GEOS-Chem Steering Committee Telecon
5 March 2019

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, **Lizzie Lundgren**, **Melissa Sulprizio**

1. **General update (Daniel)**
    - Version 12.3 is about to be benchmarked: includes OMI volcanic emissions up to 2018 from Jun, new 8-day MODIS LAI BNU product from Yuan2011 for MEGAN, soil NOx, dry dep & new PFT from Barron/Jenny/Dylan M. Concern was expressed about noise and gaps in the 8-day MODIS LAIs but the BNU product does a lot of gap filling and temporal smoothing. Plan is to make it the default, but we should check with Mike Barkley who may have a better product. Chris will go through the Yuan 2011 paper to see if concern over noise and gaps have been addressed, and Eloise will ask Mike Barkley about his LAI product.
    - Version 12.4 next: grid-independent emissions. Everything is basically now ready. Just waiting on some additional years and documentation for biogenic emissions.
        - If we update LAI data that will change biogenic emissions – means we have to redo all the grid-independent high-resolution emissions… Or do we? It seems like a lot of trouble considering that the changes from the updated LAI are relatively small. We could just update the LAI for the dates going forward and make a note it. An important implication is that the grid-independent emissions may not be consistent over the whole time record. However, people can always choose to not use the grid-independent emissions.
        - Plan is to make the grid-independent emissions the default. They are going to be used in GCHP and it makes sense to have the same default in GCHP and GC Classic.
    - By IGC9 we hope to have stage 2 of FlexGrid ready. Will allow to run nested simulations on any custom domain. Going to maintain existing fixed domains but not going to create any new ones.
    - Revamped list of model development priorities following GCSC discussion. By the time of IGC9 hoping to have a greatly shortened list of priorities; want to make sure that the working groups have a pretty clean slate for making recommendations.
    - Large number of different configurations available in the model (31!); this requires quite a lot of maintenance as we move from one version to the next. Would be easier to put logical flags into input.geos – some work now but worth it in the end. Some simulations are hardly used at all – not sure of their quality - are they obsolete? Should we cut them out? Daniel will forward list, to discuss at IGC9.
    - Chris has developed a generic tracer simulation. All simulations that just have emissions, transport, and reactions with archived oxidants can be handled with just a few modifications to the model with a run directory & KPP file. Seb has done something similar in the past. We should be able to dramatically simplify Fortran code for several of these simulations.

2. **Engineer's report (Bob)**
    - Two releases in Feb (12.2.0, 12.2.1), hopefully 12.3 released soon
    - Cloud computing for GC Classic now mature and appears to be heavily used. Paper submitted to BAMS. Tutorial exists (link in newsletter).
    - Jiawei working on getting multi-node GCHP working on the cloud.

- Now have ObsPack diagnostic in GEOS-Chem 12.2 and higher. Especially useful for carbon cycle modelling. Basically point data (several different lat/lon/alt). Useful replacement for planeflight. Needs to read coordinate data from netcdf in ObsPack format. Have some documentation on wiki for how to set this up. Will work with any of our simulations.
- Alpha release of WRF-GC from May Fu's group.
- GCPy package for benchmarking output has advanced in last few months. Now have a benchmark prototype.
- Do have a plan to retire BPCH output but want to wait until GCPy is mature and we have a benchmark comparing netcdf and BPCH diagnostics for same version to make sure no problems. Some diagnostics in BPCH may need to be preserved (e.g. satellite diagnostics).

3. Working Group Reports

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

- Aerosol pH: currently if aerosol water content below a certain threshold, pH goes to -999 and [H+] goes to high value and then these get averaged into code/diagnostic; then this pH is used for IEPOX and IMAE hydrolysis → problem for those reactions and diagnostics. Becky's group has a temporary fix and working on a better overall fix.
- Cloud pH (Jonathan Moch): calculations depend on assumed initial pH guess and number of iterations; Jonathan has a better way to do this. If no cloud, pH gets set to zero and gets averaged into diagnostic. He has a fix for this too.
- Fanqun has noticed nitrate & ammonium overestimates that have been in the code for a long time. Fangqun has fix related to wet scavenging & parameterization of in-cloud water content. Found they can use MERRA2 in-cloud water content to bring down nitrate in winter. Also use empirical washout scavenging coefficient for nitric acid rather than theoretical one, which changes by factor of 100, much better agreement with observations e.g. IMPROVE. Paper submitted, will be in GMDD soon.

