Climate
Agreement and Disagreement?

Harrison H. Schmitt

NASA Glenn
Cleveland OH
October 26, 2009

General Agreement: Temperature

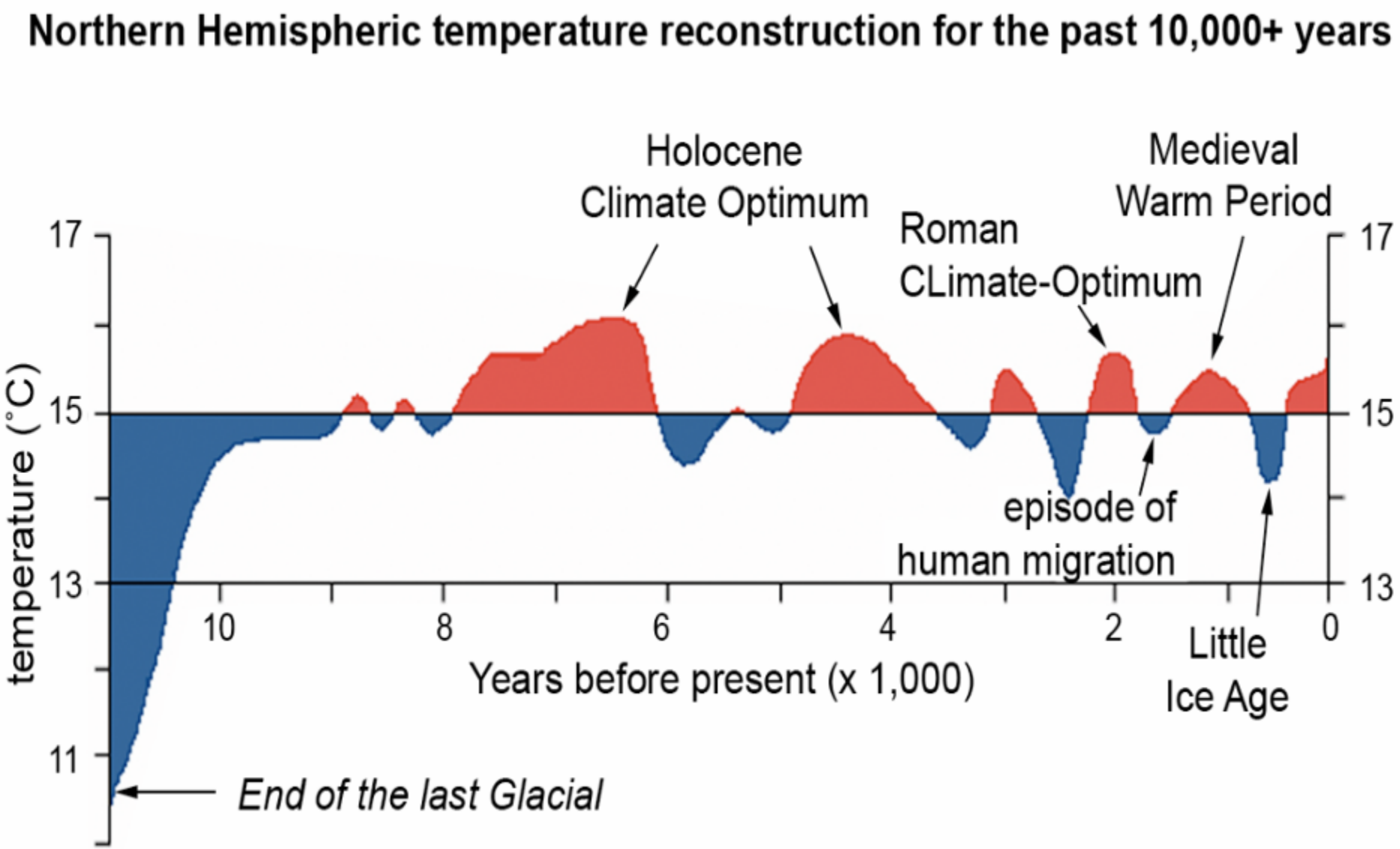
Climate is Extraordinarily Complex
- Weather Trends Superposed on:
  - Earth Rotation and Orientation
  - Oceans
  - Orbital Position and Orientation
  - Plate Tectonics

