[AV]Building Climate Datasets for Testing Claims of Human Impacts from Climate*

John R. Christy[1]

Search and Discovery Article #110119 (2009)
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Abstract

Few scientific groups actually build climate datasets from scratch as is done at UAHuntsville. We often begin our research with digital counts from satellite sensors, or original records of balloon releases or even dusty surface weather records from libraries in other countries. These datasets are useful in understanding the magnitude of changes in the climate system and to test assertions (hypotheses) about climate changes. We test a number of assertions about changes that climate models project, finding significant differences (i.e., failed hypotheses) between the modeled and the observed rates of change. Finally we shall calculate projected temperature changes under some scenarios of reduced carbon-based energy production, showing current proposals have minuscule impacts on projected climate changes.

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Building Climate Datasets for Testing Claims of Human Impacts on Climate

AAPG 9 June 2009

John R. Christy
University of Alabama in Huntsville
Alabama State Climatologist

Consensus is not Science

Michael Crichton

Consensus is not Science

Michael Crichton

All Science is numbers

William Thomson (Lord Kelvin)

Testing Hypotheses on Global Warming

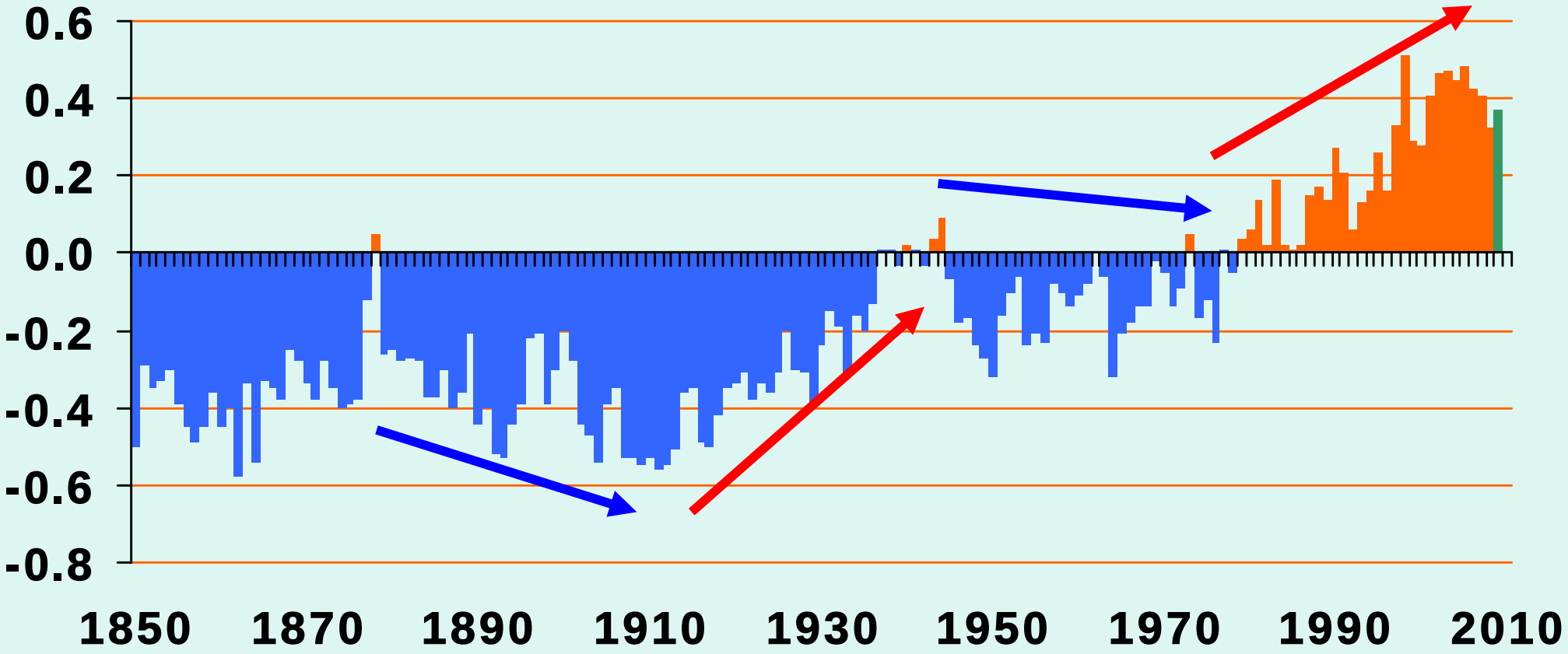
Testing Assertions based on Popular Surface Temperature Datasets

