Emissions Working Group

What are the major problems/limitations in the current standard model?

What are the ongoing model development activities?

What are the priorities and plans for implementing new developments into the standard model?

GEOS-Chem Anthropogenic Emissions

Updates for VOC, BC/OC Emissions?

Upgrade ship emissions inventory? (to ICOADS)?

Issues with CO?

	NOx	CO	VOC	SOx	NH3	BC/OC
Canada	2002, 2005	2002, 2005	1985	2002, 2005	2002, 2005	1996
USA	1999, 2002, 2004	1999, 2004	1999	1999	1999	1996
Mexico	1999	1999	1985	1999	1985	1996
Europe	1980–2005	1980–2005	1980–2000	1990–2005	1990–2005	1996
South East Asia	2004	2000	1985	2000	2000	1996
	2006	2006	2006	2006	1985	
Rest of the World	2000	2000	1985	2000	1985	1996

Table 2: Base year of GEOS–Chem anthropogenic emissions per regions and per species, when optional inventories are used. Color indicates inventory. Underlined base years are scaled into 1985–2005 to match simulated (i.e., met fields) year.

CAC Canadian national estimate	O
EPA (corrected for CA mobile emissions; 2004 : with ICARTT based corrections, 2002: with VISTAS/ARP)	O
BRAVO strictly limited to Mexico	O
EMEP	O
Streets	O
EDGAR	O
GEIA	S
Bond	S
Cooke	S
ARCTAS pre-mission global ship SO2 based on EDGAR	O

O : optional, set in input.geos
S : standard emissions, automatically on. Turned off when overwritten.

SHIP Emissions

	NOx as O3 + HNO3	CO	SO2	NH3	BC/OC
Europe	1990-2005(#)				1996
Rest of the World	2000	2000	2000		1996

(#) EMEP Ship NOx for 1980-1989 is emitted as NOx, since it cannot be separated from the anthropogenic source.
Note: OPE from Ship-NOx is 10.

GEOS-Chem Anthropogenic Emissions

Make all regional inventories default?

Other available updates to include?

Thoughts about using “a posteriori” inventories for updates?

EDGAR vs GEIA for global?

	INVENTORY	BASE YEAR	REGION	NOx	CO	PRPE	C3H8	ALK4	C2H6	ACET	MEK	ALD2	CH20	SO2	SO4	NH3	BC/OC	Variability (species)	for offline simul.
GLOBAL	GEIA	1985	global	X	X	X	X	X	X	X	X			X	X	X		season (NOx, SOx)	
	EDGAR	2000	global	X	X									X					
	BOND	1996	global														X		
REGIONAL	CAC	2002, 2005	CANADA	X	X									X		X			
	EMEP	1980-2005	EUROPE	X	X	X		X	X		X	X		X			X	Month (NOx)	
	EPA (ICARTT)	1999 (2004)	USA	X	X	X	X	X	X	X	X		X	X	X	X		Month, weekday/ weekend (all)	
	VISTAS	2002	USA	X															
	BRAVO	1999	MEXICO	X	X									X					
	STREETS	2000 (2004)	S.E. ASIA	X	X									X		X		Month (NOx, CO)	CH4, CO2
		2006		X	X	X	X	X	X	X	X	X	X	X					
	COOKE	1996	N. AMERICA														X	Month (all)	

Table 3: Inventories features. Yellow highlighting indicates default inventories turned on automatically.

GEOS-Chem Natural Emissions

- How eliminate resolution dependence? (E.g. dust, sea-salt, …)
- Megan?
- Biomass burning?
- Lightning?

Other Species

- CO_2
- CH_4
- Mercury
- Other?

Emissions Working Group Summary

What are the major problems/limitations in the current standard model?

- Persistent need for periodic updates to anthropogenic inventories, including later date for scaling
- Accurately representing natural sources
- Good discussion on resolution independent inventories for natural sources (e.g. dust, sea-salt) – no consensus
- Tagged simulations need to have consistent emissions with full chemistry simulations for e.g., CO

What are the ongoing model development activities?

- Lee Murray commented on lightning in GEOS-5 and more mechanistic developments
- Cohesive groups for mercury that seem to communicate well
- Ray Nassar updating anthropogenic CO_2, alternative balanced biosphere
- Updates to CH_4 emissions on-going at Harvard, Edinburgh, Purdue
- GFED3 available later this year, easy to implement in model

What are the priorities and plans for implementing new developments into the standard model?

- Consensus that compelling evidence desired before updating the model with top-down emissions inventories
- Clear specification of defaults, e.g. regional inventories (Le Sagar, Logan, Martin)
- Additional documentation of recent anthropogenic emissions updates (van Donkelaar, Martin, Le Sagar, Logan)
- Implement new methane emission options into standard code (?)
- Implement soil NO_x updates (Martin, Hudman)
- Ship Emissions – need to update location information – ICOADS, others? (Lee, Martin, others?)
- BC/OC updates to latest Bond inventory (?)
- Update anthropogenic VOCs, except for C_2H_6 and C_3H_8 for which new emissions will be in next version (Millet)
- Update aircraft inventory (?)

Also discussed

- Document which version of MEGAN you use