~1/2 Degree Warming/100 years since ~1660

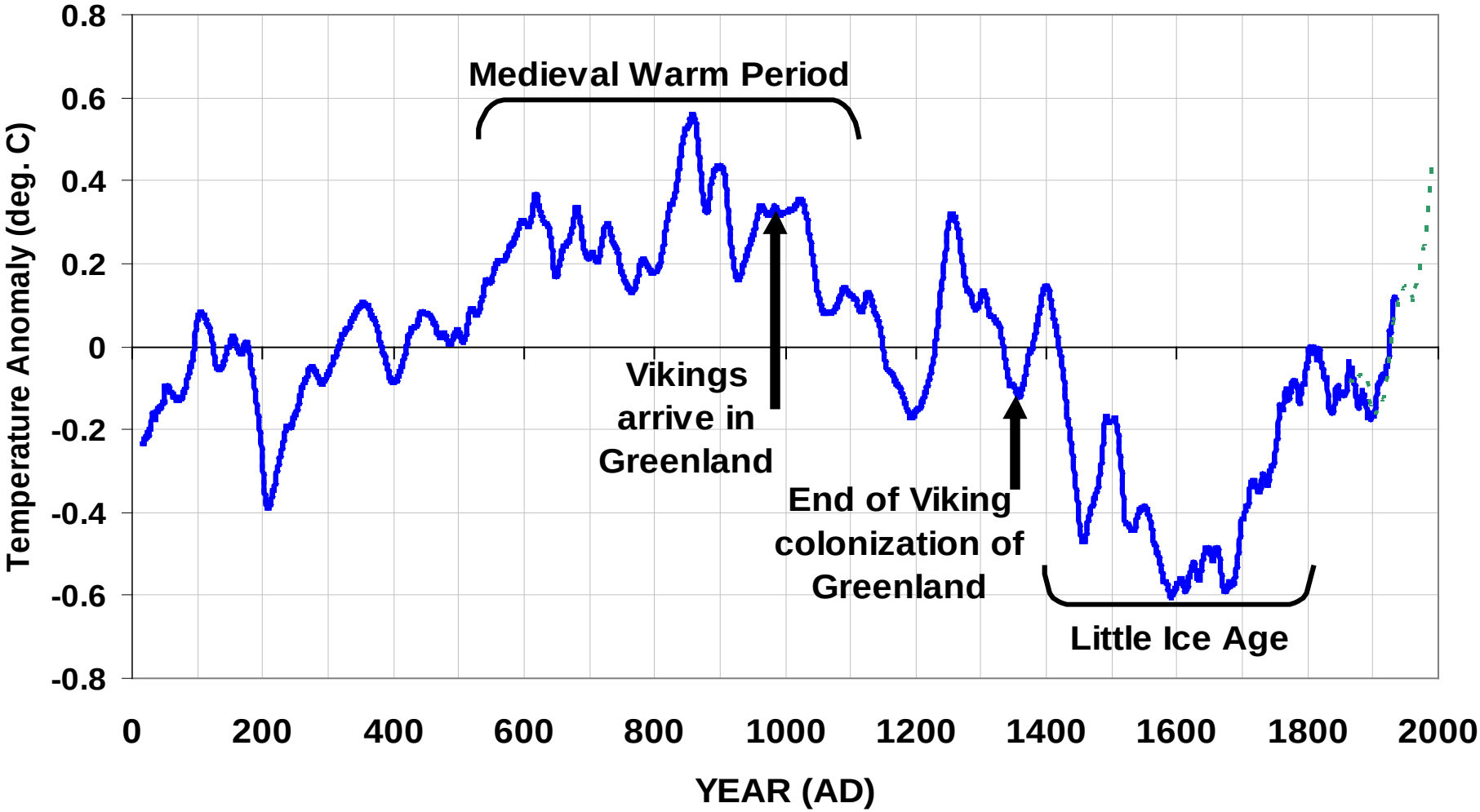
Cooling Decades follow Warming Decades

Surface Temperature Averaged ~22º C for 600 MY
- Interrupted by ~10º C Drops Every ~150 MY
- CO_2 Drop from ~7000 to ~300ppm by ~300 MY Ago

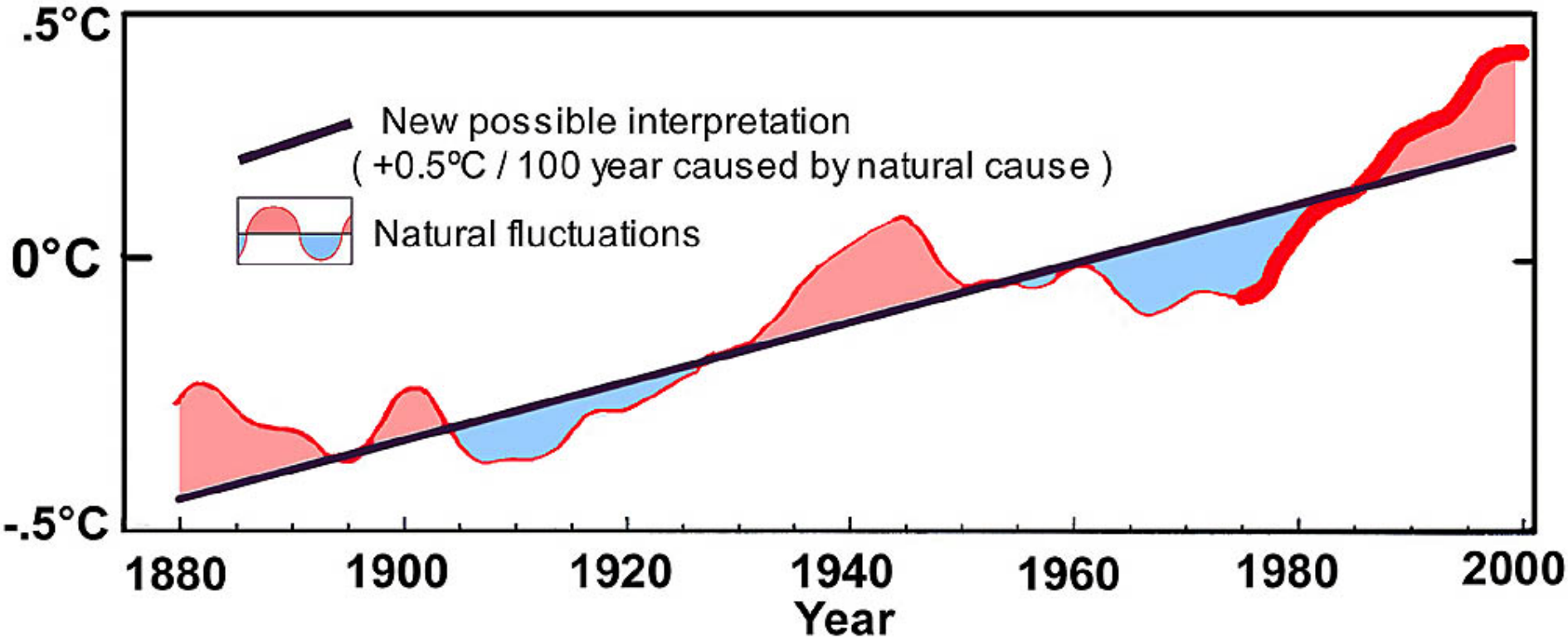
Climate swings of past 12,000 years



Last 2000 Years of Global Temperature



Modern Global Temperture Fluctuations



General Agreement: Greenhouse Effect

~33º C Normal Aggregate Contribution to Average

CO_2 Second Highest Effect

CO_2 Effect Decreases with Increasing Concentration

How Much??