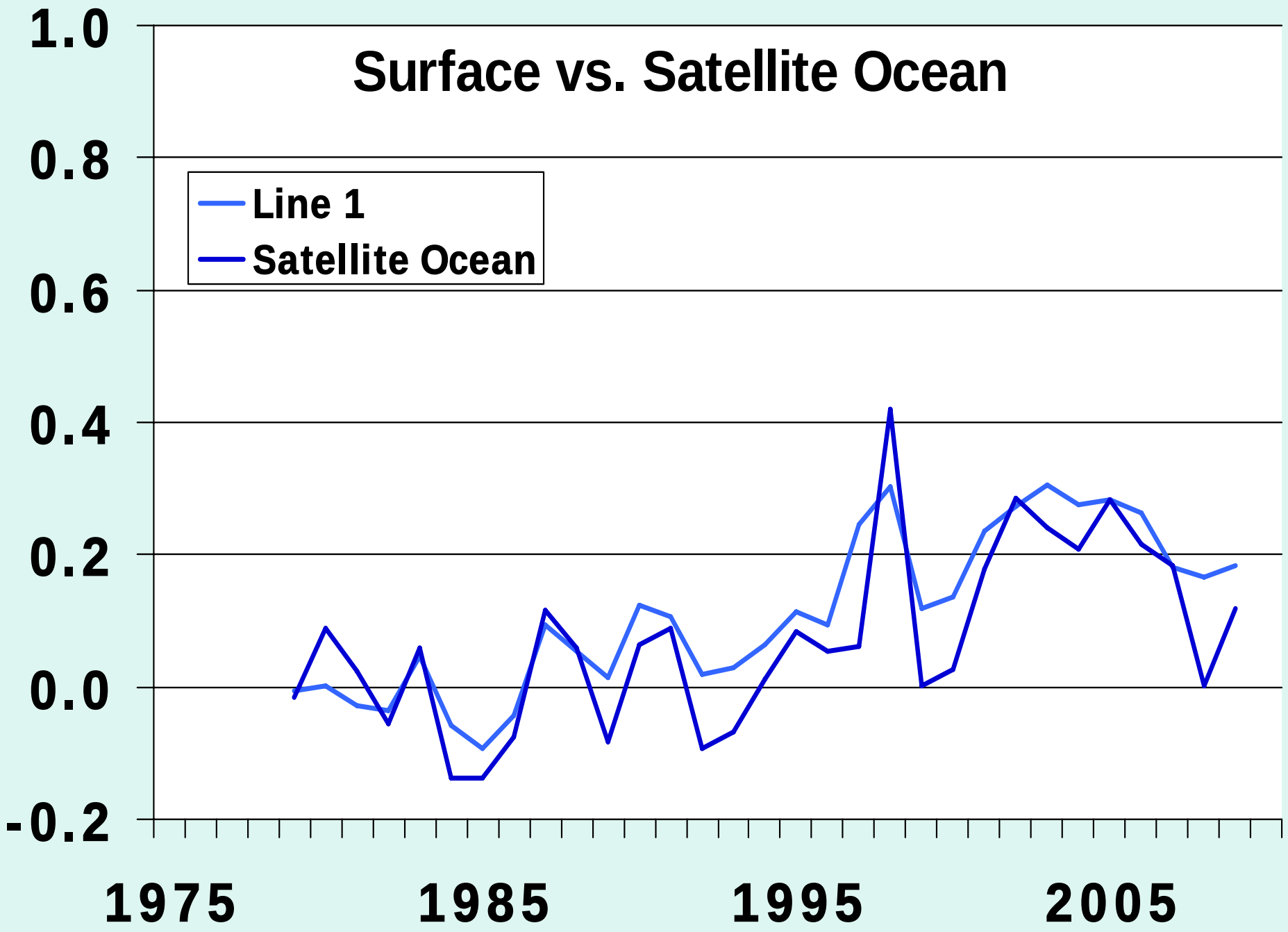
Popular datasets overstate the warming

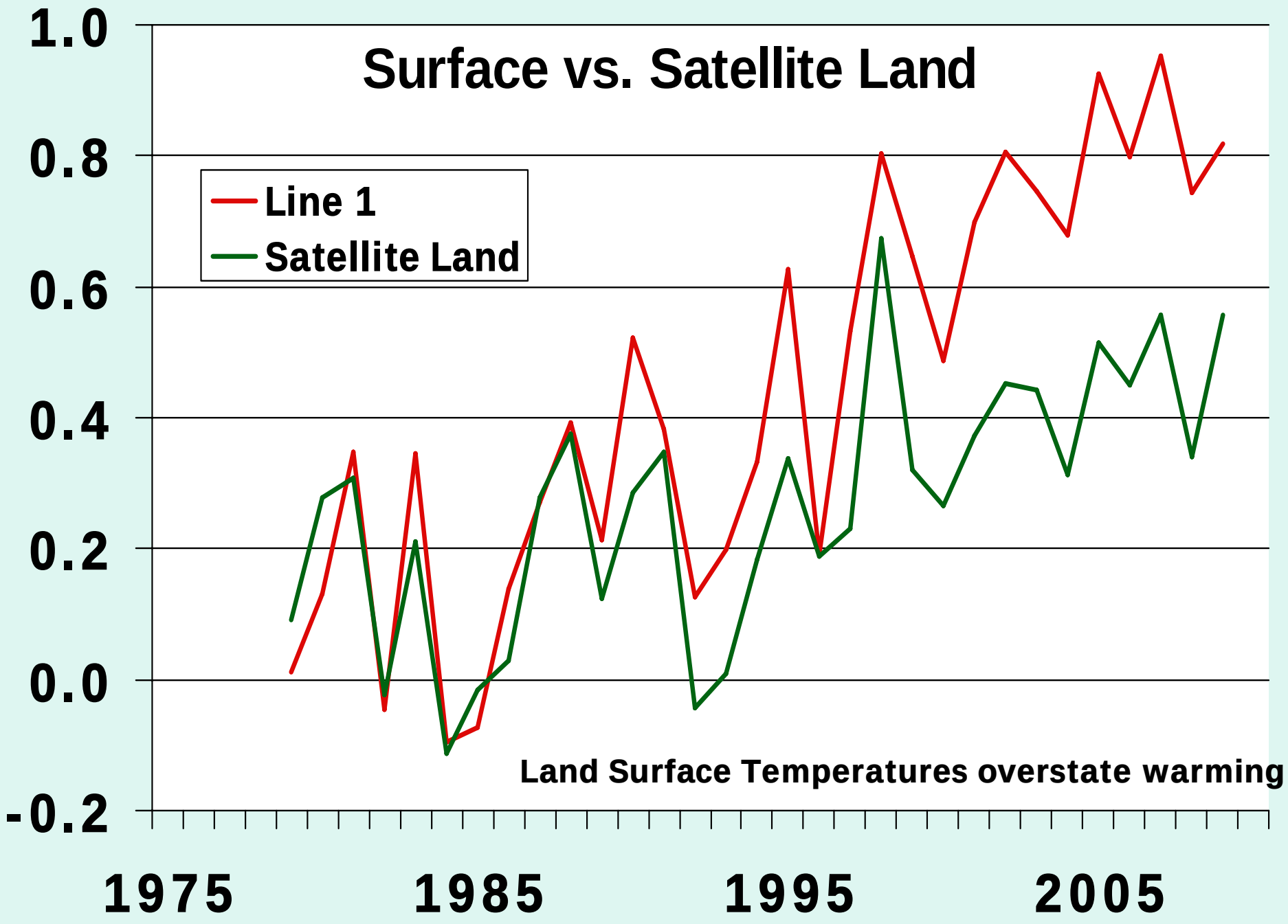
