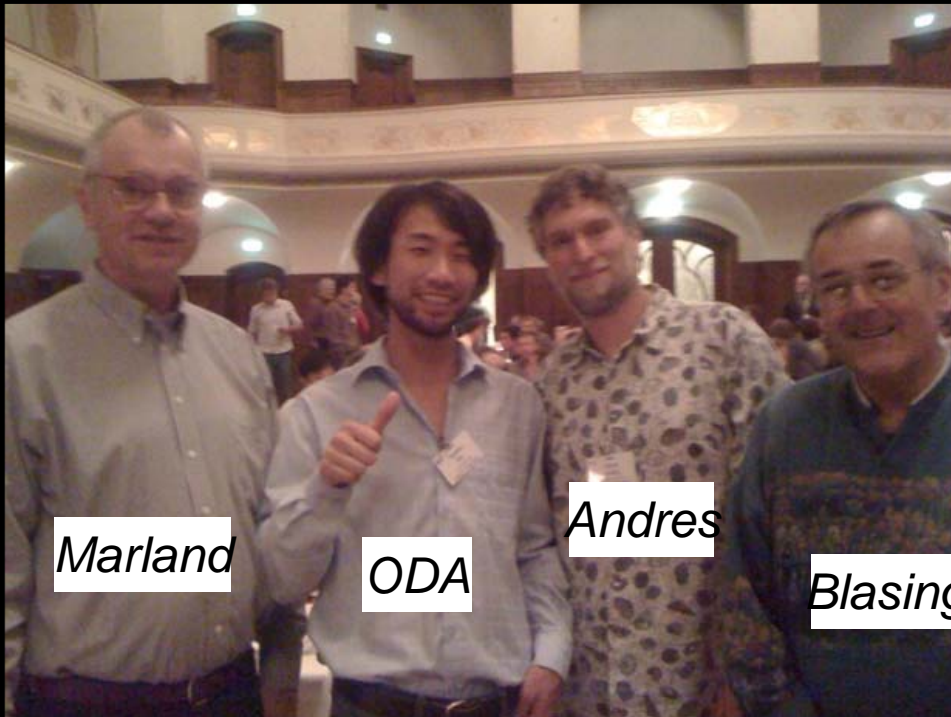


The ODIAC

(Open-source Data Inventory for Anthropogenic CO₂)
The second fossil fuel CO₂ emissions dataset
for CarbonTracker



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R.J. Andres,⁴ C.D. Elvidge,⁵
J.B. Miller^{2,4} and A.R. Jacobson^{2,6}

ODIAC meets CDIAC team @ICDC8

1. Colorado State University
2. NOAA Earth System Research Laboratory
3. Nat'l Institute for Environmental Studies, Japan
4. CDIAC, Oak Ridge Nat'l Laboratory
5. NOAA Nat'l Geophysical Data Center
6. University of Colorado

• National emissions need to be distributed...

- We have good estimates for national and regional totals.
- Yet the estimates need to be prepared in a gridded form to incorporate into models.
- Sub national spatial distributions and temporal variations need to be estimated.
- In particular, fossil fuel CO₂ emissions need to be accurately prescribed in inverse flux estimation framework.

$$F(x, y, t) = \lambda \cdot F_{\text{bio}}(x, y, t) + \lambda \cdot F_{\text{oce}}(x, y, t) + F_{\text{ff}}(x, y, t) + F_{\text{fire}}(x, y, t)$$

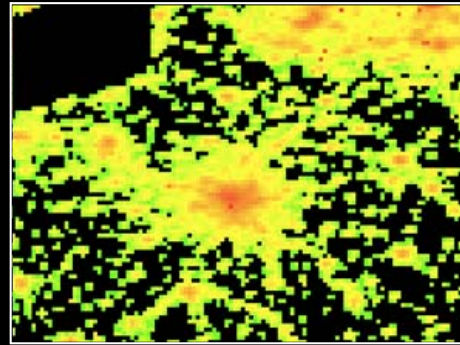
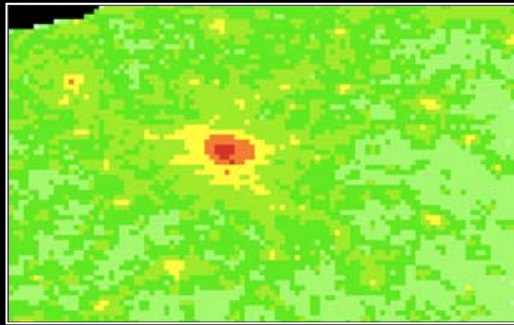
Optimized

Imposed

Nightlight as a spatial proxy for CO2 emissions

Population

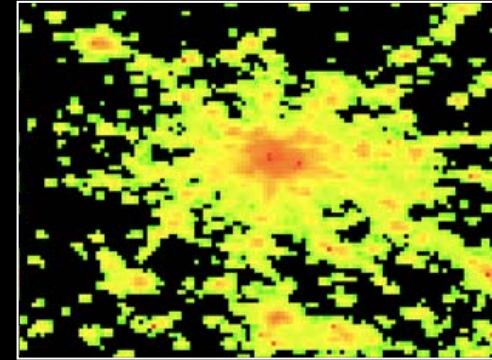
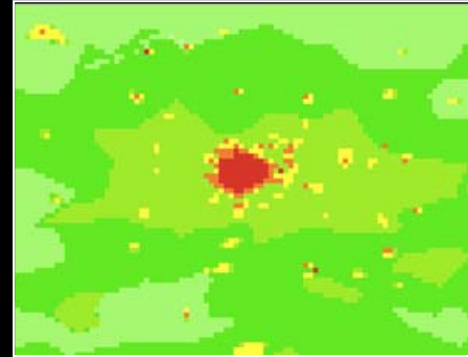
Nightlight



