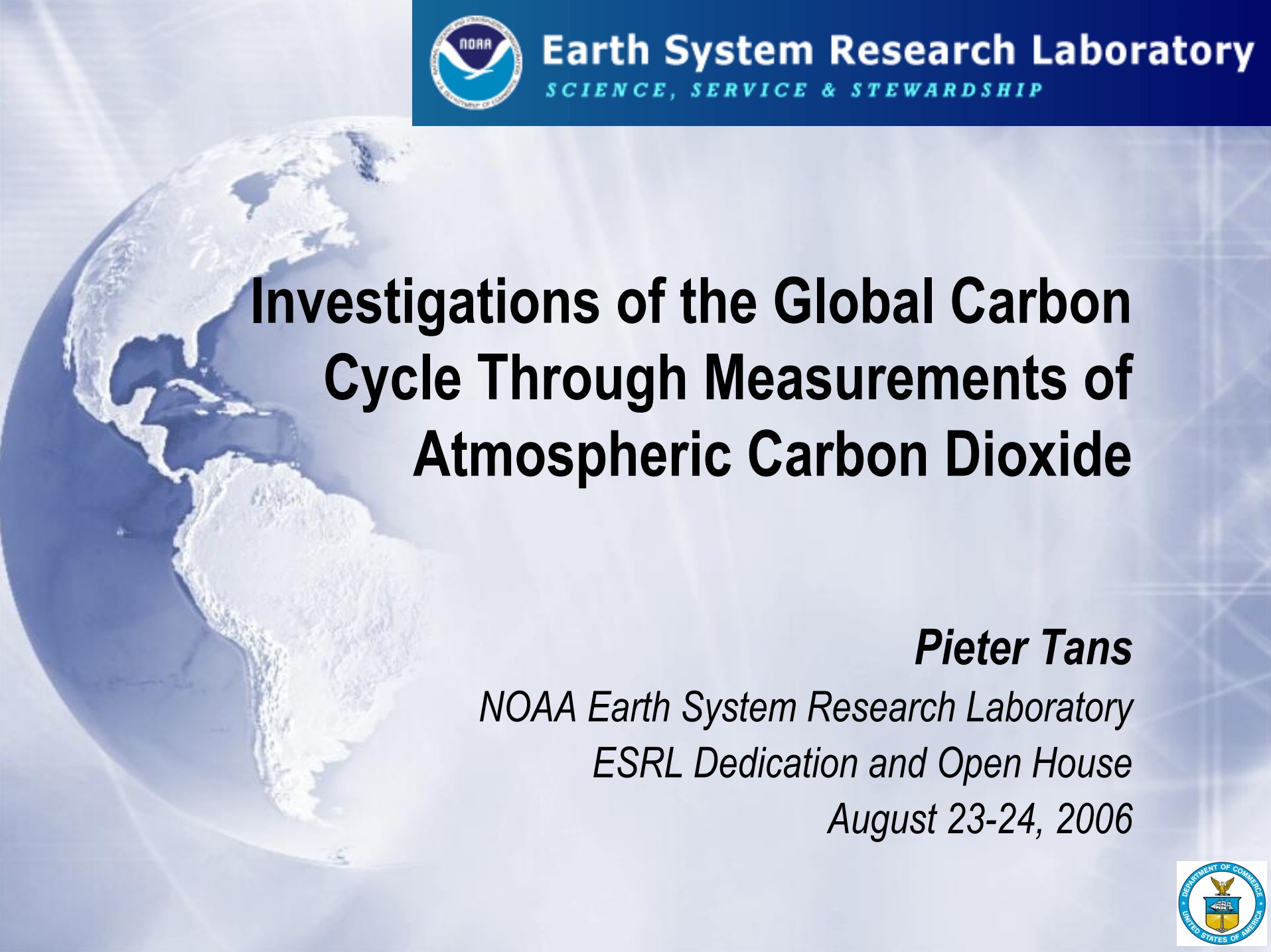


# Investigations of the Global Carbon Cycle Through Measurements of Atmospheric Carbon Dioxide

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*NOAA Earth System Research Laboratory*