General Agreement: Carbon Dioxide

Essential to Life

Most in Atmosphere and Upper Oceans from Fossil Fuels

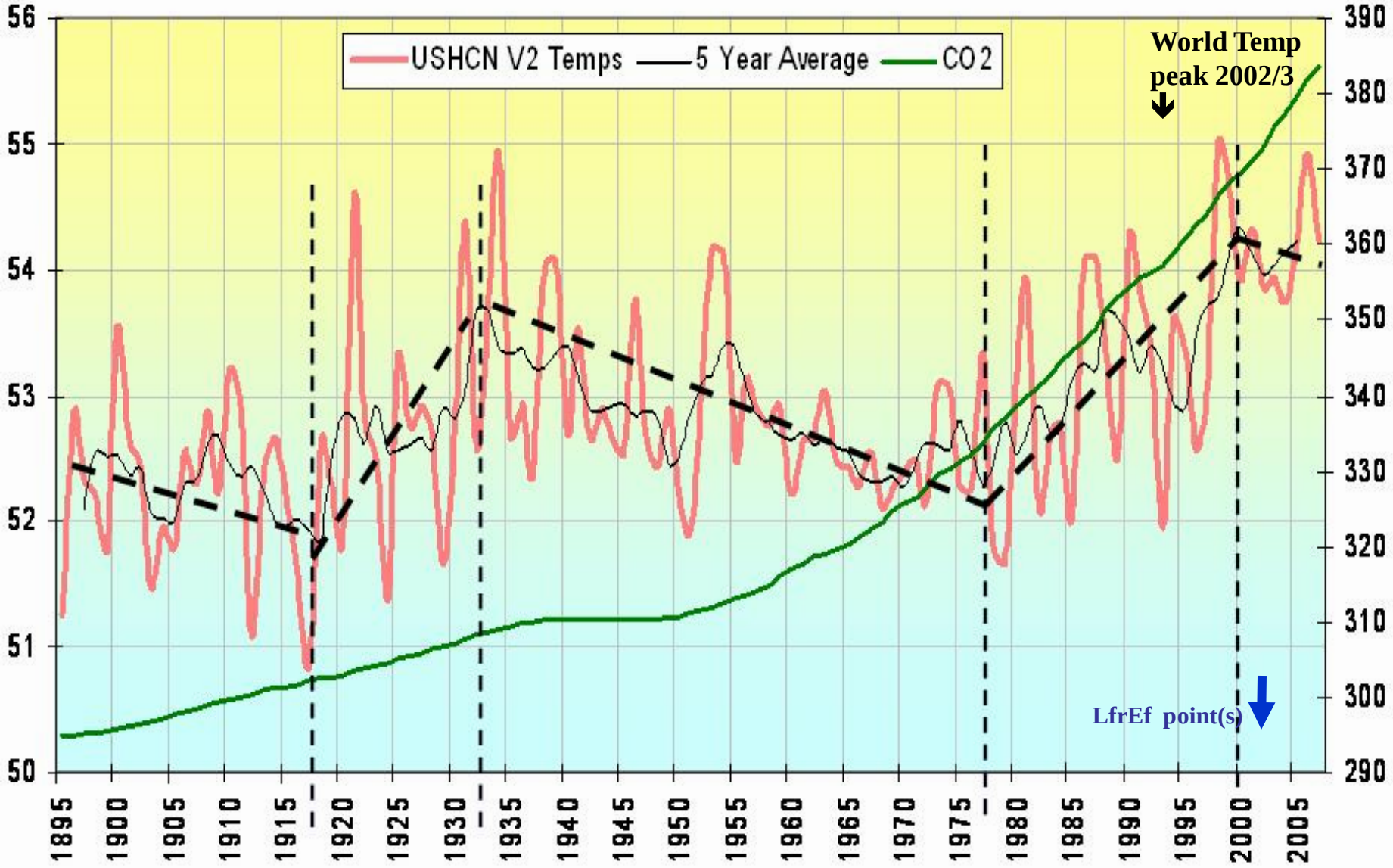
Rise from 295 to 385ppm since 1900

Linear Rise Continuous during Cooling Decades: 1940-80 and 1998-Present

Low Resolution Ice Core Shows Correlation between T and CO_2

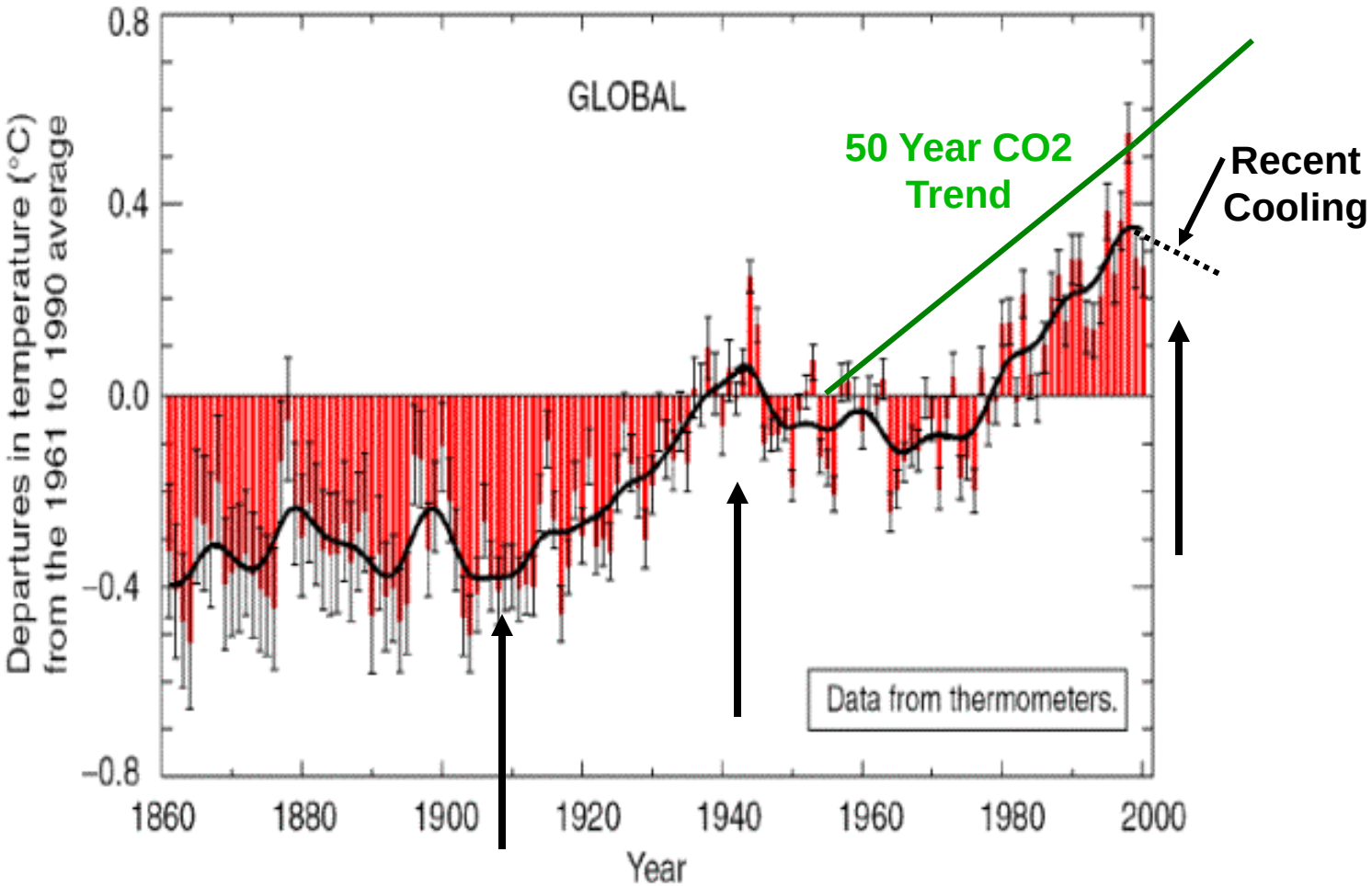
High Resolution Ice Core Shows CO_2 Lag of Several 100s of years After T Rise

Temperatures (USA) & CO2 1895 to 2008



- Official data - Graph by JD'Aleo Sept 2008 Circulated by Piers Corbyn www.weatheraction.com