Paris

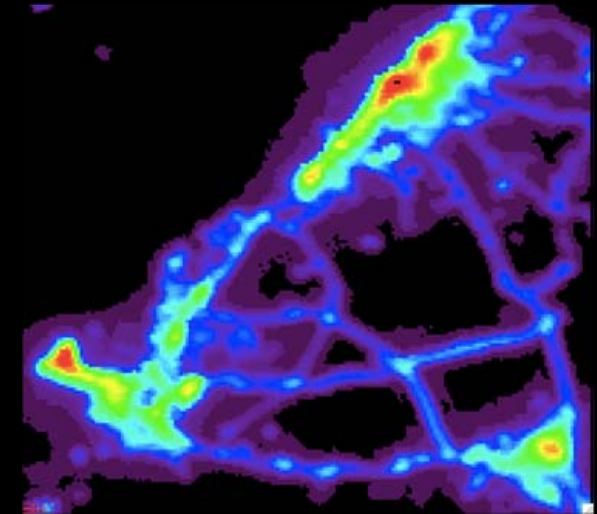
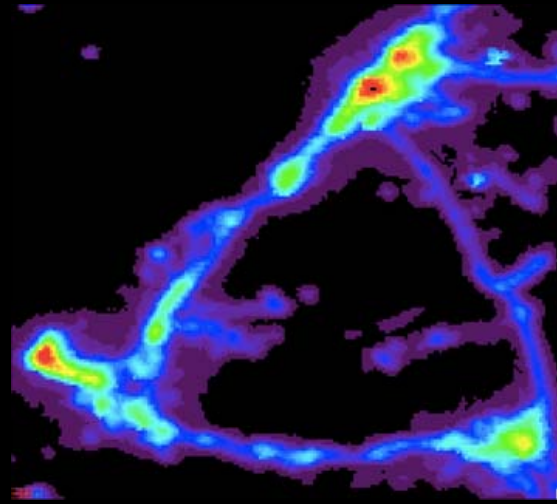
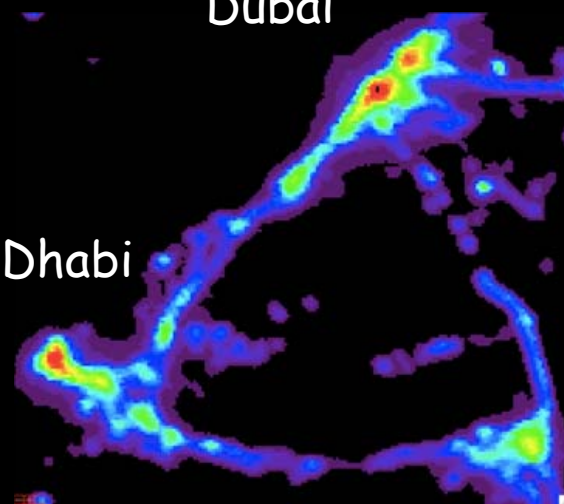
Population

Nightlight



Moscow

Dubai



1996-97

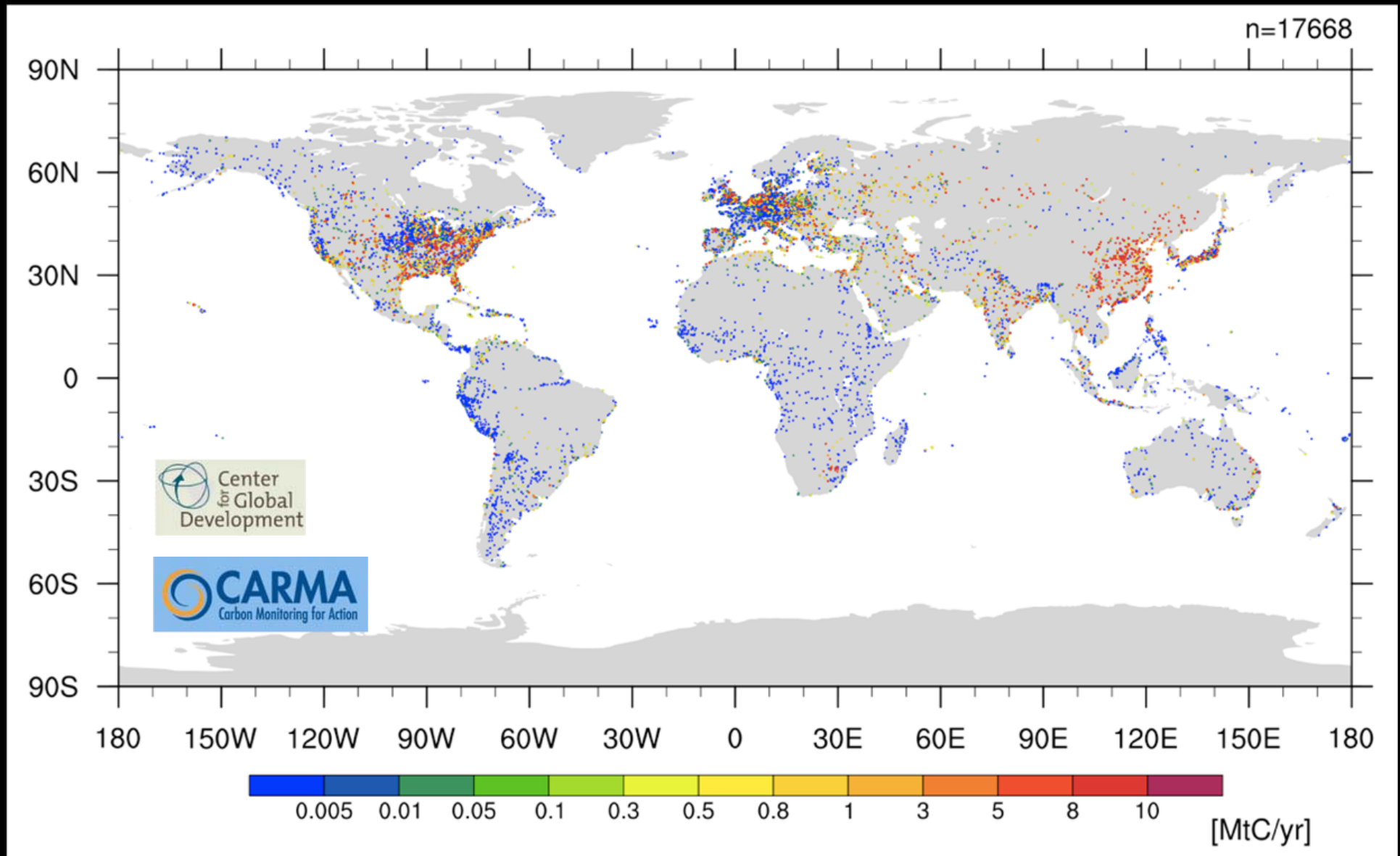
1999

2006

Abu Dhabi

Caveat - Only works when human activity is associated with lights.

CARMA power plant database



Point source emissions are not really correlated with population (also, nightlight).

