

4th GEOS-Chem Scientific and Users' Meeting
Harvard University, April 7-10, 2009
Maxwell-Dworkin building, room G115

Day 1: Tuesday, April 7

8:00 Continental breakfast

Model Overview and Development (Daniel Jacob, Harvard, chair)

8:30 Welcome, meeting goals (Daniel Jacob, Harvard)

8:40 GEOS-Chem model: new developments, future directions (Daniel Jacob, Harvard)

8:50 GEOS-Chem code: new developments, future directions (Bob Yantosca, Harvard)

9:00 Emissions update in standard and ESMF GEOS-Chem (Philippe LeSager, Harvard)

9:10 GEOS-Chem model development activities (Claire Carouge, Harvard)

9:20 GEOS-Chem adjoint: status and plans (Kevin Bowman, JPL)

9:30 GMAO activities and partnership with GEOS-Chem (Steven Pawson, NASA/Goddard)

POSTERS:

- GMI online in GEOS-5 (Steven Pawson, NASA/Goddard)

9:40 Break

Chemical Transport (Steven Pawson, NASA/GFSC, chair)

10:10 Using beryllium-7 to assess stratosphere-to-troposphere transport in global models. (Hongyu Liu, Nat'l Inst. Aerospace/NASA Langley)

10:20 Seasonal variations in the mixing layer in the UTLS (Dave McKenzie, U. Toronto)

10:30 An analysis of pollution transport events during ARCTAS using aircraft, satellite, and model results (Jenny Fisher, Harvard)

10:40 Trans-Pacific transport of black carbon and other aerosols into western N. America (Qinbin Li, UCLA)

10:50 Intercontinental source attribution of ozone pollution at western U.S. sites using an adjoint model (Lin Zhang, Harvard)

11:00 Transpacific transport of Asian dust and pollution (Junsan Nam, Georgia Tech)

11:10 Interannual variations in transport of Asian pollution to the Middle East (Jane Liu, U. Toronto)

11:20 Impacts of PBL mixing representations on global model simulation of summertime surface ozone concentrations (Jintai Lin, Harvard)

11:30 Model reduction algorithms in atmospheric pollution transport simulations (Mauricio Santillana, Harvard)

11:40 Development and evaluation of GEOS-Chem driven by CCSM3 meteorological data (Daeok Youn, SNU)

POSTERS:

- Using GEOS-Chem alongside observations from Mount Bachelor to understand the relationship between PAN and ozone during Spring 2008 (Emily Fischer, U. Washington)

11:50 Lunch

Aerosol sources and chemistry (Jun Wang, U. Nebraska, chair)

- 1:20 Retrieval of SO₂ vertical columns from SCIAMACHY and OMI: air mass factor algorithm development (Chulkyu Lee, Dalhousie)
- 1:30 Primary Biological Aerosol Particles (PBAP): an important part of the global organic aerosol budget? (Colette Heald, CSU)
- 1:40 Can we constrain sea-salt emissions over the Southern Ocean? (Lyatt Jaeglé, U. Washington)
- 1:50 Modeling dust and dissolved iron deposition to the Southern Ocean using GEOS-Chem (Nicholas Meskhidze, NC State)
- 2:00 Impact of mineral dust on nitrate and sulfate partitioning over the Northern Pacific during INTEX-B (Duncan Fairlie, NASA/Langley)
- 2:10 Impacts of Asian summer monsoon on aerosols over eastern China (Hong Liao, Chinese Acad. Sci.)
- 2:20 Synthesis of satellite (MODIS), aircraft (ICARTT), and surface (IMPROVE, AERONET) aerosol observations over eastern North America to improve MODIS aerosol retrievals and constrain aerosol concentrations and sources (Easan Drury, NREL)
- 2:30 Climate response to changing United States aerosol sources: historical and projected aerosol burdens using GEOS-Chem (Eric Leibensperger, Harvard)

POSTERS:

- Aqueous-phase reactive uptake of dicarbonyls as a source of organic aerosol over eastern North America (Tzung-May Fu, Hong Kong Polytechnic U.)
- Exploring the effects of Patagonian dust on biological activity and carbon uptake in the South Atlantic Ocean using GEOS-Chem (Matthew Johnson, NC State)

2:40 Break

Aerosols microphysics and radiation (Hong Liao, Chinese Acad. Sci., chair)

- 3:00 On the seasonality of aerosol optical thickness over the southeastern U.S. (Jun Wang, U. Nebraska - Lincoln)
- 3:10 Arctic Haze: Comparing GEOS-Chem and CALIPSO (Maurizio Di Pierro, U. Washington)
- 3:20 Attributing direct radiative forcing to specific emissions using adjoint sensitivities (Daven Henze, U. Colorado)
- 3:30 Two-moment aerosol sectional (TOMAS) microphysics in GEOS-Chem (Peter Adams, Carnegie-Mellon U.)
- 3:40 Global particle size distributions simulated with GEOS-Chem incorporating a sectional aerosol microphysics model: Key features and comparison with observations (Fangqun Yu, SUNY Albany)
- 3:50 Effect of oceanic organic carbon emissions on the growth of secondary particles and global CCN abundance (Gan Luo, SUNY Albany)

