

GLOBAL WARMING

An Interesting but Insignificant Problem

Is Global Warming Real? *Models say YES; data say NO*

A CRITIQUE (2005) OF IPCC CLAIMS

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ENERGY POLICY IS DRIVEN BY THREE FEARS

- 1) CO₂ increases causing climate disaster**
- 2) Low-level radiation causing cancer**
- 3) Oil security –Supply interruptions**

**** Atmospheric levels of carbon dioxide, methane, and other greenhouse (GH) gases are rising.**

**** Climate models project an increase in global temperatures of 1.5 to 4.5 C (by about 2100 when CO₂ levels may be twice the pre-industrial value).**

**** But actual observations do not support the theoretical models and allow for only about 0.6 C over present temperatures.**

**** The consequences of such a small change are not likely to be significant.**

The existing concern about Global Warming (GW) is based mainly on the reports of the UN-sponsored Intergovernmental Panel on Climate Change (IPCC). In particular, its Third Assessment Report (TAR) of 2001 includes economic growth scenarios that could give a temperature rise of up to 5.8 C.

Its Summary for Policymakers (SPM) claims that “there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.”

WE DON'T SEE SUCH EVIDENCE

The IPCC (2001) conclusion about human-caused GW is based on three pieces of “evidence.” None of these stand up to scrutiny.

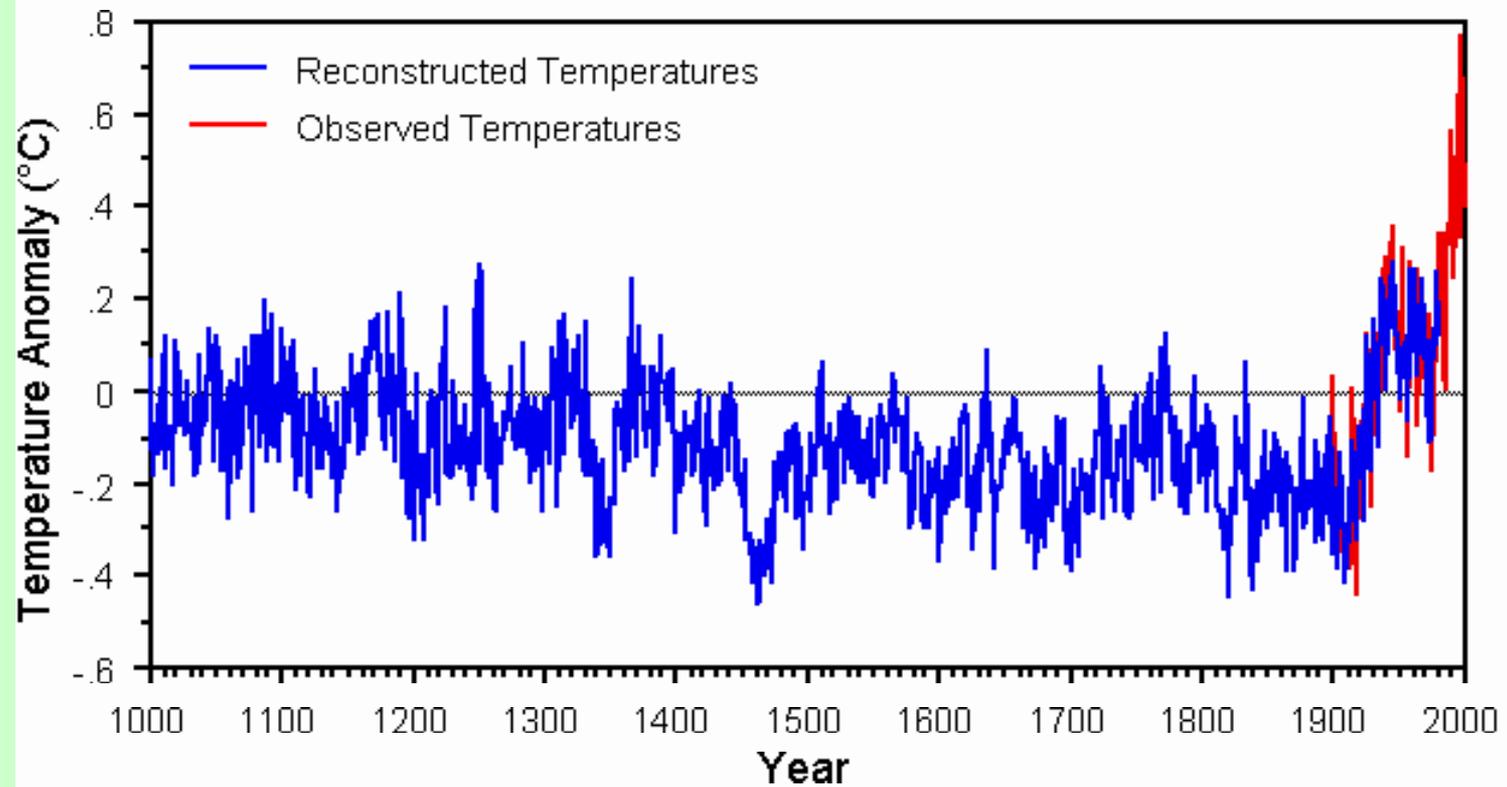
1) Temperature data from different “proxy” sources (tree rings, etc) show the 20th century to be the warmest in the last 1000 years. (Hockey stick graph)

2) Global average surface temperatures have increased by 0.6 C over the 20th century, with about half the increase since 1976, making the past decade the warmest.

3) Climate models account for the temperature history of the 20th century – provided they include both natural forcing factors affecting climate (solar variability, volcanoes) and forcings from human activities (GreenHouse gases, aerosols).

- i) **Proxy data (from tree rings, ice cores, lake and ocean sediments, corals, etc) indeed give information about the past. **But they do not support the IPCC claim.****
- ii) **The analyses by Mann, Bradley, and Hughes [MBH 1998,1999] featured by IPCC-TAR, however, disagree with previous ones that showed a substantial warm period around 1100 AD (the Medieval Climate Optimum) and a Little Ice Age from about 1400 to 1850 AD. The MBH temperature history shows a “hockeystick” shape -- a slight but steady cooling trend since 1000 AD, followed by a steep rise beginning in 1850.**
- iii) **But a careful audit of the underlying data discovered that they had been mishandled. Furthermore, the methodology itself was faulty; with its use, even random data would give a hockeystick temperature curve.**

