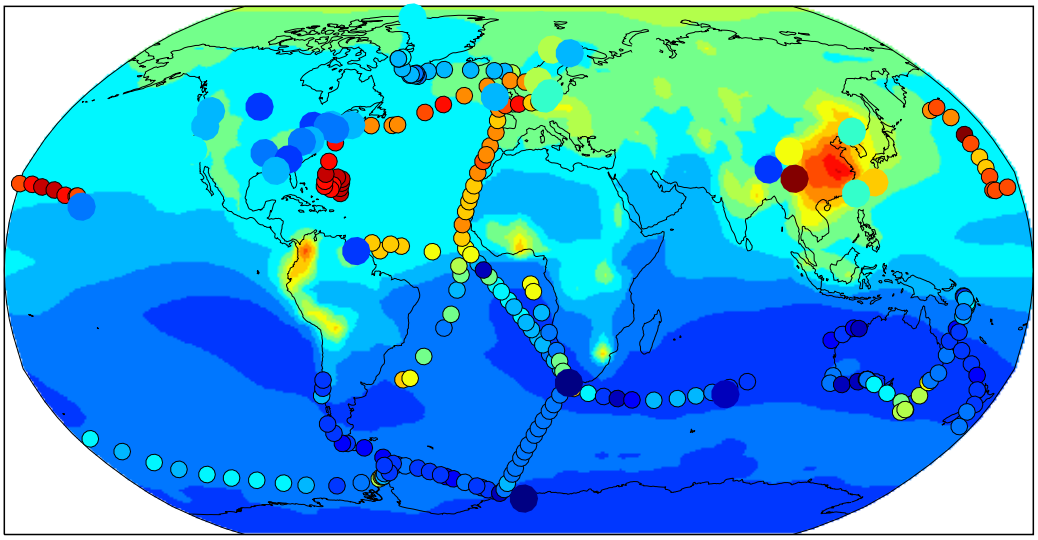
ng/m^3 (not linear)

New Model Version: Surface TGM



3.50
2.90
2.30
1.75
1.55
1.35
1.15
0.95
0.75

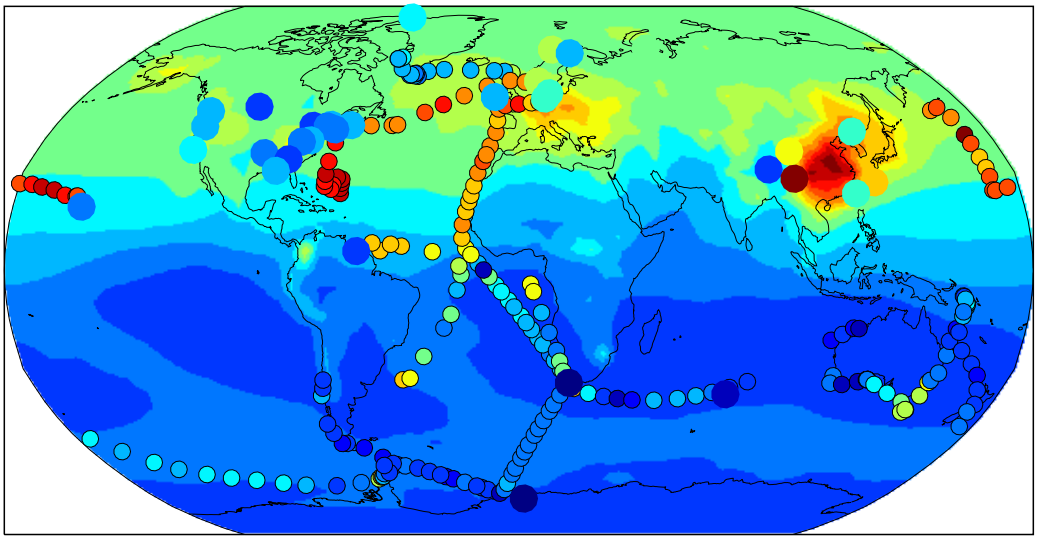
Terrestrial R^2 = 0.51

Mean Obs. = 1.48 +/– 0.30 ng/m^3

Mean Mod. = 1.45 +/– 0.13 ng/m^3

ng/m^3 (not linear)

Old Model Version: Surface TGM



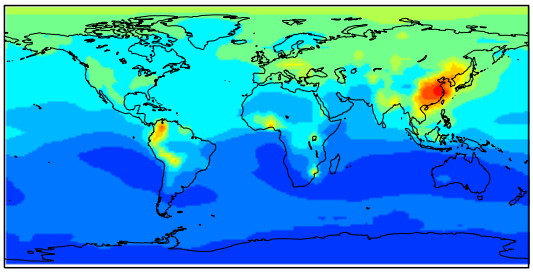
3.50
2.90
2.30
1.75
1.55
1.35
1.15
0.95
0.75

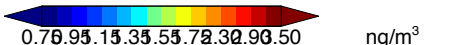
Terrestrial R^2 = 0.30

Mean Obs. = 1.48 +/– 0.30 ng/m^3

Mean Mod. = 1.54 +/– 0.19 ng/m^3

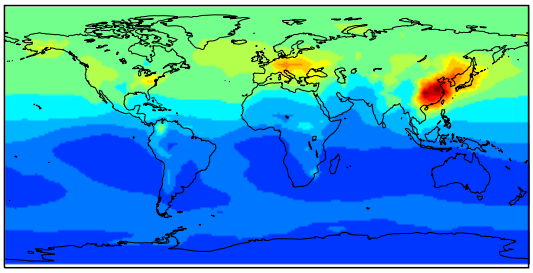
New Model Version: Surface TGM

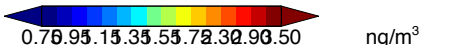




ng/m^3
Not Linear

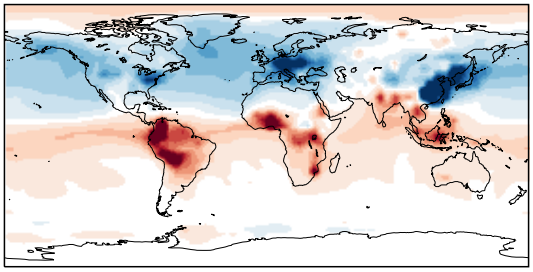
Reference Model Version: Surface TGM

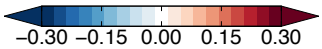




ng/m^3
Not Linear

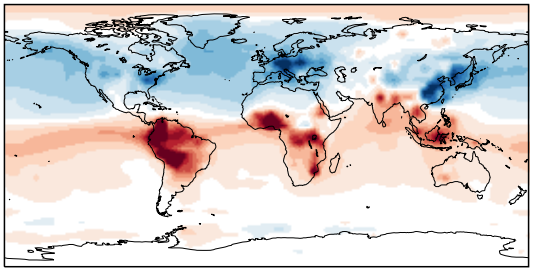
Absolute Difference

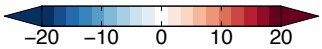




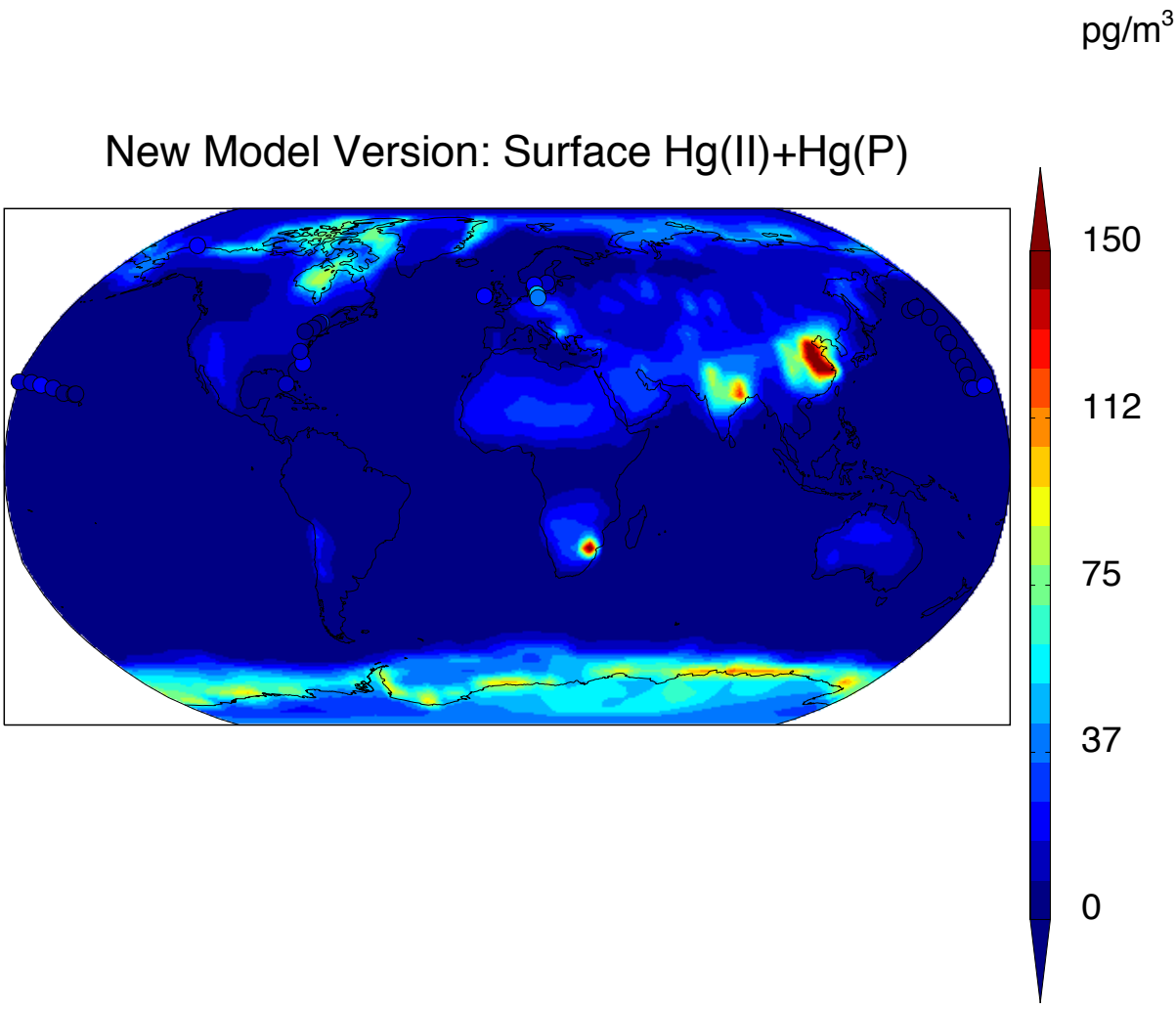
ng/m^3

Percent Difference

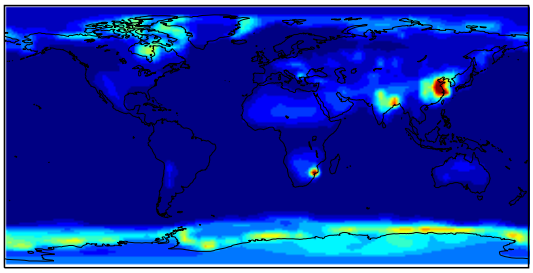




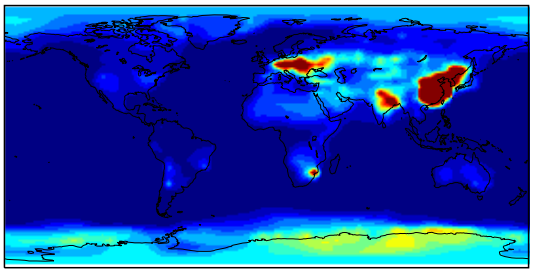
%


pg/m3
New Model Version: Surface Hg(II)+Hg(P)
150
112
75
37
0

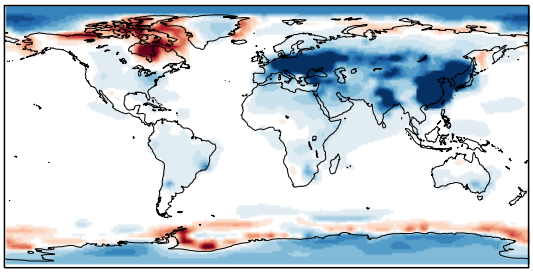
New Model Version: Surface Hg(II)+Hg(P)

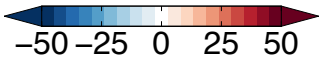


Old Model Version: Surface Hg(II)+Hg(P)

