GEOS-Chem Support Team Activities
Bob Yantosca ~ GC Model Engineer ~ IGC8 ~ 01 May 2017

Bob Yantosca (Harvard)
Melissa Sulprizio (Harvard)
Lizzie Lundgren (Harvard)

Mike Long (Harvard)
Colin Thackray (Harvard)
Junwei Xu (Dalhousie)
Yanko Davila (CU Boulder)
## What we work on

<table>
<thead>
<tr>
<th>GCST Member</th>
<th>Affiliation</th>
<th>Projects</th>
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</table>
| Bob Yantosca        | Harvard           | Software development and validation  
User support and documentation  
GCHP development and support  
Project management           |
| Melissa Sulprizio  | Harvard           | Software development and validation  
User support and documentation  
Benchmarking new GC versions |
| Lizzie Lundgren     | Harvard           | GCHP development and support  
Software development and validation  
User support and documentation  
Benchmarking new GC versions |
| Colin Thackray      | Harvard           | Specialty simulation development (e.g. Hg, POPs) |
| Mike Long (based in NC) | Harvard       | GCHP development and support  
Integrating GC into Earth System Models |
| Junwei Xu           | Dalhousie         | Processing  GMAO met data for input into GC; data archiving  
GCHP testing |
| Yanko Davila        | Colorado Univ.  
@ Boulder       | GC Adjoint development and validation  
GC Adjoint documentation and training  
GC Adjoint user support |

Honorary members: Seb Eastham and Jiawei Zhuang (GCHP development and support)
GCST supports the International GC User Community

**User support**

- Helping new users to get started with GC
- Assisting GC users in debugging their simulations
- Developing supporting software
  - GCPy : Visualization & regridding (to replace GAMAP)
  - Distributing met fields & other data for input into GC

**Source code management**

- Accepting new GC science updates from the community
- Enforcing version control with Git
- Maintaining public code repositories (on Bitbucket.org)
- Facilitating traceability for all updates made to GC
  - Documenting new features and bug fixes on the GC wiki

**Documentation, communication, & education**

- GC Web Site, Wiki, and Online User’s Manual
- GC Adjoint wiki pages
- Quarterly e-Newsletters
- GC email lists (e.g. geos-chem@g.harvard.edu)
GCST preserves the scientific integrity of GC

Ensuring code correctness
• Fixing bugs as soon as they are reported
• Performing automatic code validation tests:
  • Unit tests scan for common coding errors
  • Difference tests make sure structural changes do not change any scientific results

1-month benchmark simulations
• Tropchem+UCX+SOA, 4x5 GEOS-FP met, for July 2013
• Submitted after each new feature is added to GC
• Compared to prior 1-month benchmark
• GCSC, developers, and interested users analyze and comment on benchmark results
• Final approval is by Model Scientist

1-year benchmark simulations
• Tropchem+UCX+SOA, 4x5, GEOS-FP met for year 2013
• Submitted before each public release of GC (or sooner)
• Compared to prior 1-year benchmarks + observations
• Approval process same as for 1-month benchmarks
GCST develops the next generation of GC

High-performance computing (HPC)
- Interfacing GC into Earth System Models (ESMs)
  - NASA GEOS5-DAS
  - Beijing Climate model
  - CESM (soon!)
- GCHP development and support
  - Benchmarking and scientific validation
  - Improving the GCHP user experience / easier compilation
  - Adding new GCHP documentation
  - Engaging the GCHP user community
- Cooperative development with NASA/GMAO
  - GEOS-CTM effort (A. Molod)
  - MAPL software library development (T. Clune et al)
  - Developing a library of chemical modules for GEOS5-DAS

Improving the efficiency and usability of GC
- Making GC compatible with open-source gfortran compiler
  - Which facilitates running GEOS-Chem “in the cloud”
- Providing options for speeding up GC simulations
  - Changing time steps, flexible precision, etc.
- Overhauling diagnostics for netCDF output
For more information

During IGC8

- Model Clinic: “GC for Beginners” TODAY @ 12:15 PM
- Model Clinic: “GC for Advanced Users” TODAY @ 12:45 PM
- Model Clinic: “GC Adjoint” TODAY @ 5:15 PM
- Model Clinic: “GCHP” Tuesday @ 12:45 PM
- Model Clinic: “GC interfaced into ESMs” Wednesday @ 12:45 PM
- GCST Office Hours: TODAY thru Wednesday 1:30 – 3:00 PM

Anytime

- GC Web Site www.geos-chem.org
- GC Wiki wiki.geos-chem.org
- GC Adjoint wiki.geos-chem.org/GEOS-Chem_Adjoint

Contact us

- GCST email address geos-chem-support@as.harvard.edu
- GC Adjoint email list geos-chem-adjoint@g.harvard.edu