how to run backwards (a bit more complex than negative time steps). Will soon aim to distribute updating tasks across groups who are interested in this capability.
- Updates of UCX-adjoint framework at MIT
- Some updates to support convection from MERRA2

b. Emissions and Deposition (Emily, Jintai, Eloise, Dylan M)

- Updates related to MEGAN: ¼ deg files originally created but 1 deg was being used, so will revert to ¼ deg; updated LAI files
- Archive of native 2D met fields being put together for non-linear emissions
- Recommended set of default inventories. WG co-chairs have put that together; now posted on wiki
- New inventories being implemented in the model: new CEDS=EDGARv4.3+regional inventories developed for CMIP6 (Jintai Lin, testing but some concerns over China), new version of NEI2011 ek (Emily Fischer, available now)

c. Chemistry (Mat, Barron, Lu, Jingqiu)

- Halogen are next up in v11-02d
- No other updates

d. Aerosols (Colette, Jeff, Becky, Fangqun)

- Working through benchmarking SOA schemes in v11-02c; will need to work on evaluation against obs in the future
- No other updates

e. Carbon Cycle (Kevin, Dylan J.)

- A lot of the work surrounding issues in GCHP. GCHP now running on Pleiades (NASA computer) and now carbon simulation accessible to more people. Find big CO₂ differences between ½ deg GC-Classic with MERRA2 and GCHP at same resolution. Investigating.

f. Hg and POPs (Jenny, Chris)

- MIT folks have a version of Hg chemistry and emissions working in v11-01 with some bugs. Would like to fast track this into v11-02 (presuming bugs can be corrected in timely fashion).

g. Chemistry-Ecosystems-Climate (Amon, Hong, Lee, Jeff)

- GISS and CESM driven versions of GC ready in the next few months for incorporation in model

- Land cover module ready by the end of the year for integration in standard code.

h. Transport (Hongyu, Andrea)

- At IGC8 it was decided that need to have a common set of tracers in GMAO and GC and some benchmarks. Large list of possibilities, so plan to send out a survey to the Steering Committee.
- Currently there is a small non-mass conservation issue when using the non-local PBL scheme (did conserve mass in v9-02, so a bug needs to be tracked down). Small, but not trivial for CO₂ and CH₄. So for these you should use instant mixing scheme. GMAO recently found that need to run diffusion operator at REAL*8 to conserve perfectly.

5. GCHP updates (Randall, Seb)

- Benchmarking: GCHP now fully included in GC, first official benchmark as part of v11-02b; benchmarking of GCHP lags GC-Classic currently but this will be improved
- Usage increasing: Harvard, MIT, Dalhousie, JPL
- Diagnostics: work has been done to enable communication of diagnostics to GCHP directly (so that Classic and GCHP will have same diagnostics capability and input files); this will aid in benchmarking
- Analysis: development of a universal regridding

6. Grid-independent emissions (Randall)

- Dependence of natural emissions on model resolution has been an issue for many years. This impacts both GC classic and GCHP. A group of folks have been working on this to define a list of native resolution 2D met fields that will be archived and that can be used to generate emissions. A number of folks working on code to calculate the emissions. Envision that in the future there would be switch so that could use either archived natural emissions or calculate these online (at high resolution) within the model.

7. Nested model updates (Yuxuan, Lin)

- ¼ deg nested grid over Australia (Jenny Fisher), in which she discovered an issue with boundary conditions

8. Dealing with the pace of structural changes (Colette and all)

- Concern about the pace of structural changes (that were implemented to support GCHP) and this challenging the ability of science updates and keeping code compliant (e.g. TOMAS). The impact of these on the user experience has not always been extensively discussed in advance of implementation. We should be more mindful to discuss and assess the impact of future structural challenges before integration in the standard code.

9. Updating variable names (Chris)

- Opportunity to revise names of diagnostics as move to netcdf. Could promote clarity and ease of use (upper vs lower case, clarification). Lots of different priorities to balance. For example, would like to preserve met variable names as GMAO... The whole Steering Committee should be involved in this process, so stay tuned.

10. GEOS-Chem Asia meeting (Daniel)

- Useful to have this regional meeting as travel for all the folks in China to Harvard for the IGC meetings can be challenging.
- Registration page will open in December
- Will not replace IGC meetings (i.e. where priorities set, etc.)