GEOS-Chem Steering Committee Telecon
1 December 2017

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)**
    - Status of v11-02d – Melissa working w/ developers of halogen chemistry, benchmarks to GCSC soon (next week), 1-month and 1-year together; doesn't seem to break ozone; current plan is no option to have halogens off, will have a tropospheric only version of halogen chemistry; will run with seasalt debromination switch turned off (there is some double counting, we are already doing mechanistically). Prasad – have decided (with developers) not to include nitric acid uptake on seasalt aerosol as part of halogen update because not yet mature
    - Plans for v11-02e – meant to be flux capability, Chris has sent algorithm to GCST but will take too long for v11-02e (maybe f?). Instead list of things that won't take too long (see list of website)
    - v11-02f will start before next telecon – should look at what is in pipeline. Could be an emission version, what are priorities? GCSC should provide wish list over next month or so.
    - Public release of v11-02: shooting for early 2018 (Feb?); will happen once netcdf diagnostics are in place (will be compatibility between GCHP and GCC; important milestone). Not retiring bpch diagnostics in v11-02.
    - Porting of GEOS data onto Amazon Web Services cloud - convenient repository for pulling data (would be publicly archived), using cloud computing, would be convenient for standard reference and usage for broader community (wouldn't need own system to run). Still working on this, DJJ will be discussing with AWS next week. No immediate plans for GCHP on cloud. Seb – in theory should be no problem to run GCHP on one node (=64 cpus) on cloud; more than one node more tricky (but this is the eventual plan)

2. **Engineer's Report (Bob)**
    - Main structural work has been netcdf diagnostics; built to take data and pass to GCC or GCHP
    - Most bpch diagnostics every chemistry timestep, but GCHP takes data every dynamic timestep (10 min instead of 20 min); GCST recommends updating at dynamic timestep to maintain compatibility between GCC and GCHP
    - Naming conventions: most will not allow underscores, just upper/lower case mix. Exception is CHEM_, MET_, etc. For GCC will be able to use wildcards (all advected, etc.). See website (list of v11-02 diagnostics) & newsletter for more.
    - Working on scripts for benchmarking in GCPy. Code-a-thon a few weeks ago to merge codes into repository to form core GCPy; GCST is going to migrate benchmarking code from IDL to Python. GCPy not mature but encourage beta users + feedback.
    - Satellite and planeflight diagnostics are not easily accommodated by NetCDF – may look into satellite simulator, but not in this release. These diagnostics will remain unchanged.
    - Names of metadata & index variables CF and COARDS compliant, similar to CESM format. Variable names – some can be very long, so decided not to use for variable names. Kevin suggests a translation table of our variable names and what equivalent would be from climate model names. Bob – may be possible to set different variable names without changing code, can investigate.

3. **GMAO Update (Andrea, Christoph, Seb)**
    - Running composition forecast since March; would like to make that data publicly available sometime early next year, using v11-02d; still finalizing diagnostics
    - UCX evaluation comparison against GMI ongoing, there is a difference with BrCl but not sure why yet
    - FP transitioned from 5.16 system to 5.17 system. Nothing fundamental affected, archive is still lat-lon at same resolution. No difference in physics or dynamics except smoothed topography field, but will have some impacts on near-surface winds which will affect emissions
    - Seb now has sample cubed-sphere archive from GMAO; have successfully put into GCHP, testing now, working on how best to regrid.
    - Not clear when cubed-sphere operational archive will begin being generated.
    - Timetable for MERRA-3? Not in the next 1-2 years. Will be coupled to the ocean.

4. **Working Group Reports**
    a. **Adjoint model and data assimilation (Daven, Jun)**
        - GCHP adjoint development using CO2, multiple groups working together on this.
        - UCX inversion nearly ready
        - May Fu & student have completed adjoint for dicarbonyl mechanism
        - Jun & Daven working on operator for OMPS to invert for SO2, NO2 emissions
        - Kevin: LETKF multi-constituent assimilation for chemistry has been implemented in GCC, now being evaluated against other models

    b. **Emissions and Deposition (Emily, Jintai, Eloise, Dylan M)**
        - Mat Evans working on new deposition of ozone to the ocean
        - Emily's group almost done with implementation of updated NEI11 emissions + evaluation, important for oil & gas esp in West, paper is drafted and Emily happy to share in advance
        - CEDS emissions have been implemented in GEOS-Chem; other than China reasonably consistent with other inventories (basically EDGAR + regional) but missing variability over China; collaborating to update for China
        - Lin has new ammonia emissions for China

    c. **Chemistry (Mat, Barron, Lu, Jingqiu)**
        - Duplication of some oxidation of biogenics (MONX), conversations with aerosol group to make sure that is being done in way that is consistent for both aerosols and gas-phase
        - Two groups working on aromatic chemistry (Peking, MIT) – future development?