ODIAC CO2 emissions distribution for 2006

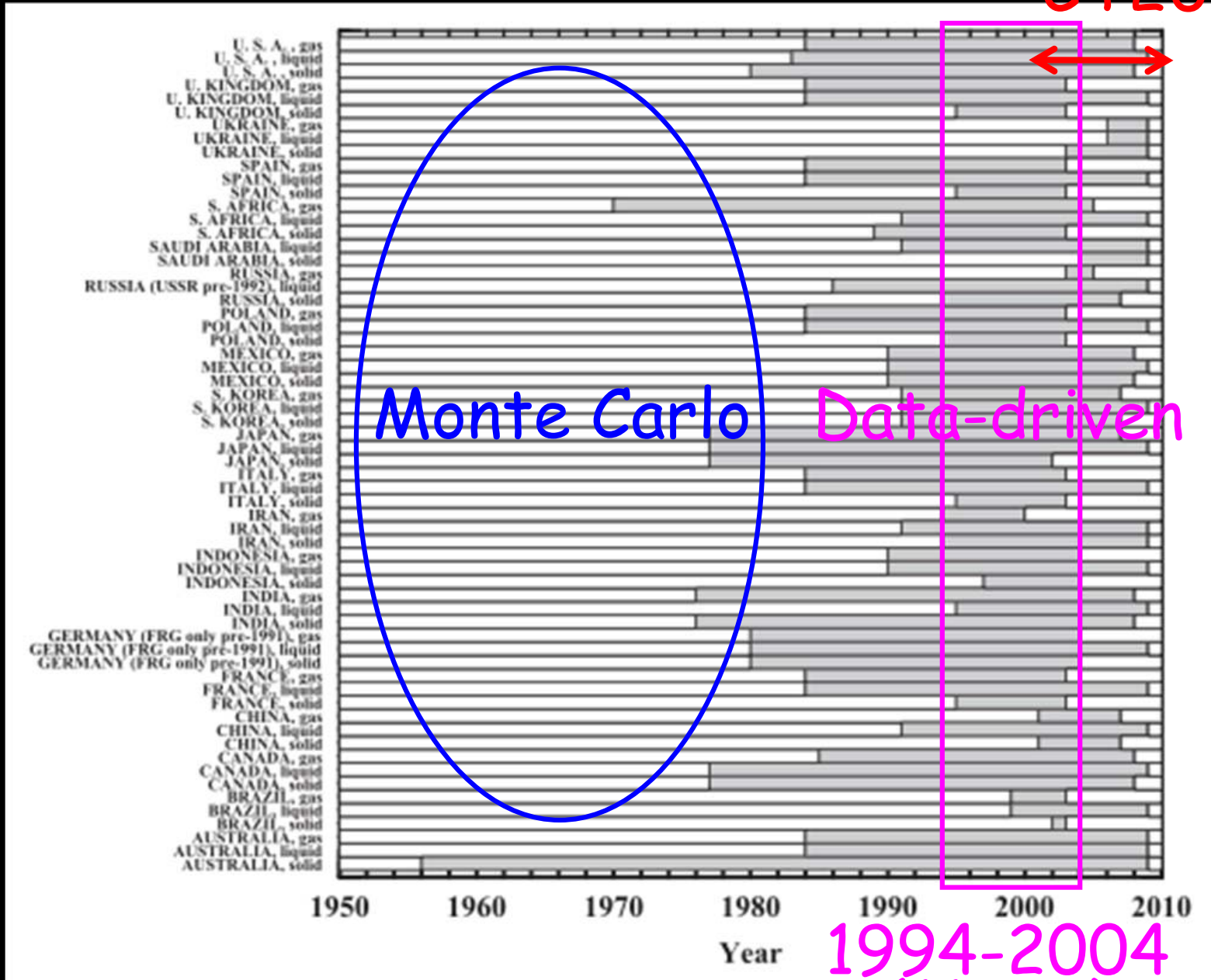


Resolution (°)	Population		Nightlights		FFDAS		Brenkert 1998		This study	
	diff (MtC)	correl	diff (MtC)	correl	diff (MtC)	correl	diff (MtC)	correl	diff (MtC)	correl
0.5	1213	0.70	1360	0.68	1143	0.74	-	-	744	0.87
1.0	1006	0.80	1087	0.81	900	0.85	1045	0.75	474	0.94
2.0	806	0.84	810	0.88	651	0.91	788	0.84	315	0.97
3.0	670	0.87	691	0.90	545	0.92	654	0.87	262	0.98
4.0	608	0.88	641	0.92	479	0.93	644	0.87	206	0.99