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

- Nothing to report

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

- Telecon about updating chemistry scheme that will happen next week
- How will we deal with multiple options for aromatics chemistry? One of items for discussion in the telecon next week
- Telecon info should be sent to the whole GCSC for others to participate who are not in the Chemistry WG

d. Carbon Cycle (Kevin, Dylan J.)

- Preparing carbon-related priorities to be added to model development priorities list.
- Seeing larger and larger divergence between standard code and adjoint. Need to address how to reduce these disparities. WG will discuss whether to focus on GCHP.
- Unit problem in the 3-D source of CO2 from CO has been solved in version 12.2.1.

e. Hg and POPs (Jenny, Chris)

- Nothing to report

f. Chemistry-Ecosystems-Climate (Amos, Hong, Lee, Jeff)

- Nothing to report

g. Transport (Hongyu, Andrea)

- Expanded list of transport tracers has been implemented in v12.2. Benchmark results look reasonable. Further comparisons to come.

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

- Looking at update priorities, trying to focus more on GCHP. Updates to MAPL code are making things more feasible, looking into which features will work with adjoint. Ongoing effort, but when it works will allow to address coding challenges.

4. **GMAO Update (Andrea, Christoph)**
    - On the verge of releasing a new FP system, others are in the pipeline and will be in FP soon. Andrea considering preparing a list of recommendations for which products to use when. GMAO still has issues where transport problems don't feed back into whether or not new FP is released. What we can do is provide some info on whether new system is ok to use for different applications. Consensus is that this sort of information would be useful.
5. **Nested model updates (Yuxuan, Lin)**
    - Nothing to report
    - With Flexgrid, restart file will not be a problem. We could provide a high-resolution global restart file that can be cut to user's domain.
    - Q: Will Flexgrid require global high-res met files or can users cut to custom domain to save space? A: Yes will be able to use pre-cut met fields.
6. **GCHP updates (Seb, Randall)**
    - Project at NCAR comparing GCHP to CESM
    - Demonstration has been performed using very high resolution runs on the cloud
    - New version of MAPL will improve I/O problems, also hopefully will help in getting adjoint, 1-D timeseries
    - Continuing to prioritize accessibility of GCHP.
        - Upgraded version of ESMF, much easier to build, will become simple GCHP dependency eventually
        - Cube-sphere grid implemented in GCPy, easy to compare GCHP/GC Classic
        - Working on making compiling easier & clearer
        - Grid-independent emissions helping
7. **GCPy benchmarking (Mat, Lizzie)**
    - Lizzie has shared benchmark prototype for 1-month benchmark
    - About to start work on 1-year benchmark
    - Mat Evans directing this; all feedback to go to Mat & he will coordinate with GCSC to come to final decisions about benchmark
8. **GCSC membership (Daniel)**
    - Possibility of stratospheric working group or at least stratospheric oversight – GMAO has been doing a lot of comparisons between GEOS-Chem & GMI, and they have highlighted issues as they arise. Dylan Jones has offered to co-chair a stratospheric working group with someone from GMAO. Susan Strahan happy to take on this role, has already been leading these comparisons. Kick this off at IGC9?
    - All current members willing to remain on GCSC. Daniel will send email to GEOS-Chem users list to see if anyone else interested in contributing. May Fu to join as WRF-GC Scientist. No need to restrict membership.
9. **IGC9 agenda (Daniel)**
    - 228 people registered. Big meeting room secured for Monday-Wednesday, TBD for Thursday (Harvard exams starting).
    - Two dinners: Monday & Wednesday.
    - Daniel to email preliminary agenda to all attendees; can still make minor changes at that point.
    - Chris noticed very few Hg-POPs presentations. A bit of a problem for our working group in terms of setting future priorities. Several people coming who are already presenting on a different topic but also doing Hg/POPs work – could we ask them to also present a poster? Only two submissions, one

Hg and one POPs. If people would like to change presentations we could do that. 17 people have signed up for Hg-POPs WG meeting. Daniel, Chris, Jenny to discuss options offline.

- Colette: would be useful to put out a call to users to let us know papers that have come out since IGC8 that we can then get to relevant WGs. Daniel to set up a Google survey form for this; this list will also be used by Randall's group to update GEOS-Chem publication list.