Temperature History of the Northern Hemisphere

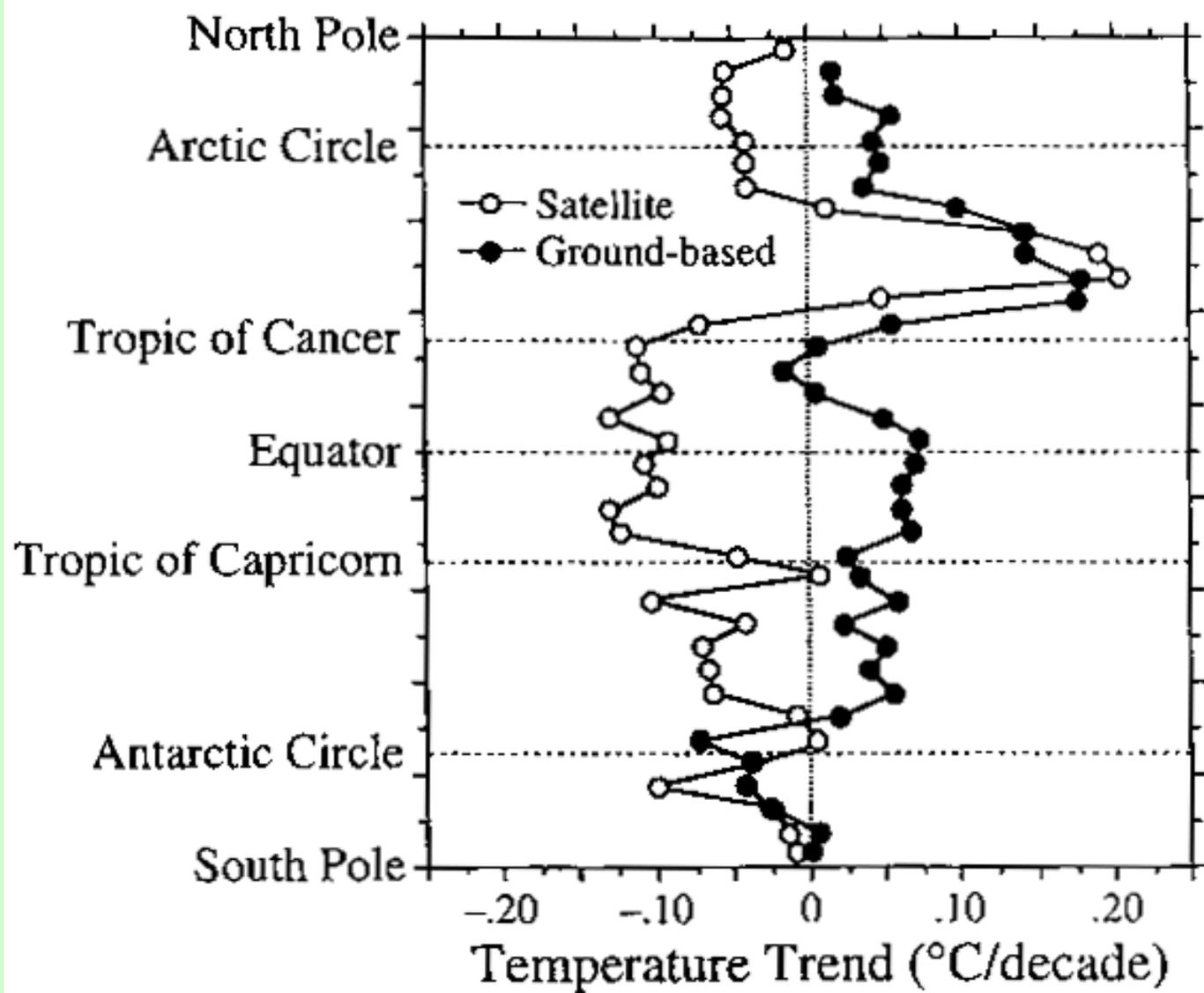


Independent researchers, incl also GW promoters, agree that **the hockeystick is broken**, but now argue, rather disingenuously, that the hockeystick never really proved the existence of anthropogenic global warming (AGW) -- but at best provided only circumstantial evidence. [von Storch, Cubasch, Rahmstorf].

In addition, as hundreds of studies have shown, there was no stable "pre-industrial climate" and **temperatures often exceeded present levels.**

- ❖ Few scientists dispute that the global average temperature rose during the early part of the 20th century -- up to about 1940.
- ❖ It then cooled until about 1975, raising widespread fears of a coming Ice Age.
- ❖ A sudden rise of nearly 0.2 C occurred between 1976 and 1978, linked to a shift in ocean circulation.
- ❖ These climate changes are not at all consistent with AGW, or with GCMs, and are generally attributed to other factors – either external or internal to the atmosphere-ocean system. **Did the climate warm since 1979?**

- The main dispute centers on whether there has been a warming since 1979, the year that weather satellites first began pole-to-pole measurements of atmospheric temperatures.
- A **disparity** soon became evident: Data from land and ocean measurements seemed to indicate a global mean warming of nearly 0.2 C per decade, while satellite-borne microwave radiometers and balloon-borne radiosondes showed **negligible warming**. This disparity led to a report by the National Research Council of the US-NAS that tried but was unable to reconcile the disparity [NRC 2000].
- The problem persists – and is made worse since GH models predict that the atmospheric trend should exceed the surface trend. But **observations give the opposite result** [Douglass, Pearson, Singer 2004]



There have been several unsuccessful attempts to discredit the satellite results. It seems more likely, however, that the **surface data are contaminated** (for example, by urban heat islands) and produce a spurious global warming trend.

In addition, methods for deriving **sea-surface temperatures are questionable.**

One thing is certain: **One cannot assert that the atmosphere is currently warming appreciably – nor that the cause is anthropogenic.**