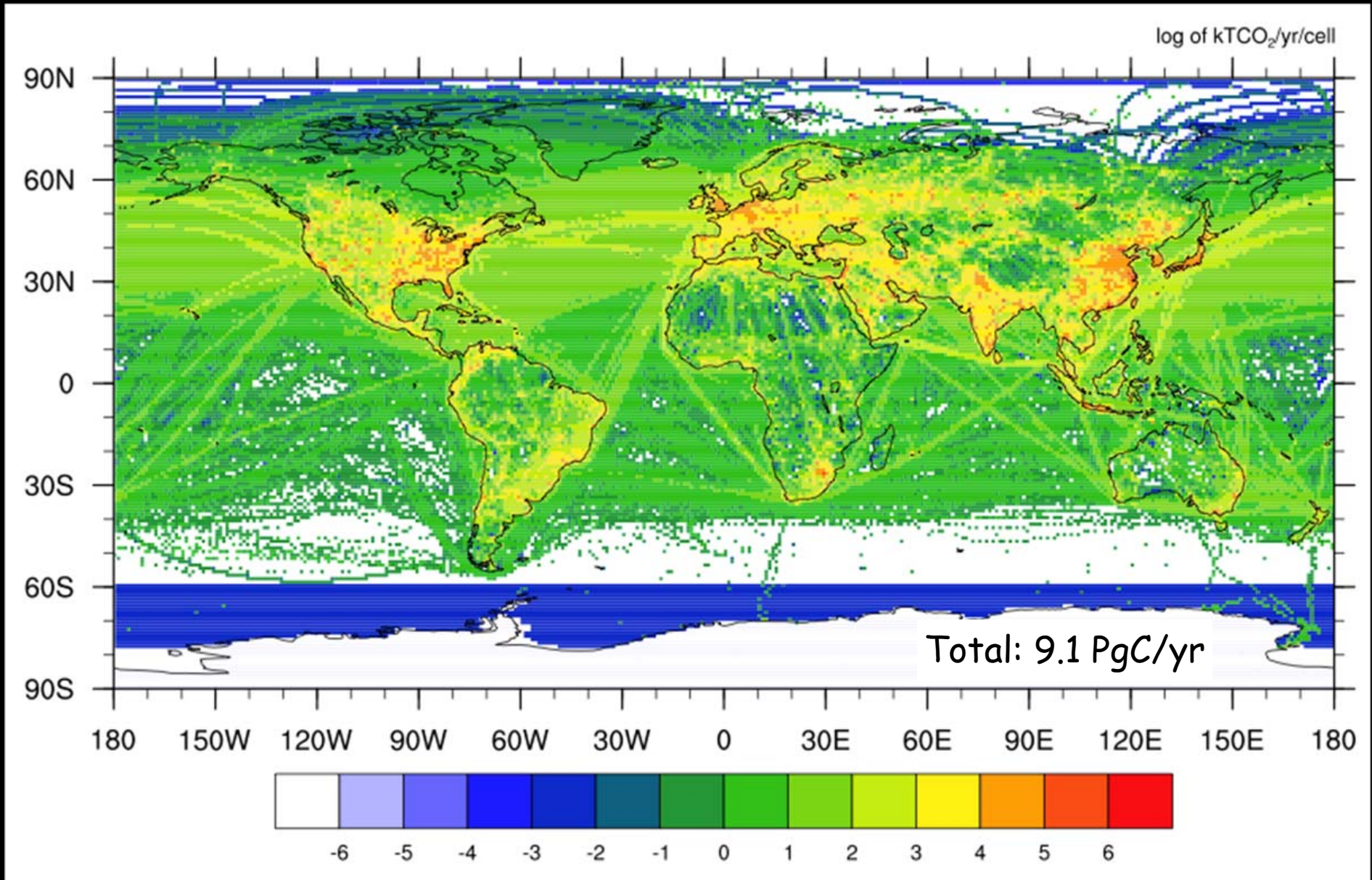
Time variation

Fuel consumption of top 20 emitters

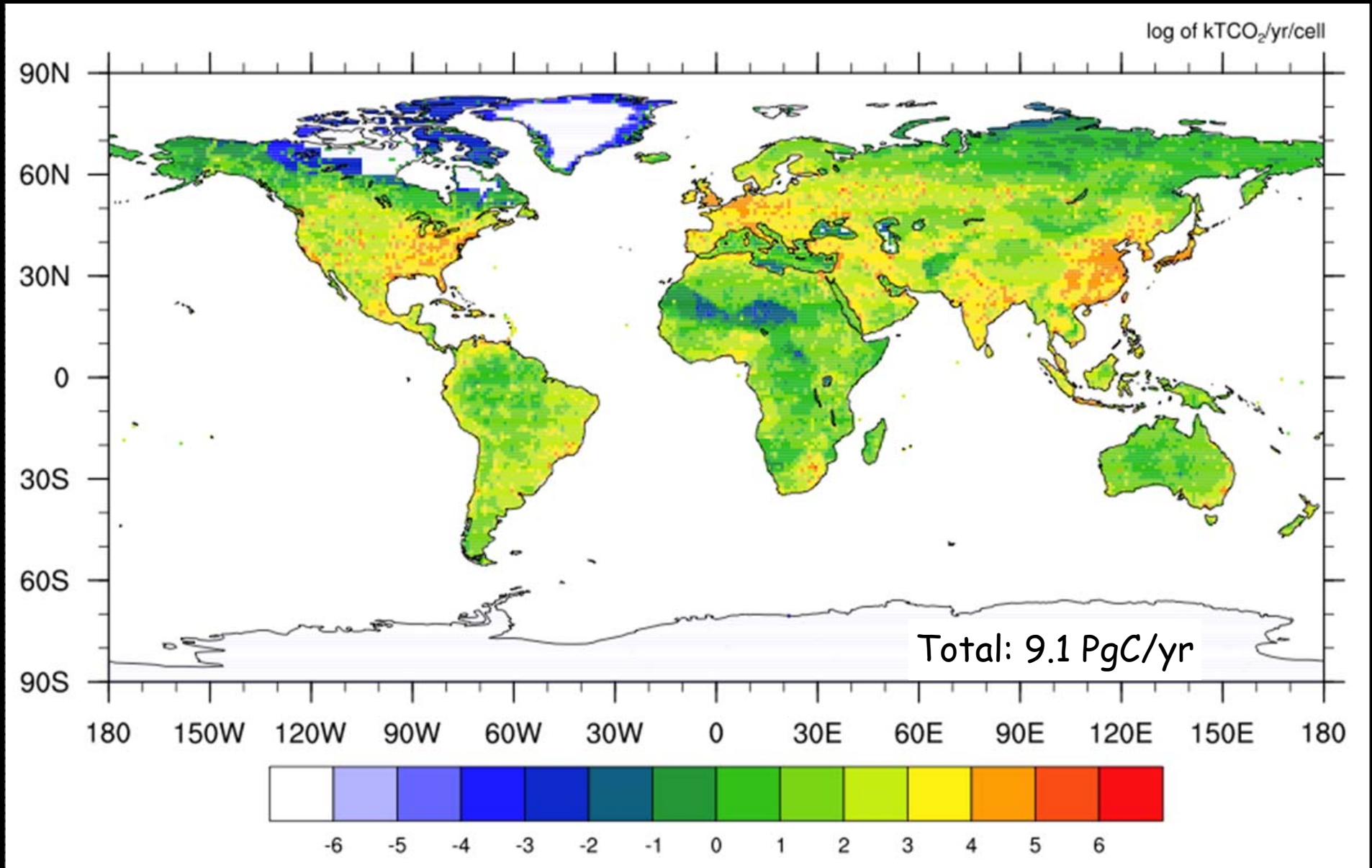
CT2011



- Global emissions field Y2010 - ODIAC ver.3.0

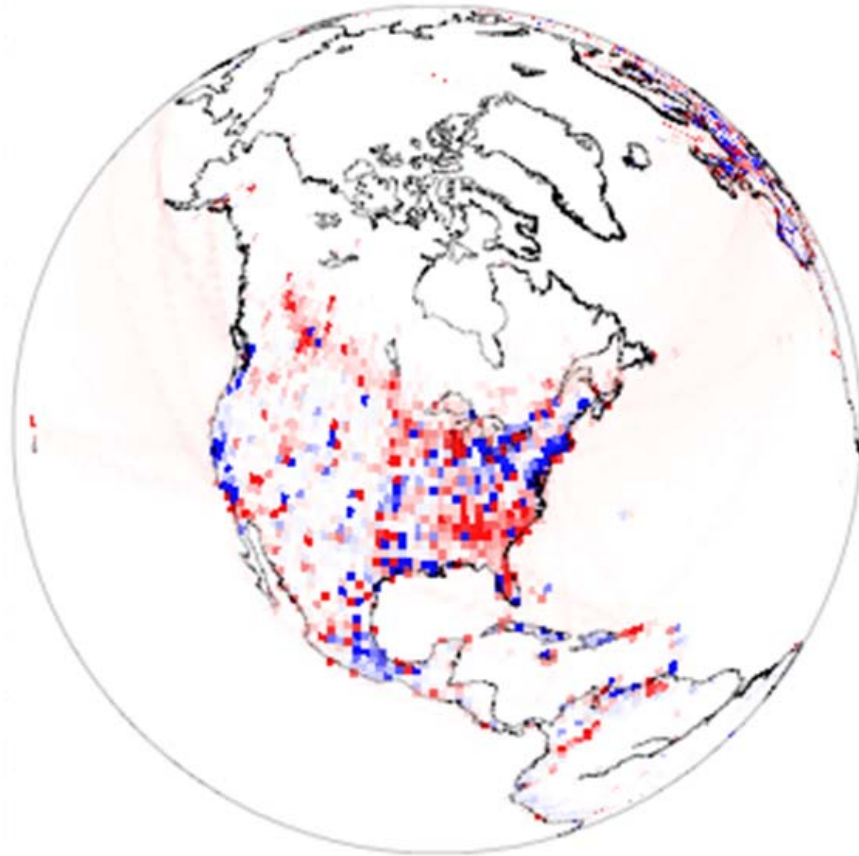


Global emissions field Y2010 - Miller

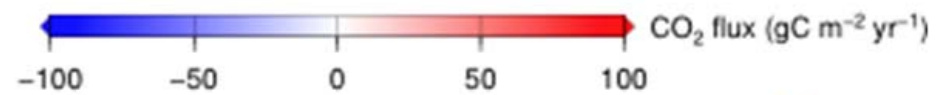