*ESRL Dedication and Open House*

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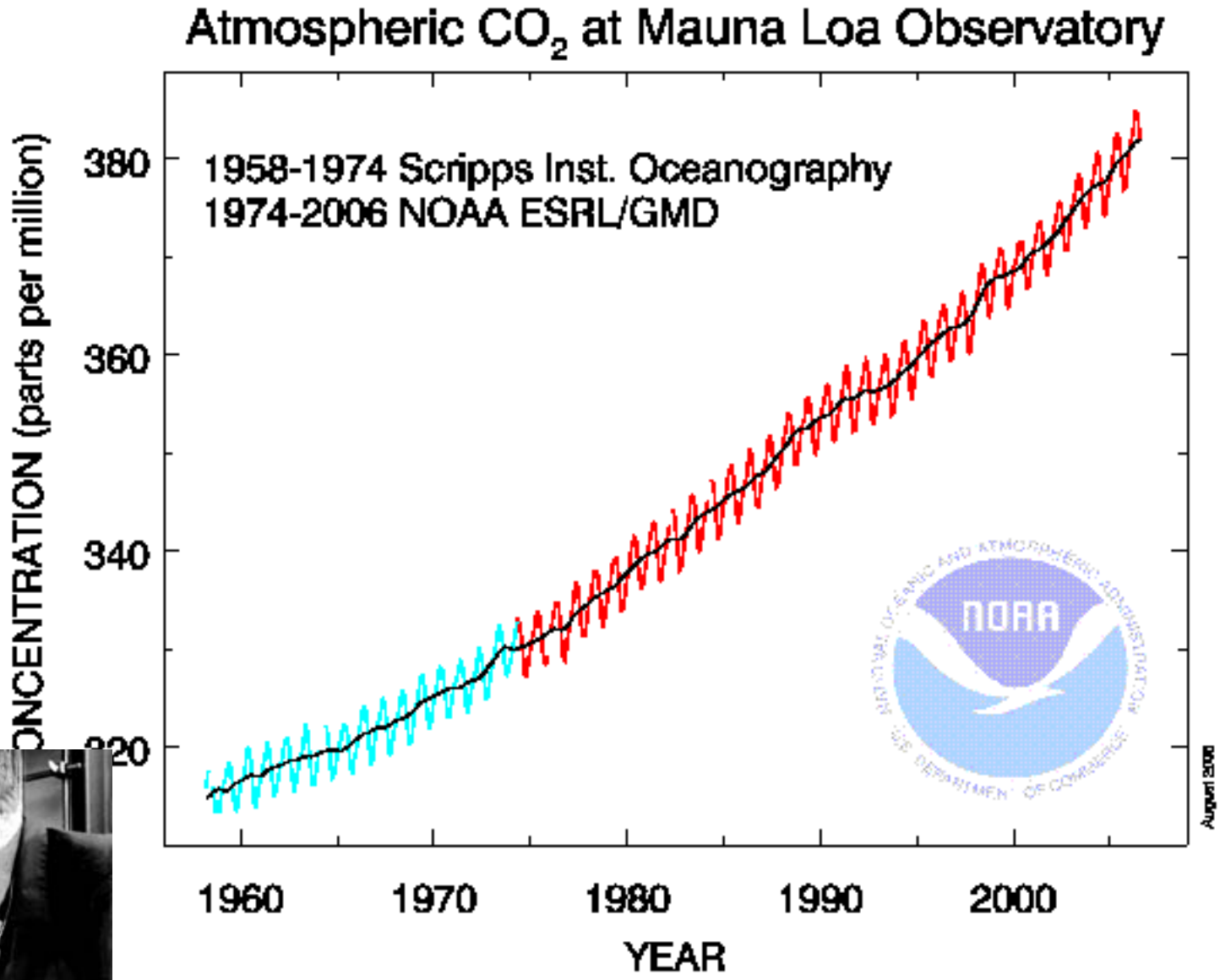
*APRIL* 1896.