POSTERS:

- Secondary organic aerosol formation from aqueous-phase reactions of glyoxal with OH radicals (Yong Bin Lim, Rutgers)
- Global distribution of CCN number concentration: Effect of sizes and emission heights of primary carbonaceous aerosol (Fangqun Yu, SUNY Albany)
- Particle size distributions and CCN concentrations in the global atmosphere: Uncertainties associated with sulfur emission inventories and primary sulfate emission parameterizations (Gan Luo, SUNY Albany)
- Quantifying aerosol direct radiative effect with MISR observations (Qinbin Li, UCLA)
- Aerosol optical thickness over the East Asia: GEOS-chem simulation constrained by MODIS reflectances (Xiaoguang Xu, U. Nebraska – Lincoln)

4:00 Break

Biomass burning (Bob Yokelson, U. Montana, chair)

- 4:20 Large variations in vertical transport of surface fire emissions observed from space (Siegfried Gonzi, U. Edinburgh)
- 4:30 Incorporating a 1-D plume-rise model parameterization into GEOS-Chem to simulate vertical transport of fire emissions over North America (Maria Val Martin, Harvard)
- 4:40 The sensitivity of CO and aerosol transport to the temporal and vertical distribution of N. American boreal fire emissions (Yang Chen, JPL)
- 4:50 Effects of Siberian forest fires on regional air quality and meteorology in spring 2003 (Rokjin Park, SNU)
- 5:00 GEOS-Chem simulations of the impact on tropospheric O₃ from the 2003 Canberra megafires (Nicholas Jones, U. Wollongong)
- 5:10 Satellite detection and model analysis of wildfire NO_x emissions in Siberia: Links to interannual variability of surface ozone for the period 1998-2004 (Hiroschi Tanimoto, NIES)
- 5:20 Nationwide impacts by fire emissions in the United States in summer 2002 (Tao Zeng, Georgia EPD)
- 5:30 Comparing CO and O₃ measurements from TES during ARCTAS with GEOS-Chem simulations (Matthew Alvarado, Harvard)
- 5:40 Interpretation of OMI NO₂ observations during ARCTAS (Nicolas Boussez, Dalhousie)

POSTERS:

- Recent measurements of biomass burning emissions and plume chemistry (Robert Yokelson, U. Montana)
- Observing boreal wildfire emissions from space: HCHO and NO₂ (Kateryna Lapina, CSU)

6:00-7:00 Day 1 Poster session (Maxwell-Dworkin ground floor)

7:00-9:00 Reception (Maxwell-Dworkin ground floor)

Day 2: Wednesday, April 8

8:00 Continental breakfast

Tropospheric ozone (Yuhang Wang, Georgia Tech, chair)

8:30 The HTAP model inter-comparisons: What do we learn about GEOS-Chem? (Mat Evans, U. Leeds)

8:40 Spatially and temporally constraining the lightning flash rate parameterization in GEOS-Chem and its impact on tropospheric ozone variability (Lee Murray, Harvard)

8:50 Interannual variability in tropical CO and ozone as seen by Aura satellite data and global models (Jennifer Logan, Harvard)

9:00 The impacts of dynamics on tropical tropospheric ozone variability inferred from TES and GEOS-Chem model (Junhua Liu, Harvard)

9:10 Insight into processes affecting upper tropospheric ozone: interpretation of satellite (OSIRIS, MAESTRO, ACE) and in-situ observations (Matthew Cooper, Dalhousie)

9:20 Assimilating Tropospheric Emission Spectrometer profiles in GEOS-Chem (K. Singh, Virginia Tech)

9:30 Quantifying the impact of long-range transport of pollution on ozone abundances in the Arctic troposphere (Thomas Walker, U. Toronto)

POSTERS:

- Partitioning the LIS/OTD lightning climatological dataset into separate ground and cloud flash distributions (William Koshak, NASA/Marshall)
- Improving techniques for satellite-based constraints of the lightning parameterization in a global chemical transport model (Lee Murray, Harvard)
- Spring O₃ at Mount Washington Observatory: implications for stratospheric intrusions (Yaping Xiao, U. New Hampshire)

9:40 Break

Photochemistry (Lyatt Jaeglé, U. Washington, chair)

10:00 Global model of the oxygen isotopic composition of atmospheric nitrate and comparison with observations (Becky Alexander, U. Washington)