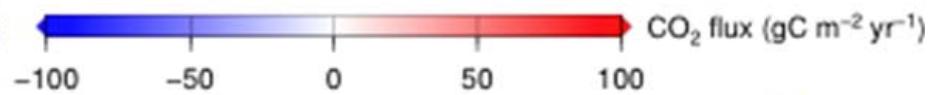
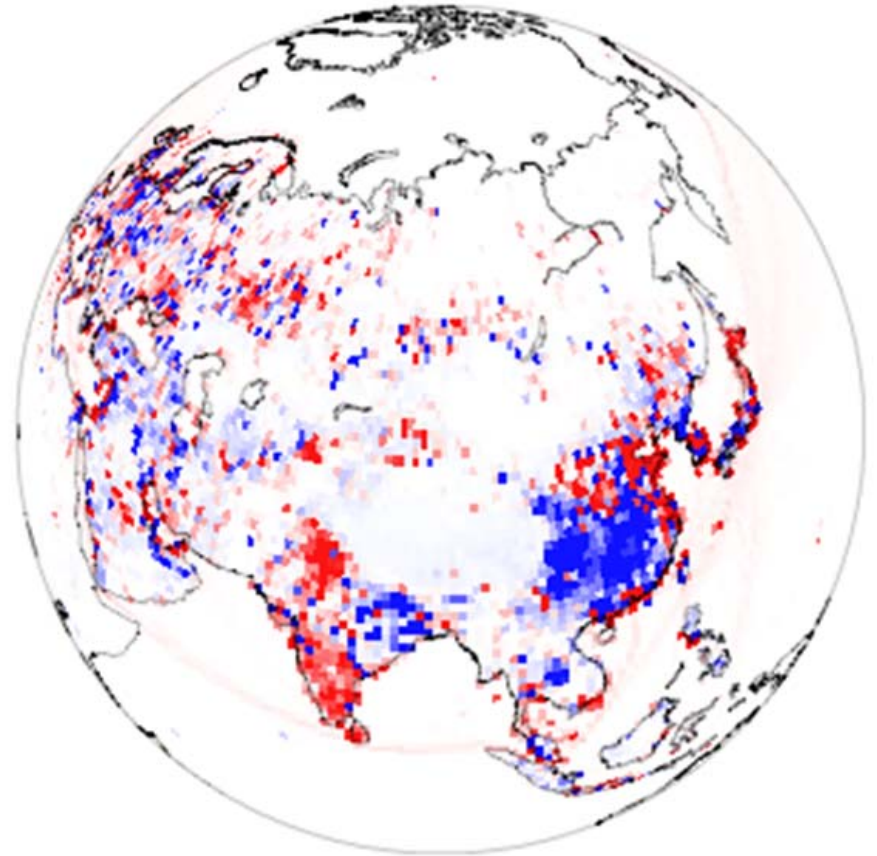


• ODIAC minus Miller

Fossil emissions differences (ODIAC – Miller)
2000–2010 average



Fossil emissions differences (ODIAC – Miller)
2000–2010 average



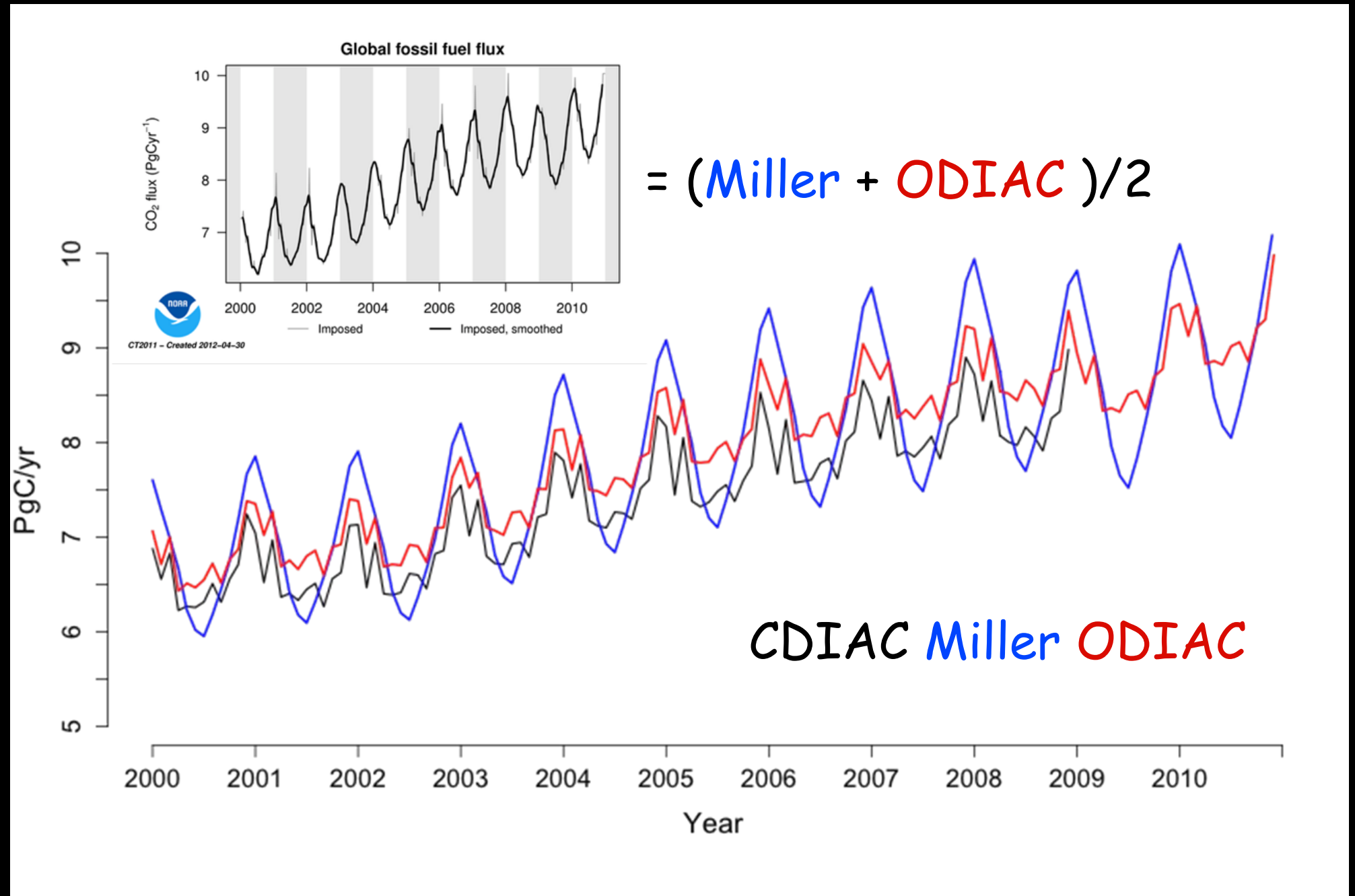
NOAA Earth System Research Laboratory
CarbonTracker CT2011 release