CO2 Can't Explain Pre-1940 Warming or Post-1940 and Post-1998 Cooling



General Agreement: Oceans

Drastically Modify Weather and Climate

- Stored Solar Heat
- Current Dynamics
- Oscillatory Changes

~50 Times More CO_2 than Atmosphere

General Agreement: Solar Effects

Earth's Axis and Orbit vs. Solar Ecliptic

- **Seasons**
- **Global Ice Ages**

500 year Little Ice Age: 3 sunspot minima

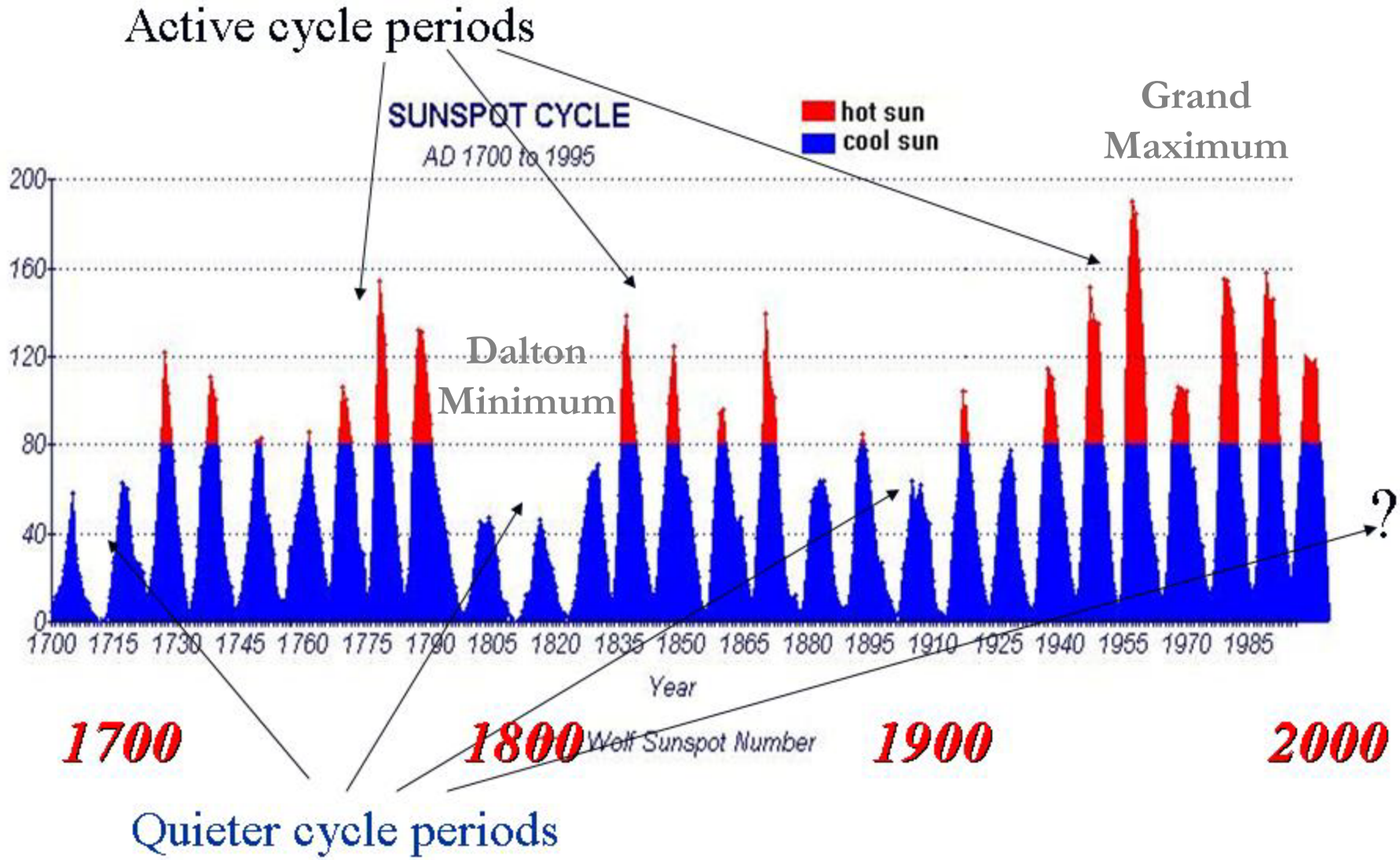
Natural Records in Tree Rings, Cave Deposits, etc.

Solar Magnetic Field Intensity Varies with Sunspot Activity

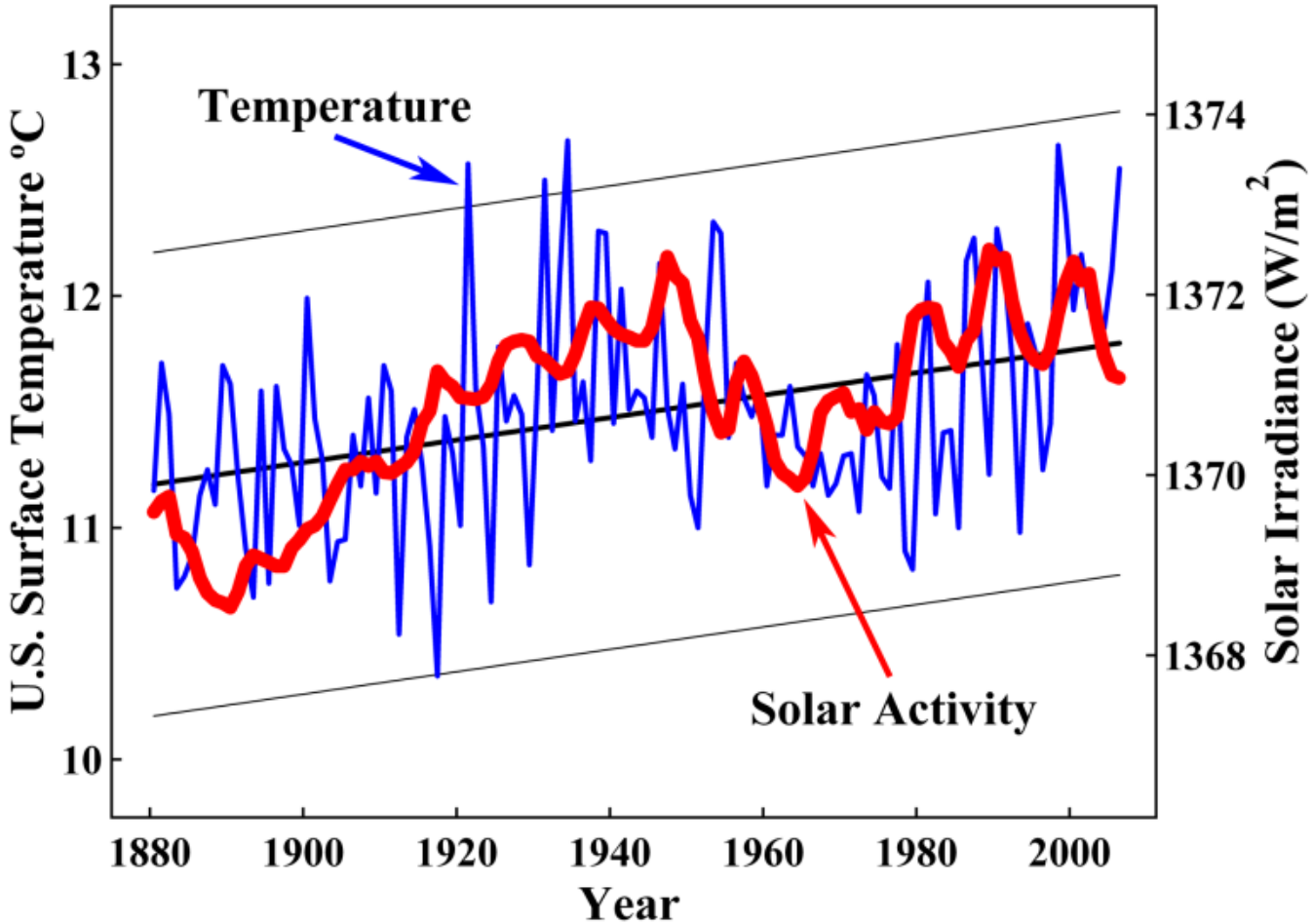
Cosmic Ray Flux in Atmosphere Varies with Solar Magnetic Field Intensity

