GEOS-Chem Steering Committee Telecon
7 August 2019

Attending/Missing**:**
Becky Alexander, Kevin Bowman, **Sebastian Eastham, Mathew Evans, Emily Fischer, Jenny Fisher,** Tzung-May Fu, **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, Lizzie Lundgren, Jingqiu Mao, Eloise Marais, Randall Martin,** Dylan Millet, Andrea Molod, Lee Murray**, Jeff Pierce, Susan Strahan, Melissa Sulprizio,** Amos Tai, Jun Wang**, Yuxuan Wang, Bob Yantosca, Fangqun Yu,** Lin Zhang, Yanxu Zhang

1. **General update (Daniel)**
    - 12.4 approved, thanks to Randall, Jintai, Lee
    - 12.5 (MAPL updates for GCHP) ready to be benchmarked, will be released with 12.4
    - 12.6 will update NOy heterogenous chemistry and cloud entrainment (code from Chris)
    - GEOS-Chem Asia Meeting (GCA-2) will be held May 18-20 2020 in Hangzhou & GEOS-Chem Europe Meeting (GCE-1) June 22-24 2020 in Leeds – no expectation for GCSC members to attend but would be great to have many come to enable working group breakouts.
    - GEOS-Chem clinic to be held at Harvard after AMS meeting on Jan 17 2020.
    - Would be a good idea to have a GC Town Hall at AGU – as a get together and also an opportunity to share GEOS-Chem with others not currently using. Unfortunately too late for this year – deadline was in April. Still an opportunity to do so for AMS. Interest?
        - Does seem like a good opportunity – would have to think about what to do with it
        - General presentation of GEOS-Chem status, updates, recent developments. Mostly an info session to learn about GEOS-Chem, like first session of IGC meetings (more focused on tools than science)
        - Utility for advertising the model to those who might want to get into this area, learning what it is you can do with GEOS-Chem
        - AMS also has option for short courses. Could perhaps do both.
        - Emily will look into how this fits with Atmospheric Chemistry Symposium

2. **Engineer's report (Bob)**
    - Logo has caught on
    - New version of WRF-GC, details from May
    - 12.6 netcdf diagnostics will include ability to save out a smaller region than global to save space
    - Benchmarking for 12.5 will compare bpch and netcdf diagnostics and start getting rid of bpch diagnostics where we can; will likely need to retain for some specialty simulations, etc.
    - Overhauled GEOS-Chem documentation on wiki, especially streamlined front page. Manual page now moved to wiki, easier to navigate. Content re-packaged as "Guides".
    - GCST encouraging users to use Github to report bugs via "issue trackers". Will stay visible, easier way to keep up with bugs.
    - Newsletter will go out with 12.5 release to avoid version fatigue

3. **Status of versions 12.4-12.6 (Melissa)**
    - 12.4.0 approved. Some remaining issues to be fixed in 12.5.0
        - PM2.5 anthropogenic dust source not being saved
        - Zero eruptive volcano emissions – updated volcano emissions were missing from 2015 but Christoph has provided a new dataset that includes them up to 4/2018

- 12.5.0 also has updated biogenic VOC emissions (includes MEGAN updates) in the off-line fields, and will retire older emission inventories. Only a 1-month benchmark planned.
- 12.6.0 also basically ready to go. Some errors have been fixed. Also include CMake as an option for GC Classic only. Will require 1-year benchmark.
- For biogenic VOC emissions, have both GEOS-FP and MERRA-2, will cover entire record.

4. Maintaining off-line emissions going forward (Randall)

- Jun Meng has the code to maintain offline emissions in the GEOS-FP and MERRA-2 fields going forward. Lee Murray maintaining lightning emissions.
- As emission parameterizations change in future GEOS-Chem versions, off-line emissions will be updated going forward in the GEOS data sets but no recomputation of emissions for previous years will be done (too much work). A log will be kept of when the parameterizations for off-line emissions have changed. Users wishing to apply new parameterizations to older years can use on-line emissions or do their own off-line calculation.
- Some uncertainty about future ability to use Compute Canada, Randall is developing a new repository at WashU, but we have time before we need to sort this out.

5. GCHP updates and benchmarks (Randall/Seb)

- GCHP telecon was held recently.
- Team at York has tested GCHP at multiple resolutions
- Lizzie has been leading a lot of work to remove bottlenecks
- Significant work to improve build process using CMake, should report code errors early in process of building rather than ~30 min into the process
- Some concerns raised with Spack including lack of accessibility in China, being investigated
- Promising work on an adjoint of GCHP; design could ensure long-term integration of adjoint so forward and adjoint version stay in sync
- Broad call out for users to add experiences with GCHP to wiki
- General request for beta testers to try out new features with GCHP, identify issues that may have been missed. Doing beta testing through Github.
- GCHP 12.5.0 has some caveats (see Newsletter), including memory leaks when doing hi-res multi-year runs. Problem can be avoided by using scripts that exist to set up sequential 1-month runs. There are some differences in outputs doing it this way, the differences are still being quantified, but generally <1%. This must have to do with model output that's not saved as part of the restart file, and could affect GC-Classic too. This is being investigated.
- Questions about how to simplify installing / acquiring libraries. Spack and containers can help, but cannot be installed on Chinese computers. Most institutions have netcdf and MPI already installed, but they are finicky (and pre-configured in different ways or not always sufficient). Software engineering group prioritizing this issue. Please report problems.