    d. **Aerosols (Colette, Jeff, Becky, Fangqun)**
        - Working with Melissa on implementing sulfate formation from HOBr in 11-02d, has some implications for reactive halogen chemistry.
        - 11-02e sulfate oxidation from metal catalyzed oxidation. Deciding on whether to have a switch – may have a scaling factor in HEMCO that could be set to zero to turn off, also very uncertain so good to have a scaling
        - Adding seasalt aerosol alkalinity tracers, ready to go but not sure when that will go in.
        - Question about isoprene SOA – Havala suggesting based on Thornton group that there is duplication between IEPOX chemistry and VBS and we should perhaps remove VBS isoprene SOA (CMAQ hasn't implemented yet). Still figuring out how v11-02 affects SOA (some lingering concerns about recent mergers), maybe for now we keep an eye on this and think about

removing in future. Can we use Eloise's analysis as constraint on whether we are double counting with VBS + irreversible? Eloise – find overestimate, hints that VBS is duplication. For now we have both but they are independent, so you can always not include only one in analysis. Smaller working group discussion to happen at AGU.

e. **Carbon Cycle (Kevin, Dylan J.)**
   - CO2 running at C360 globally. Q: what is best way to provide credit for GCHP?
   - SF6 evaluations (NOAA/CSU), comparing GEOS-Chem/MERRA vs TM5, finding some vertical biases that are not just due to convection because at high latitudes.
   - DOI on GEOS-Chem related carbon fluxes for CO2, CH4, available on DAACs; if we input into GEOS-Chem how do we handle multiple DOIs?

f. **Hg and POPs (Jenny, Chris)**
   - Colin on his way to integrating Hannah Horowitz's chemistry in next public release (need to follow-up with Colin, should go into v11-02)
   - Plans to integrate chemistry mechanism into KPP – separate Hg mechanism

g. **Chemistry-Ecosystems-Climate (Amos, Hong, Lee, Jeff)**
   - After v11-02d, GISS coupling updates to go into standard code
   - Plan to import JULES biosphere into GEOS-Chem
   - Also a number of groups working on dry dep different schemes esp. stomatal conductance term; Amos would like to know which groups are working on this
   - Any possibility of linking to other ecosystem models? No immediate plans but could be done, offline conversation

h. **Transport (Hongyu, Andrea)**
   - Radon emissions update sent to GCST but not yet submitted; wait until paper is submitted to implement
   - Would like a common set of tracers in GC and in GEOS, could include some in benchmark; will send out list for user survey to pick top preferences; first 17 in list have been in GMI for years; need to figure out if these can be run in existing code; Lee suggests running in Radon

5. **Nested model updates (Yuxuan, Lin)**
   - Africa nested model ready, submitted to GCST by Eloise

6. **GCHP updates (Randall, Seb)**
   - Diagnostics updates ongoing, most have passed tests, some investigations ongoing
   - U Toronto can run GCHP on Canadian supercomputer
   - New MAPL release from GMAO that is being integrated into GCHP – allows possibility of dedicated output server, input server which will help with I/O bottleneck (pipeline); but does require IFORT
   - Validation of GCHP continuing
   - Paper well underway

7. **GEOS-Chem within the GEOS system (Lu, Christoph, Seb)**
   - First application at C720 (~12km x 12km) using tropchem v10-01, goal to provide nature run for OSSE; have done some ozone evaluation against data and offline GEOS-Chem, no bias in free trop but overestimate at surface consistent with GCC; writing GMD paper
   - May do a nature run 2 when we have halogen chemistry
   - Evaluation of stratosphere is what GMI folks are interested in, looking esp. at BrCl

- At higher resolution dynamics is bottleneck, doesn't scale as well as chemistry; one reason is transporting more species

8. Status of grid-independent emissions (Randall)

- Using met fields at native resolution to construct base emissions at high resolution that can then be regridded to coarser
- Lee has calculated lightning flash rates for entire MERRA-2 archive and 2015-2017 for GEOS-FP, will go to GCST soon
- Dave Ridley has produced offline dust fields, working on scaling factor for coarse resolution
- Jintai's group working on biogenics and seasalt, primarily for MERRA2
- Can we have ready for v11-02? Yes for lightning, maybe for dust, biogenics & seasalt timeline TBD

9. Tagged CO updates for v11-2 (Jenny)

- New version is with GCST, switch allows one to use either new version or old; requires chemical production field which GCST will produce during 1-year benchmarking process

10. DOI for GEOS-Chem (Lizzie)

- Simple to create a DOI for a GC version using OFS which links to a BitBucket archive.
- Downside is that it doesn't include git history, so would use for citation rather than cloning
- Will start with registering v11-02 public release, then go from there

11. GEOS-Chem Asia meeting + GEOS- Chem Europe meeting (Daniel for Hong, Mat)

- GCA May 21-23 2018 @ NUIST, hosted by Hong, registration page will go up in December with email to community
- GCE September 2018 @ U Edinburgh, hosted by Paul Palmer, dates to be set soon.