NOAA Earth System Research Laboratory
CarbonTracker CT2011 release

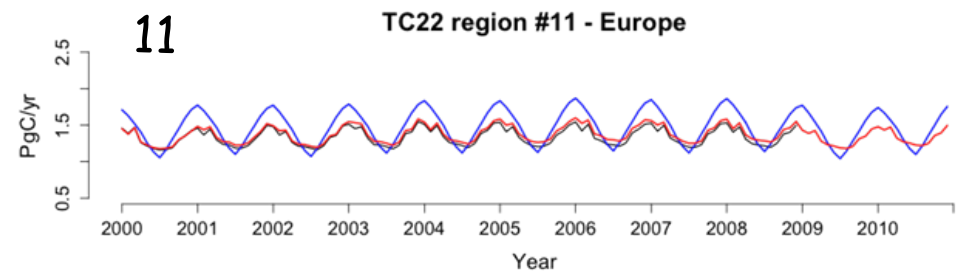
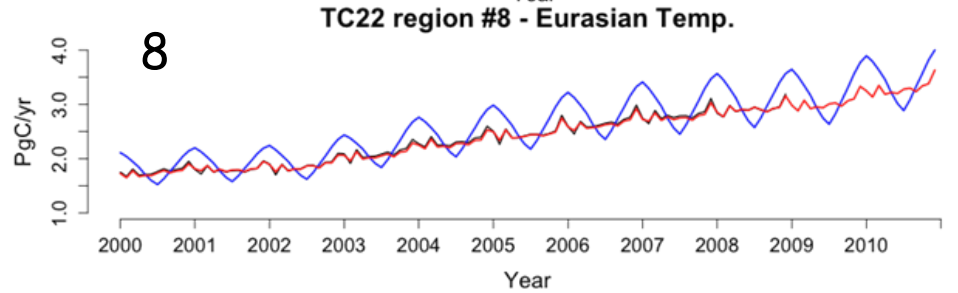
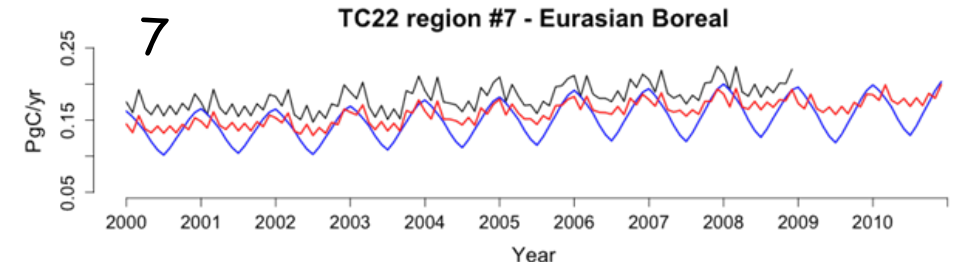
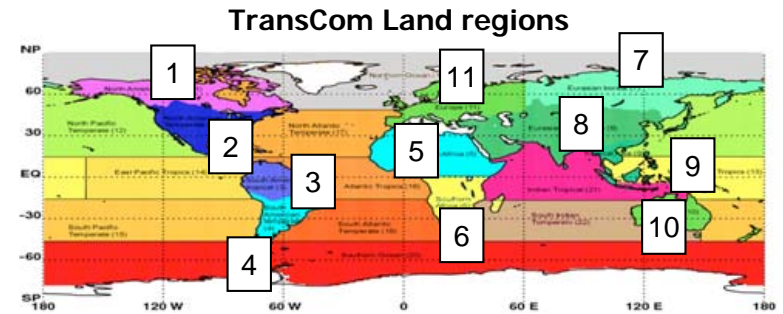
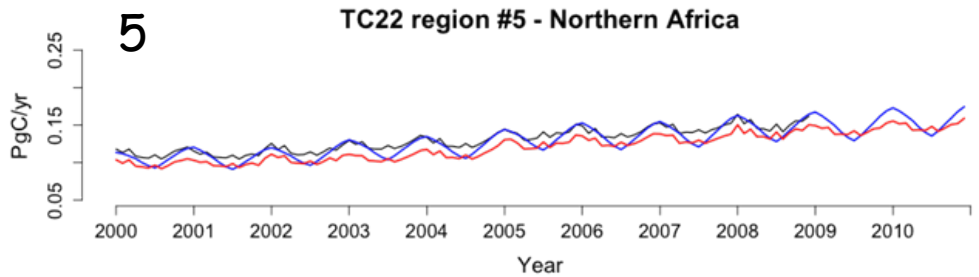
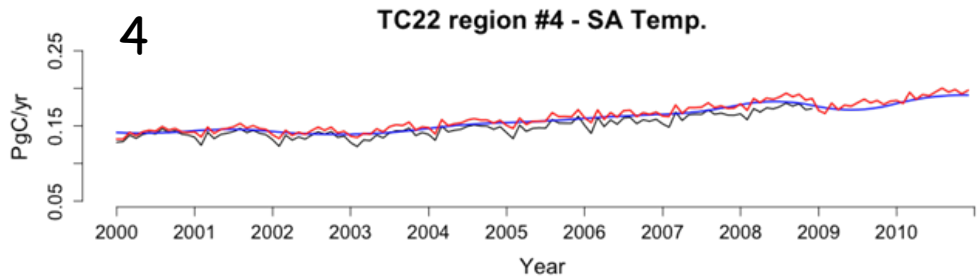
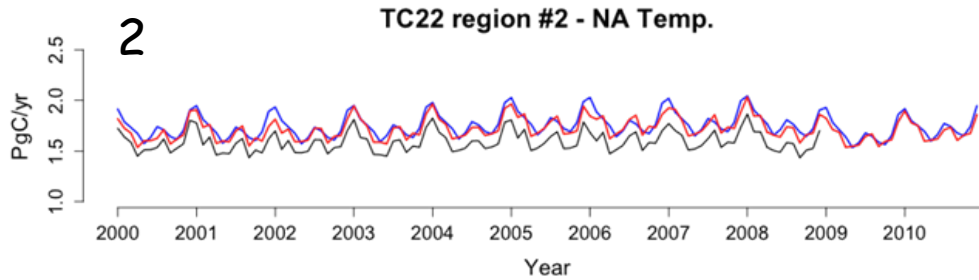
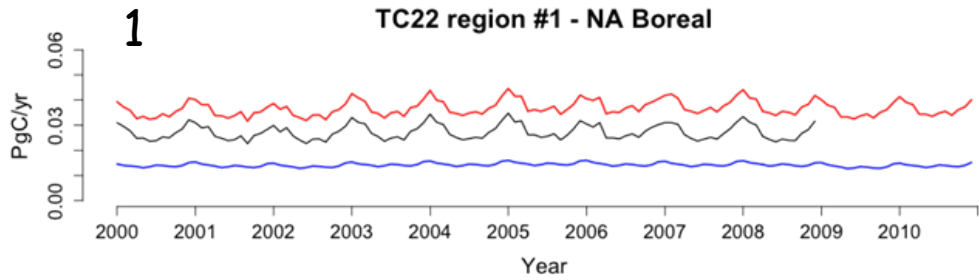