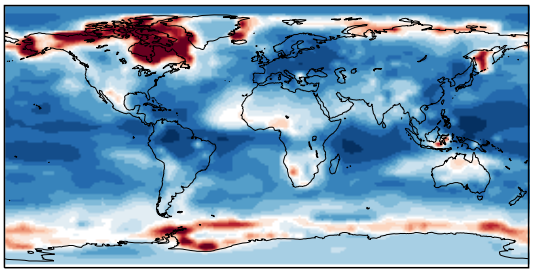


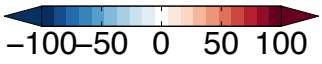
Absolute Difference

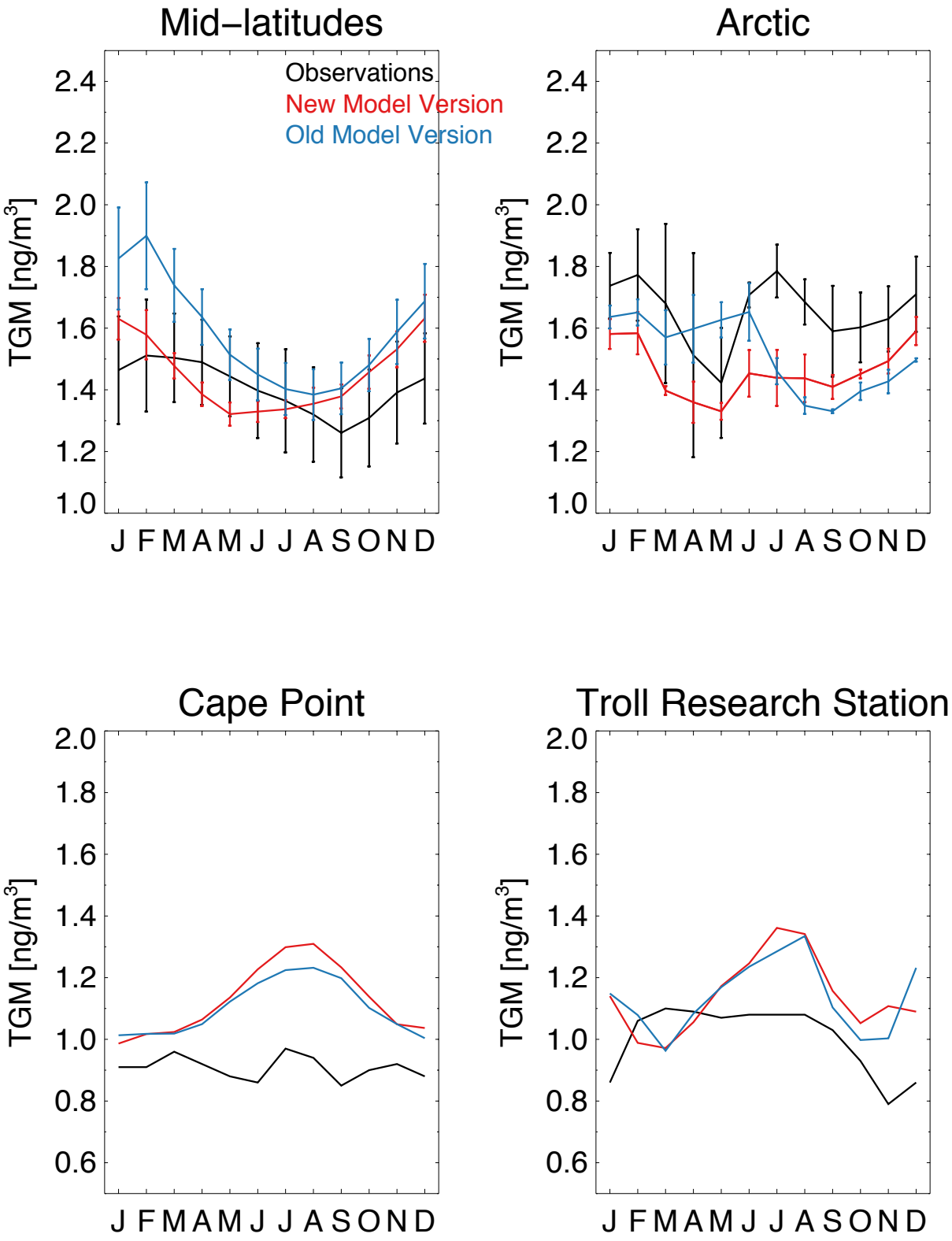


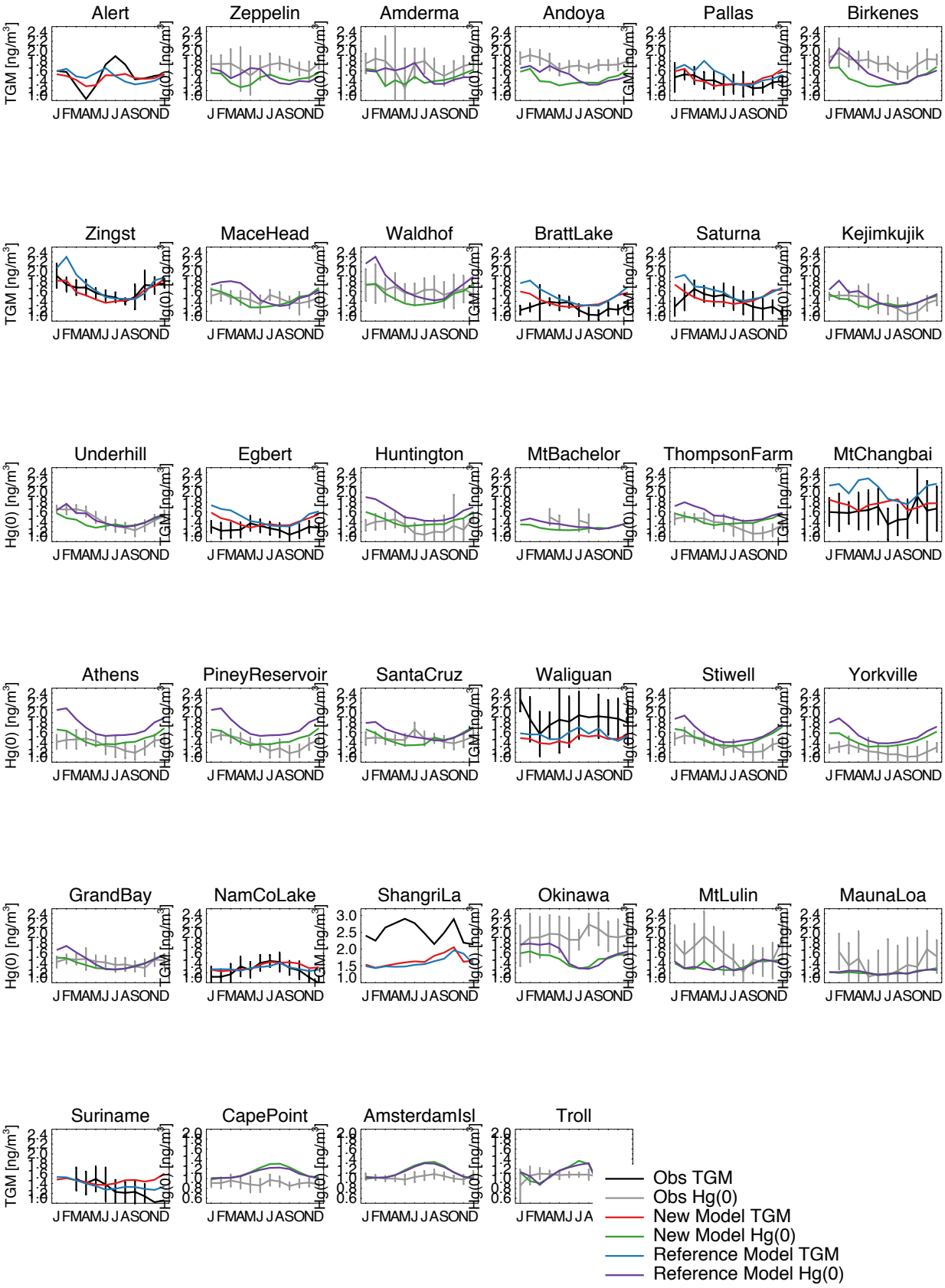


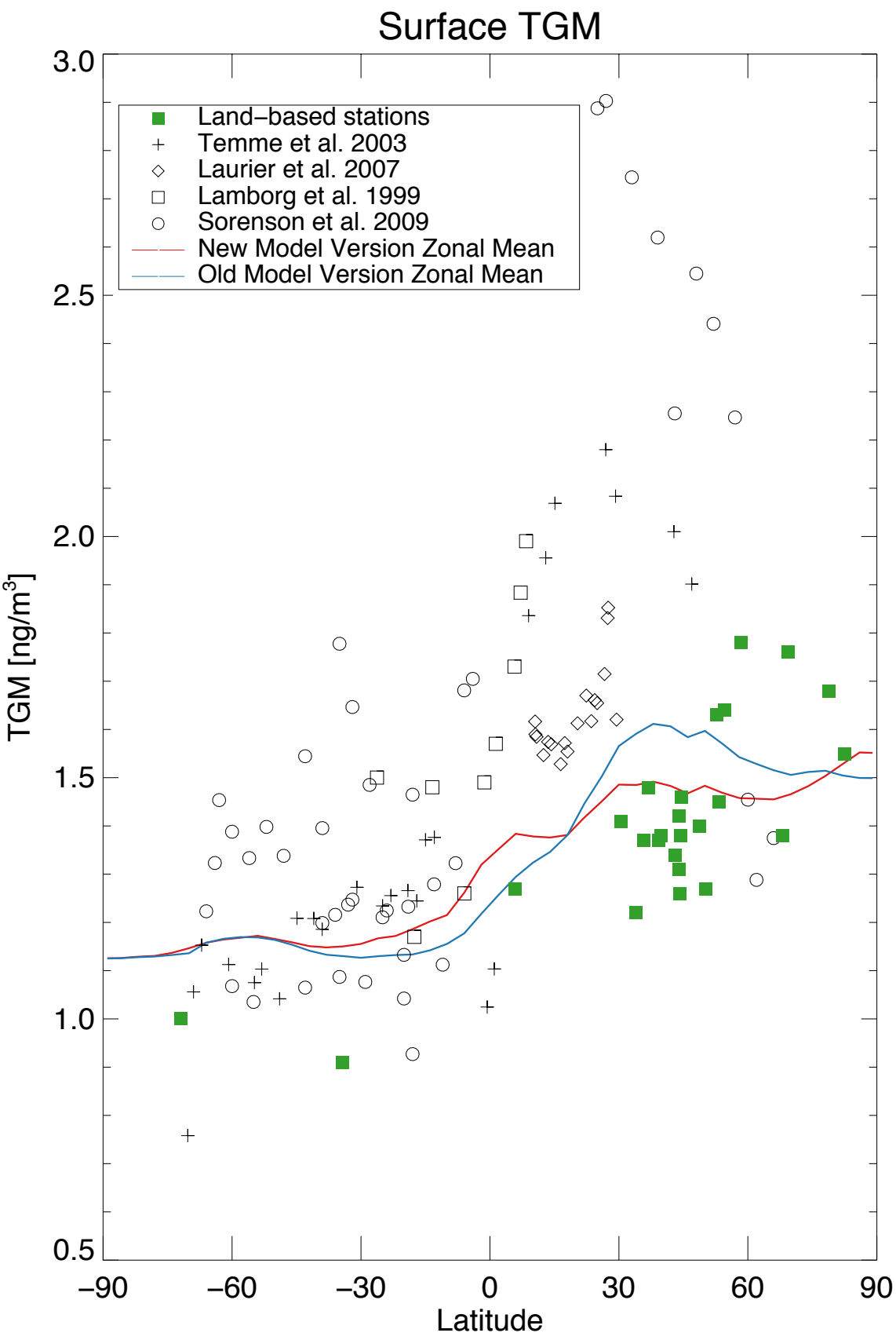
Percent Difference

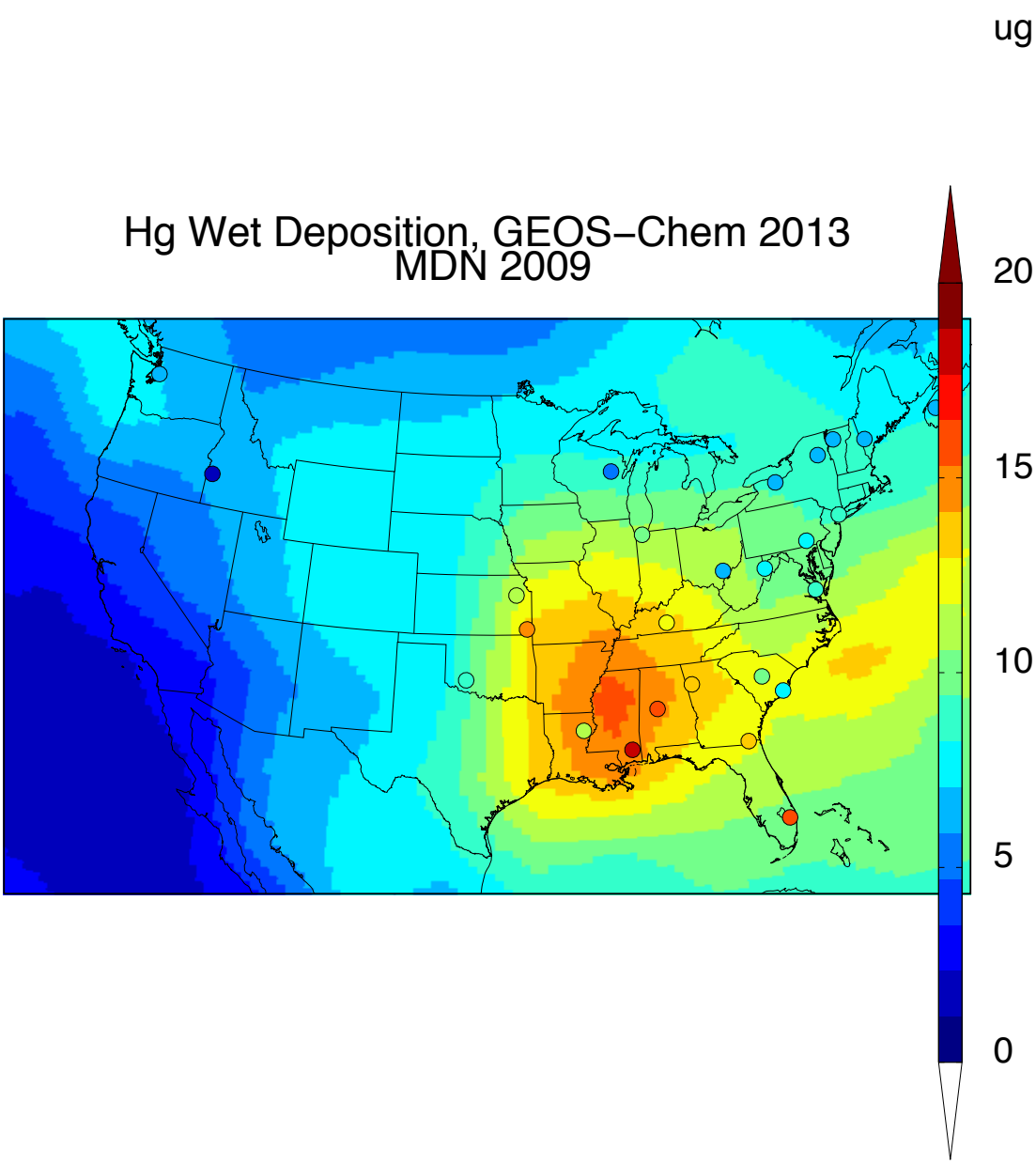


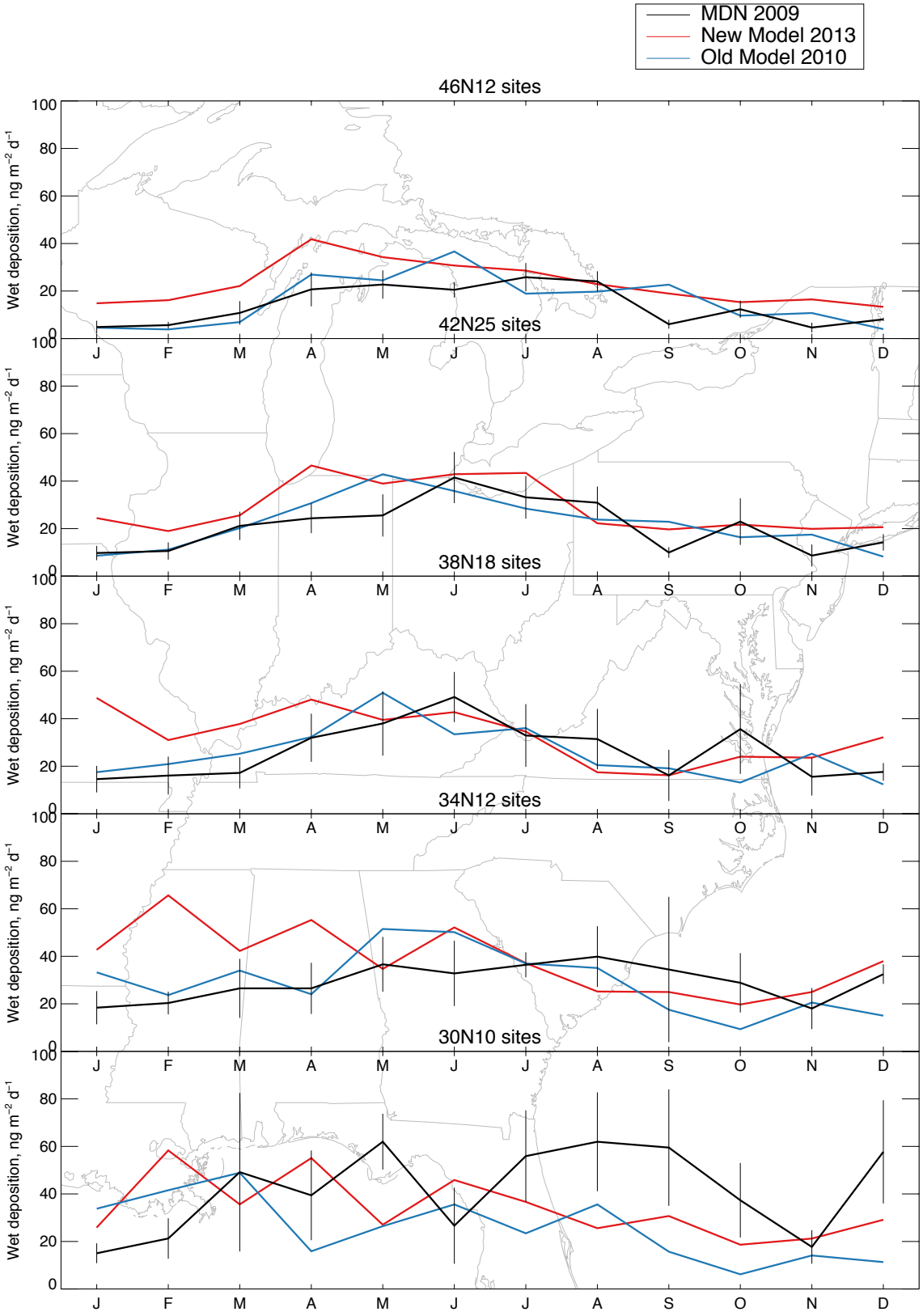



Mid−latitudes
Arctic
Cape Point
Troll Research Station
Observations
New Model Version
Old Model Version
TGM [ng/m3]
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
J F M A M J J A S O N D

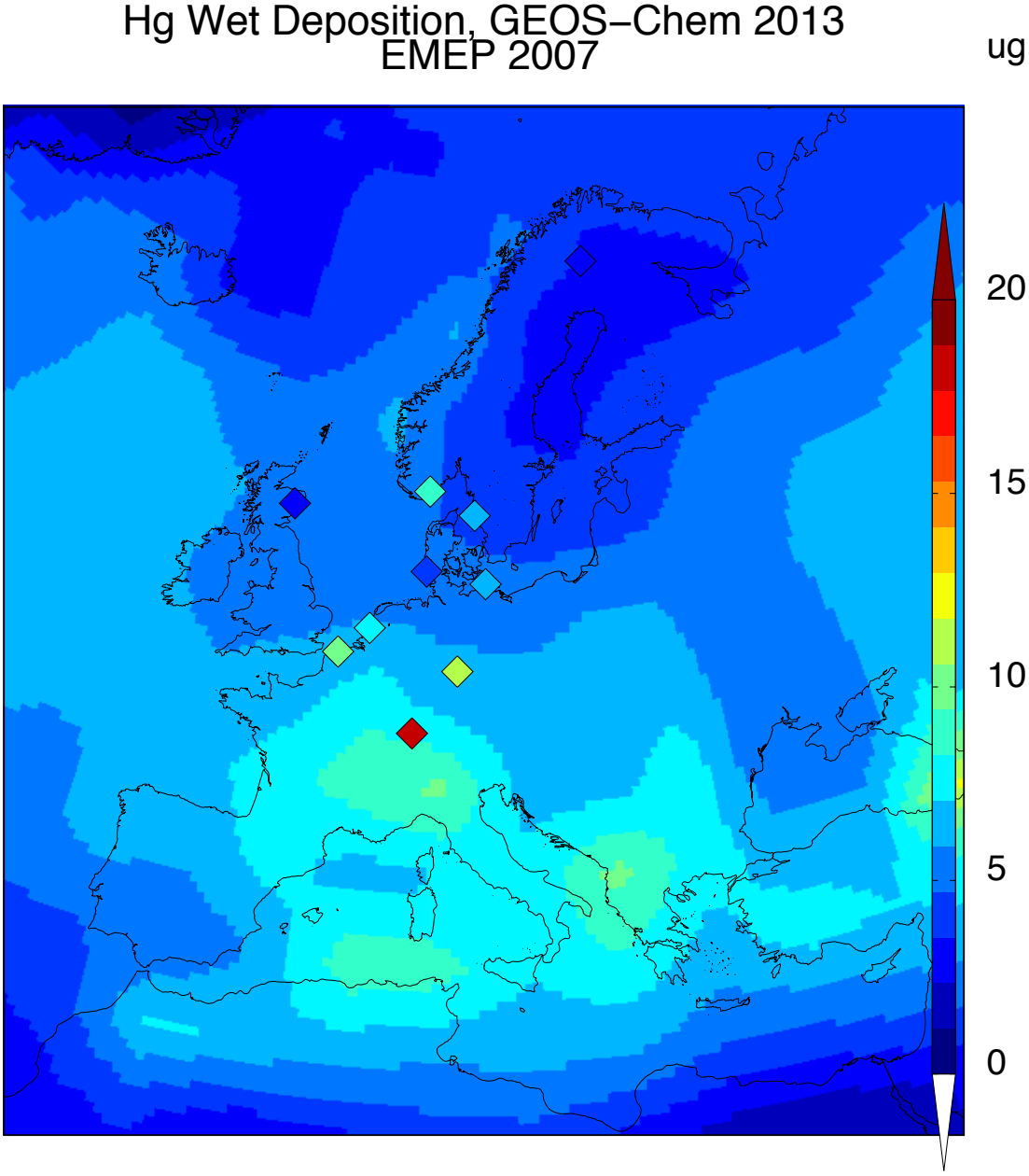

Alert
Zeppelin
Amderma
Andoya
Pallas
Birkenes
Zingst
MaceHead
Waldhof
BrattLake
Saturna
Kejimkujik
Underhill
Egbert
Huntington
MtBachelor
ThompsonFarm
MtChangbai
Athens
PineyReservoir
SantaCruz
Waliguan
Stiwell
Yorkville