Cosmic Ray Ionized Gases Nucleate Water Particles in Atmosphere

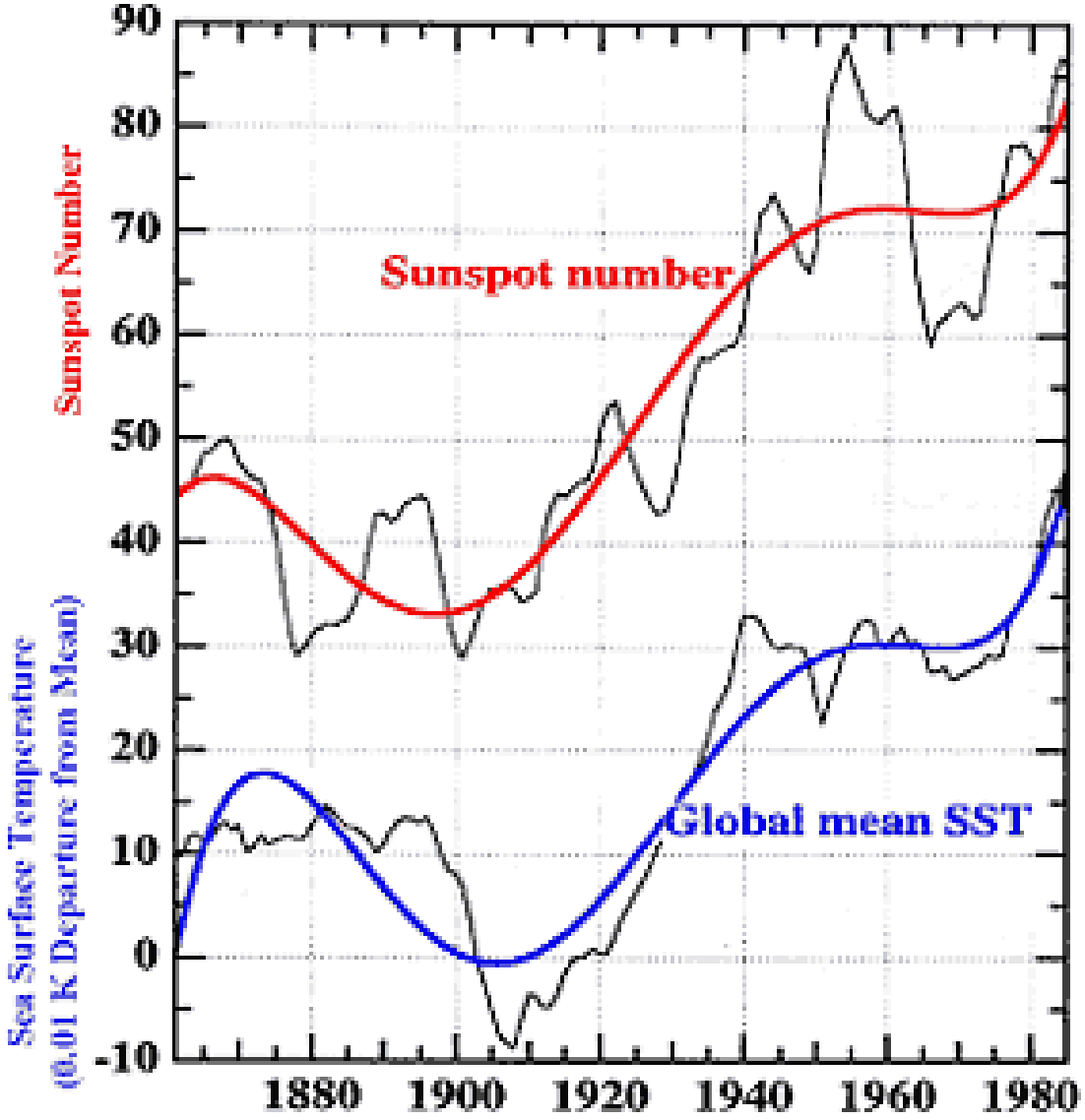
11 year solar cycles vary in their strength on a longer term on cycles of 22, 53, 88, 106, 213, 429, etc. years