Time series - Global emissions

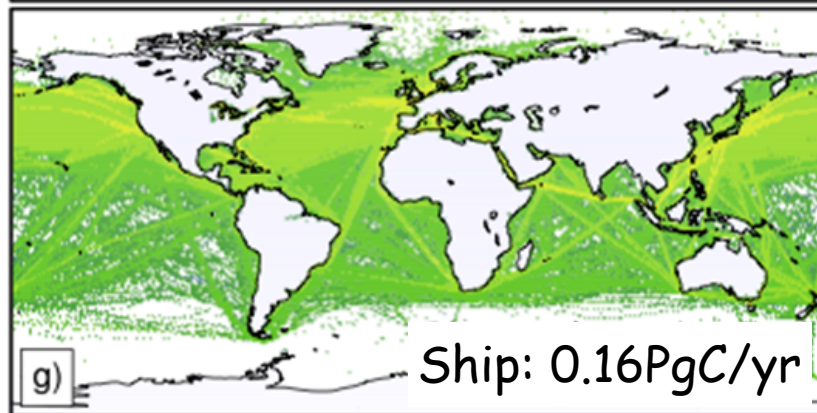
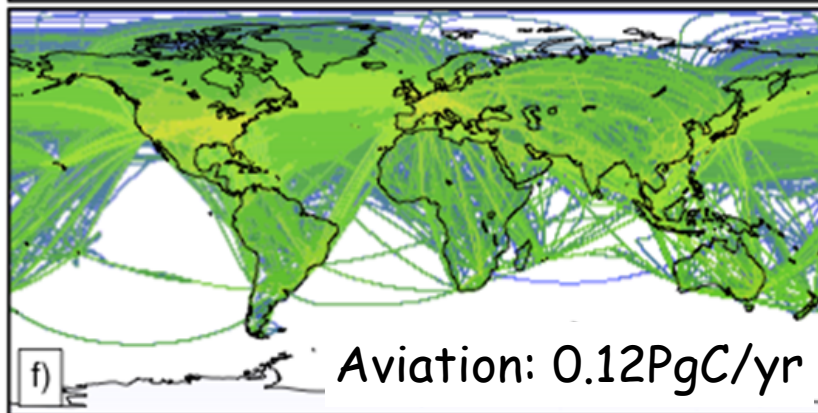
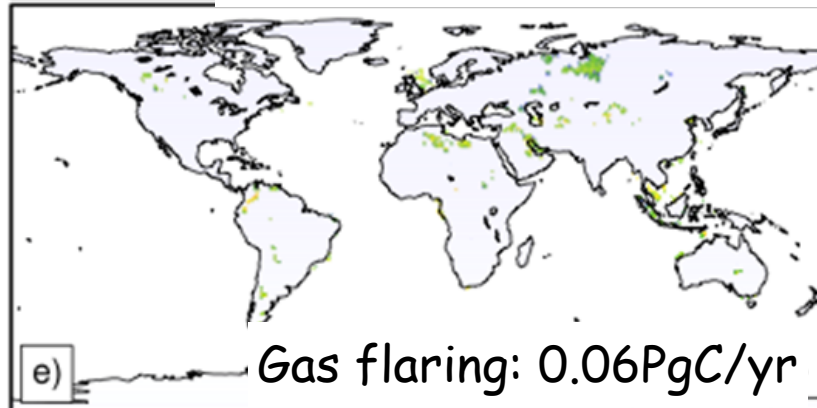
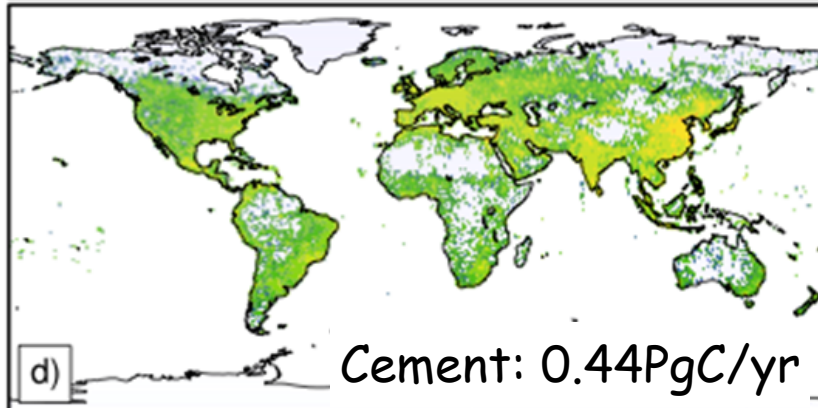
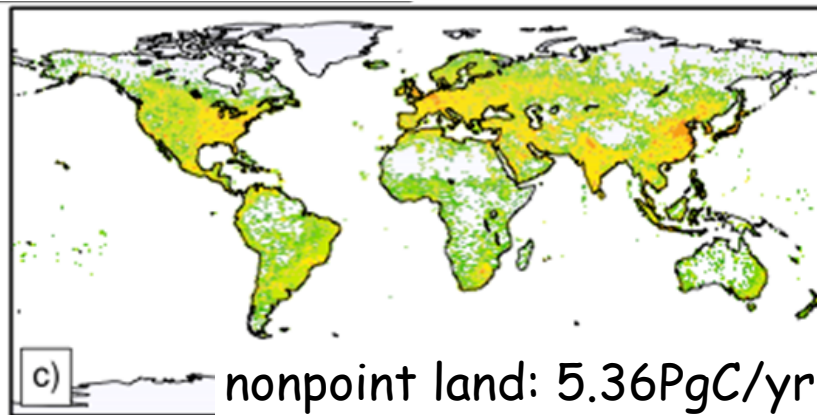
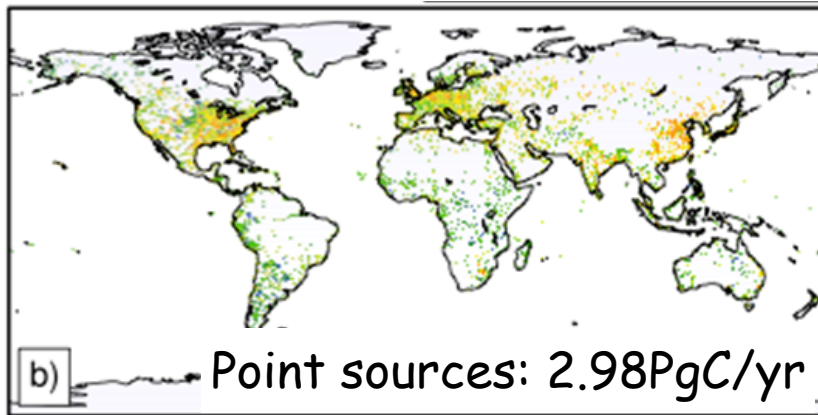