"Global" Surface Temperature

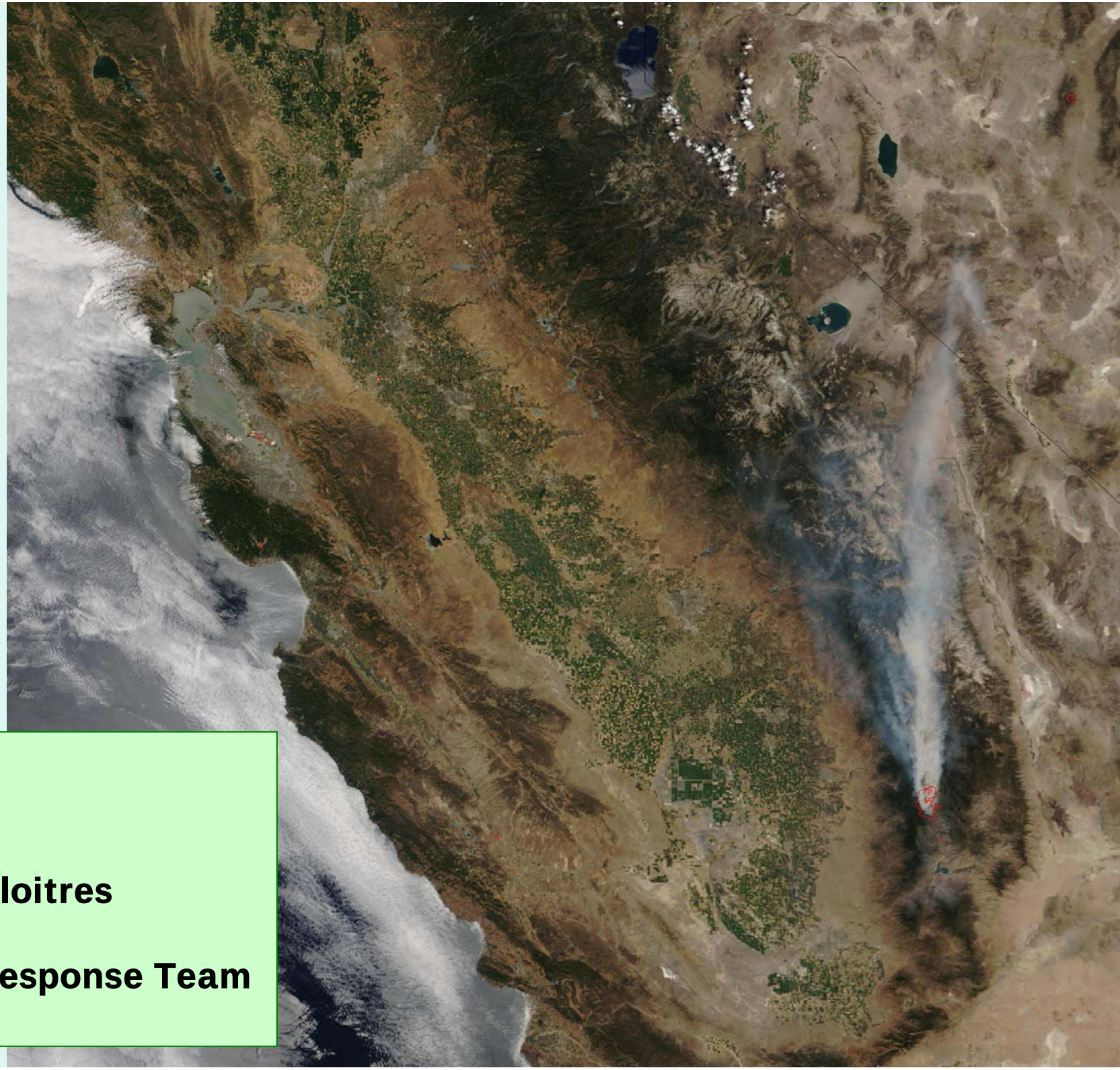
HadCRUT3 (2009 Jan-Apr only)

CO2 up 38 % at current rate of 0.6 % per year




Surface vs. Satellite Ocean
Line 1
Satellite Ocean
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
1975
1985
1995
2005