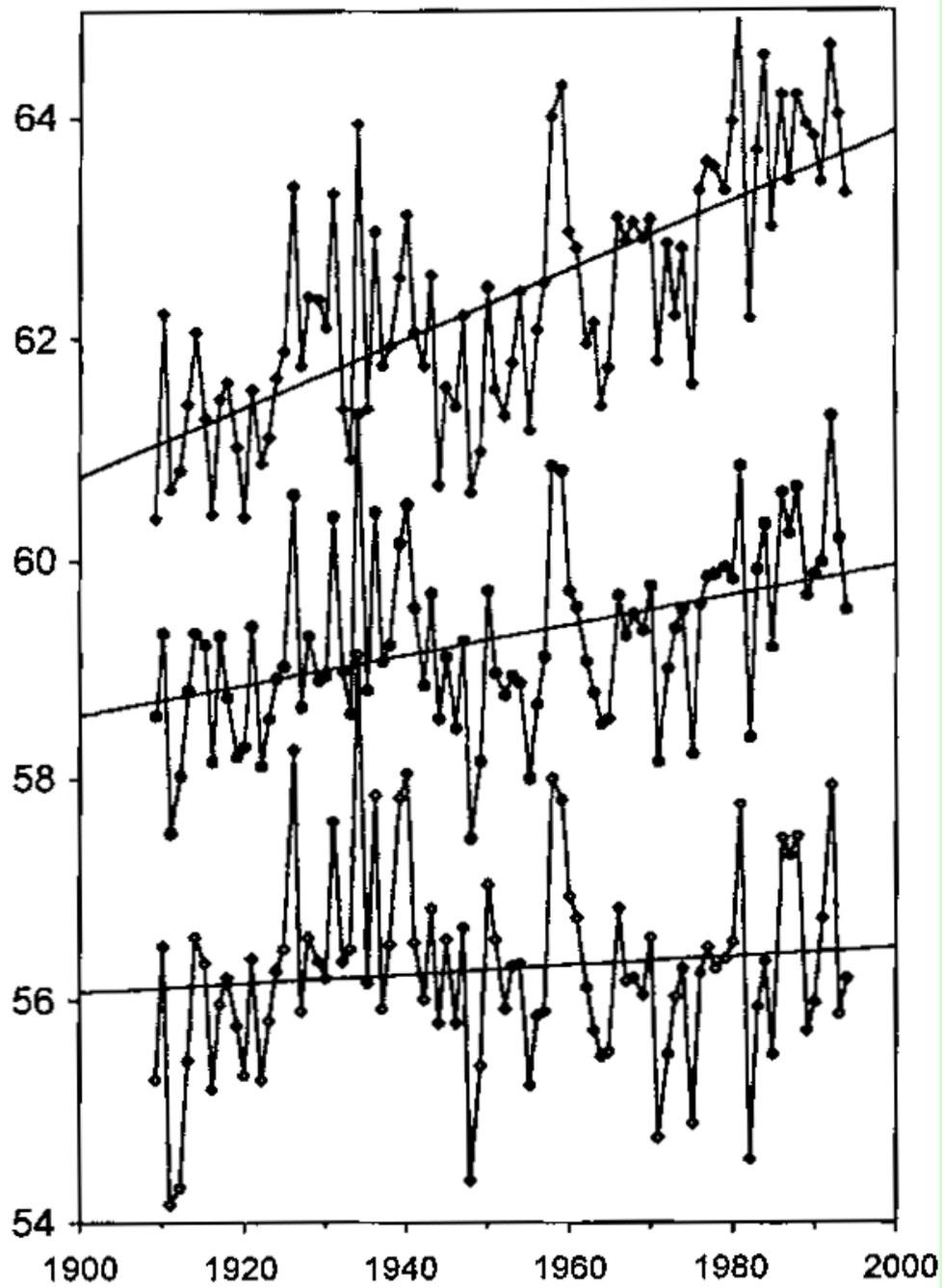
Urban Heat Island Effect

**California weather stations show
warming trend in counties with >1 million people
no warming trend in counties with <100,000**

[Ref: Goodridge, Bull Am Met Soc, July 1996]

**[Note temperature increases to a max in 1940,
followed by cooling trend to ~1975]**

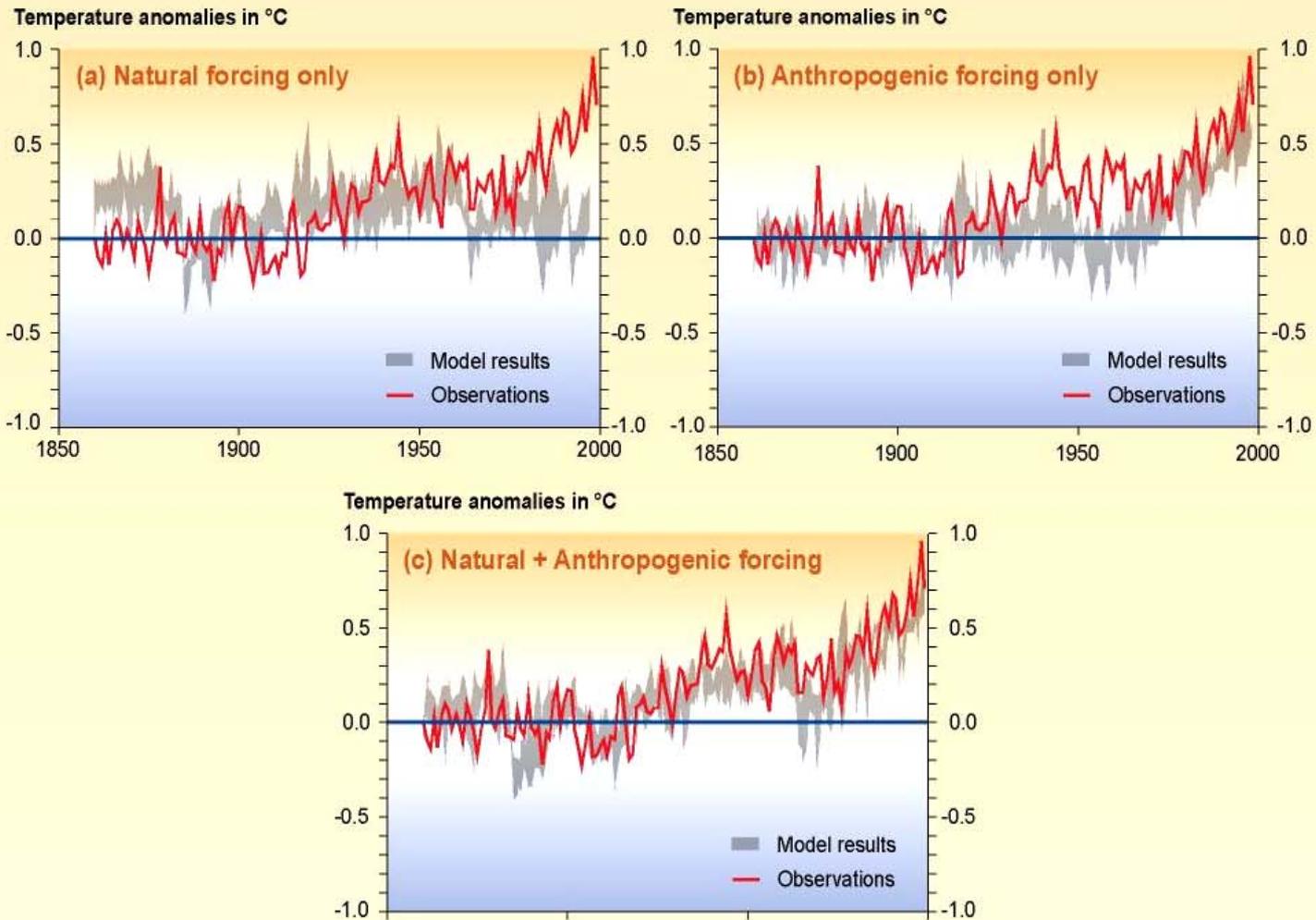
Degrees Fahrenheit



The remaining IPCC claim is that climate models can explain the **global mean** temperature record of the 20th century with a combination of natural forcings (from solar variability and volcanoes) and anthropogenic forcings (GH gases, aerosols).

But this claimed agreement seems to be nothing more than a case of **curve fitting with the choice of a number of arbitrary parameters** [Ref: G. North]. For example, a computer-modeling exercise demonstrated that climate sensitivity can vary between 1.9 and 11.5 C (for a doubling of atmospheric CO₂ concentration) by just changing slightly any of a half-dozen parameters dealing with clouds [Stainforth 2005]. Similarly, aerosols show a wide range of optical parameters and therefore forcings.

Comparison between modeled and observations of temperature rise since the year 1860



SYR - FIGURE

▪The crucial test would be to demonstrate agreement between model results and observed temperature trends – **not for just the global mean but as a function of latitude** – or even just for the NH and SH separately.