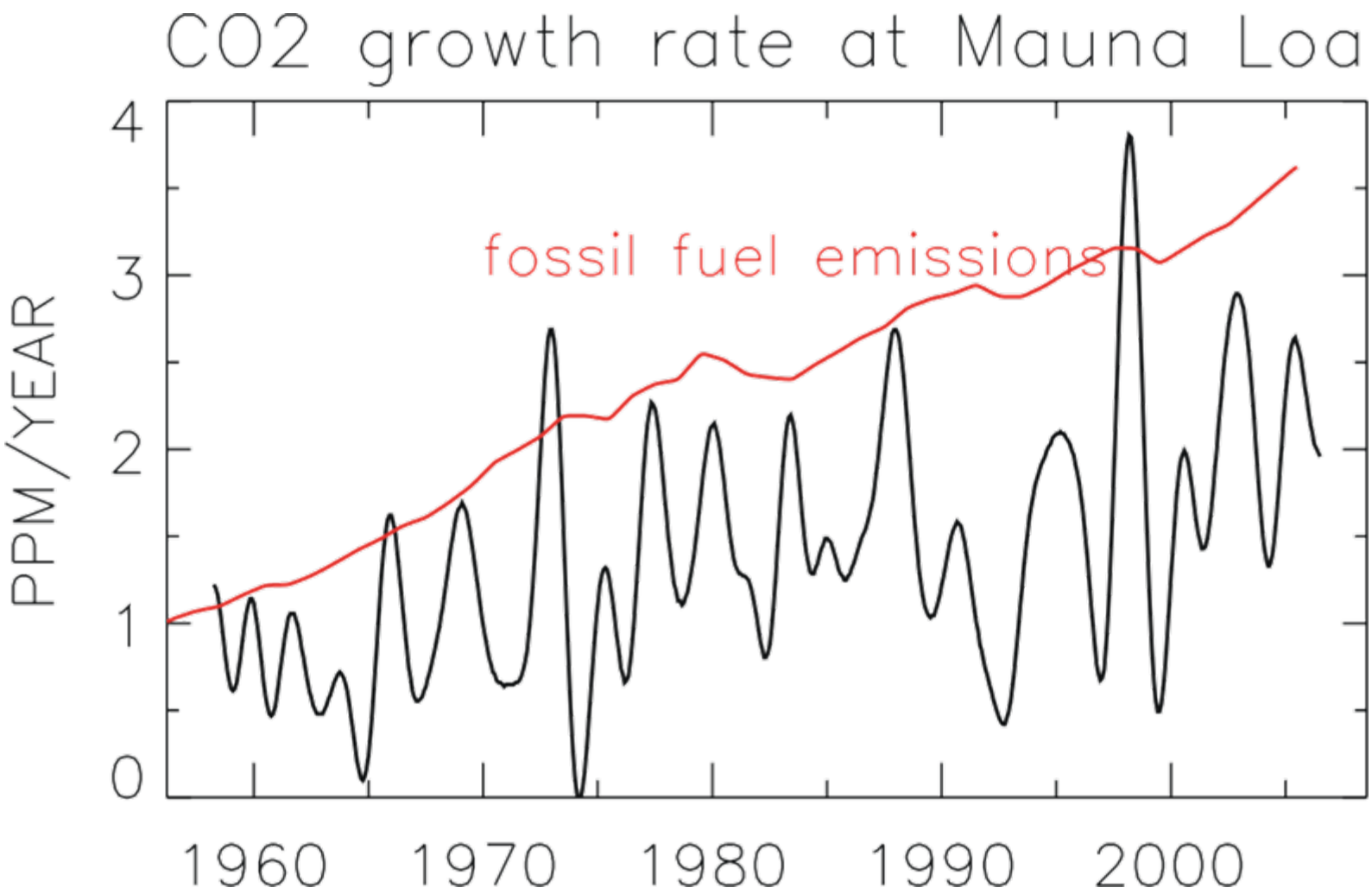

## XXXI. *On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground.* By Prof. SVANTE ARRHENIUS *.

### I. *Introduction : Observations of* Langley *on Atmospherical Absorption.*

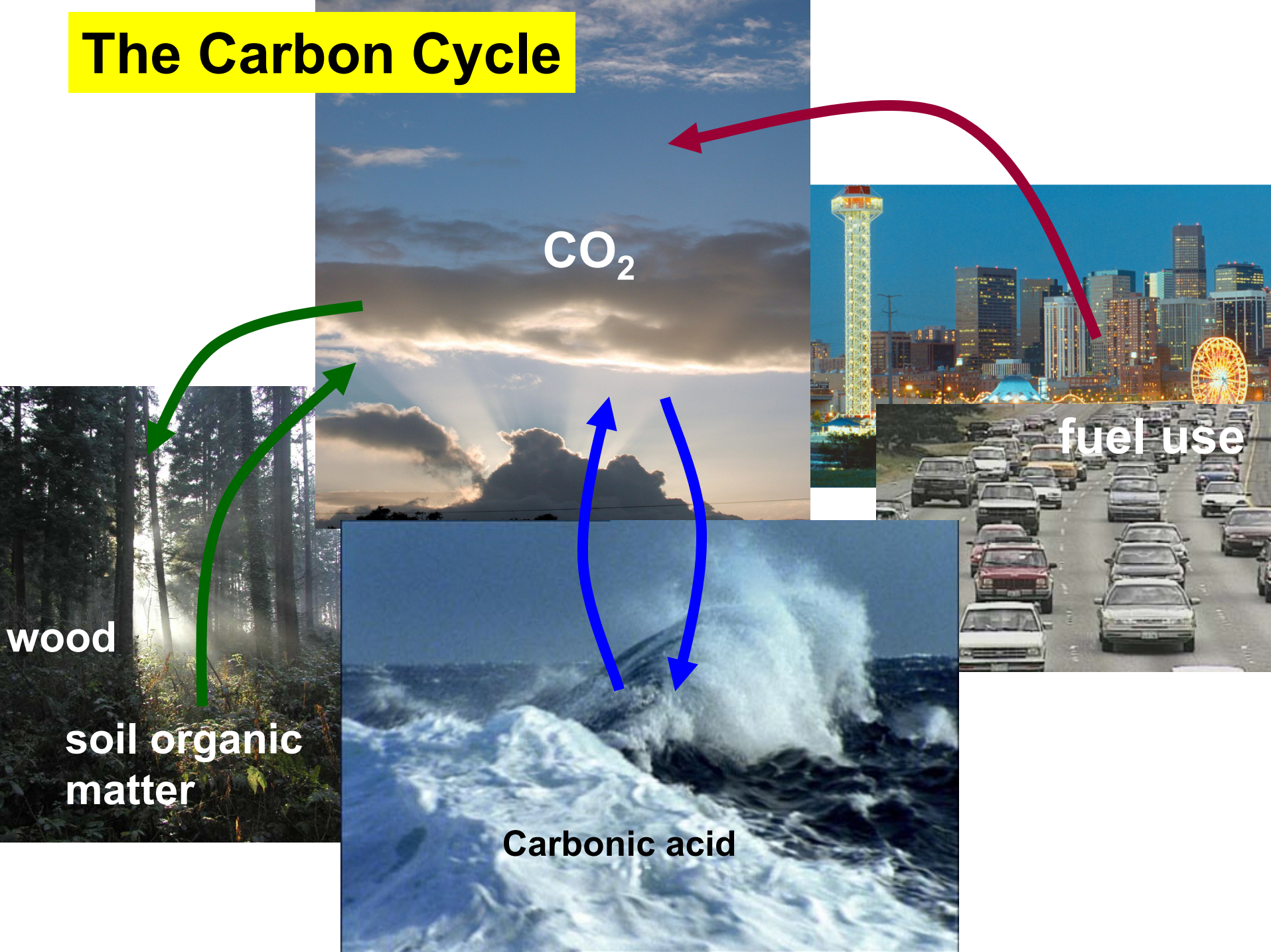
A GREAT deal has been written on the influence of the absorption of the atmosphere upon the climate. Tyndall † in particular has pointed out the enormous importance of this question. To him it was chiefly the diurnal and annual variations of the temperature that were lessened by



