**GEOS-Chem Steering Committee Telecon**
**May 23, 2012 10-11:30 Eastern**

**Attending: Daniel Jacob, Bob Yantosca, Randall Martin, Colette Heald, Jun Wang, Loretta Mickley, Steven Pawson, Dylan Millet, Noelle Selin, Paul Palmer, Ray Nassar, Yuxuan Wang, Lyatt Jaegle, Dylan Jones, Daven Henze, Prasad Kasibhatla**

**Absent: Kevin Bowman, Jeff Pierce, Jingqiu Mao, Hong Liao, Mathew Evans**

**General News (D. Jacob)**

- Start thinking about IGC6, host @ Harvard, beginning of May would be the likely timing. To be discussed more next telecon.
- Will discuss code credits after v9.1.3 release.

**GEOS-5.7.2 testing in GEOS-Chem (D. Jacob)**

- Patrick Kim working with Bob to test full-chemistry and Rn/Pb/Be 2x2.5. Full chemistry reasonable. However Rn/Pb/Be simulation showed aerosol scavenging ok, lifetime of Pb in troposphere is 9 days (better than previously), but Rn concentrations in surface air too low (tied to high nighttime BL depths). GEOS GCM has some issues with PBL heights calculation, being investigated at GMAO, will be addressed in a couple of weeks with potentially new algorithm for this.

**GMAO news (S. Pawson)**

- GEOS 5.2.0 has had other issues of PBL height, under investigation
- New staff member working on PBL diagnosis so hope to make progress on this issue.
- Discussion of how best to keep GMAO & users happy: provide stable timeseries of products for users but conflicts with GMAO desires to update -- possibly put 2 systems in place: (1) 0.5 degree system more stable (2) 0.25 degree system more volatile but still accessible by community. Can't afford to run 2 operational 0.25 degree systems. Under consideration, more discussion in the future. GC community is excited about 0.25 degree system but there can be some advantage to having access to different meteorological products (for error estimation).
- Also moving towards hybrid variational ensemble approach which might be useful to the GC community. TBD
- Investigation of eddy vertical motions representation in the coarser resolution has been deferred while dealing with other issues, but hopefully to be addressed in the near future.
- MERRA will not be viable in a couple of months – can't get the latest obs into the product. Once NOAA 16/17/18 are lost there will be no satellite data in the product

**Update on 0.25x0.3125 nested grid code development using GEOS-5.7.2 (Y. Wang)**

- Development joint Harvard/Tsinghua, GEOS5.7 testing, and hi-res emissions re-gridding from Harvard

- Tsinghua working on the advection scheme updates: modifying TPCORE, parameters, BC, timestep set to 5 min. Have tested code for single CO tracer, advection-only, 5 days for Asian nested grid (20% larger than previous domain, 257x281 dimension, to address both SEAC4RS and East Asia). Look generally consistent with 4x5 results, doing more testing. Plan to start testing full-chemistry next week.
- Two issues: (1) run time (85 min to run 5 days on 4 cpus vs. 4x5 takes less than a minute → so about a factor of 100 increase due to number of gridboxes and timestep). (2) potential concern with memory issues, hasn't come up yet but only running single tracer. Solution is to cut the domain or to separate the domain. Yuxuan recommends cutting into South Asia and East Asia. Possibly explore gridding up to ½ degree. A question of whether we will maintain this ½ degree capability in the future – may be tied to whether GMAO maintains 2 data streams.
- As an aside: Jun reported that GEOS5 has more LWC than MODIS retrievals – resolution could play a role.
- Get feedback on domain size from Paul Palmer related to 2014 field campaign.
- Possibly use GMAO CO tracer @ hi-res as point of comparison with nested grid. Steven will investigate

**Pending release of 9.1.3 (D. Jacob)**

- Version has been long in coming – addition of updates and bug fixes has slowed it down a bit.
- Latest sub-version included daily/3hr GFED3. Currently Melissa updating tropospheric Br chemistry (some small bugs found in this process), strat P/L from GMI. Those are the last planned updates.
- Hoping for full-year benchmark and release within a month.

**Grid-independent mode, transition to netCDF, other issues (R. Yantosca)**

- Covered in Model Engineer's report
- Have been adding to the standard code to allow for grid-independent approach, largely removing ascii files and legacy code. Mike and Bob going down to Goddard next week, will bring down code (chemistry solver, photolysis, deposition), interface it with the GCM and test it out. Have already successfully tested with a preliminary version of code from Arlindo DaSilva.
- Christoph Keller is working on creating a data structure to handle emissions with ability to handle scale factors. Emissions will be the focus of Year 2 of the project.
- netCDF libraries required for v9.1.3 onwards. Lee Murray and Bob have worked on an easier installer tool, now available to the community.
- About a year away from grid-independent model being the standard GEOS-Chem code.

