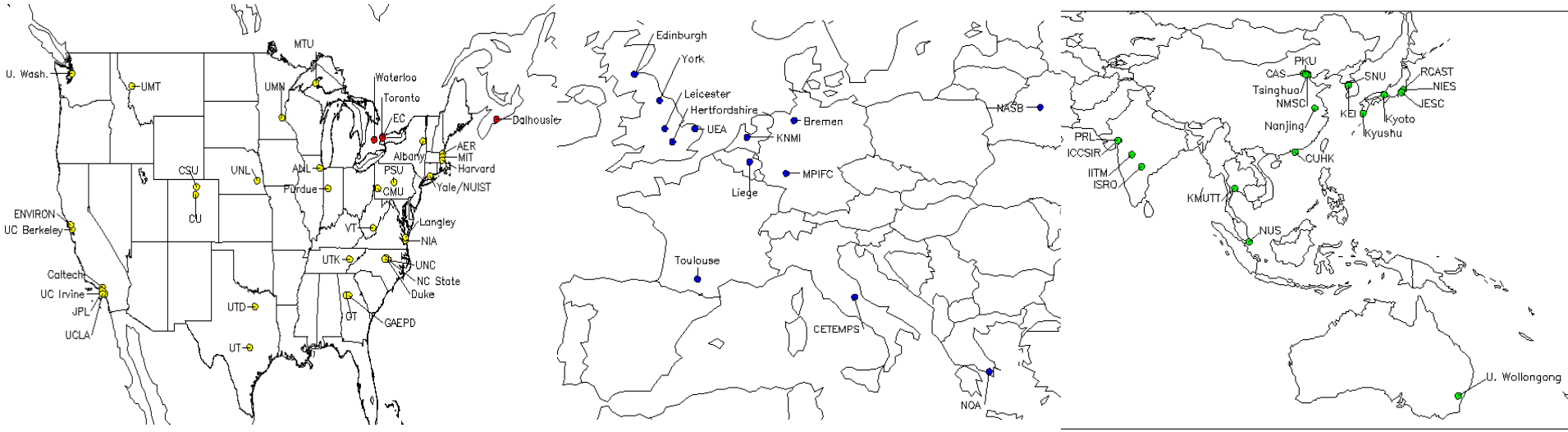
Welcome to the 6th International GEOS-Chem Meeting!

The GEOS-Chem user community: 70 institutions, 18 countries



Thanks to our sponsors:

NOAA — National Oceanic and Atmospheric Administration, U.S. Department of Commerce

NASA

EPRI — Electric Power Research Institute

National Centre for Atmospheric Science — Natural Environment Research Council

NSF

Harvard School of Engineering and Applied Sciences

Harvard University Center for the Environment

Thanks to Sandra Klemm, Brenda Mathieu, Harvard grad students for logistics

Meeting Objectives

Exchange information at the frontier of knowledge of atmospheric composition

- IGC6 is first and foremost a scientific meeting

Promote interactions both within and outside GEOS-Chem community

Sustain functioning of the GEOS-Chem community

- Model clinics
- Working Group meetings
- Business meeting: leadership/communications, model standards, long-term vision

Identify model development priorities for the next two years

- A major charge for the Working Group meetings

Full Agenda: 90 Talks, 70 Posters, Clinics, WG Meetings

Monday, May 6

Model Overview
GEOS-Chem Working Group Introductions

Aerosol Sources and Chemistry
Black Carbon and Related Processes
Model Clinics (Forward, Adjoint, Met & Grid Independent)
1st Poster Session (6:00 onward)

Tuesday, May 7

Aerosol Effects on Climate and Air Quality
Regional Air Quality (posters and introductions)
Mercury and POPs
1st Poster Session (12:40-1:40)

Climate-Chemistry
Working Group Meetings (discussion, development needs)
(Sources & Sinks, Chemistry-Climate, Hg & POPs)
(Oxidants and Chemistry, Carbon, Nested)
2nd Poster Session (6:00 onward)

Interspersed Scientific Presentations & Users Meeting

Full Agenda: 90 Talks, 70 Posters, Clinics, WG Meetings

Day 3: Wednesday, May 8

- Sources and Sinks: Nitrogen
- Tropospheric Ozone & Photochemistry (posters and intros)
- Carbon Dioxide Fluxes
- Sources of other Carbon Gases (posters and intros)
- 2nd Poster Session (1:10-2:10)

- Sources of other Carbon Gases (oral)
- Working Group Meetings (discussion, development needs)
  (Adjoint, Aerosols, Software Engineering)

Day 4: Thursday, May 9

- Tropospheric Ozone & Photochemistry (oral)
- Regional Air Quality (oral)
- GEOS-Chem Business Meeting (decide priorities, vision)
- Awards for Poster Introductions