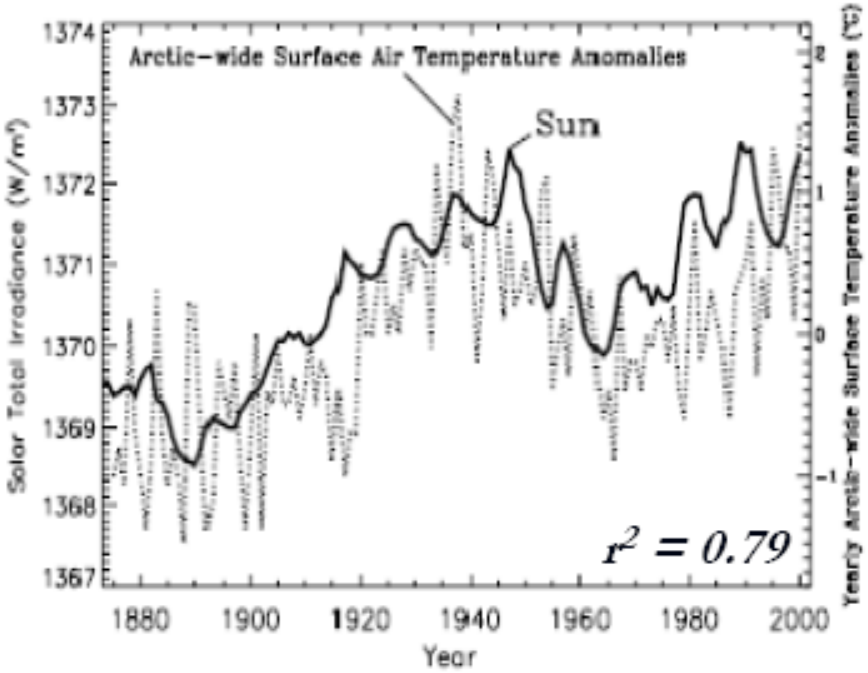


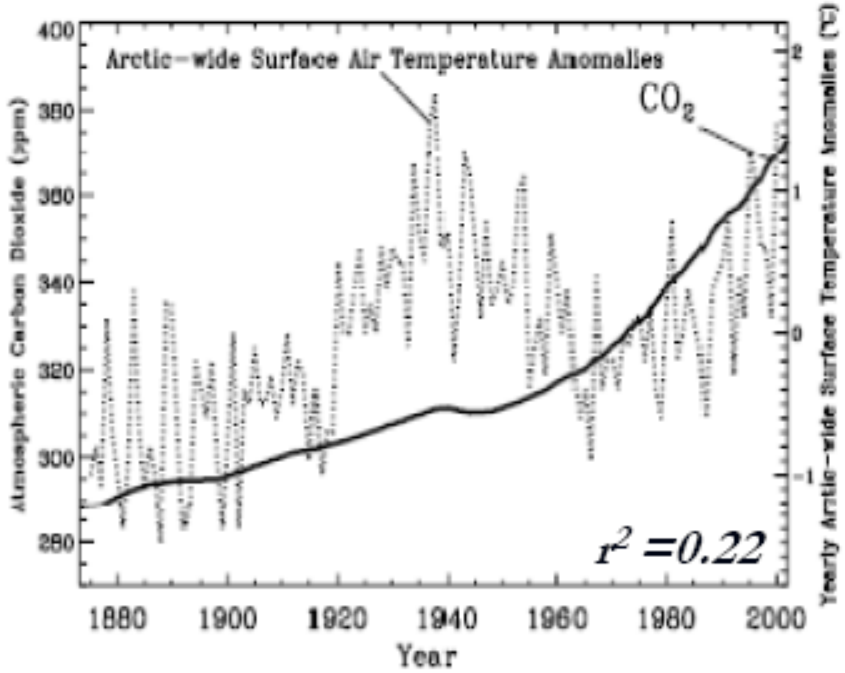
U.S. Temperature Fluctuations Correlate with Solar Changes



Solar Variations Link to Decade-later Changes in Sea Surface Temperatures







Arctic Annual Mean Temperatures vs Solar Irradiance

(Soon GRL 2005)

Sunspot correlation—79%
CO2 correlation—22%

Fit is much better of solar irradiance with <u>arctic</u> temperatures (Polyokov) than with CO^2

Disagreement: Temperature

Global Trends

a. Nothing Unnatural vs.

b. Increase Accelerating Due to Humans

Measurement

a. Biased Observational Data vs.

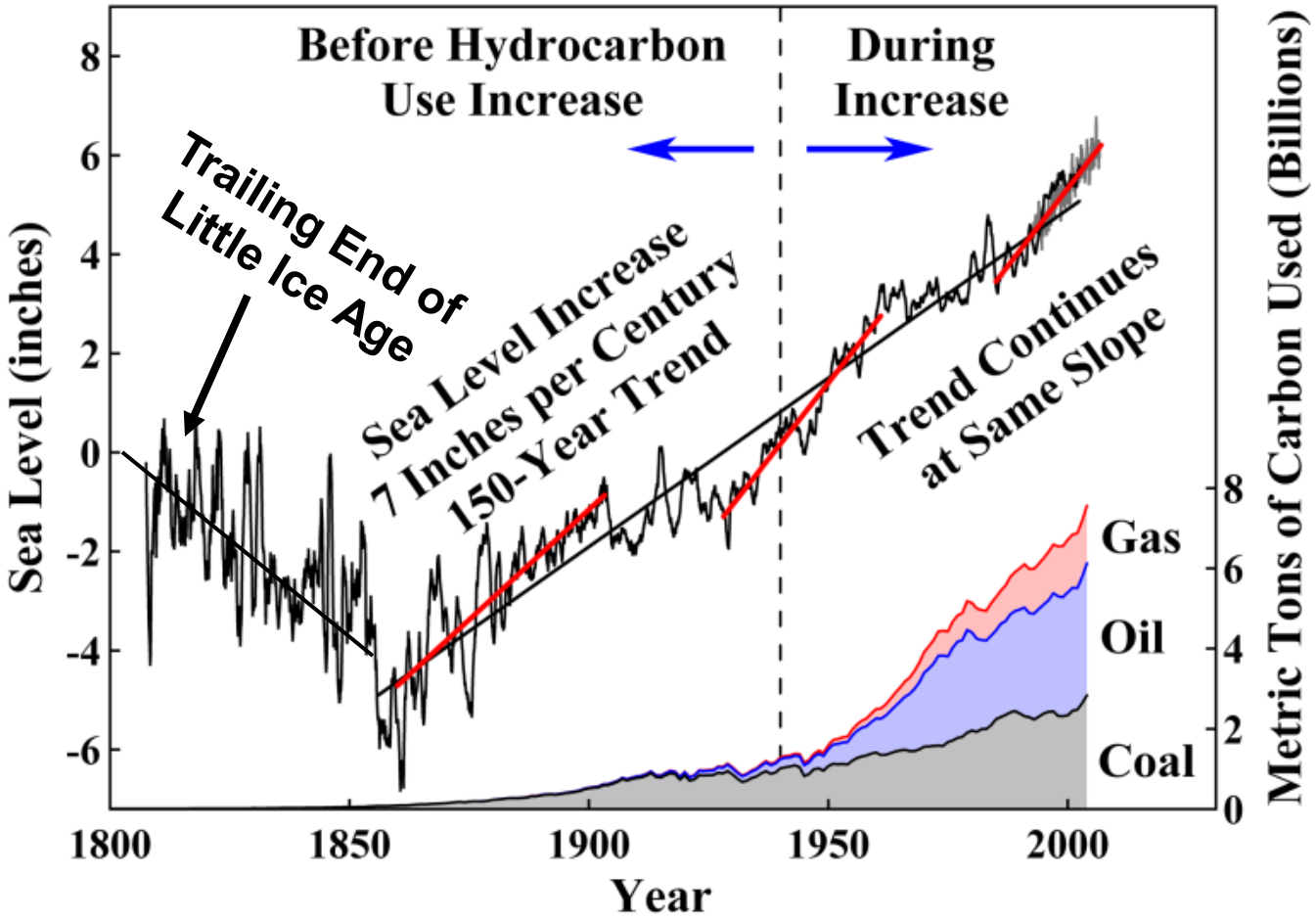
b. Data Good Enough

Short-term changes

a. Will reverse as in Past vs.