GrandBay
NamCoLake
ShangriLa
Okinawa
MtLulin
MaunaLoa
Suriname
CapePoint
AmsterdamIsl
Troll
TGM [ng/m3]
Hg(0) [ng/m3]
J FMAMJ JASOND
Obs TGM
Obs Hg(0)
New Model TGM
New Model Hg(0)
Reference Model TGM
Reference Model Hg(0)


Surface TGM
Land−based stations
Temme et al. 2003
Laurier et al. 2007
Lamborg et al. 1999
Sorenson et al. 2009
New Model Version Zonal Mean
Old Model Version Zonal Mean
TGM [ng/m3]
3.0
2.5
2.0
1.5
1.0
0.5
−90
−60
−30
0
30
60
90
Latitude

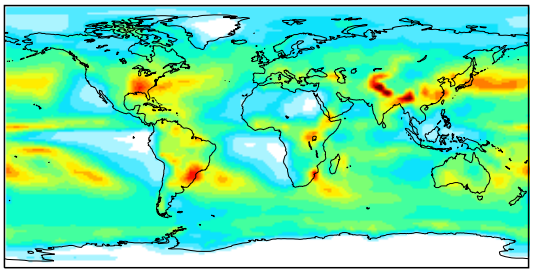

Hg Wet Deposition, GEOS−Chem 2013
MDN 2009
ug m−2 y−1
20
15
10
5
0

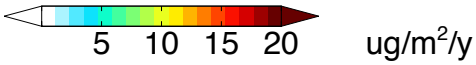

MDN 2009
New Model 2013
Old Model 2010
46N12 sites
42N25 sites
38N18 sites
34N12 sites
30N10 sites
Wet deposition, ng m^{-2} d^{-1}
0
20
40
60
80
100
J
F
M
A
M
J
J
A
S
O
N
D