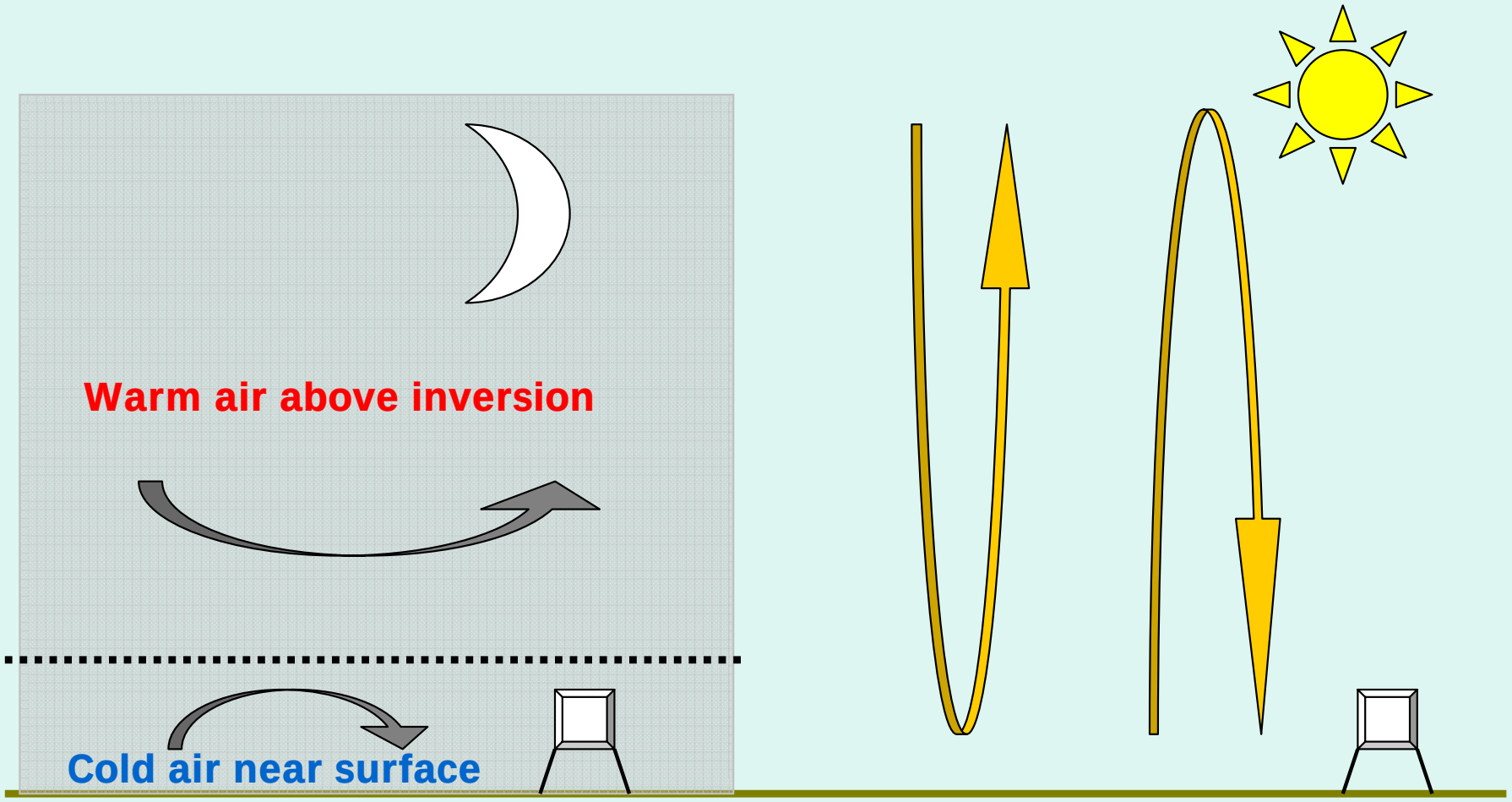

Surface vs. Satellite Land
Line 1
Satellite Land
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
1975
1985
1995
2005
Land Surface Temperatures overstate warming