b. Evidence of Irreversible Human Effect

Sea Level Rise reflects recovery from Little Ice Age: Unaffected by hydrocarbon use



Rise lags temperature by 20 years: Thermal expansion and other factors

Disagreement: Greenhouse Effect

Carbon Dioxide Effect

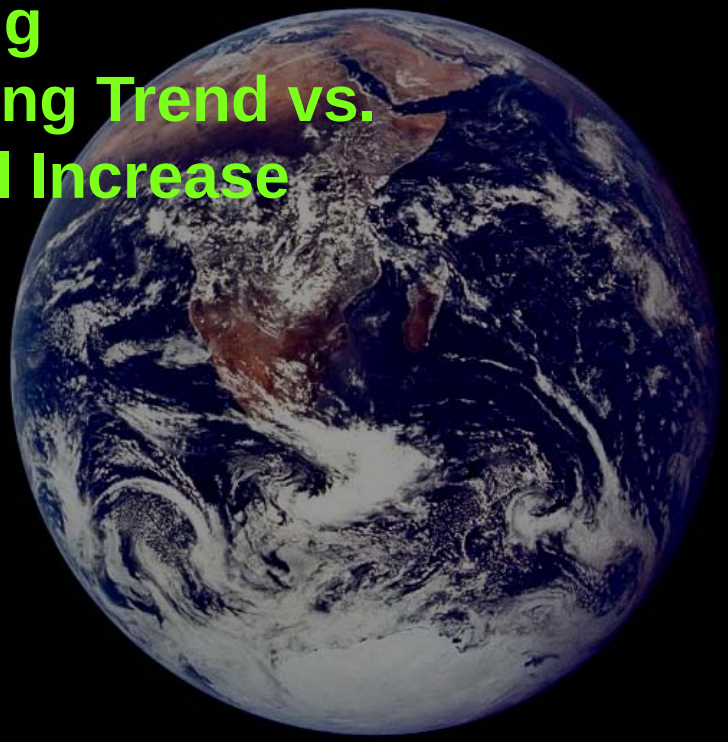
a. 20X Less than Water vs.

b. Drives Global Climate Change

Carbon Dioxide Radiative Forcing

a. No Evidence of Increasing Trend vs.

b. Models Show Trend Will Increase



Disagreement: Carbon Dioxide

Atmosphere-Ocean Exchange (50 parts stay in ocean)

a. 5-10 years vs.

b. 100-200 years or more

Release from Oceans Due to Natural Warming

a. How Much Would 1.75^{o} C Warming Give? vs.

b. Fossil Fuel Release Predominates.

Increased Radiative Forcing

a. 1% more with 5% increase in CO_2: 1995-05 vs.

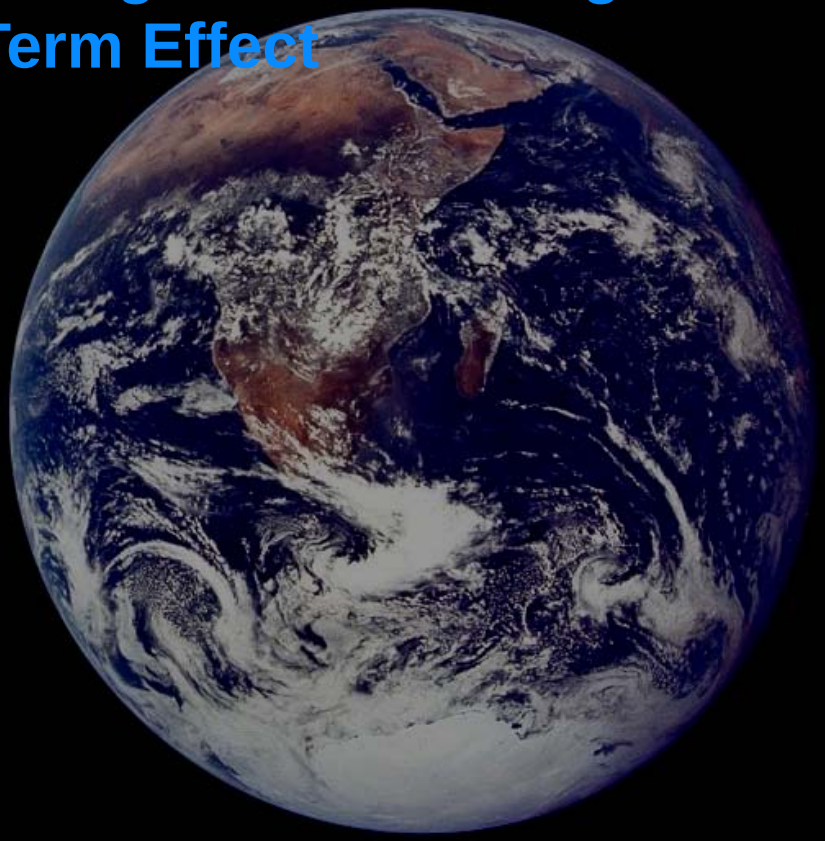
b. 20% more with 5% increase in CO_2 : 1995-2005

Disagreement: Oceans

Coupled Oscillations

a. Account for Decades Long Climate Changes vs.

b. No Significant Long-Term Effect



Disagreement: Solar Effects

Surface Temperature Correlation

a. 72% from Satellites vs.

b. Irradiance Variations Too Small to Cause Effects

Historical and Geological Evidence

a. Very Strong vs.

b. No Way to Amplify Irradiance Variations

Amplification Mechanism

a. Ocean and Cosmic Ray Data Show It Exists vs.

b. None Proven

Disagreement: Climate Modeling

Physical and Mathematical Representation

a. Cannot Model Complexities of Climate vs.

b. Model Prediction of Warming “very likely” correct

Energy and Mass Redistribution

a. Combined Convection Effects Dominate vs.

b. CO_2 Radiation Trapping Dominates

Feedbacks from Climate Perturbations

a. Non-linear in a Non-linear System vs.

b. Linear behavior

Disagreement: Climate Modeling

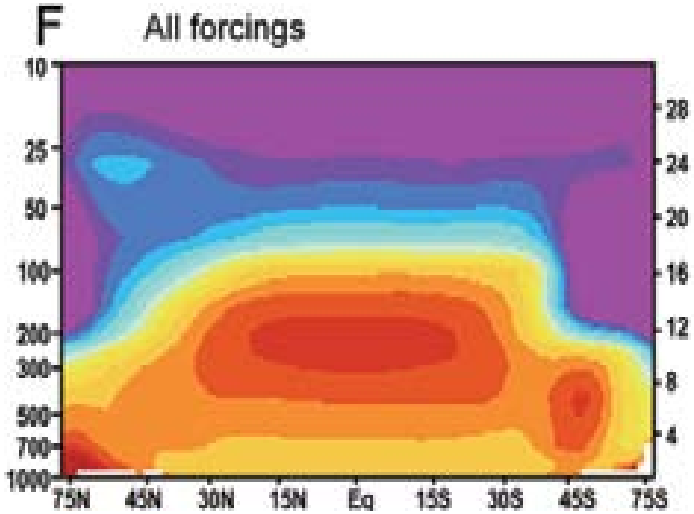
Temperature and CO_2 Correlations

- a. CO_2 Increases Lag Temperature Increases vs.
- b. CO_2 Increases Lead Temperature Increases