Hg Wet Deposition, GEOS−Chem 2013
EMEP 2007



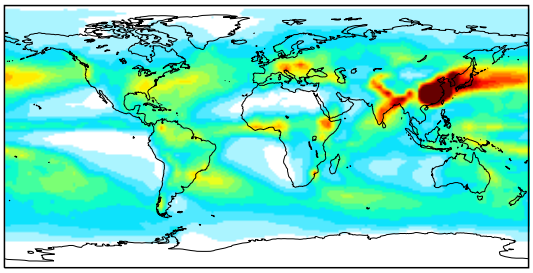
New Model Version: Total Wet Dep





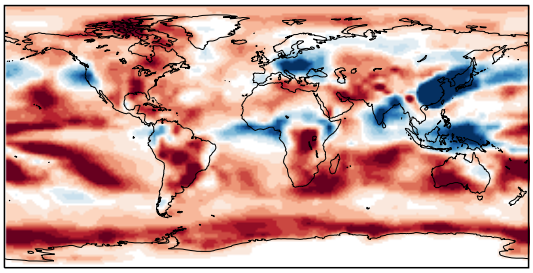
ug/m^2/y

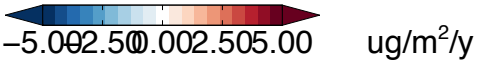
Old Model Version: Total Wet Dep



ug/m^2/y

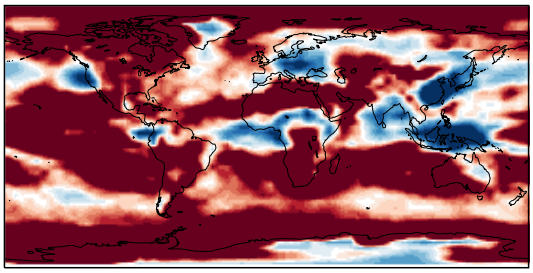
Absolute Difference

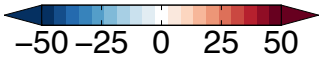




ug/m^2/y

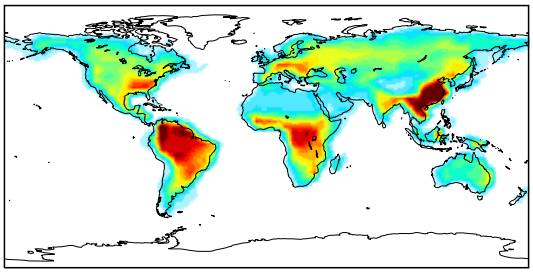
Percent Difference

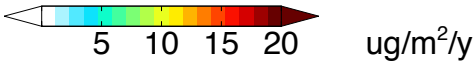




%

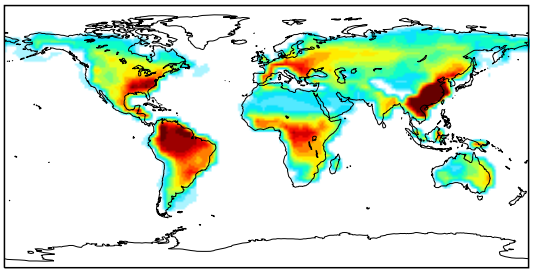
New Model Version: Hg(0) Dry Dep





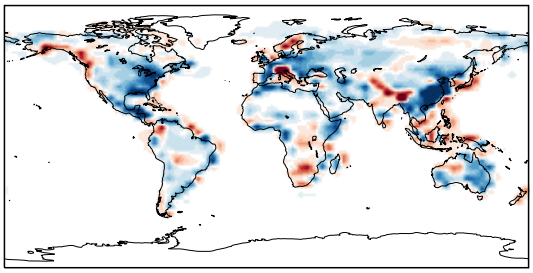
ug/m^2/y

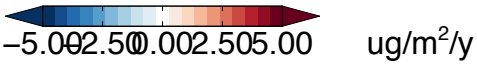
Old Model Version: Hg(0) Dry Dep



ug/m^2/y

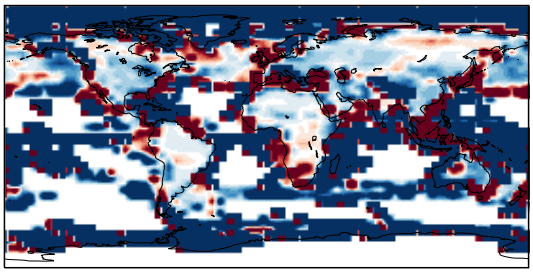
Absolute Difference

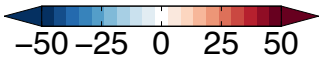




ug/m^2/y

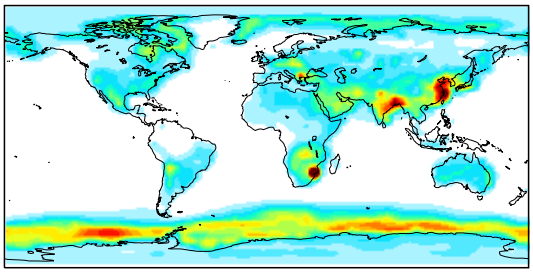
Percent Difference

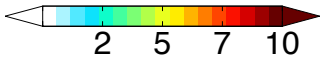




%

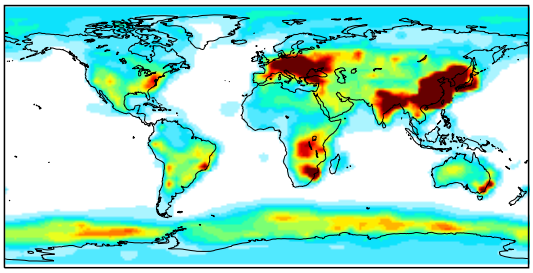
New Model Version: Hg(II)+Hg(P) Dry Dep

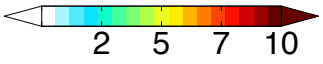




ug/m^2/y

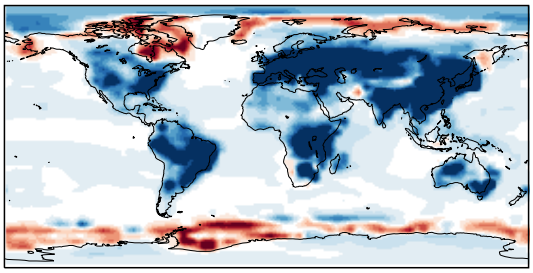
Old Model Version: Hg(II)+Hg(P) Dry Dep

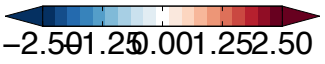




ug/m^2/y

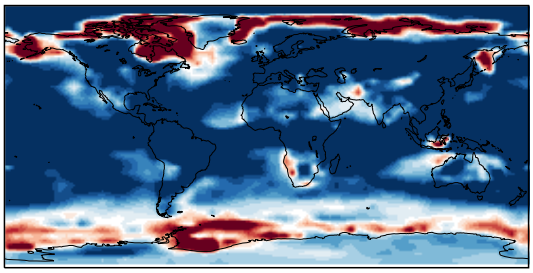
Absolute Difference

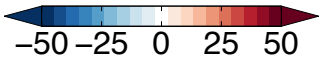




ug/m^2/y

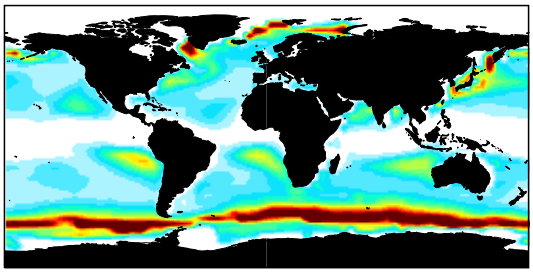
Percent Difference

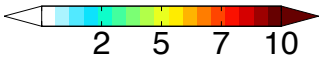




%

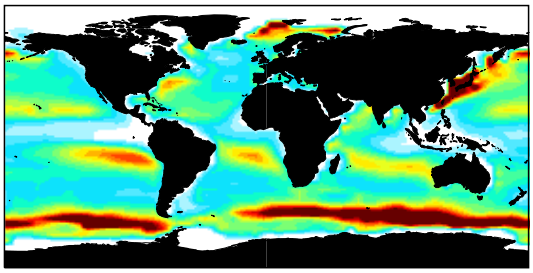
New Model Version: Sea Salt Uptake

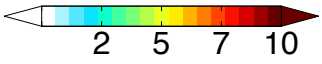




ug/m^2/y

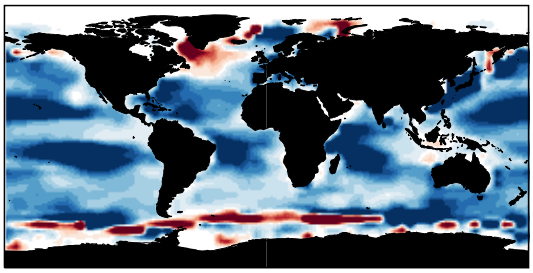
Old Model Version: Sea Salt Uptake

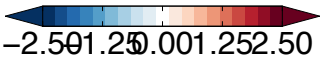




ug/m^2/y

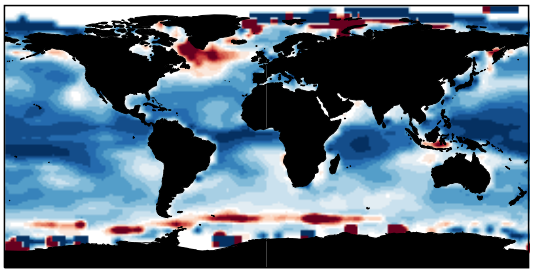
Absolute Difference

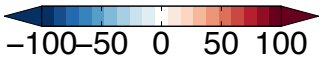




ug/m^2/y

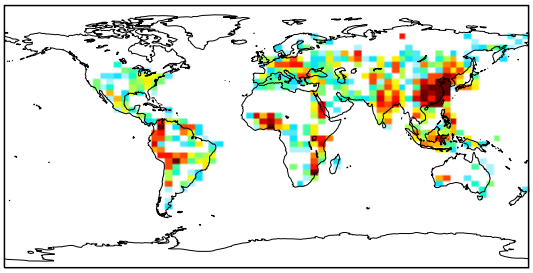
Percent Difference

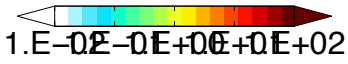




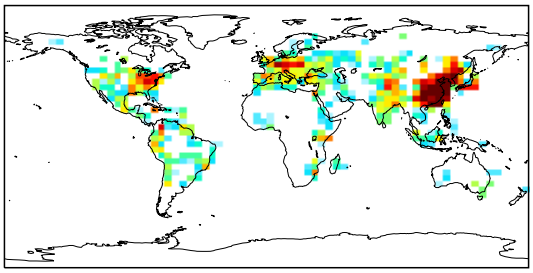
%

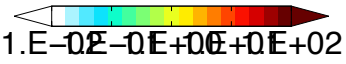
New Model Version: Anthro Emissions – Hg(0)



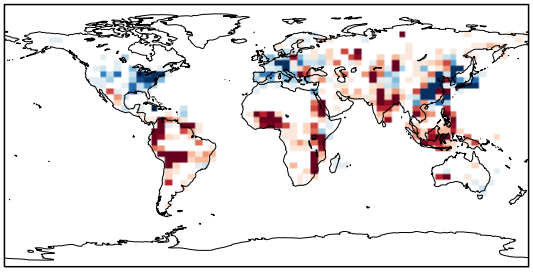


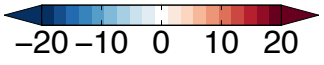
Old Model Version: Anthro Emissions – Hg(0)



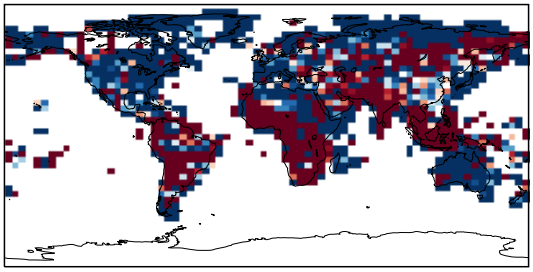


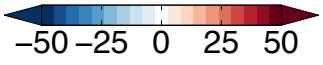
Absolute Difference



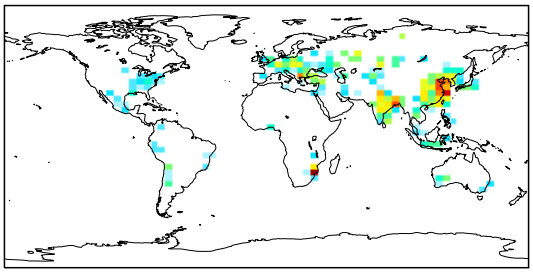


Percent Difference



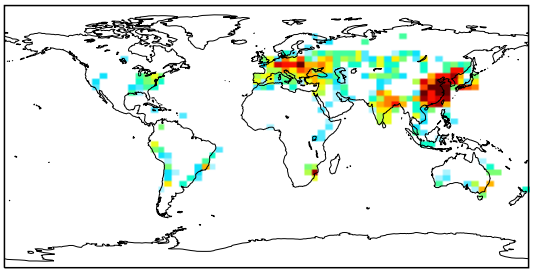


New Model Version: Anthro Emissions – Hg(II)+Hg(P)



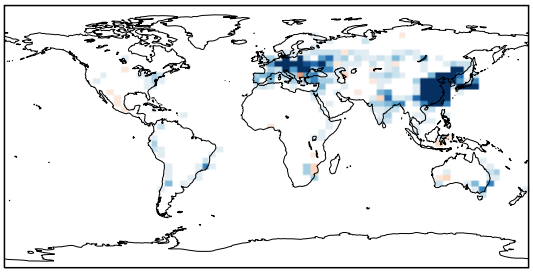
1.E–02 1.E–01 1.E+00 1.E+01 1.E+02 kg/y

Old Model Version: Anthro Emissions – Hg(II)+Hg(P)



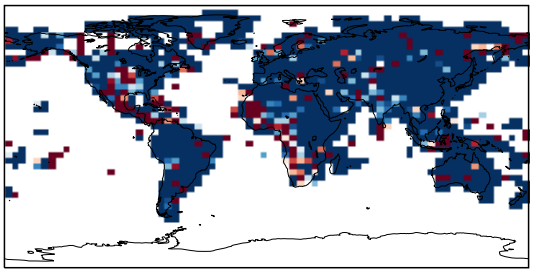
1.E–02 1.E–01 1.E+00 1.E+01 1.E+02 kg/y

Absolute Difference



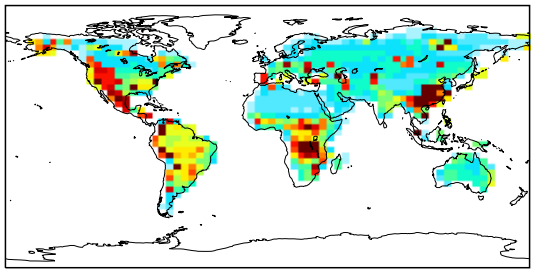
–20 –10 0 10 20 kg/y

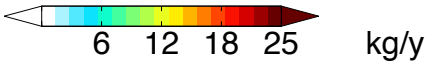
Percent Difference



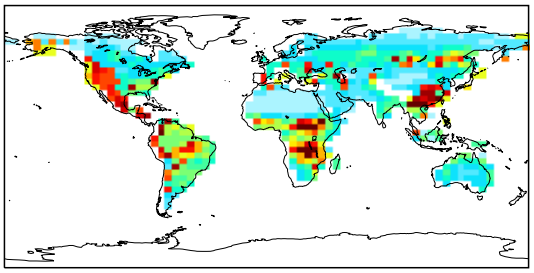
–50 –25 0 25 50 %

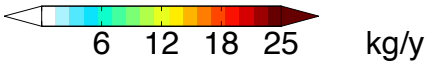
New Model Version: Direct Terrestrial – Geo, BB, & Soil