MODIS
21 Jul 2002

Jacques Descloitres
MODIS
Land Rapid Response Team
NASA GSFC

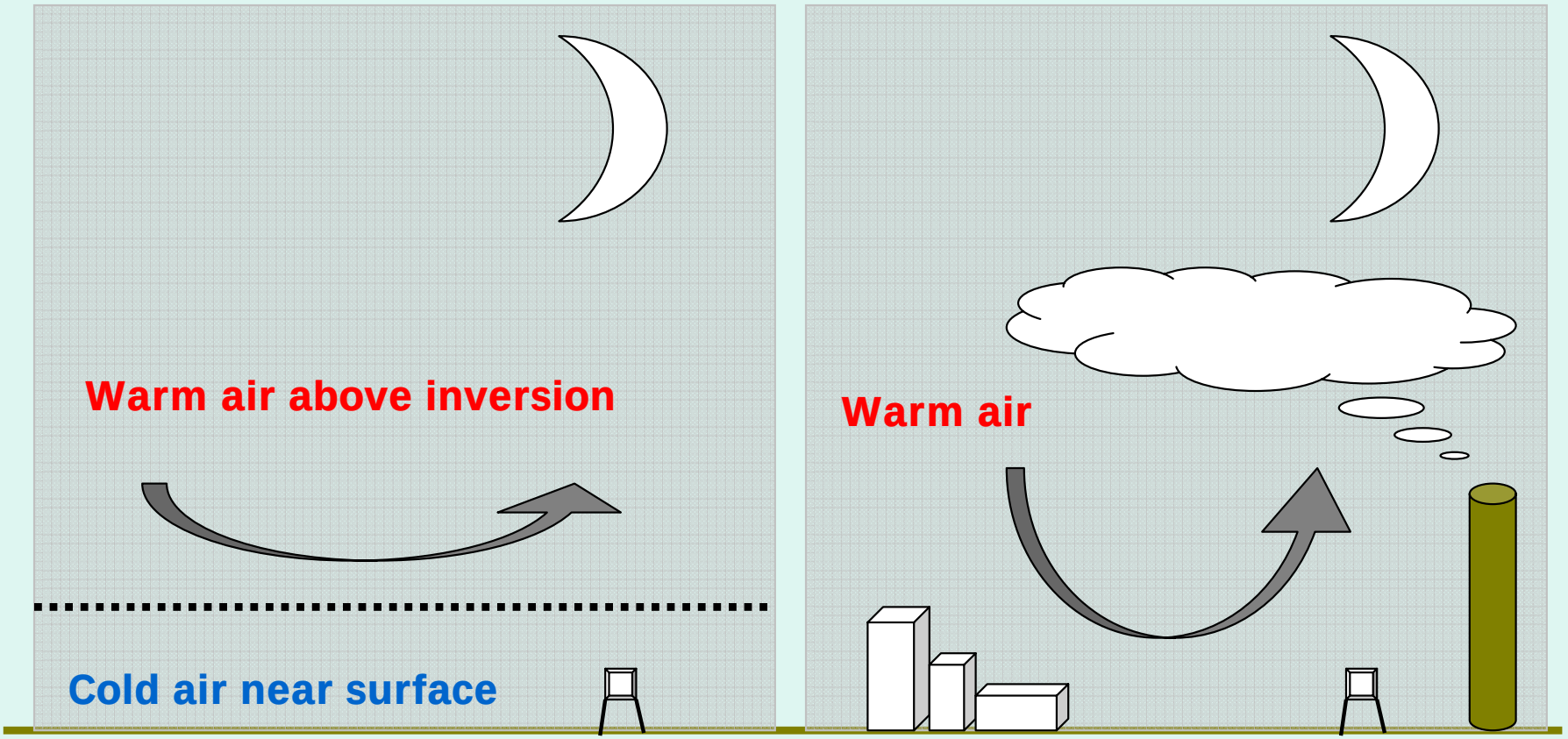
Day vs. Night Surface Temp



Nighttime - disconnected shallow layer / inversion. Temperature affected by land-use changes, buildings, farming, etc.