**WORKING GROUP REPORTS**

**Chemistry (D. Jacob for J. Mao and M. Evans)**

- What do we do about Br chemistry in v9.1.3? Recommendation: do not maintain separate versions of the code. Single version of the code with option to turn it off by effectively dialing down precursor emissions. Would keep the simulation cost (~10% penalty) but advantage of not maintaining two divergent chemical mechanisms.
- Treatment of organic chemistry in GEOS-Chem: many divergent elements - different flavours of isoprene chemistry, updates to organic peroxy radicals, aromatics, dicarbonyls. Need to focus these and develop standard organic chemistry update. V9.1.4 will include some of these updates.
- HO2 uptake by aerosols: follow up from previous SC meeting, should wait until Jingqiu's paper is accepted (re-submitting to Nature) for incorporation into standard code. Available by request.

**Aerosols (C. Heald)**

- DMS climatology and emission parameterization has been updated by Becky Alexander's group and will soon be sent to Support Team for integration in the standard code (may make it into v9.1.4 but depends on timing). On a related note Tom Breider has added DMSO chemistry as an intermediate species and that is on the horizon for the standard code.

**Hg & POPs (L. Jaegle and N. Selin)**

- Bess Corbitt submitted update to Hg code, including using Br fields from Justin, also some updating of redox rate constants, and tagged Hg simulation.

**Chemistry-Climate (L. Mickley)**

- Working on GISS Model E 2x2.5 version and expecting to have GCAP met fields this summer.

**Carbon gases and organics (D. Millet and R. Nassar)**

- Ray working with better CO2 FF inventory that has better spatial resolution, ready for v9.1.4
- Temporal scaling factors for daily and diurnal variability of CO2, ready for v9.1.4
- Many new options for ocean and terrestrial CO2 fluxes: Kevin Bowman has some publicly available fields (CMS), need to be clarify if can be integrated in GC; also some SIB fluxes available from Caltech and ODIAC from CIRA/CSU → if get permission to use these could have another CO2 update with these options, but will require some user responsibility to use "reasonable" combinations.

**Nested Model (J. Wang, Y. Wang)**

- Preparing for NA benchmarking nested code for v9.1.3 (1 month per season).

**Sources and Sinks (R. Martin and P. Palmer)**

- Qiang Zhang from Tsinghua: benchmarked EDGAR 0.1 degree global inventory through 2005, also working with Christoph Keller on emissions.
- Dalhousie: updated Canadian emission inventory to 2008, sent to GC Support Team

- Dalhousie: NH3 emission inventory for Canada doesn't have seasonality: have a new inventory from Ag Canada that has May peak, consistent with IASI → once tested will integrate in standard code.

**Model adjoint and data assimilation (D. Jones, D. Henze)**

- Nicolas Boussarez helping out with code support
- Efforts working on Methane adjoint & offline aerosol adjoint (BC & dust)
- Full chemistry nested adjoint not working 100% hopefully ironed out with more users. Nested grid simulation has been successful for other simulations
- In pipeline: sensitivity to rxn rates output, designing cost functions related to deposition, improving estimate of inverse Hessian

**Radiative Forcing Calculations in GEOS-Chem (L. Mickley)**

- In discussion for awhile and a number of users expressed interest
- Require online integration for LW/SW
- First, most promising choice: RRTMG code developed by AER, both LW and SW, Kevin Bowman has advocated for this, Colette & Steven Barrett talking with AER, they plan to contract AER to implement this online in GEOS-Chem starting this summer. Will also be a second evaluation stage.
- Second: LIDORT, we thought was proprietary, already in adjoint, so makes sense to have in forward as well as adjoint. Daven conveyed that Rob Spurr says it's public, advantage is that you get derivative information, downside is that not easy to implement in parallel (not confident that it's well implemented in adjoint), expensive to run b/c of derivatives, generic RT model so if provide cross-sections can do LW (hasn't been used much if at all for the LW in the past), but do need to provide this info. Can deal with clouds, but need to specify this.
- Not clear that we should also bring LIDORT into the standard forward code b/c want something fast, across all wavelengths for forward model. So RRTMG seems more appropriate.
- Jun Wang mentioned the code he has been using as an option, original code is publicly available, designed for clouds, if want to use for aerosols need updates from Jun.
- Could have multiple codes available. Loretta will follow up.

**What should be included in v9.1.4 (D. Jacob)**

- Time-frame has been new version every 6 months
- Expanded SOA was supposed to go into v9.1.3 will go into v9.1.4
- Small updates from chemistry working group will all go in
- Organic chemistry: waiting on Jingqiu and Mat to determine if there will be a v9.1.4 update
- CO2: updated FF emissions (manuscript from Ray), ocean/biospheric fluxes (some may have manuscripts)
- Interest in acid uptake on dust expressed by Mat, and others, so now would be the time.

- Soil NOx emission module: Matt Cooper from Dalhousie adapting Rynda's code and now a student from KNMI is working on some updates.
- Satellite based NOx emission trends
- Sulfur updates from UW, put late in the list as finalize: DMS emissions, cloudwater pH for sulfate formation (confirm evaluation with Tom Breider)
- Emissions: Canadian inventory for 2008 (possibly with seasonal variation of NH3), EDGAR4 anthropogenic emissions
- Hg updates all ready to go in.
- Tagged sulfate & nitrate code is ready, but not critical (no users outside of UW), so could be deferred