▪Finally, we note that **several important forcings were not included** in the models because their magnitude (or even sign) is too uncertain.

▪Yet if agreement can be claimed without such forcings, it is **highly unlikely that agreement would persist** if they were included.

- We have tried to demonstrate here that the IPCC claim for existence of “new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities” cannot be maintained.
- This does not argue that AGW is absent; but that it is simply too small to be detectable, and much less than calculated from GCMs.
- Our best estimate, based on assigning the all of observed atmospheric warming to AGW, is a **GH warming of perhaps 0.6 C by the year 2100.**

Temperature in 2100, based on observations rather than models:

**** Satellites (MSU-UAH) show a trend of 0.08 C per decade. [It would be less if one allows for the 1998 El Nino peak.]**

**** Assume (conservatively) that ALL is due to increasing CO₂.**

**** Then the surface trend should be about 20% less (acc. to GH theory) --or about 0.065 C/decade.**

**** Assume (again conservatively) that CO₂ will increase exponentially, then the temp trend will be linear (acc to radiation theory).**

**** So by 2100 we should see an increase of at most 0.6 C over the present value.**

[If CO₂ increases at 0.04%/yr, then the value in 2100 will be 555ppm; at 0.03%/yr it will be 505ppm vs pre-industrial 280ppm and present 380ppm.]

As a consequence of greenhouse forcing, all GCMs (general circulation models) predict a positive temperature trend that is greater for the troposphere than the surface -- increasing with altitude until it reaches a maximum ratio with respect to the surface of as much as 1.5 to 2.0 at about 8 km. However, the temperature trends from several independent observational data sets show decreasing trends with altitude, as well as mostly negative trend values. This disparity indicates that **climate models fail to account for the effects of greenhouse forcings [Douglass, Pearson, Singer 2004]**

Fig 2A Global

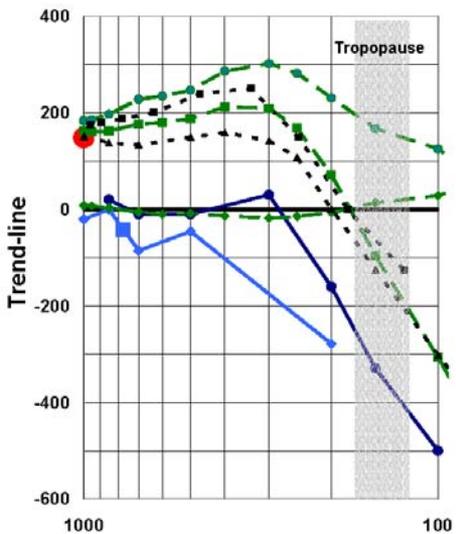


Fig 2B Tropics (30S--30N)

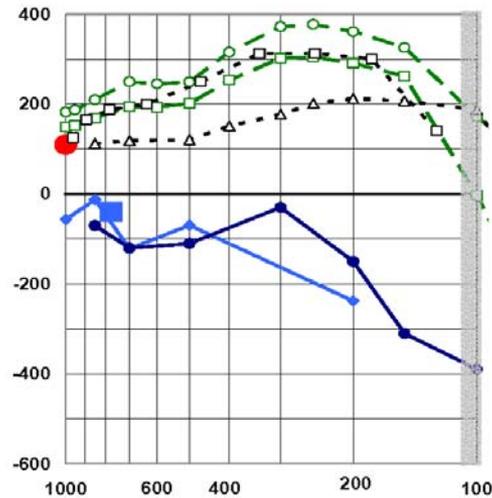


Fig 2D NH (30N--90N)

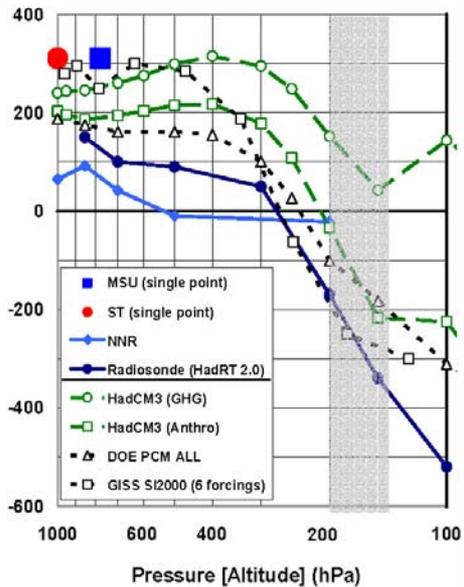
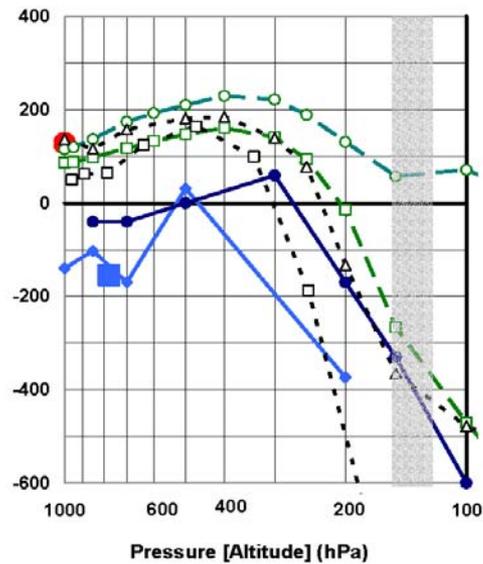


Fig 2C SH (60S--30S)



Why do climate models disagree with observations?

****Insufficient resolution, due to limited computing power**

****Inadequate parameterization of clouds and cloud physics**

[Climate sensitivity can vary from 1.9 to 11.5 C (Stainforth 2005)]

****Inadequate knowledge of magnitude and sign of Water Vapor feedback, (determined mainly by unknown WV levels in upper troposphere)**

****Inadequate knowledge of natural and human forcings**

The Kyoto Protocol is ineffective but very costly

****It calls for industrialized nations to cut 5% from 1990 emission levels by 2012**

****This would reduce the model- calculated warming by only 0.05 C (one-twentieth of a degree)**

****Without US participation, this becomes an undetectable 0.02 C (too small to measure)**

****With emission trading in force, there would be no reduction**

******Stabilization** of GH gas levels requires a **reduction of 60 to 80%** by ALL nations! It would not stabilize climate.**

There is no scientific consensus about GH-forced global warming

****Poll of leaders of Am Meteorological Society 1991**

****International Heidelberg Appeal 1992**

****Statement of Atmospheric Scientists 1992**

****Leipzig Declaration of climate specialists 1996 and 2005**

****Statement of Am Assoc of Petroleum Geologists 1999**

****Oregon Petition against Kyoto (by nearly 20,000 scientists)**

****Statement of Am Assoc of State Climatologists 2001**

****Report by the Russian Academy of Sciences May 2004**

****Poll of 500 international climate specialists (D. Bray 2004)**

International responses

****An international survey (2004) among some 500 climatologists found that "a quarter of respondents still question whether human activity is responsible for the most recent climatic changes." (Der Spiegel, 24 January 2005; <http://service.spiegel.de/cache/international/spiegel/0,1518,342376,00.html>).**