Interspersed
Scientific
Presentations
&
Users Meeting

Live video cast organized by Patrick Kim and Alex Turner

Some Logistics

Uploading Talks (Thanks to Patrick Kim and Alex Turner)

- http://www.fas.harvard.edu/~geoschem
  - Username: GCMeeting
  - Password: GCUser
- Directions on submission page
- Presentations must be submitted before the break before your session

If you don't have web access, bring a thumb-drive to a member of the A/V team (Patrick Kim or Alex Turner) in the front of the room at the beginning of the break

Oral Presentations

- Max 7 minutes
- Remaining 3 minutes for Q&A + changeover

Posters

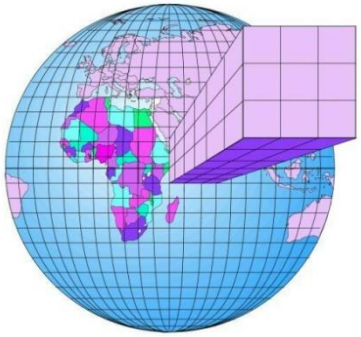
- Oral introductions: max 30 seconds
- Session 1 posters must be taken down before Tuesday evening

GEOS-Chem Chemical Transport Model (CTM)

Input data
- NASA GEOS meteorological fields
- other

Model solves 3-D chemical continuity equations on global or nested Eulerian grid

Modules
- emissions
- transport
- chemistry
- aerosols
- deposition
- sub-surface



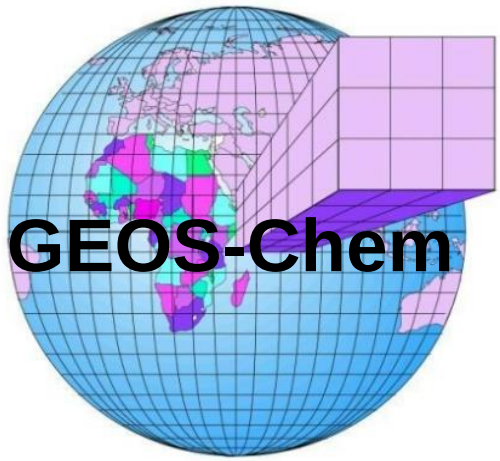
Model adjoint

Applications
- chemical processes, transport, budgets
- inverse analyses
- radiative forcing
- air quality
- biogeochemistry
- …

Model capabilities:

- Tropospheric aerosol-oxidant chemistry, aerosol microphysics, CO_2, methane, mercury, various tracers
- 1980-present GEOS meteorological data, future and paleoclimates (GCMs)
- Horizontal resolution: 0.25ºx0.31º (native GEOS-5), 1/2ºx2/3º , 2ºx2.5º, 4ºx5º

GEOS-Chem pushes the frontier of atmospheric composition modeling while also contributing to broader Earth science & applications