6. Halogen chemistry telecon report (Mat)

- Telecon held in July, included people working on kinetics, ice cloud parameterizations, etc. A lot of development has been happening but not in collaboration so lots of branches – want to bring this all together for a consolidated paper which will then provide blueprint for updating standard model.

7. Plans for versions 12.7 and 12.8 (Daniel)

- Current plan: 12.7 will have updated wet deposition parameterization; 12.8 new aromatic chemistry. Both will require a 1-year benchmark.

- Kelvin Bates' isoprene mechanism is now ready to be put in (paper accepted in ACP). Reduced to not have any more species than current mechanism. Includes deposition changes relevant to isoprene oxidation products.
- Propose to combine wet dep parameterization update with new isoprene mechanism update. Would supplement anything from Sarah's older paper if it isn't in the isoprene scheme. Would be best to swap 12.7 and 12.8.
- New plan: 12.7 = aromatic chemistry, 12.8 = isoprene + wet dep
- add small alkyl nitrate chemistry (delivered to GCST) with aromatic chemistry
- What about methanol chemistry? Currently inactive, is there a plan to include this? There was consensus at IGC9 that we want this. Daniel to follow up with Dylan M to see how mature the methanol sources are.
- Comment on Kelvin's new isoprene mechanism: if used for SOA production, produces way too much SOA. Could mean different things – research question – see Kelvin's paper. Suggestion to use his mechanism for gas-phase, but for isoprene species just limit to the species that are in Eloise's paper. Still a referenceable mechanism. Ok with people on call, Daniel to follow up with Colette.

8. WRF-GC update (May)

- Updates sent via email
- Still working on the WRF nested capability and two-way coupling

9. Reporting bug fixes (Jenny)

- Developers losing a lot of time on bugs
- One option is to follow GEOS-Chem github through Slack via following GEOS-Chem repository
- One idea is to ask community to submit as issues (and/or GCST to convert emails to issues)
- Could tag issues with "bug" to make it easier to filter
- v12.5.0 – issue tracker will ask about general question vs bug and include a template; subject heading will automatically have "bug"
- Would email be too many emails? GCST says yes. Sometimes hard to know major vs minor bug fixes. Can also see open vs closed issues.
- From version history doesn't seem like there are all that many bug fixes…
- Add something to the Newsletter about checking for bug fixes
- People can follow just the branch that they are using(?) but GCST doesn't recommend following any branch besides master. Can one follow e.g. just 12.4.0 to know which bugs are relevant to a given version?
- Proposal: create an issue for every bug, continue to look into this on the support team side. Re-visit in 3 months at next telecon.

10. The new Software Engineering Working Group (Melissa and Lizzie)

- At least 30 people on the email list.
- Five general areas for the working group:
    - Optimize performance
    - Improve usability
    - Facilitate interface with met models
    - Tools for data visualization
    - Model quality assurance
- Spreadsheet available from wiki page, as well as minutes
- Looking for new members to join the mailing list, contact Melissa & Lizzie if interested in working on any of these
- Killian and Bob to look at timing & memory usage

- For usability, containers have a lot of interest
- Other work in progress

11. GEOS-Chem instructional videos on YouTube (Lizzie)

- YouTube channel for GEOS-Chem. 2 videos so far: Getting Started with GEOS-Chem and Setting up GCPy
- Would like ideas for other videos
- Encourage people to subscribe – need 100 subscribers for appropriate URL, and also will get notified when new videos exist.

12. Member updates (all)

- Hongyu: updates from transport WG
    - Fangqun's group has just published their updated wet dep param. One update was to use MERRA-2 3D cloud LWC instead of constant. Hongyu's group has tested with Pb210 tracers – ok in some places but problems at high latitude, UTLS – probably too much ice scavenging. Fangqun: GMD paper focused on US, now looking at global (EMEP, Asia, ATom data), BC/OC/NO3/SO4. Changing ice uptake, some other parameters.
- Jingqiu: has been using NEI11 but cannot separate biofuel contribution (meant to be included). Is there a way to solve that problem? Barron: these are being aggregated before they come to us, we should ask the original processors at EPA whether they can separate that out for us. Barron to send a request internally.
- Eloise: Brian McDonald (NOAA) interested in incorporating VOC from consumer products. Patrick Campbell from NOAA also working on implementing NEI2016, talking with Rachel Silvern and Barron – has a process for making it ready for GEOS-Chem. NEI2016v1 will be available next month; if we want specific sectors separated now would be the time to ask.
- Jintai: Paper published about using real-time hourly emission measurements from Chinese power plants (including diurnal cycles, more accurate than GEOS-Chem). Are others interested in implementing this improved diurnal cycle into the model? Diurnal cycle largely from power load, could be generalizable. This would be useful information (currently diurnal cycles based on Netherlands, US only). Jintai would provide average diurnal cycles, could be ported to other years too.