10:10 The sensitivity of the oxygen isotopes of sulfate to changes in oxidant concentrations during the preindustrial-industrial transition (Eric Sofen, U. Washington)

10:20 New insights in isoprene photooxidation: from chamber studies to global model (Fabien Paulot, Caltech)

10:30 Implications of the uptake and reaction of HO₂ on aerosols (Helen Macintyre, U. Leeds)

10:40 Assessing the oxidation capacity in the polar region (Jingqiu Mao, Harvard)

POSTERS:

- Developments on tropospheric bromine chemistry in GEOS-Chem (Justin Parrella, Harvard)

10:50 Break

Regional air quality (Rob Pinder, EPA, chair)

11:10 Impacts of NO_x emissions change on surface ozone in East Asia and China: the HTAP SR3 and SR6 cases (Joshua Fu, U. Tennessee)

- 11:20 Air quality during the Beijing 2008 Olympics: effectiveness of emission restrictions (Yuxuan Wang, Tsinghua U.)
- 11:30 High resolution modeling of CO spatial and temporal variations in Europe (Anna Protonotariou, Nat'l Obs. Athens)
- 11:40 Gas & aerosol boundary conditions to Chimere CTM from GEOS-Chem (Gabriele Curci, U. L'Aquila)
- 11:50 Investigating downscaling techniques for the linkage of GOES-Chem and CMAQ (Yun-Fat Lam, U. Tennessee)

POSTERS:

- Global health and economic impacts of future ozone pollution (Noelle Selin, MIT)
- Using GEOS-Chem in global multimedia models for life cycle assessment (Shanna Shaked, U. Michigan)
- A comparison of field observations with global and regional chemical mechanisms (Barron Henderson, U. North Carolina)
- Development of global and regional modeling emission inventories in support of climate-chemistry modeling using GEOS-Chem/CMAQ (Jun-Hun Woo, Konkuk U.)
- Climate change in the Eastern Mediterranean-Links with air quality (Kostas Varotsos, Nat'l Obs. Athens)
- Correlations between PM_{2.5} and meteorology in the U.S. and its relation to climate change: a statistical study (Amos Tai, Harvard)

12:00 Lunch

Regional air quality observed from space (Folkert Boersma, KNMI, chair)

- 1:30 Adjoint inversion of SCIAMACHY NO₂ columns (Changsub Shim, JPL/Caltech)
- 1:40 Seasonal variation in nitrogen oxides at northern midlatitudes as inferred from ground-based and satellite-based observations (Lok Lamsal, Dalhousie)
- 1:50 Integrating satellite observation for assessing air quality over North America with GEOS-Chem (Mark Parrington, U. Toronto)
- 2:00 Global ground-level PM_{2.5} concentrations inferred from MODIS and MISR observations (Aaron van Donkelaar, Dalhousie)
- 2:10 Satellite remote sensing of a Multipollutant Air Quality Health Index (Randall Martin, Dalhousie)
- 2:20 Estimating particle sulfate concentrations using MISR aerosol properties (Yang Liu, Emory U.)
- 2:30 Observing System Simulation Experiments (OSSE) in support of GEO-CAPE science and measurement requirements definition (Kevin Bowman, JPL)

POSTERS:

- Air quality forecasting using geostationary satellite observations (Peter Zoogman, Harvard)
- Using satellite observations of tropospheric NO₂ to test global changes in anthropogenic NO_x emissions: from the Clean Air Act to the Mediterranean Sea and the 2008 Beijing Olympic Games (Folkert Boersma, KNMI)
- Assimilated inversion of NO_x emissions over East Asia using OMI NO₂ column measurements (Yuhang Wang, Georgia Tech)
- The impact of Hurricanes Katrina and Rita on pollution emissions as inferred by OMI NO₂ (Bryan Duncan, NASA/GSFC)
- Application of OMI Ozone Profiles in CMAQ (Lihua Wang, U. Alabama Huntsville)
- Constraint on anthropogenic NO_x emissions in China from different sectors: a new methodology using multiple satellite retrievals (Jintai Lin, Harvard)

2:40 Break

Mercury (Elsie Sunderland, Harvard, chair)

- 3:00 A global mercury simulation and budget based on Hg+Br chemistry (Chris Holmes, Harvard)
3:10 Changing emissions and global mercury cycling (Elizabeth Corbitt, Harvard)
3:20 Incorporating a global terrestrial mercury model into GEOS-Chem (Nicole Smith-Downey, U. Texas)
3:30 Evaluating mercury exposure and source attribution using GEOS-Chem (Noelle Selin, MIT)

POSTER:

- Enhancements to the ocean mercury modeling capability in GEOS-Chem (Elsie Sunderland, Harvard)

3:40 Break

Carbon gases (Qinbin Li, UCLA, chair)