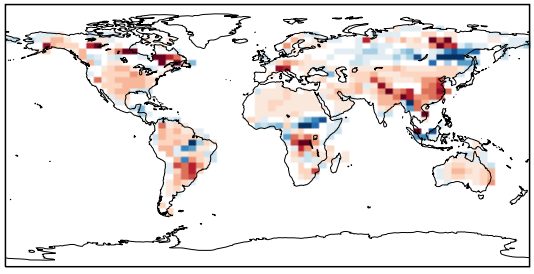


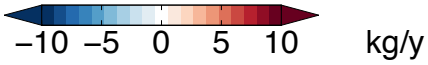
Old Model Version: Direct Terrestrial – Geo, BB, & Soil



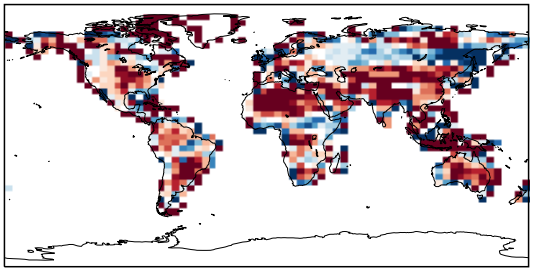


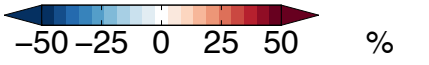
Absolute Difference



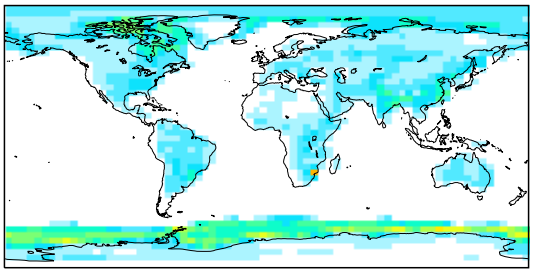


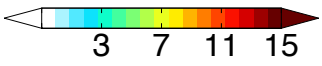
Percent Difference



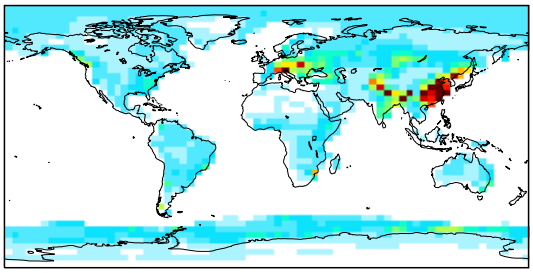


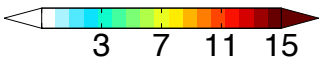
New Model Version: Prompt Reemission – Land & Snow



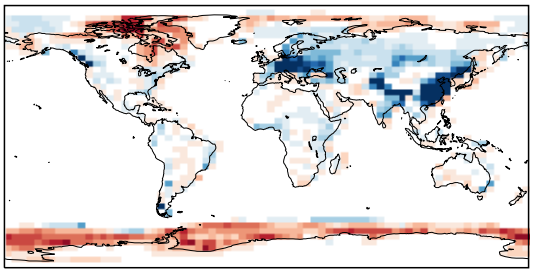


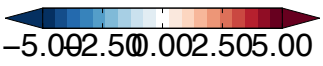
Old Model Version: Prompt Reemission – Land & Snow