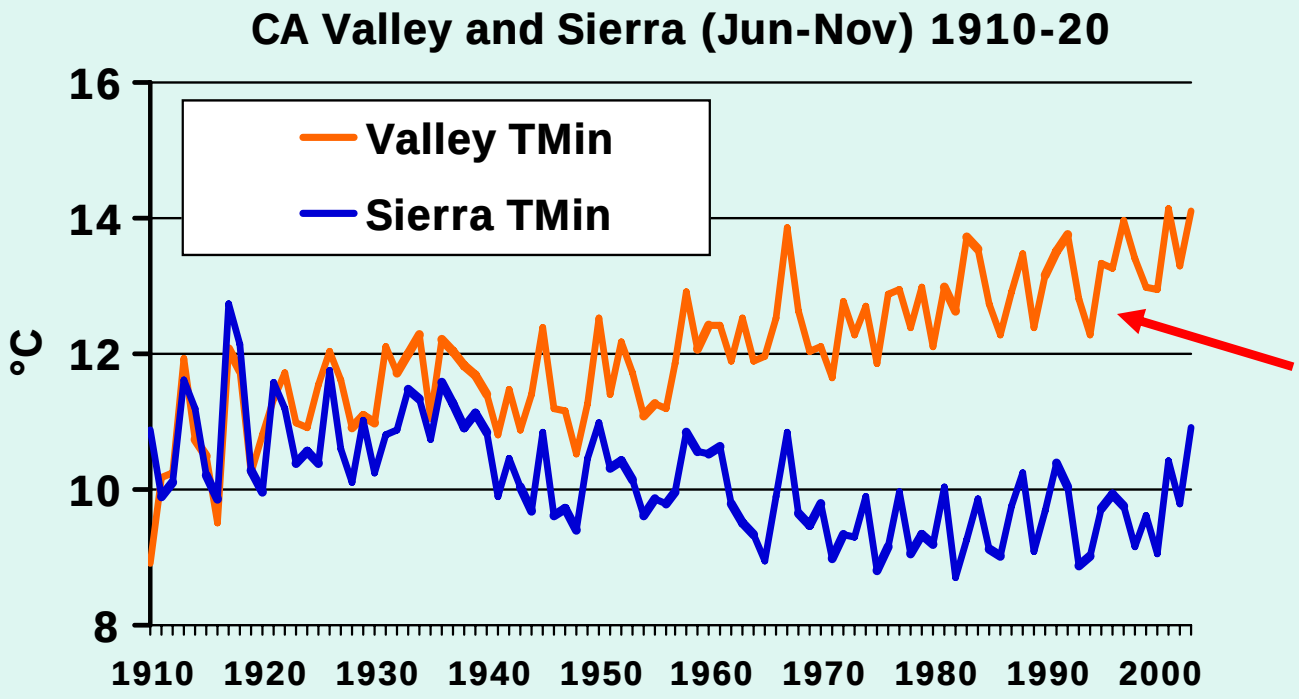
Daytime - deep layer mixing, connected with levels impacted by enhanced greenhouse effect

Night Surface Temp



Nighttime - disconnected shallow layer/inversion. But this situation can be sensitive to small changes such as roughness or heat sources.

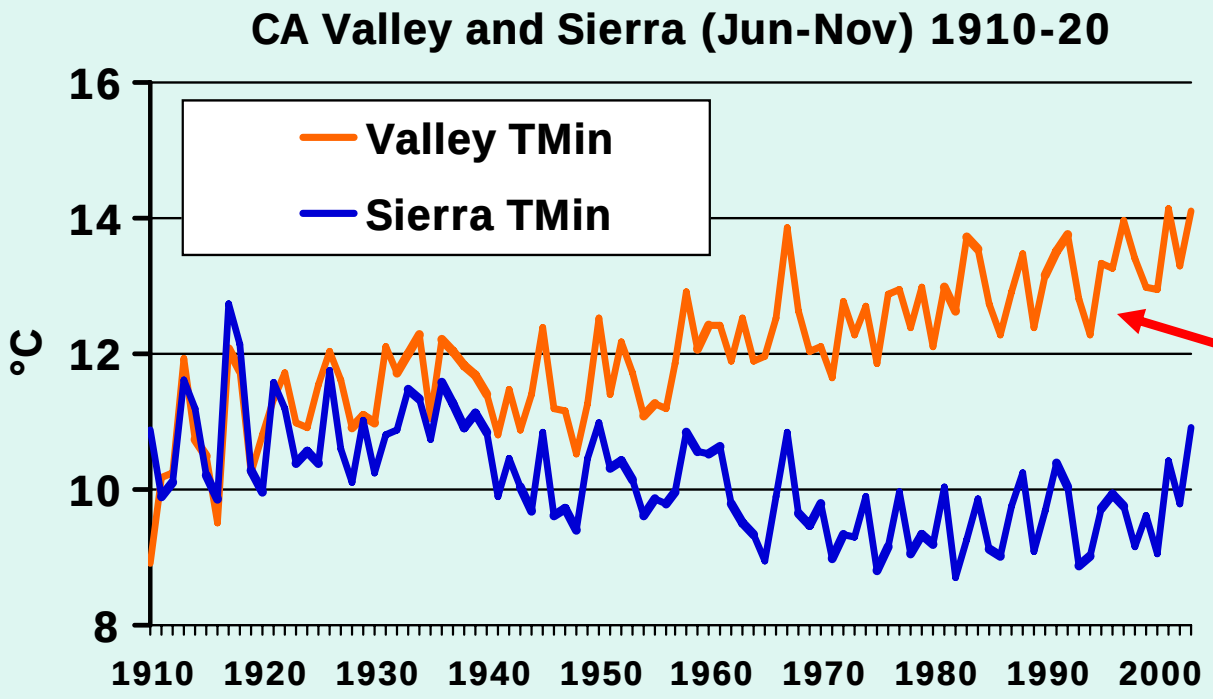
Buildings, heat releasing surfaces, aerosols, greenhouse gases, etc. can disrupt the delicate inversion, mixing warm air downward - affecting TMin.