- 4:00 Global CO source estimates as derived in an adjoint inversion from combined MOPITT, AIRS, and SCIAMACHY measurements of CO columns (Monika Kopacz, Harvard)
4:10 Evidence for a soil source of CO in the deserts of Saudi Arabia (Dylan Jones, U. Toronto)
4:20 Modeling CO₂ and its sources and sinks with GEOS-Chem (Ray Nassar, U. Toronto)
4:30 What can we learn about upper tropospheric CO₂? (Xun Jiang, JPL)
4:40 Using satellite data in joint CO₂ - CO inversion (Helen Wang, Harvard)
4:50 Atmospheric constraints on the global budget of carbonyl sulfide (Parvatha Suntharalingam, U. East Anglia)
5:00 Primary and secondary sources of atmospheric acetaldehyde (Dylan Millet, U. Minnesota)
5:10 Methane source contribution in the Arctic: a study using GEOS-Chem and airborne CH₄ measurements obtained during ARCTAS-08 (Christopher Pickett-Heaps, Harvard)
5:20 Evaluating hotspot tropospheric methane concentrations in Himalaya region with GEOS-Chem and AIRS satellite retrievals (Jinyun Tang, Purdue)

POSTERS:

- A satellite perspective on the inter-hemispheric transport of CO (Chenxia Cai, JPL)
- Quantifying the impact of aggregation errors and model transport biases on top-down estimates of carbon monoxide emissions using satellites observations (Zhe Jiang, U. Toronto)
- Atmospheric formic acid: modeling and satellite remote sensing (Gonzalo Gonzalez Abad, York U.)
- Evaluating a simulation of methane using ground-based and satellite measurements (Annemarie Fraser, U. Edinburgh)
- Inversion analysis of North American methane emissions Using INTEX-NA aircraft data (Kevin Wecht, Harvard)
- BVOC emissions in GEOS-Chem: model evaluation at two tropical rain forest sites (Michael Barkley, U. Edinburgh)

5:30-7:00 Day 2 Poster session

Day 3: Thursday, April 9

8:00 Continental breakfast

Chemistry-Climate-Land Interactions (Dylan Millet, U. Minnesota, chair)

8:30 New directions in studies of chemistry-climate interactions using GEOS-Chem (Loretta Mickley, Harvard)

8:40 Effects of tropical deforestation on tropospheric chemistry: a 10-year study using GEOS-Chem (Prasad Kasibhatla, Duke)

8:50 Impacts of changes in land use/land cover on chemistry & air quality (Shiliang Wu, Michigan Tech)

9:00 Future inorganic aerosol levels (Havala Pye, Caltech)

9:10 Application of sensitivity of ozone air quality to temperature change to validate chemical transport models for future ozone simulation over the United States (Moeko Yoshitomi, Harvard)

9:20 Impact of climate change on North American wildfire and ozone air quality in the United States (Rynda Hudman, UC Berkeley)

9:30 Effects of climate change on future forest fire and its impact on regional air quality (Hyun Cheol Kim, U. Houston)

9:40 Re- thinking the IPCC radiative forcing bar chart: the sector based paradigm (Nadine Unger, GISS)

9:50 Break

10:10 The GEOS-Chem model: software engineering, code development, user support issues (Bob Yantosca, Philippe LeSager, Claire Carouge, discussion leads)

11:00-12:30 Working groups, 1st session:

- WG1.1: Emission inventories (co-chairs Jennifer Logan, Randall Martin)
- Adjoint model clinic led by Daven Henze, Monika Kopacz, Kumares Singh

12:30-2:00 Lunch

Plenary discussions (continued)

2:00-3:30 Working groups, 2nd session:

- WG2.1: Aerosol processes (co-chairs Colette Heald, Fangqun Yu)
- WG2.2: Carbon gases (co-chairs Dylan Jones, Prasad Kasibhatla)
- WG2.3: Chemistry-climate interactions (co-chairs Becky Alexander, Loretta Mickley)

3:30 Break

3:45-5:15 Working groups, 3rd session:

- WG3.1: Model adjoint (co-chairs Kevin Bowman, Daven Henze)
- WG3.2: Regional modeling (co-chairs Rokjin Park, Yuxuan Wang)
- WG3.3: Oxidants and chemistry (co-chairs Mat Evans, May Fu)

5:15 Adjourn

Day 4: Friday, April 10

8:00 Continental breakfast

Future Perspectives

8:30 Working group report: 1st session

8:50 Working group reports: 2nd session

10:00 Break

10:20 Working group reports: 3rd session

11:40 Future directions: model development priorities, community issues (Daniel Jacob, discussion lead)

12:30 Adjourn

MODEL CLINIC

2:00-5:00 GEOS-Chem model clinic led by Bob Yantosca, Philippe LeSager, Claire Carouge