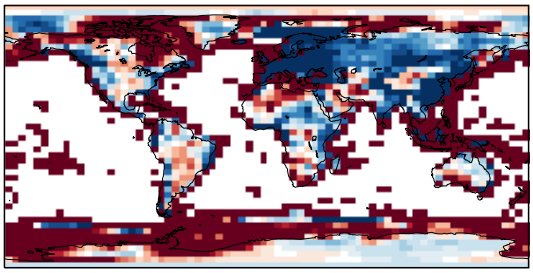


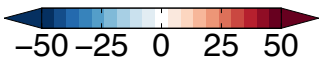
Absolute Difference



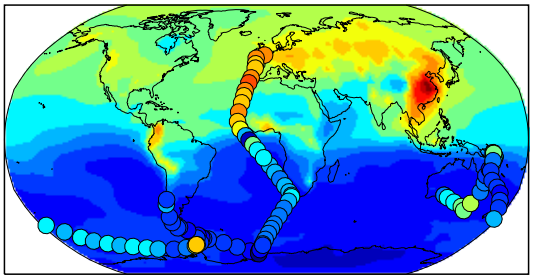


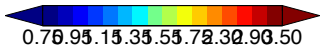
Percent Difference



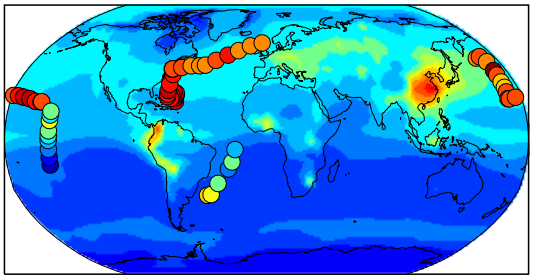


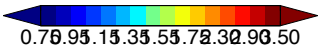
MBL Hg(0) December – February



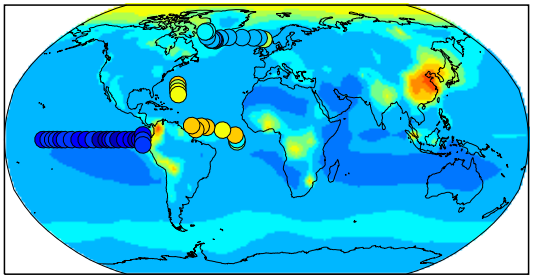


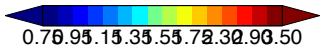
MBL Hg(0) March – May



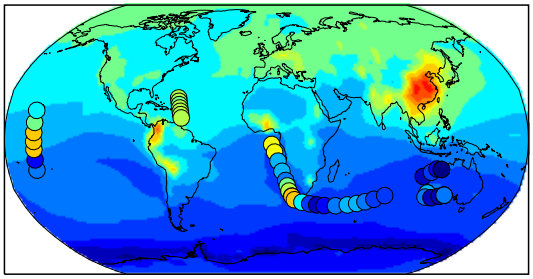


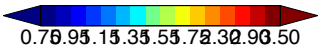
MBL Hg(0) June – August



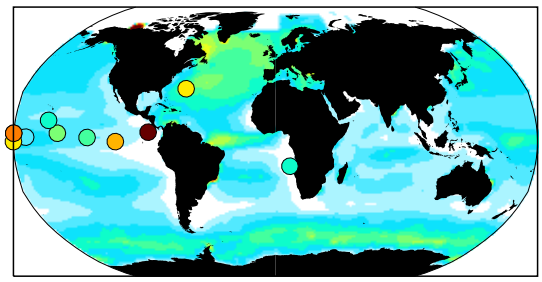


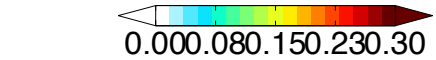
MBL Hg(0) September – November



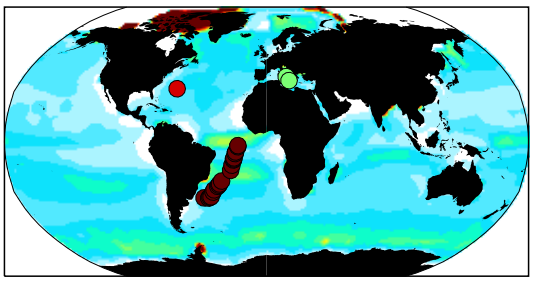


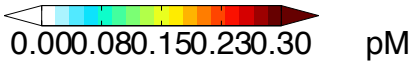
Ocean Hg(0) December – February



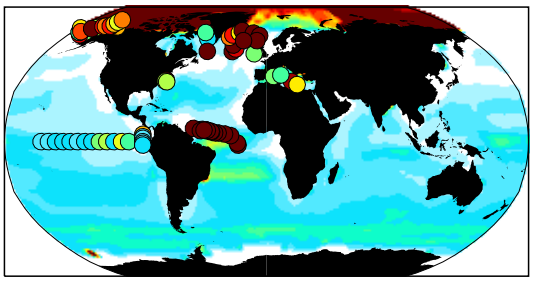


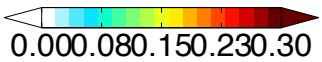
Ocean Hg(0) March – May



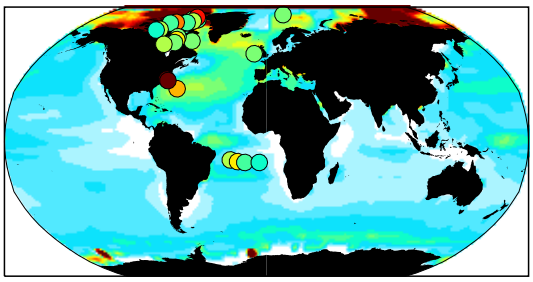


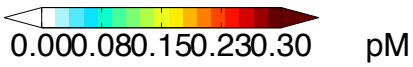
Ocean Hg(0) June – August



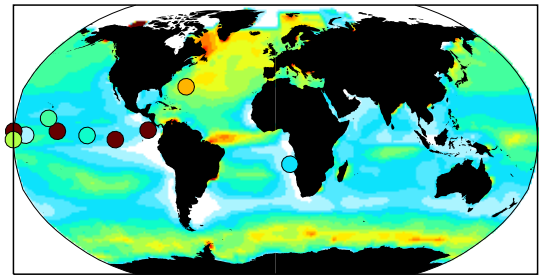


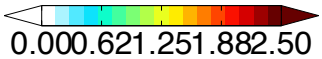
Ocean Hg(0) September – November



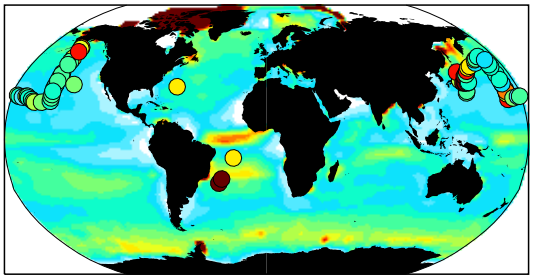


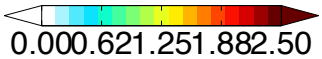
Ocean Total Hg December – February



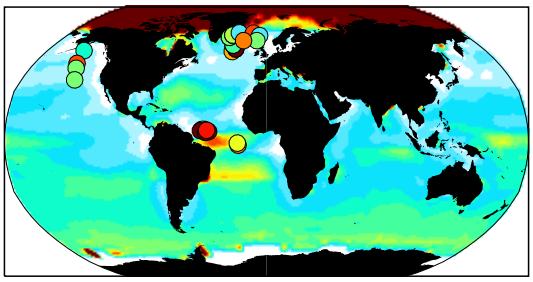


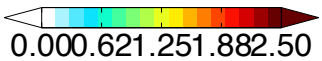
Ocean Total Hg March – May



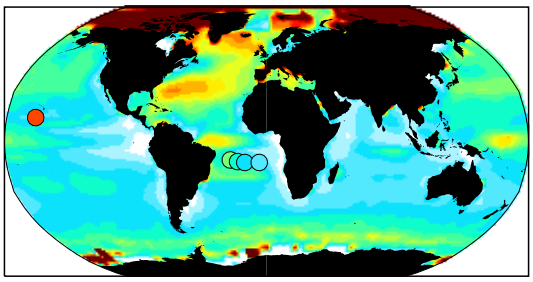


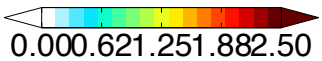
Ocean Total Hg June – August



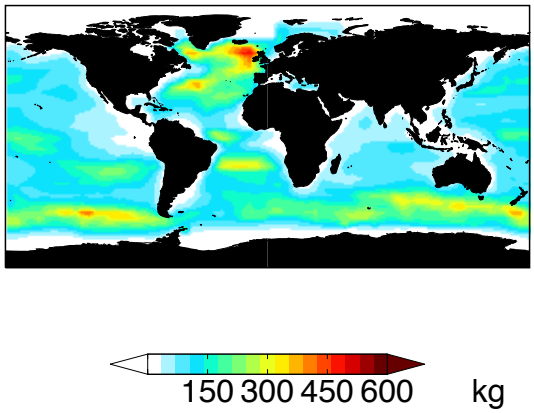


Ocean Total Hg September – November

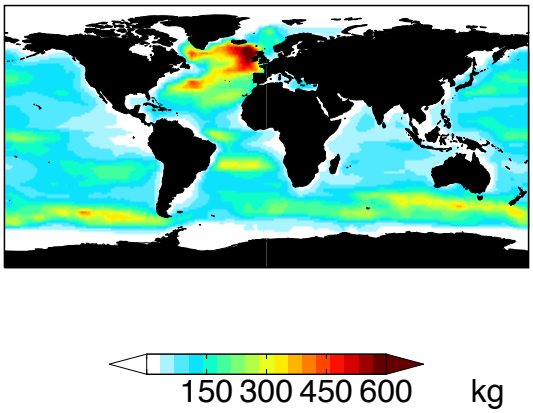




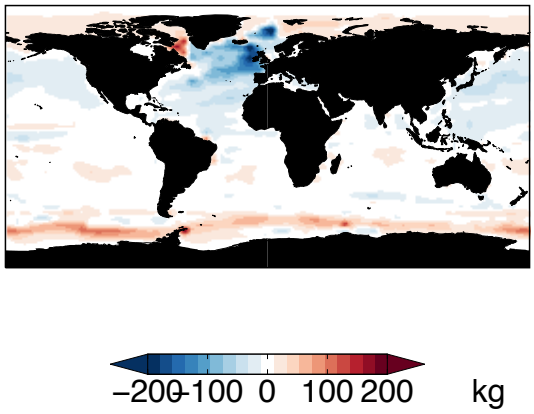
New Model Version: Ocean Hg(0) Mass



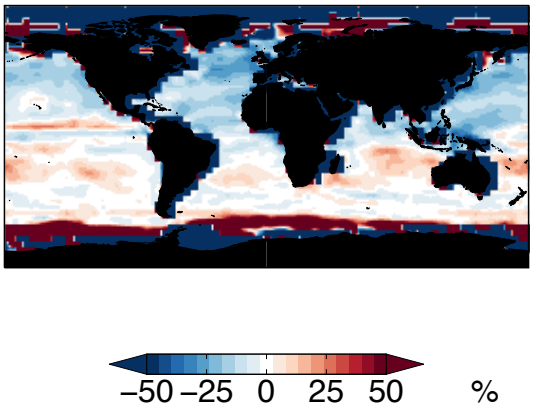
Old Model Version: Ocean Hg(0) Mass



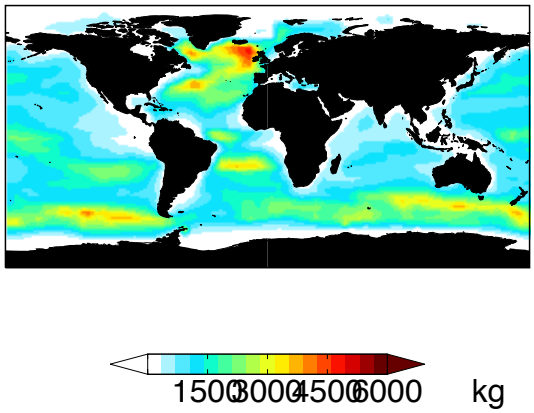
Absolute Difference



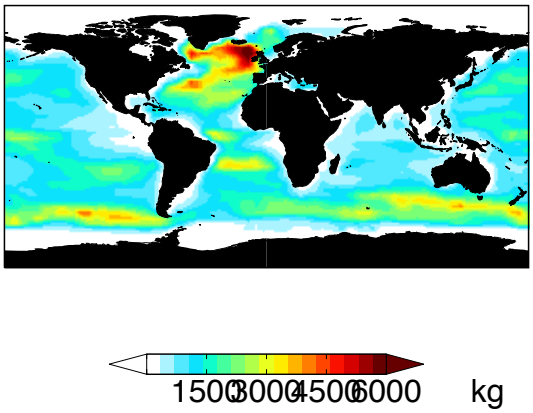
Percent Difference



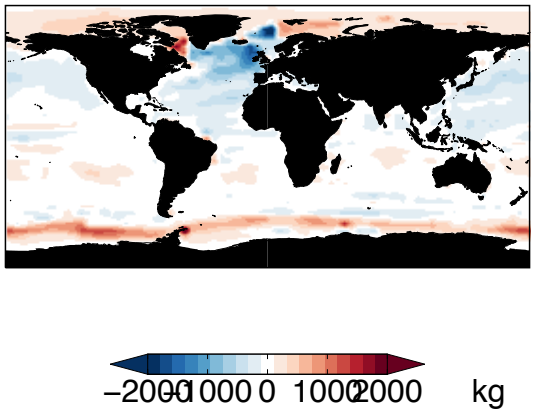
New Model Version: Ocean Hg(II) Mass



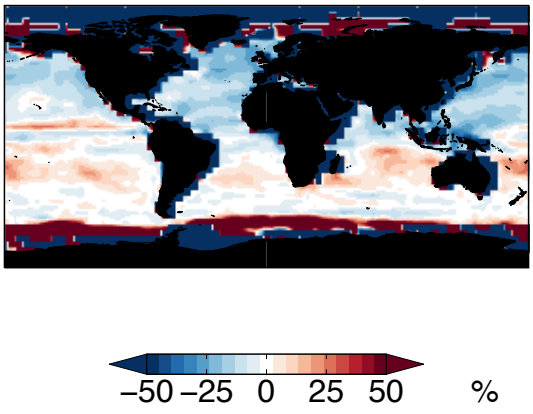
Old Model Version: Ocean Hg(II) Mass



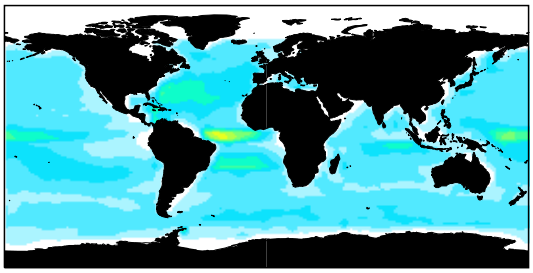
Absolute Difference



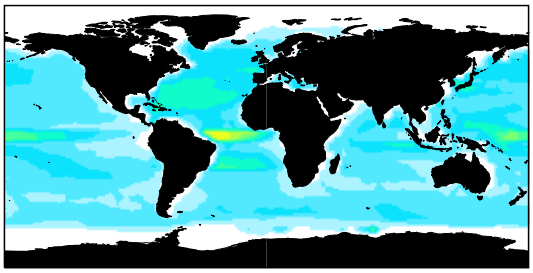
Percent Difference



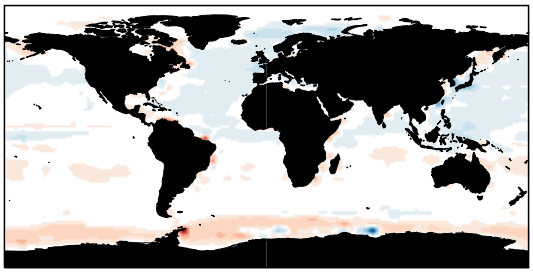
New Model Version: Ocean Particulate Mass

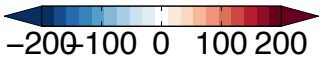


Old Model Version: Ocean Particulate Mass

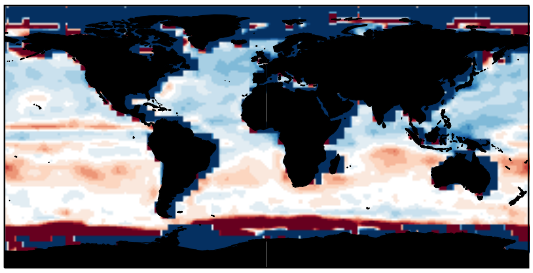


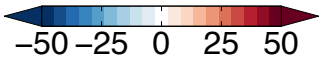
Absolute Difference



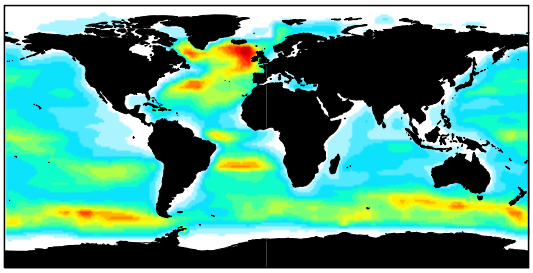


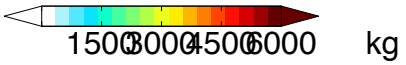
Percent Difference



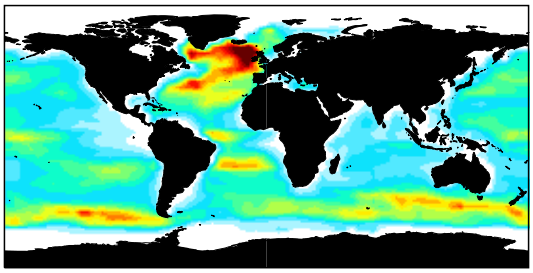


New Model Version: Ocean Total Inorganic Hg Mass

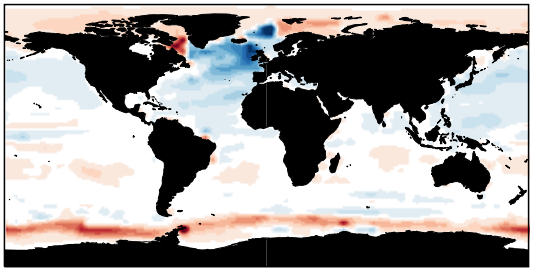


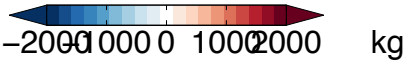


Old Model Version: Ocean Total Inorganic Hg Mass

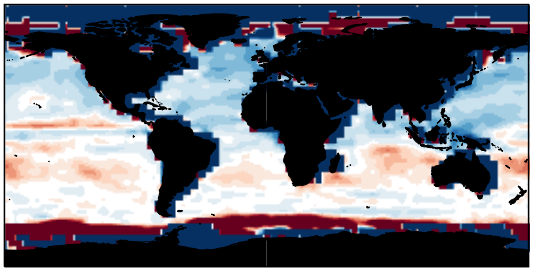


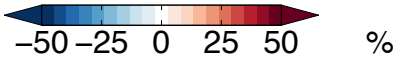
Absolute Difference



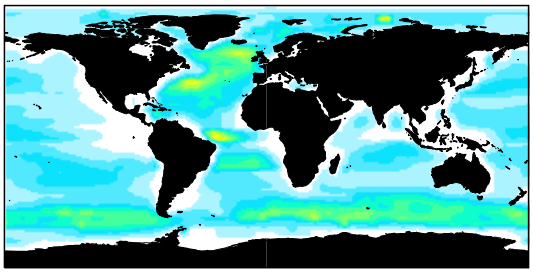


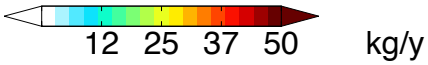
Percent Difference



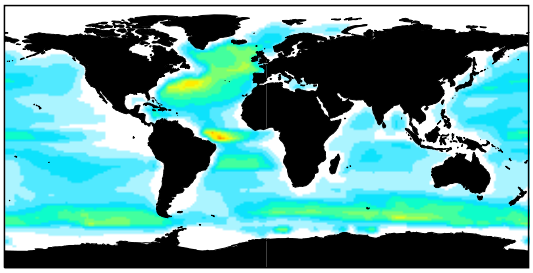


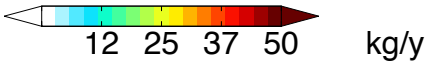
New Model Version: Gross Ocean Evasion



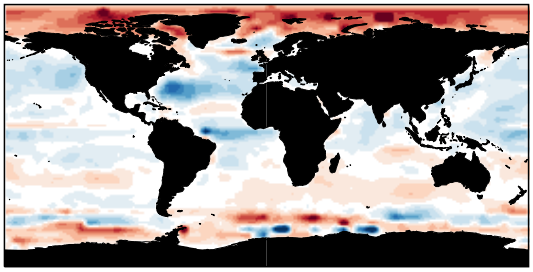


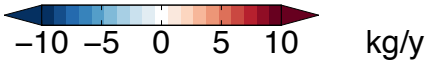
Old Model Version: Gross Ocean Evasion



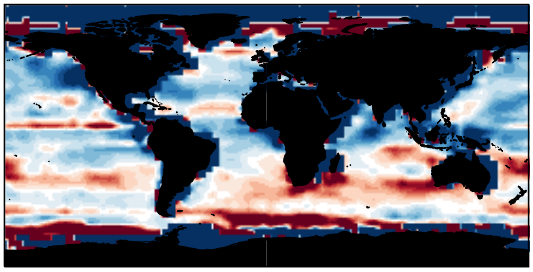


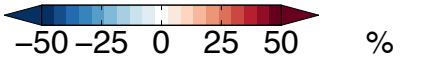
Absolute Difference



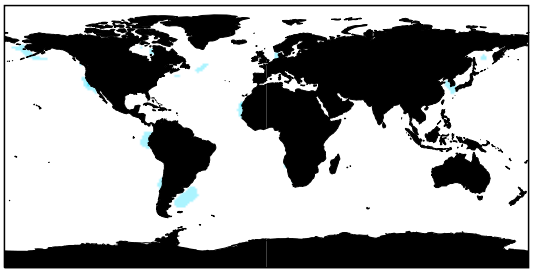


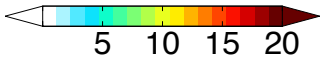
Percent Difference



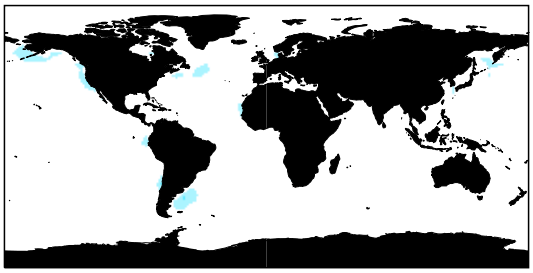


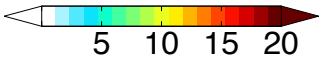
New Model Version: Gross Ocean Hg(0) Uptake