****After the Russian Academy of Sciences issued its report in May 2004, President Vladimir Putin has termed Kyoto “scientifically flawed.”**

****Even Tony Blair has emphasized the ongoing scientific debates among climate scientists: "So it would be true to say the evidence [on anthropogenic global warming] is still disputed" (Davos Speech, 26 January 2005; <http://www.number-10.gov.uk/output/Page7006.asp>).**

But some remain unconvinced

****“Global warming is a greater threat than WMD” (Hans Blix)**

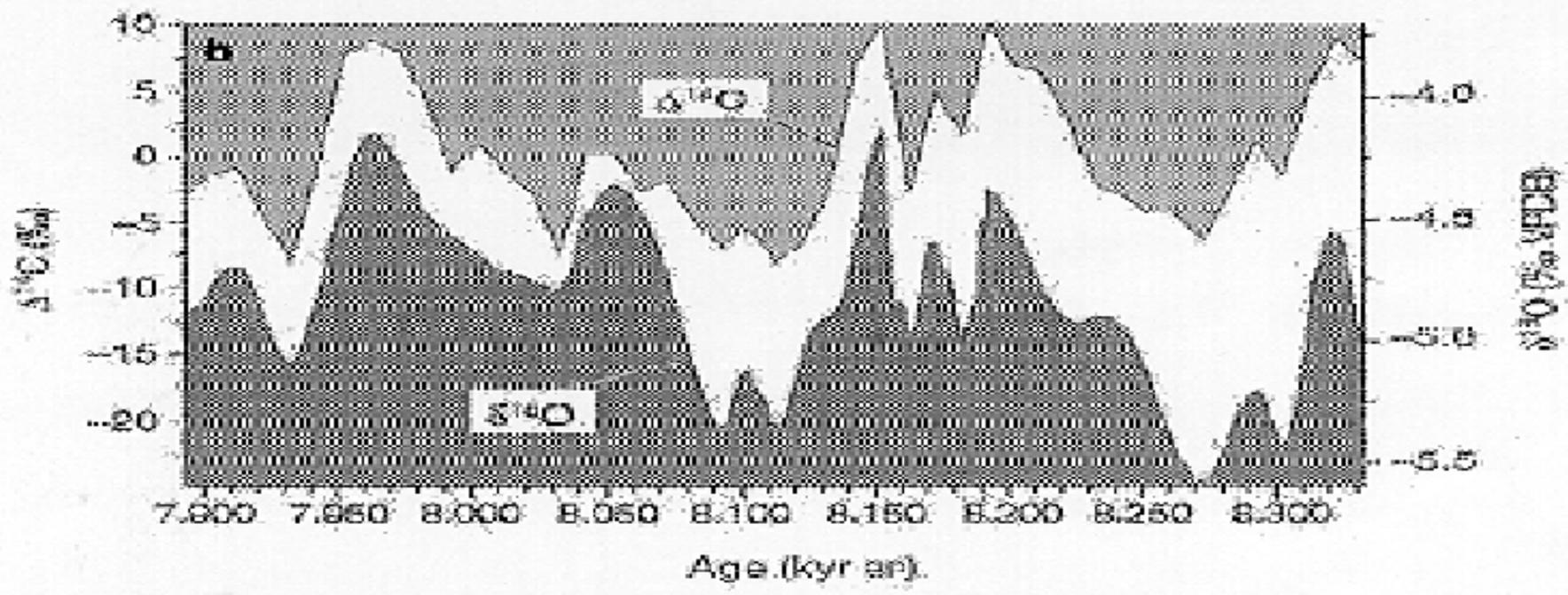
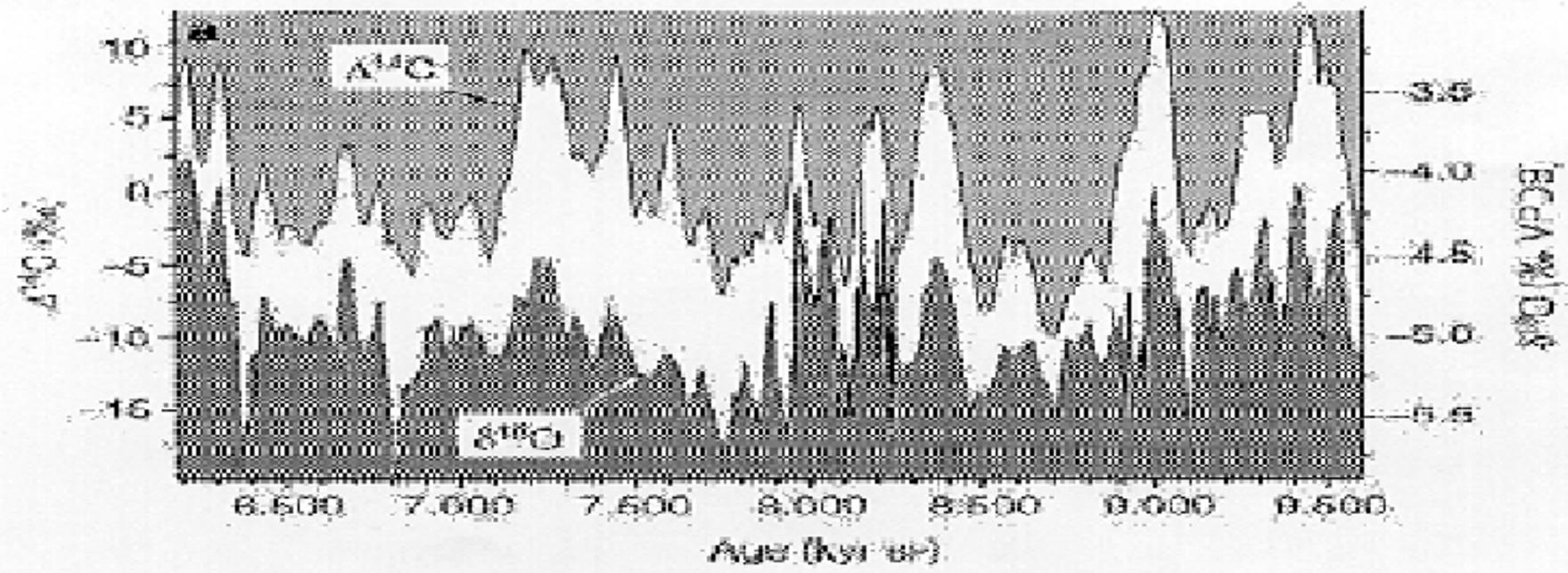
****“Global warming is a greater threat than terrorism”**

****“Antarctica is likely to be the world's only habitable continent by the end of this century if global warming remains unchecked.” (Sir David King, UK Chief Scientist).**

****“The science is settled” (Tim Wirth, Al Gore, etc. in 1996)**

(Decadal time-scale) Climate changes are mainly controlled by Sun, not by CO₂:

**See correlation in Stalagmite data [Neff *et al.* Nature 2001]:
Carbon-14 shows solar changes, oxygen-18 climate changes**



What to do?