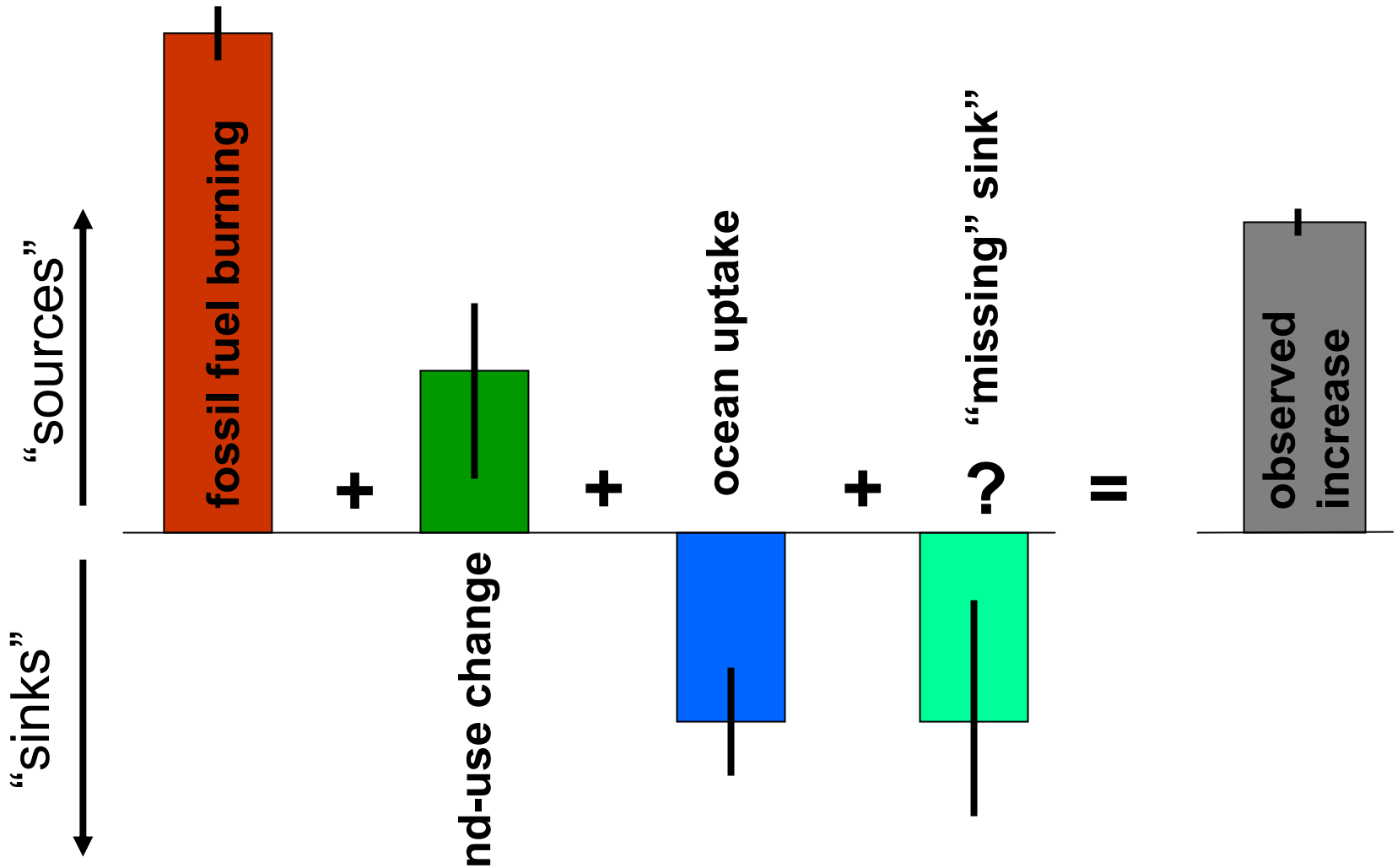

www.cmdl.noaa.gov/ccgg/trends/


CO2 growth rate at Mauna Loa
fossil fuel emissions
PPM/YEAR
4
3
2
1
0
1960
1970
1980
1990
2000