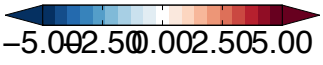


Old Model Version: Gross Ocean Hg(0) Uptake

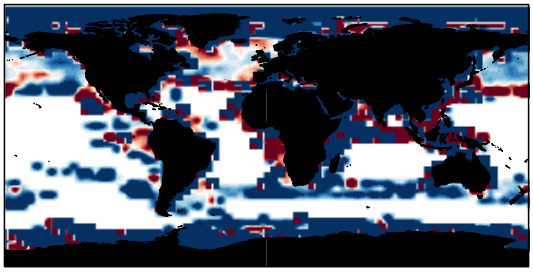


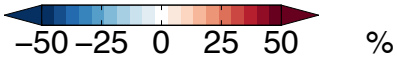


Absolute Difference

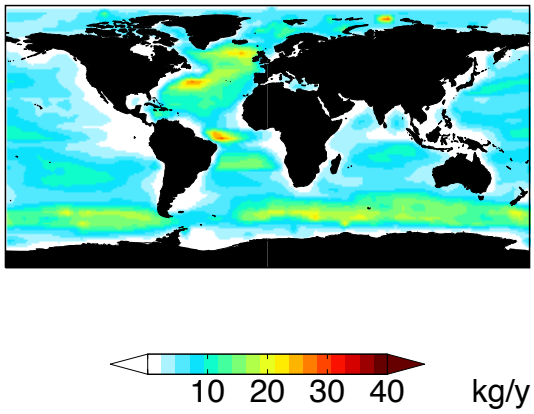


Percent Difference

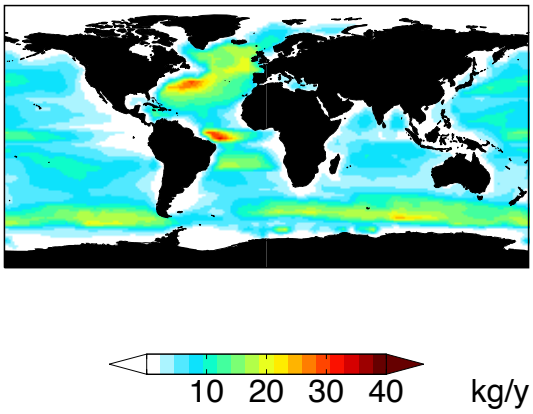




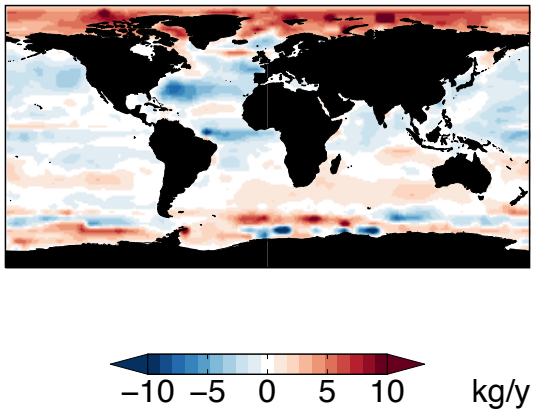
New Model Version: Net Ocean Evasion



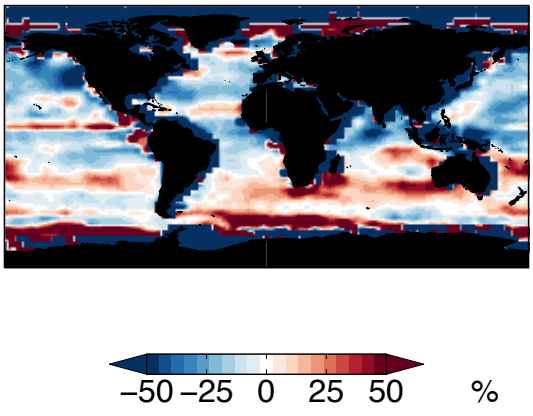
Old Model Version: Net Ocean Evasion



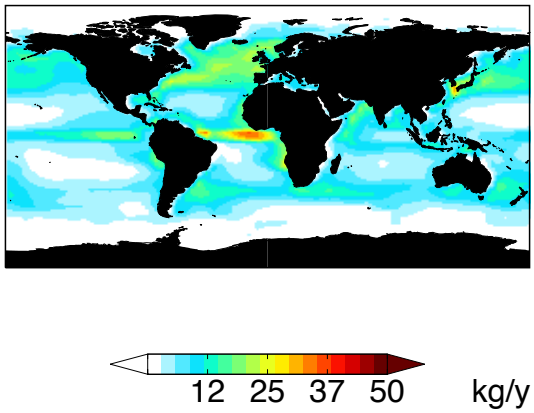
Absolute Difference



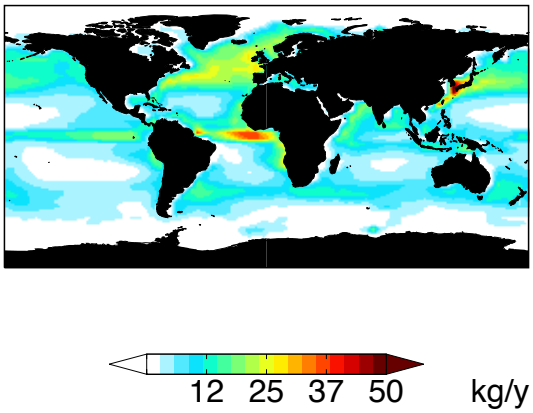
Percent Difference



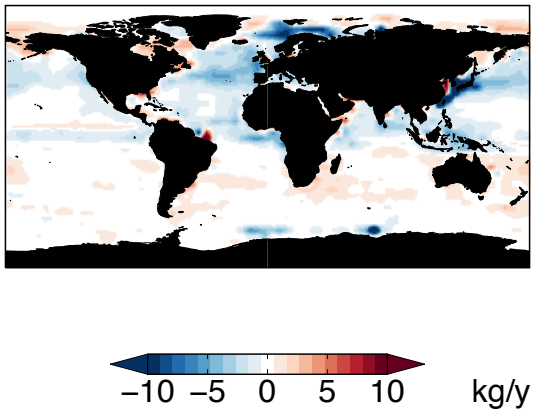
New Model Version: Ocean Hg Sinking



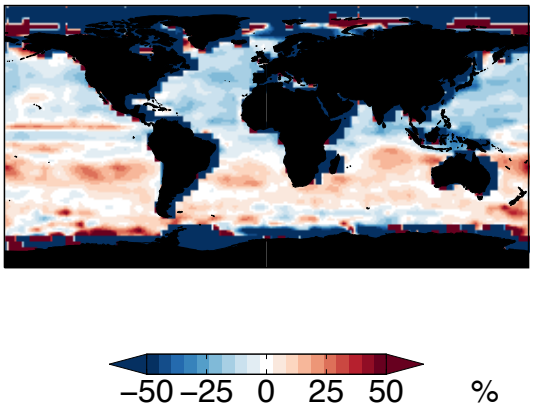
Old Model Version: Ocean Hg Sinking



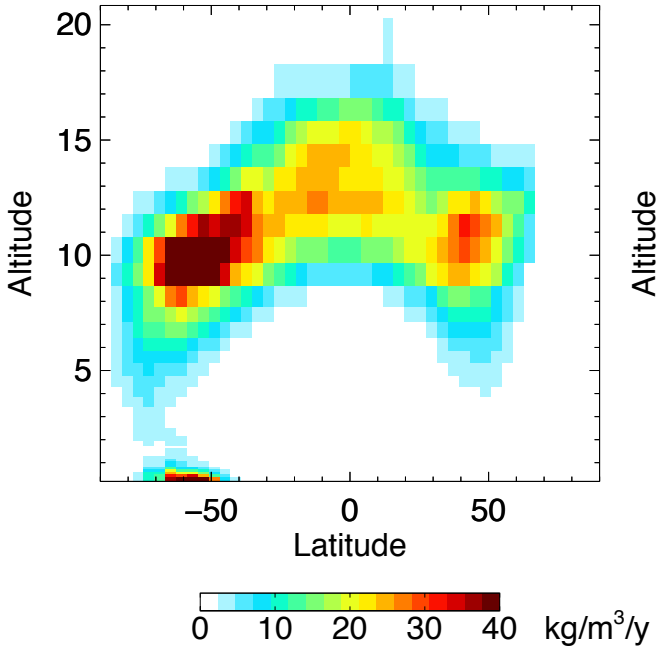
Absolute Difference



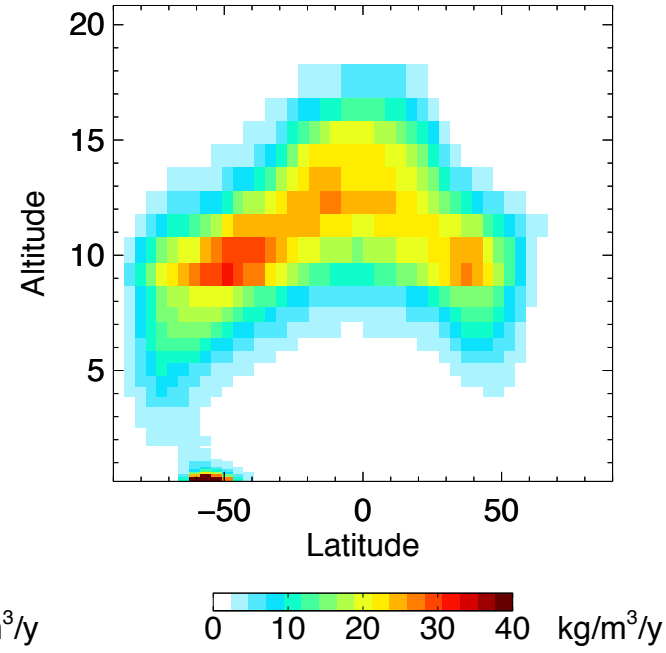
Percent Difference



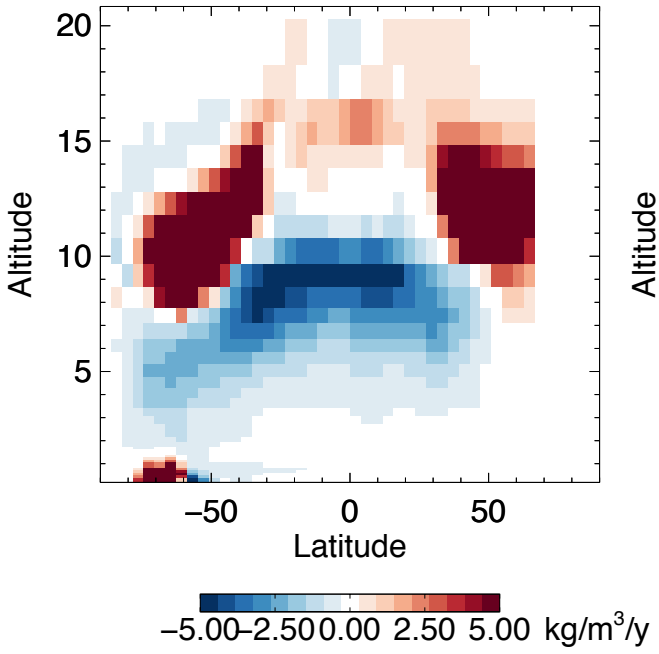
New Model Version: Zonal Gross Ox by Br



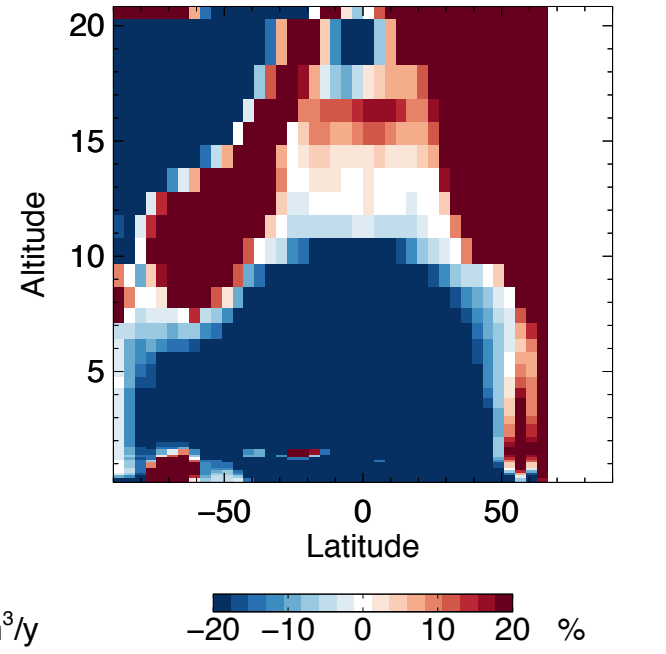
Old Model Version: Zonal Gross Ox by Br



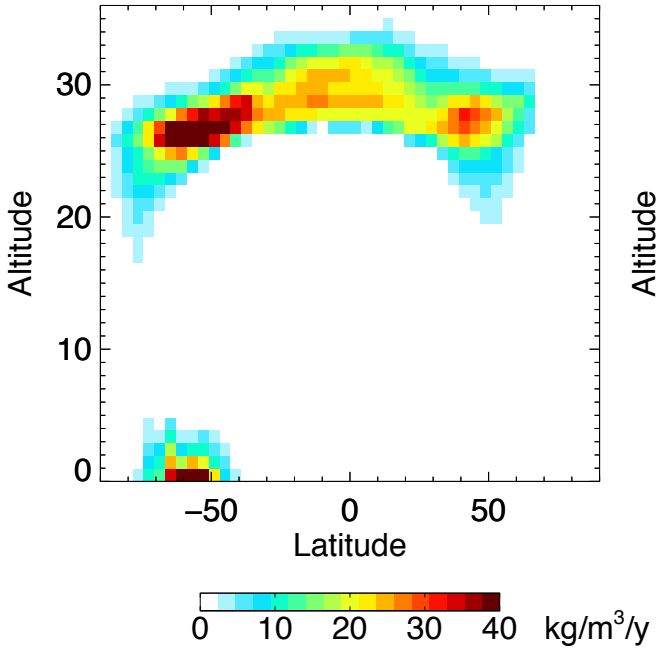
Absolute Difference



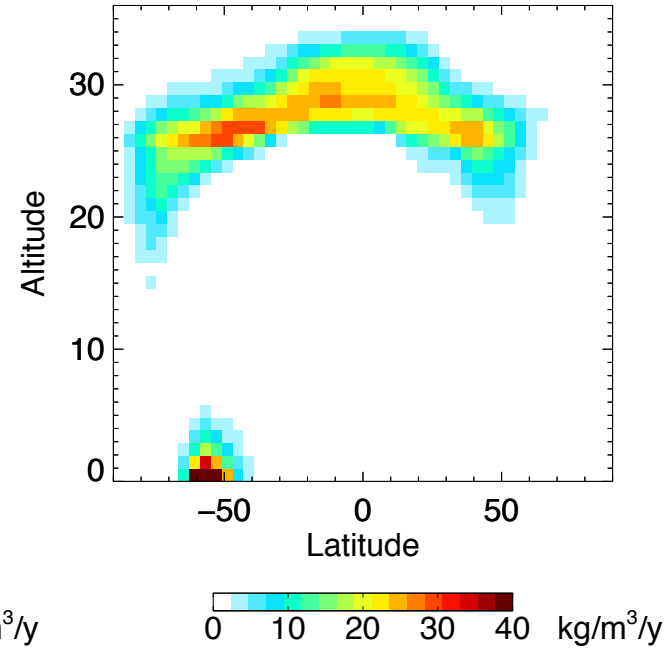
Percent Difference



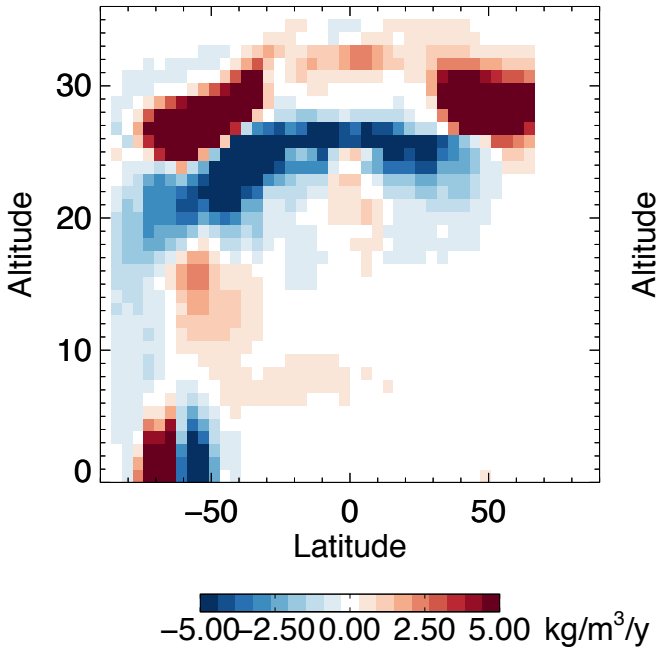
New Model Version: Zonal Net Oxidation