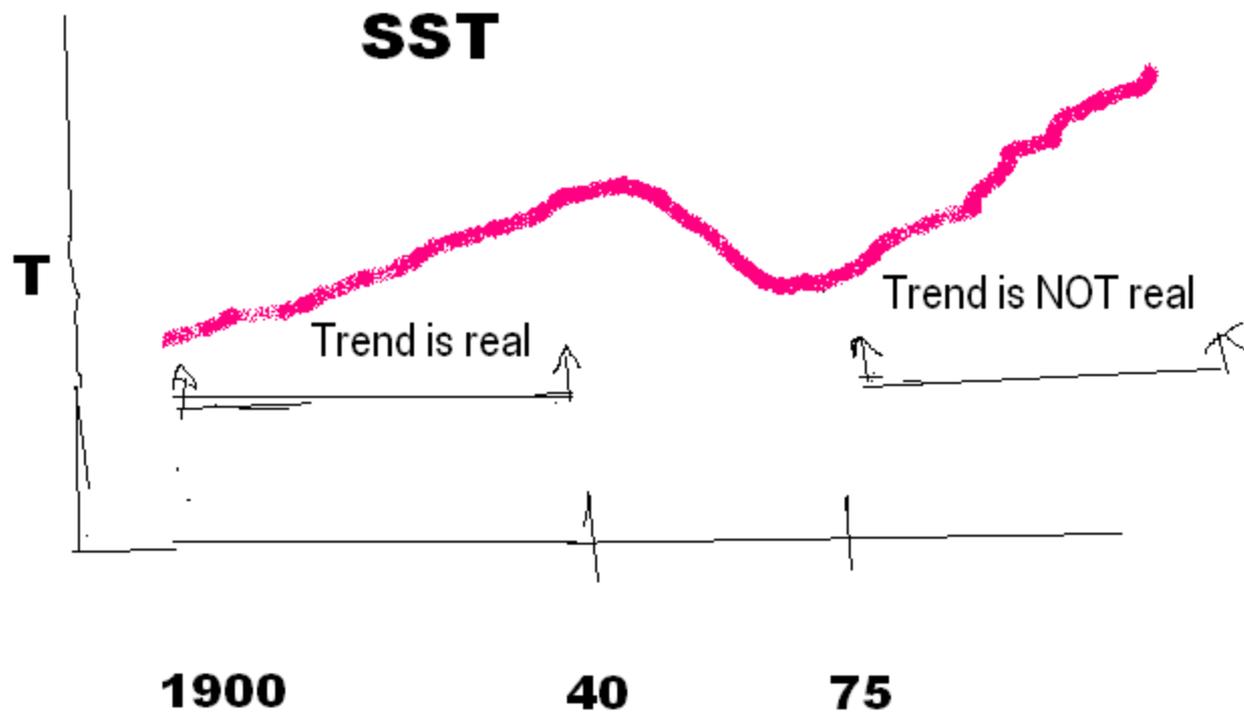
- o Global changes are mainly natural; human effects likely minor in comparison.**
- o Worldwide poverty should be top priority environmental target; encompasses fresh water, disease control, and other human needs.**
- o Supply of low cost energy is essential for economic growth to overcome poverty.**
- o Resources spent to reduce GH gases are a wasted investment, raise energy costs, and result in perpetuating poverty.**



Sea Sfc Temperatures

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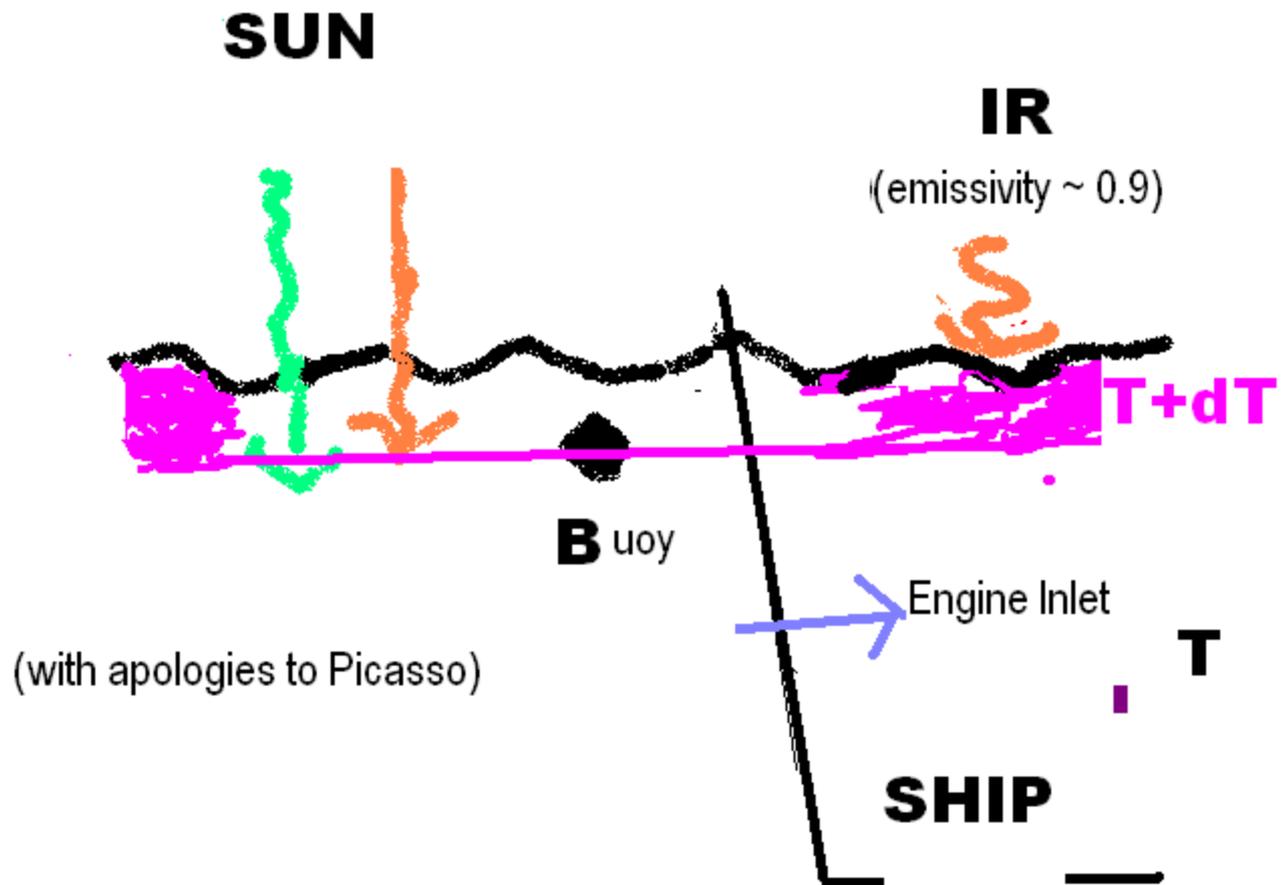


Are SST Increases Real?