# The Carbon Cycle



# Carbon “budget” of the 1980s decade



# Annual mean concentration relative to South Pole

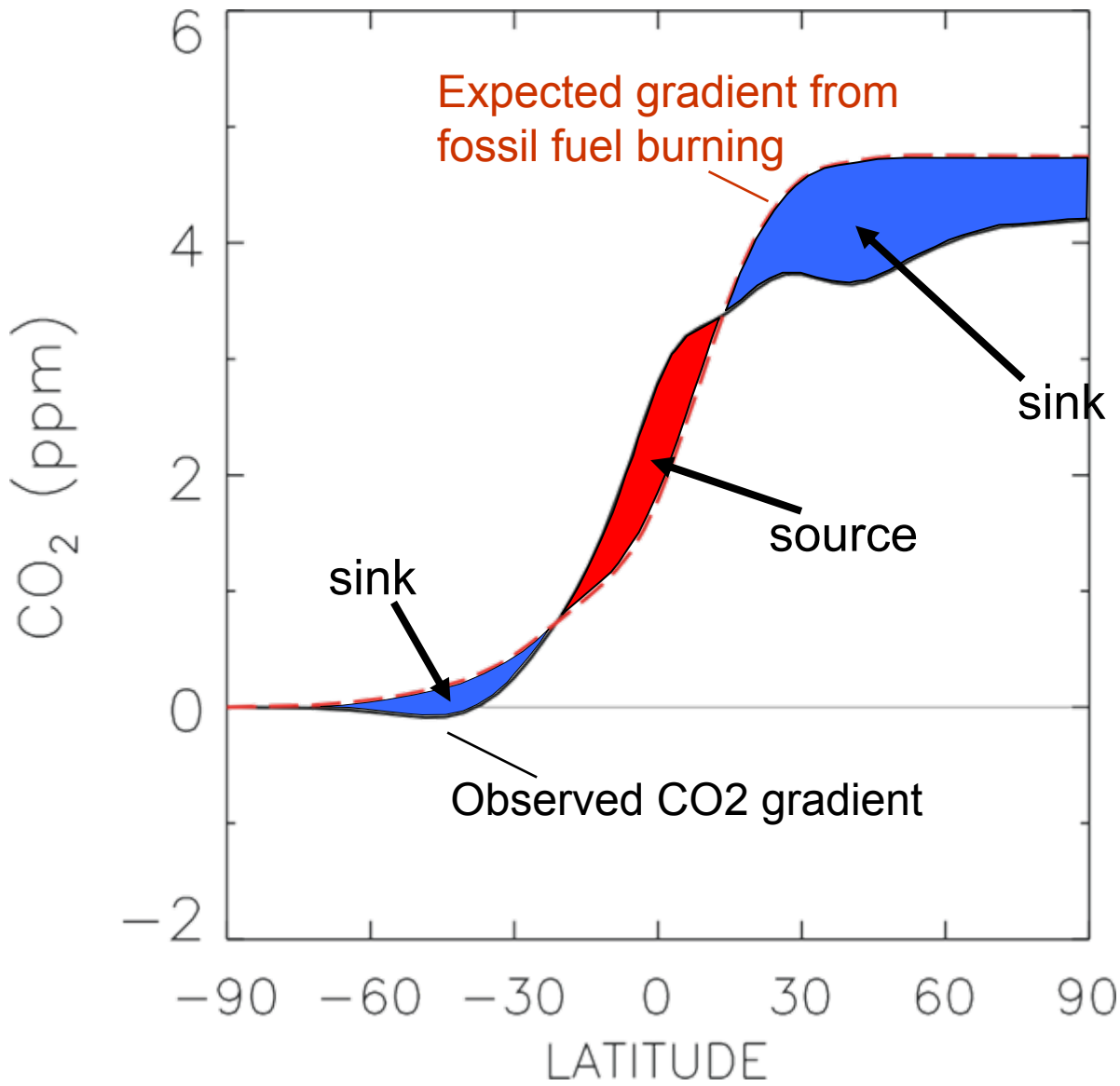
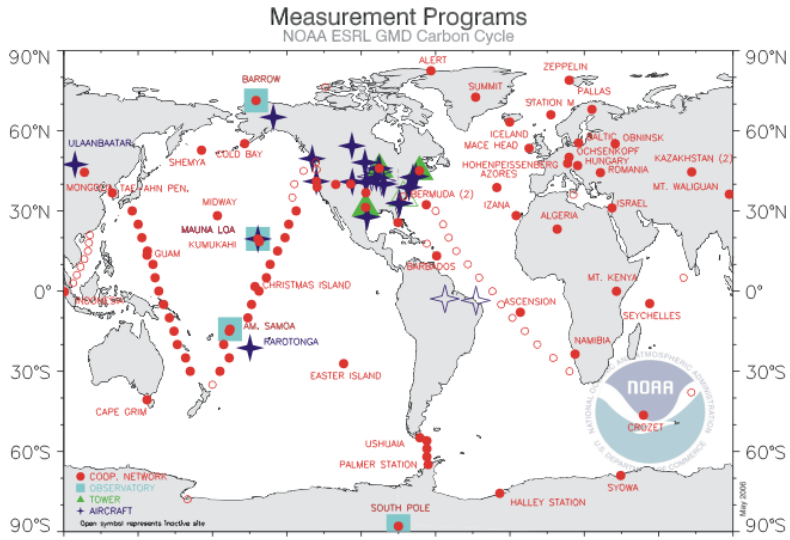


Photo: Mark Losleben, U. of Colorado

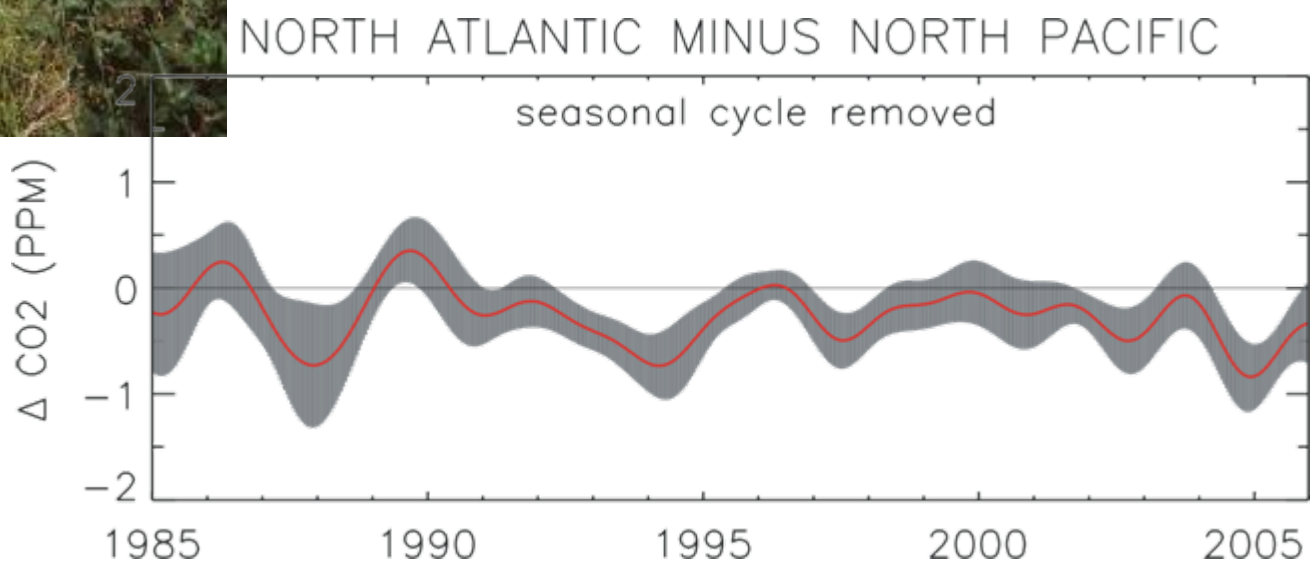
ESRL started sampling at Niwot Ridge, Colorado, (altitude 3,523 m) in January 1968. Since that time, a global cooperative observing network was built.