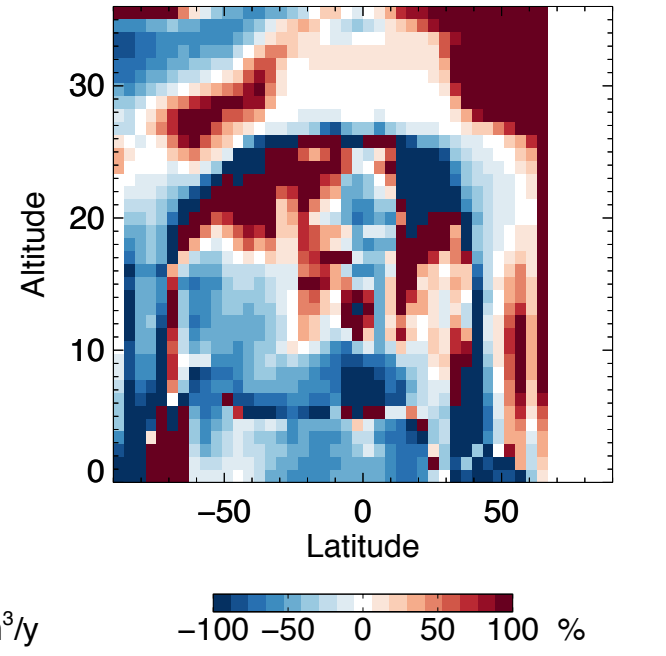
Old Model Version: Zonal Net Oxidation



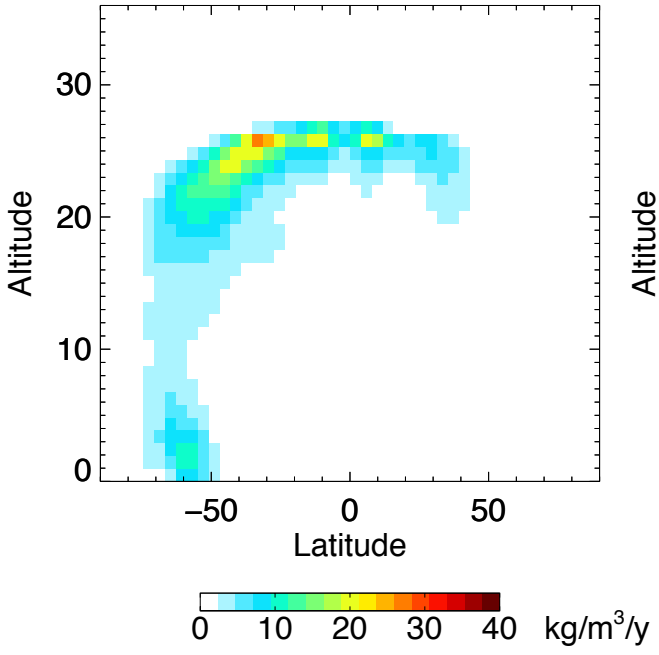
Absolute Difference



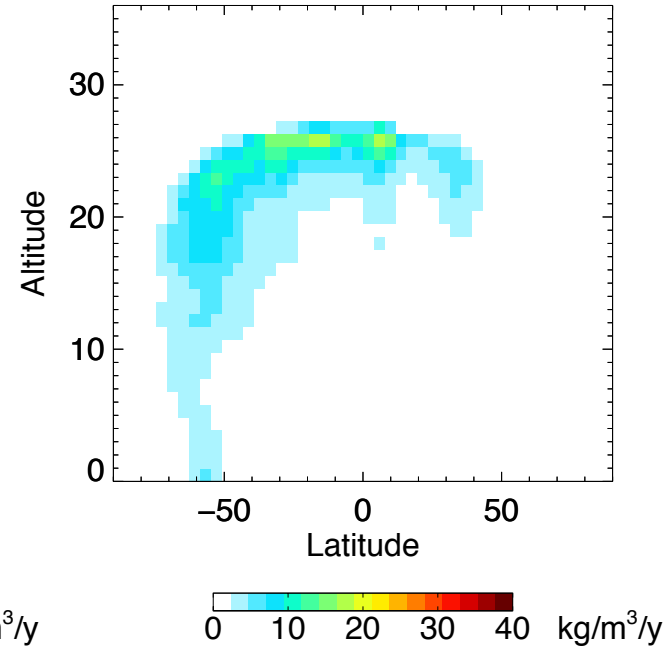
Percent Difference



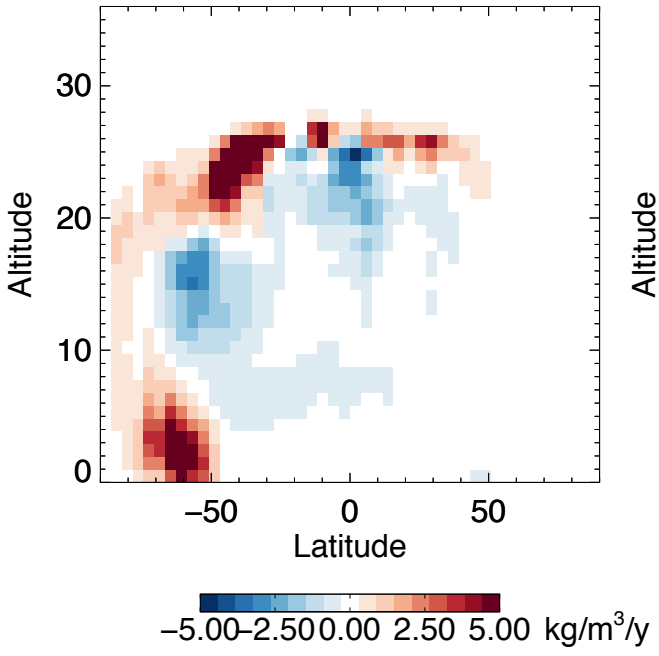
New Model Version: Zonal Gross Reduction



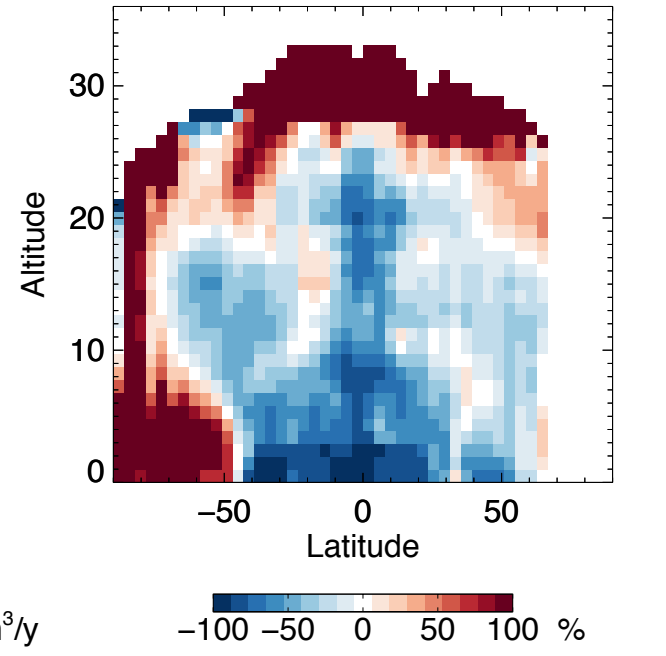
Old Model Version: Zonal Gross Reduction



Absolute Difference



Percent Difference



OLD MODEL VERSION NEW MODEL VERSION

TROPOSPHERIC MASS			DEPOSITION		
Hg^0:	4016	3973 Mg	Hg^0 dd:	1309	1221 Mg/y
Hg^2:	301	261 Mg	Hg^2 dd:	1009	562 Mg/y
Hg^P:	223	147 Mg	Hg^P dd:	67	22 Mg/y
			Hg^2 wd:	2088	2868 Mg/y
SURFACE OCEAN MASS			Hg^P wd:	497	375 Mg/y
Hg^0:	226	230 Mg	Hg^0 oc uptake:	58	61 Mg/y
Hg^2:	2387	2486 Mg	Hg^2 seasalt:	1209	756 Mg/y
Hg^P:	162	169 Mg	TOTAL DEPOSITION:	6239	5869 Mg/y

EMISSIONS			REDOX		
Hg^0 anthro:	1106	1558 Mg/y	Gross Ox by Br:	5872	6306 Mg/y
Hg^2 anthro:	748	229 Mg/y	Gross Reduction:	1763	1896 Mg/y
Hg^P anthro:		Mg/y	Net Oxidation	4109	4409 Mg/y
Hg^0 geo:	249	250 Mg/y			
Hg^0 soil:	730	869 Mg/y			
Hg^0 bb:	223	202 Mg/y			
Hg^0 land re:	269	216 Mg/y			
Hg^0 snow:	198	192 Mg/y			
Hg^0 oc evasion:	2574	2578 Mg/y			
TOTAL EMISSIONS:	6100	6097 Mg/y			