Time series - Major TC land regions

CDIAC Miller ODIAC



What's next?



Nat'l total

Int'l Bunker

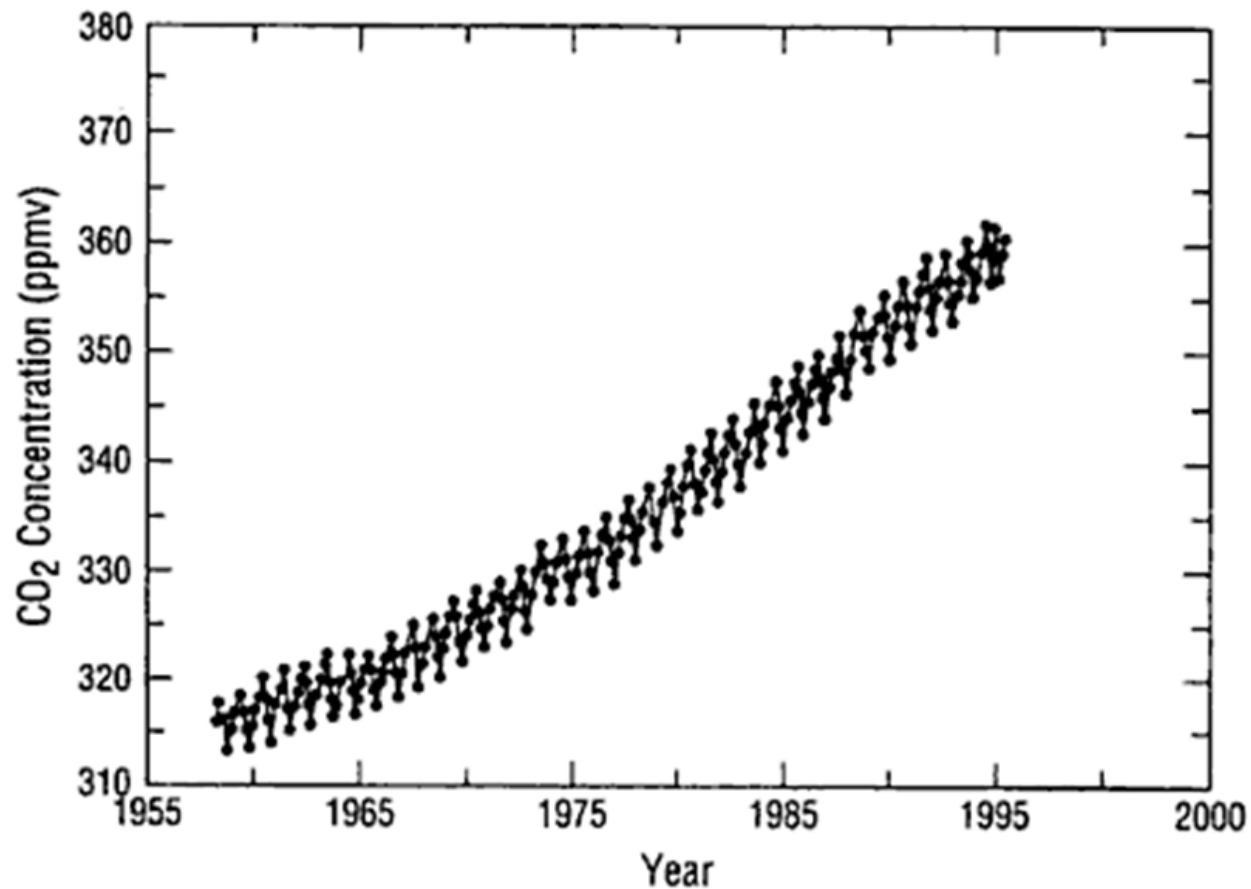


FIGURE 1.2 Monthly atmospheric CO₂ concentrations at Mauna Loa, Hawaii. (Source: ORNL-ODIAC 1995.³)

1.2 THE CO₂ CONCENTRATION BUILDUP

Although there was some observation that the average earth surface temperature rose by 0.25°C between 1880 and 1940, it was not until the 1950s that measure-