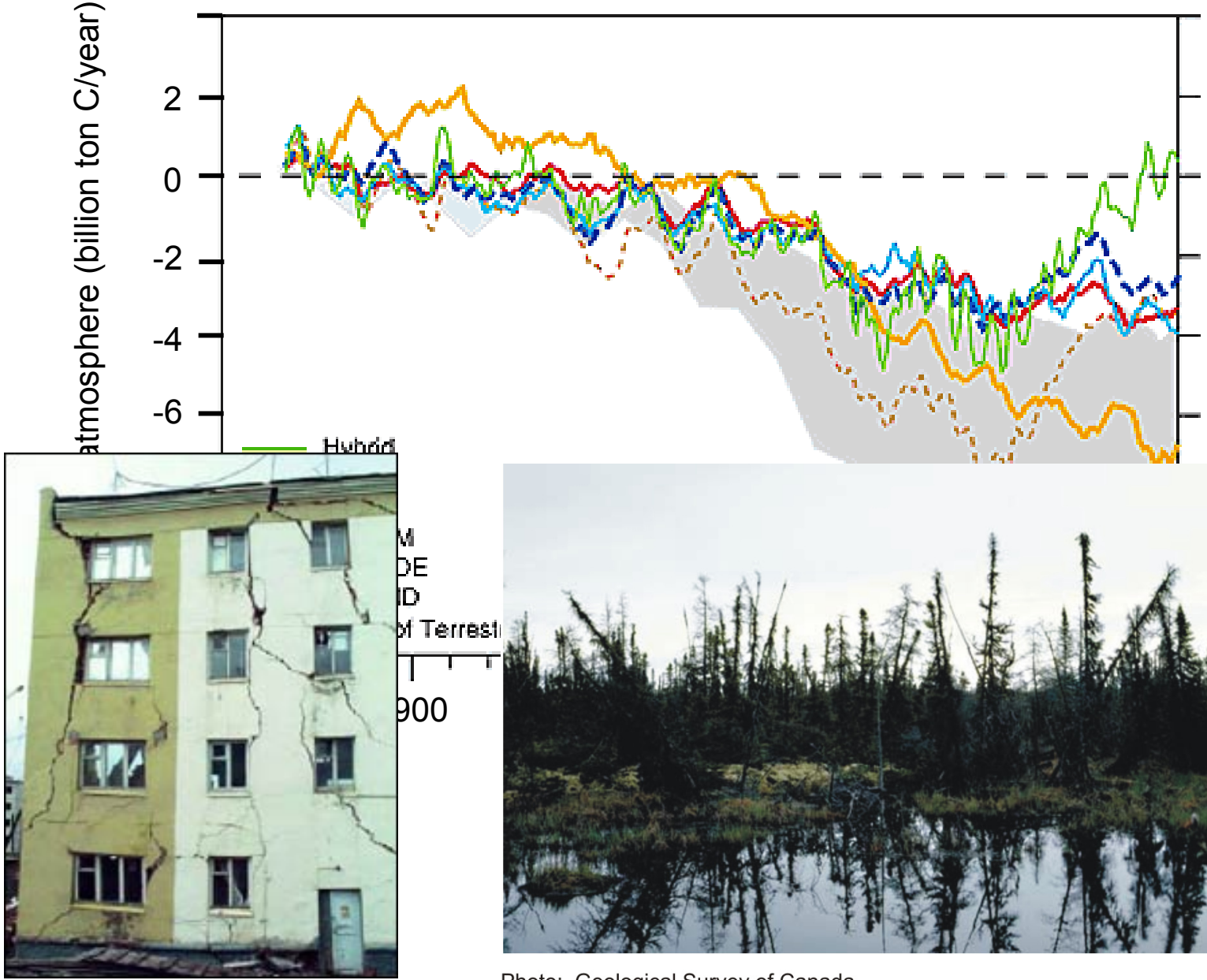
Portable Air Sampler at Work in Kazakhstan

Franklin-Parker Reserve, Pine Barrens, NJ

Is the CO2 concentration downwind of North America lower than it is upwind?