Observing systems
- chemical data assimilation

Chemistry-climate interactions
- interface with GCMs, ESMs

Satellite retrievals
- *a priori* infomation

Local air quality models
- outer nest

Functioning of the GEOS-Chem community

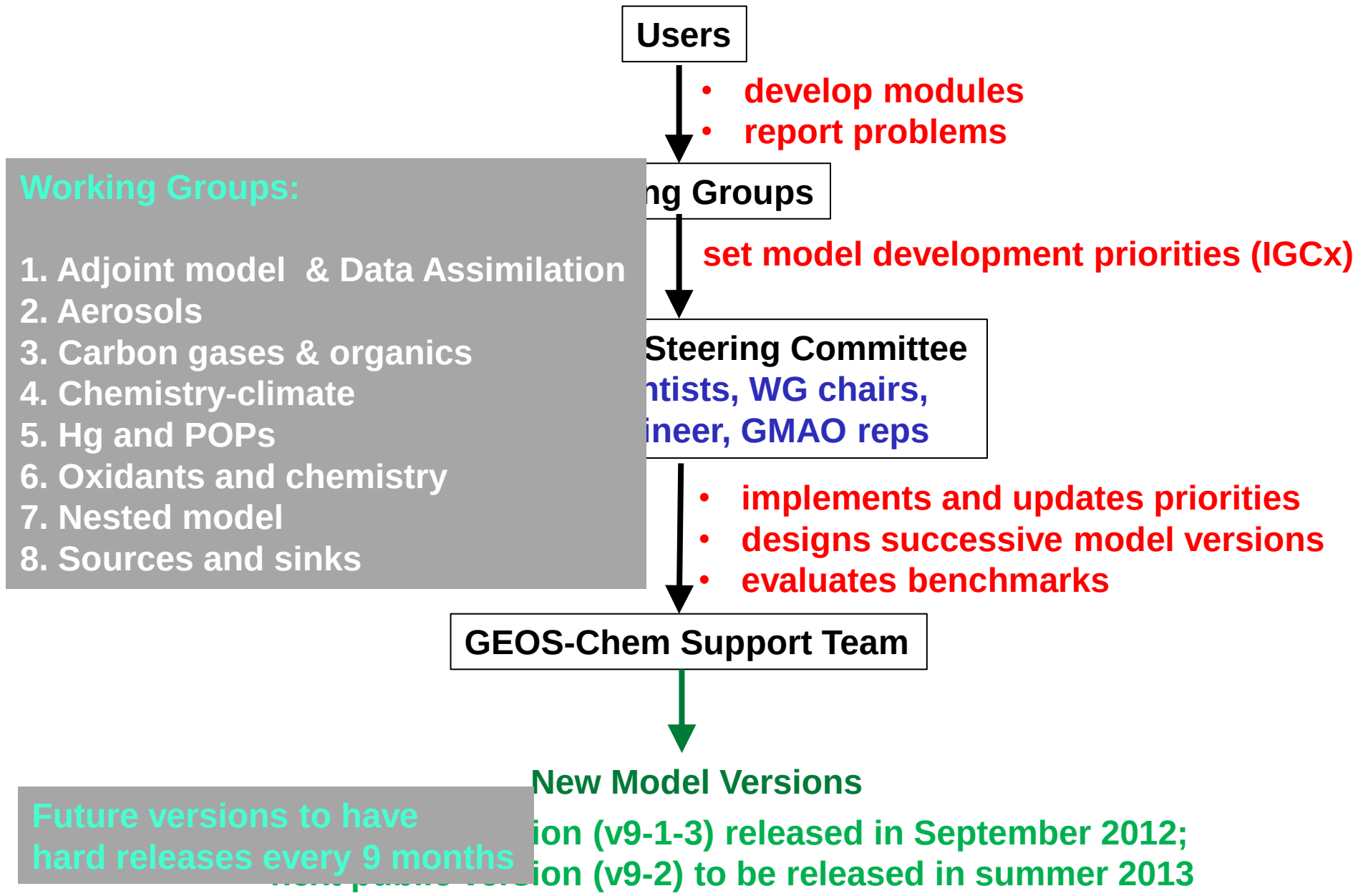
- **GEOS-Chem is a grass-roots community model**
  - **Code is open-access, extensively documented and supported**
  - **All model development is initiated by users to serve their research needs**
  - **New developments are promptly implemented in the standard model**

- **Strong model management maintains model unity, traceability, state of science**
  - **GEOS-Chem Support Team (Harvard/Dalhousie/CU) maintains standard and adjoint model: developments, benchmarking, version control, user support**
  - **Support Team is funded by NASA (1.5 FTE) and NSERC (0.5 FTE); strong leverage from community volunteerism is essential**
  - **GEOS-Chem Steering Committee monitors model development, promotes good practices and communication, leads Working Groups**

- **The model is owned by its users, and with ownership comes responsibilities:**
  - **Keep up with the model (newsletters, wiki, working groups, IGC meetings)**
  - **Contribute to the community: help with requests, report bugs…**
  - **Share mature developments for incorporation into standard model**
  - **Update regularly to latest standard version of model**
  - **Be generous in credit to developers**

The success of GEOS-Chem relies on the community spirit of its users!

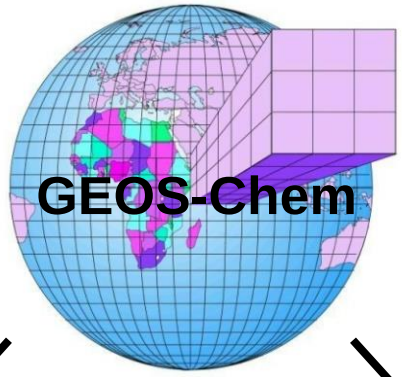
Model development flow



Major GEOS-Chem developments over the horizon

- **0.25°x0.31° nested capability (Tsinghua, Dalhousie)**
  - **Take it for a spin! Will be in standard model v9-2**
- **Grid-independent GEOS-Chem (Harvard, NASA GMAO)**
  - **Allows model to run on any grid, with any dynamical core, interface with any model through ESMF**
  - **Includes new emission libraries module**
  - **In advanced development stage; will eventually be GEOS-Chem**
- **Increased computational performance (Harvard, York, GMAO)**
  - **New implementation of KPP chemical solver**
  - **MPI parallelization through ESMF**
- **RRTMG radiative transfer code (AER, MIT, SUNY-Albany)**
  - **Allows radiative forcing calculations from UV to IR**
- **Stratospheric chemistry (MIT)**
  - **will substitute "climatological chemistry" presently in GEOS-Chem**

Dual driving forces in GEOS-Chem development: A positive force!



GEOS-Chem as a tool for data interpretation

GEOS-Chem as a component of Earth System Models

Push for improved processes, input data, resolution ⟷ **Push for improved performance, flexibility, software engineering**