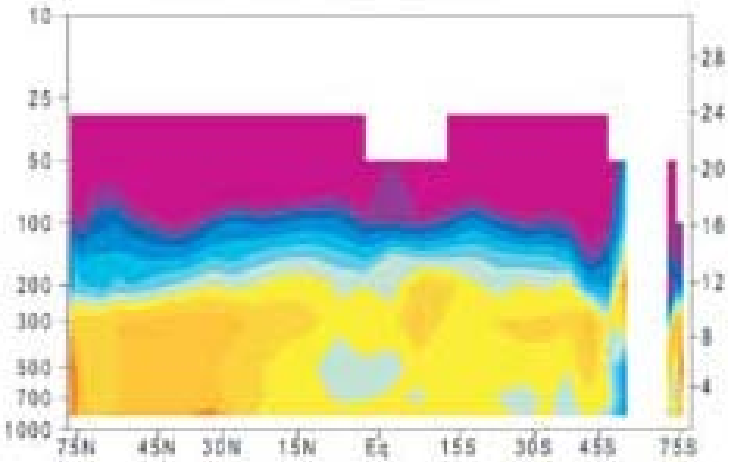
Human Causation of Temperature Change

- a. Troposphere Temperature Constant Since 1979 vs.
- b. Climate Models Predict Troposphere Warming

Current Climate Models Wrong

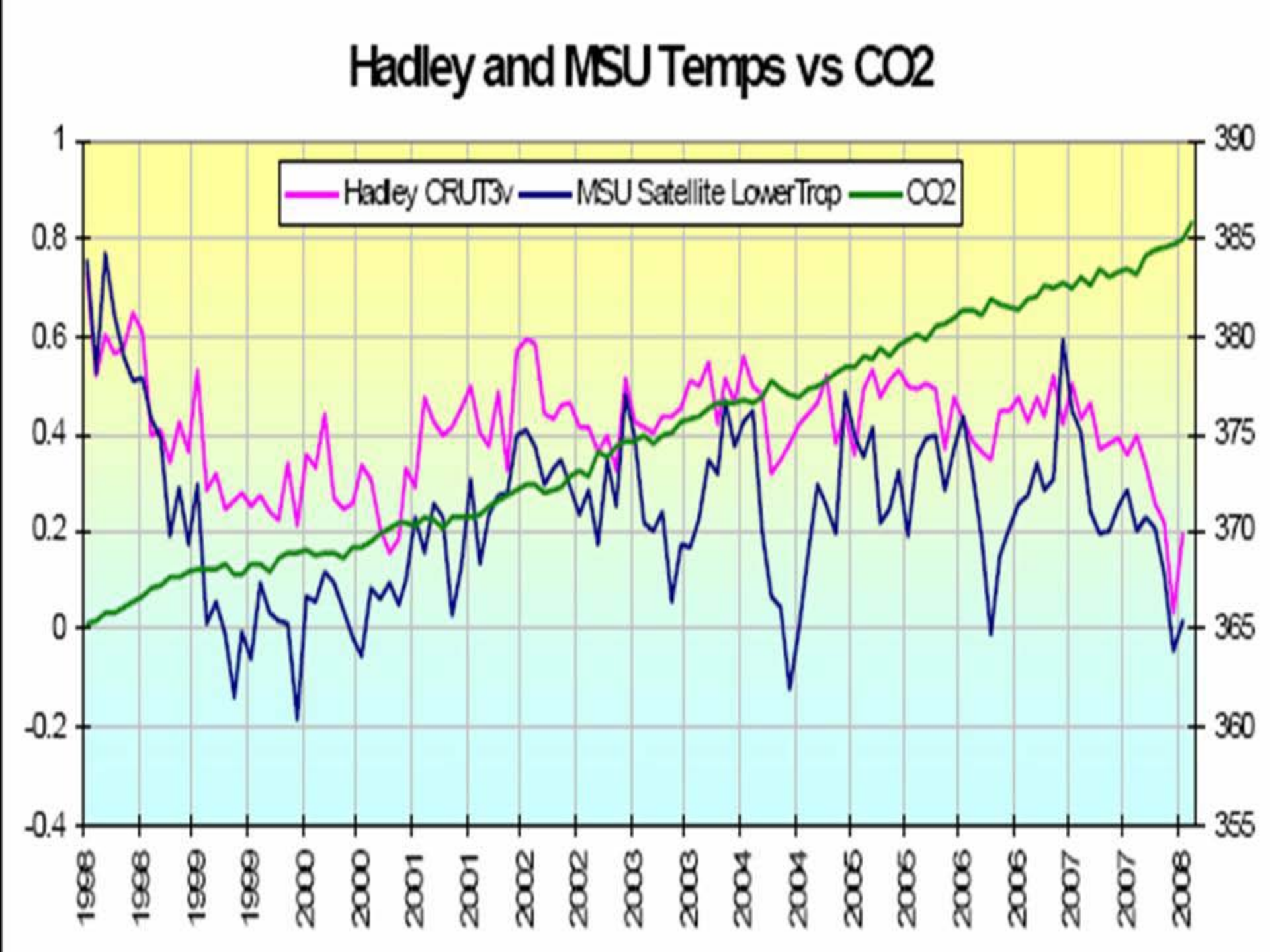


Model Prediction for 1958 - 99



Observed Warming 1979 - 99

- Predict a troposphere hotspot
- There is no hotspot


Hadley and MSU Temps vs CO2
Hadley CRUT3v
MSU Satellite LowerTrop
CO2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
390
385
380
375
370
365
360
355
1998
1998
1999
1999
2000
2000
2001
2001
2002
2002
2003
2003
2004
2004
2005
2005
2006
2006
2007
2007
2008

Disagreement: Research Publication

Major Scientific Journals and National Media Outlets

a. Publication and Peer Review Bias Against Dissent from Human Causation

b. Dissent from Human Causation not Scientifically Valid

Summary

Reasonable people should agree that areas of disagreement on climate could be subject to rigorous scientific observation and analysis.

Proceeding with potentially highly detrimental regulatory and tax policy changes based on models before these disagreements are resolved…..

would be unconstitutional and a further attack on American liberty and standard of living.