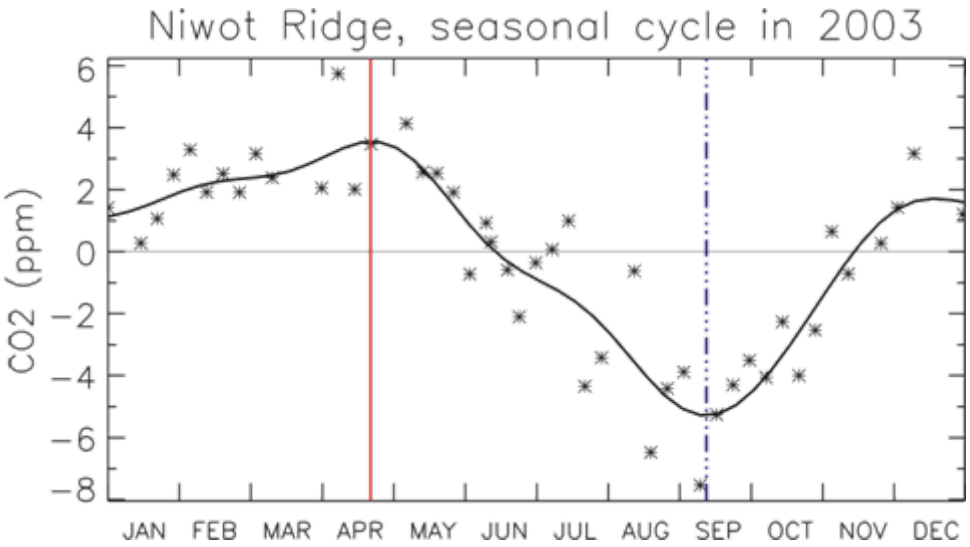


## Terrestrial carbon cycle model projections

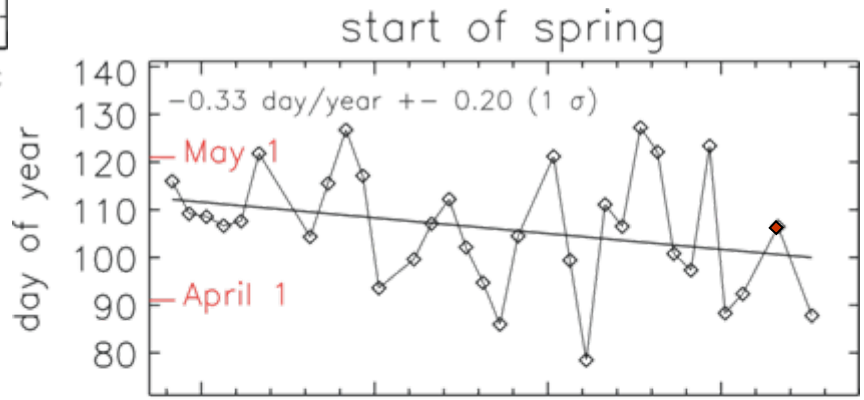


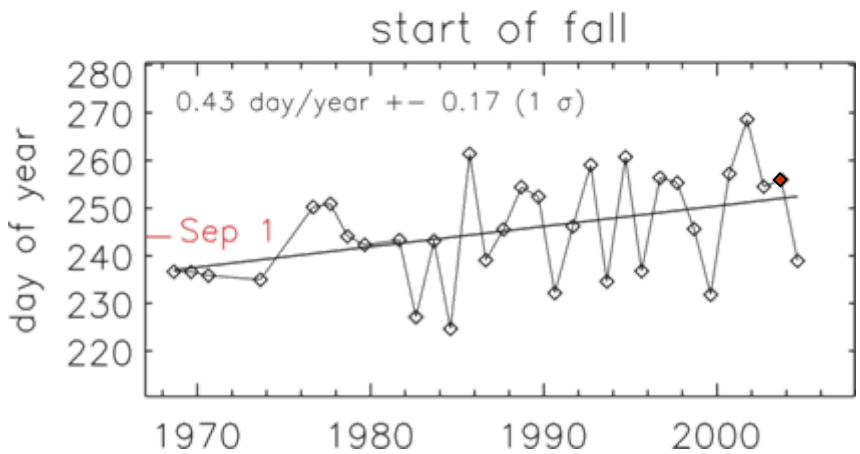

CC, 2001

Photo: Geological Survey of Canada

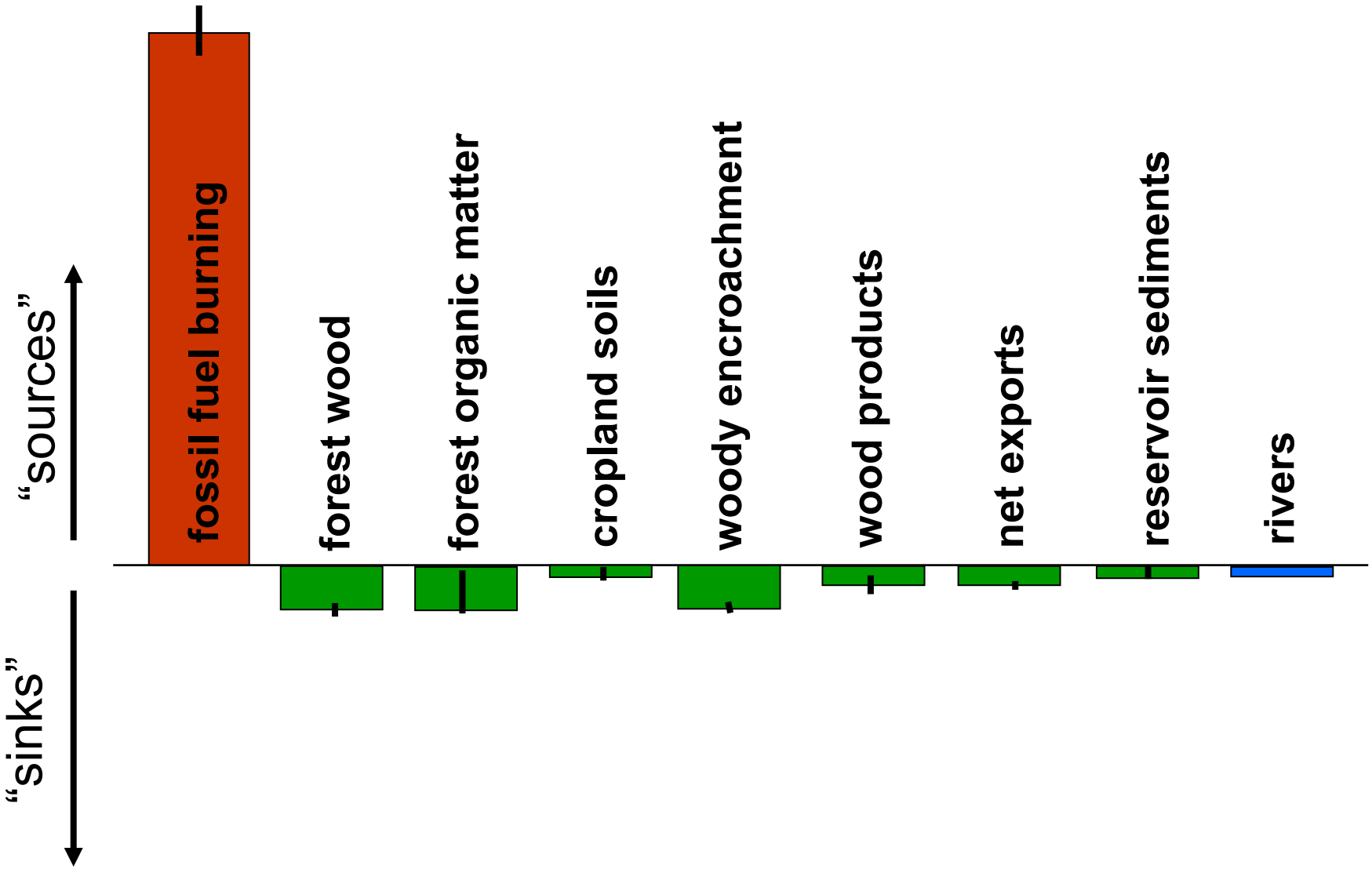



The CO2 data in Colorado suggest that from the late 1960s to today the spring is starting earlier, while the fall commences later in the year.



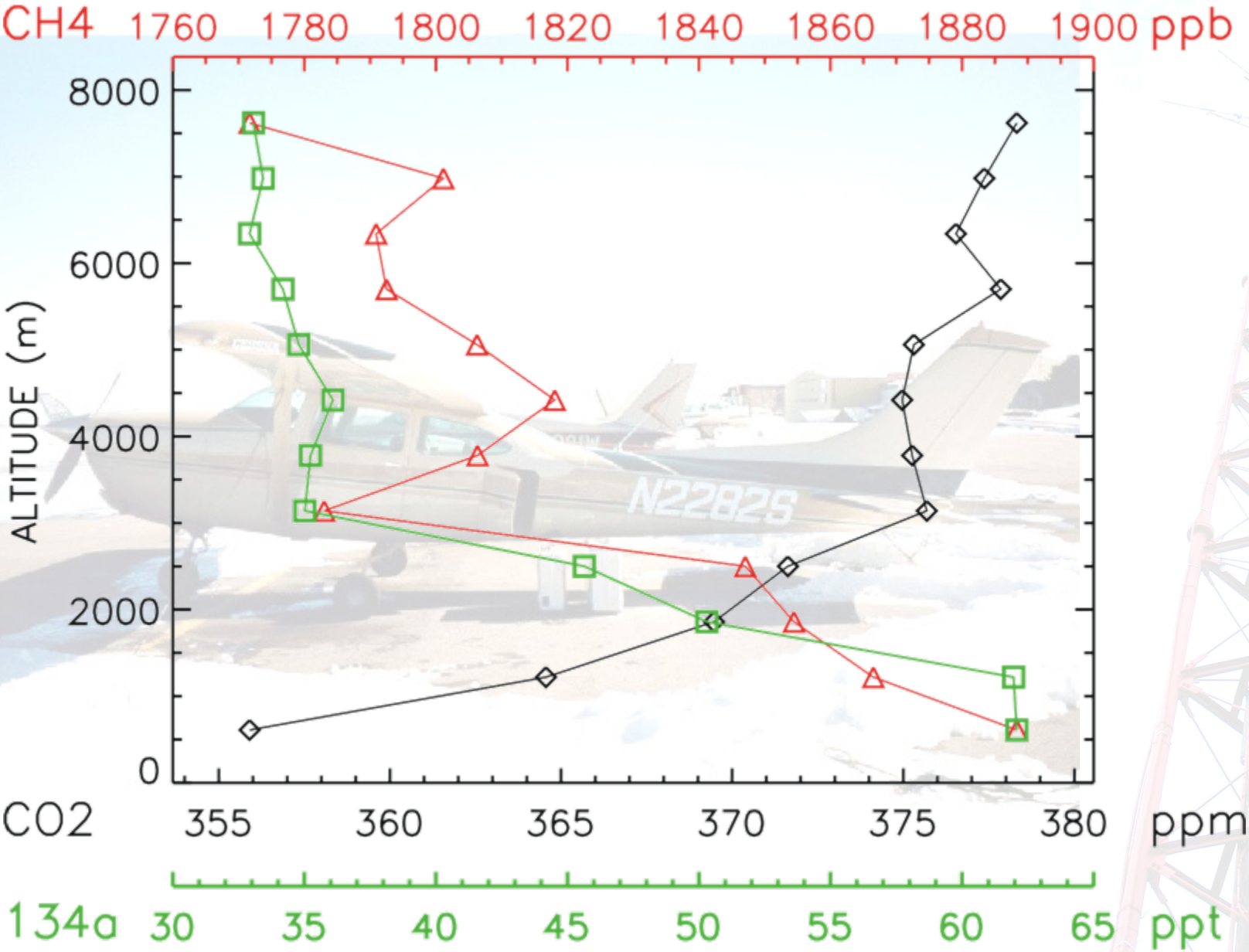



# Tentative carbon “budget” for the U.S.




Source: Pacala et al., Science (2001)

# Oglesby, IL, 9 August 2005



# Take-Home Messages

- Carbon dioxide is a major concern for future climate change
- It is likely that atmospheric carbon dioxide levels will be more than twice their pre-industrial value by the end of this century
- NOAA/ESRL is a world-leader in carbon dioxide monitoring and research
- The NOAA/ESRL North American Carbon Cycle Observing System will be capable of:
  - monitoring regional carbon dioxide uptake and emission in the U.S.
  - providing U.S. regional information for managing carbon, for example, sequestration or carbon credit verification
  - serving as a prototype for other regions/countries who wish to monitor their carbon footprint