- Observed SST pre-1940 increase is real; observed also by proxies.
- Reported post-1979 increase may be an artifact caused by methods of observation.
- This may explain well-known disparity between surface and satellite/balloon temperature trends (NRC Jan. 2000)

Can GH Effect Heat SST

- Solar (visible) radiation penetrates into ocean; deposits energy.
- IR (long-wave) from GH gases cannot penetrate. Energy is absorbed in “skin;” goes mainly into evaporation etc; hence reduced contribution to SST.
- WHY DOES SST INCREASE?



IR Contribution to SST

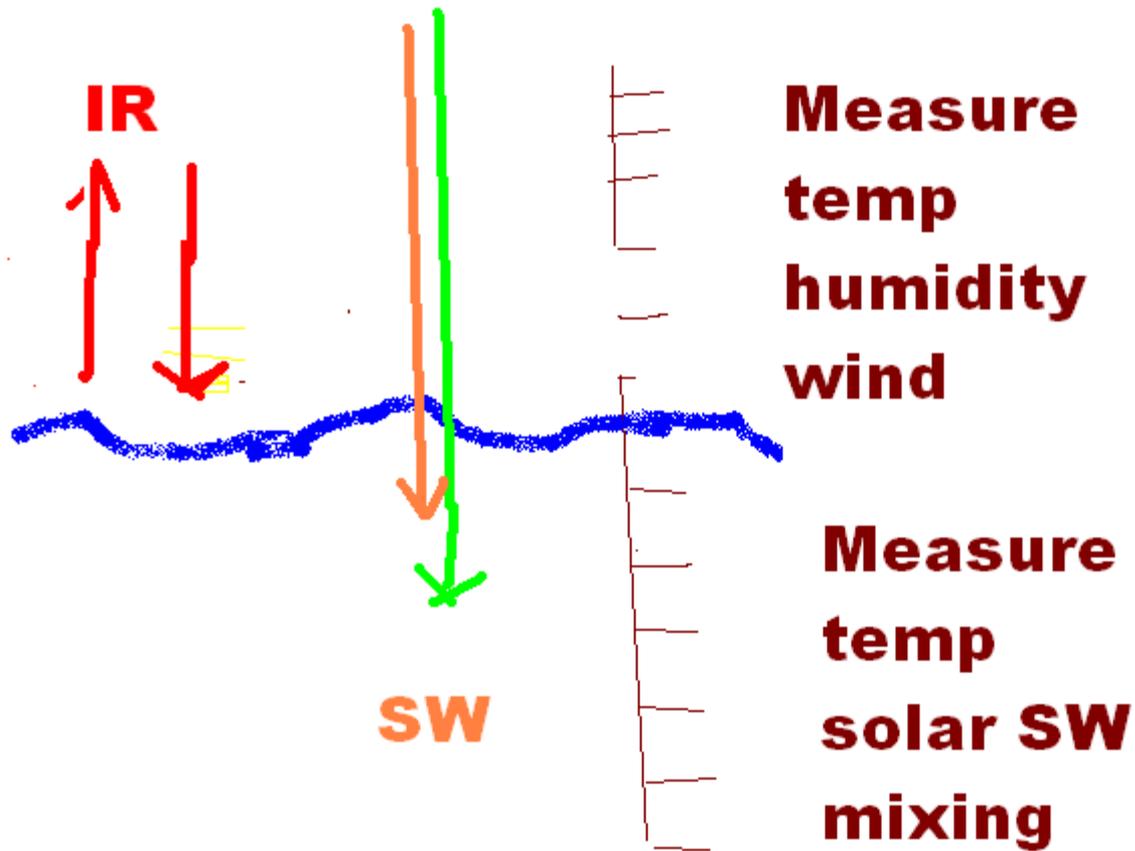
Experiment to measure fraction

**Measure downwelling and upwelling IR,
WITH and WITHOUT clouds**

**Temp above and below surface,
humidity, wind speed, sea state etc**

**Determine heat loss to atmosphere by
radiation, evaporation, convection**

10/27/2005



SST Experiment

How Good are SST Data

From Strategic Plan for the US Climate Change Science Program (July 2003):

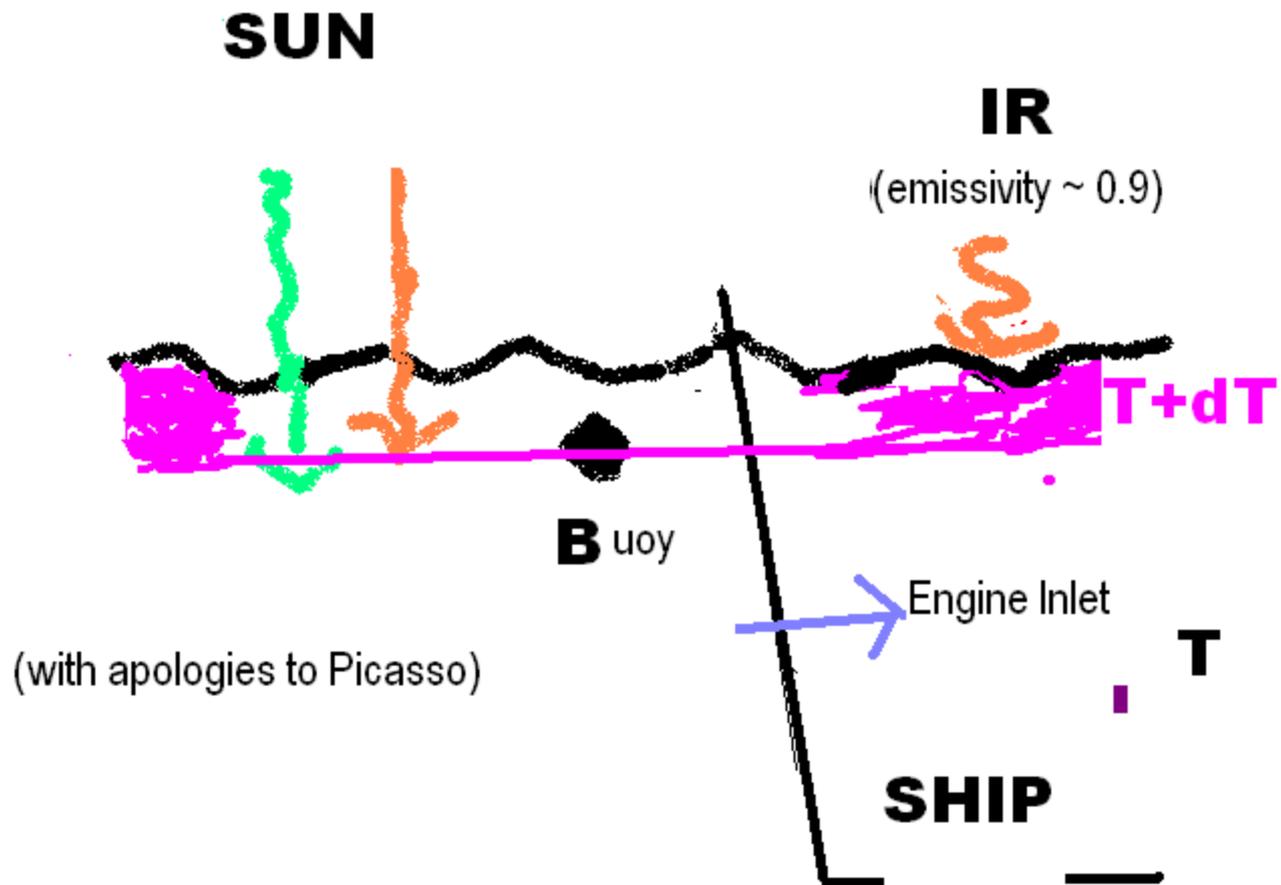
- **First item in Goal 1 is (p.17):**
"Temperature trends in the lower atmosphere--steps for understanding and reconciling differences [in observations] ...
- ***Inconsistencies in the temperature profiles of different data sets reduce confidence in understanding of how and why climate has changed....***
- *********
- **Major disparity occurs in the tropics and SH**

Hypothesis

- It has been suspected that the use of different data sources to derive SST could introduce a fictitious trend as their mix changed over time [S.F. Singer at AMS annual mtng, Phoenix, 1998; AGU Spring mtng 2000].
-
- The solar energy input to the ocean occurs mainly in the photic zone in the upper few meters of the mixed layer, typically taken to be 100 meters.
-

Buoys vs. Ship Data

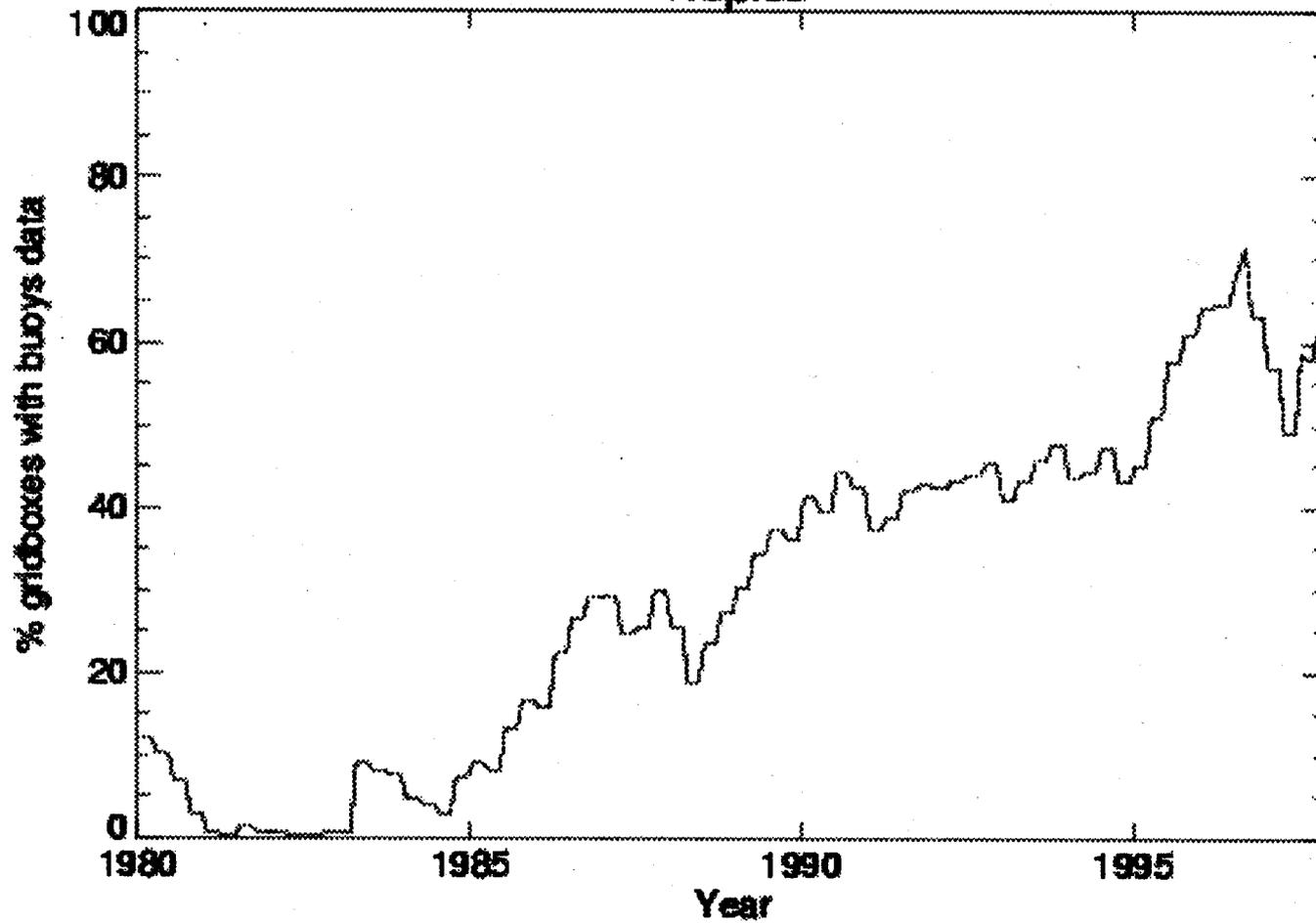
- **This creates a small temperature gradient so that buoys will record a slightly higher temperature than sensors at a greater depth that measure the temperature of engine-cooling water at the ship intake ports.**
-
- **An increase with time in the use of buoy data could thus simulate a temperature trend.**
-



Simple 1-Dimensional Model

- Let the temperature at 1 meter depth in the photic zone of solar radiation exceed the mean temperature of the mixed layer T by dT . Assume that neither T nor dT vary with time.
- Let the proportion of buoy data B increase linearly with time t according to $B = a + bt$
- The “mixed” SST is $SST(t) = (1 - B) T + B (T + dT)$
- At time $t=0$, $SST(0) = T + a*dT$.
- Hence the “trend” of SST becomes $[SST(t) - SST(0)] / t = b*dT$ [not zero]

Percentage of Coverage of all insitu obs from buoys Tropics



A Fictitious SST Trend

- The “trend” of SST becomes
 - $[SST(t) - SST(0)] / t = b \cdot dT$
- instead of zero.
-
- Take dT as ~ 0.5 deg C; b as $\sim 30\%$ per decade
-
- Hence “Trend” is $0.3 \times 0.5 = \sim 0.15$ deg/decade
-

Tests of Hypothesis

- **Process ship and buoy data separately.
- **Measure day and night buoy temperature trends.
- **Effect should disappear when buoy contribution saturates

Conclusion

- **If SST temp trend is artifact, and land stations are contaminated by urban heat island effect, there is little post-1979 SFC warming.
- **This would be in accord with data from satellites, balloons, and proxies – all showing little current warming [Douglass, Pearson, Singer. GRL July 9, 2004]

References

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Acknowledgements

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