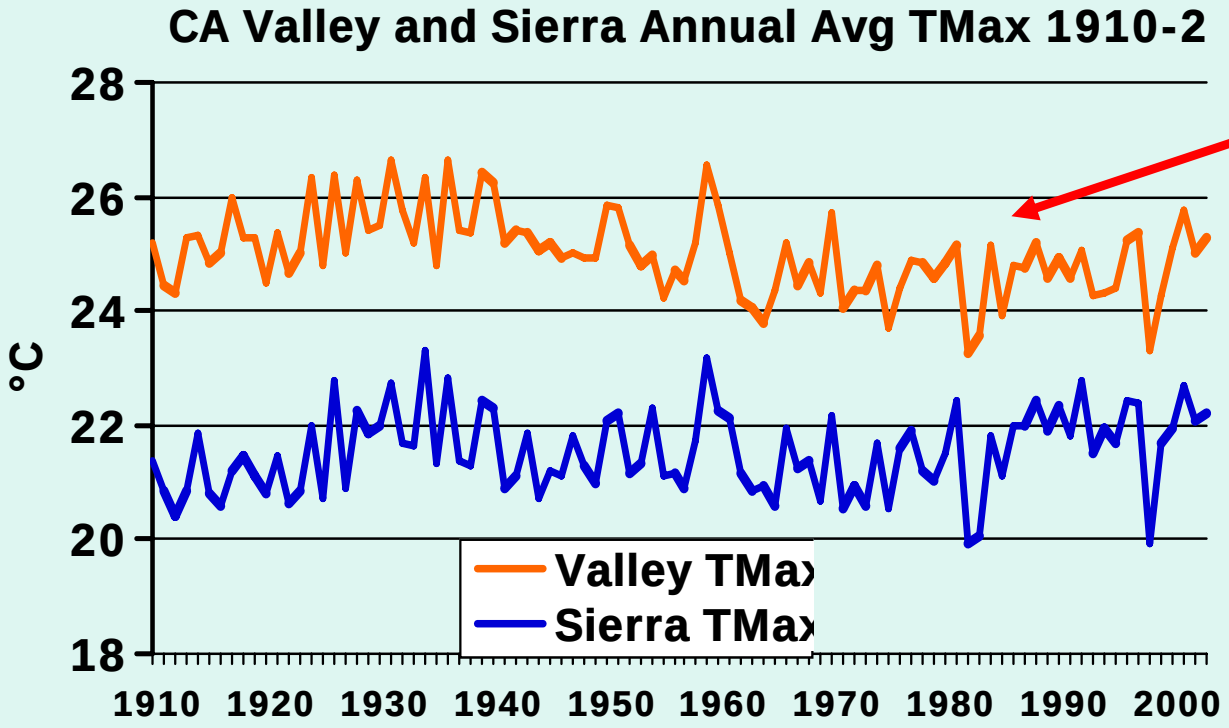


Nighttime temperatures rising but not because of greenhouse gas warming, but are included in popular datasets

Daytime temperatures tell more accurate story

Christy 2002, Christy et al. 2006, 2007, 2009, Pielke et al 2008, Walters et al. 2007





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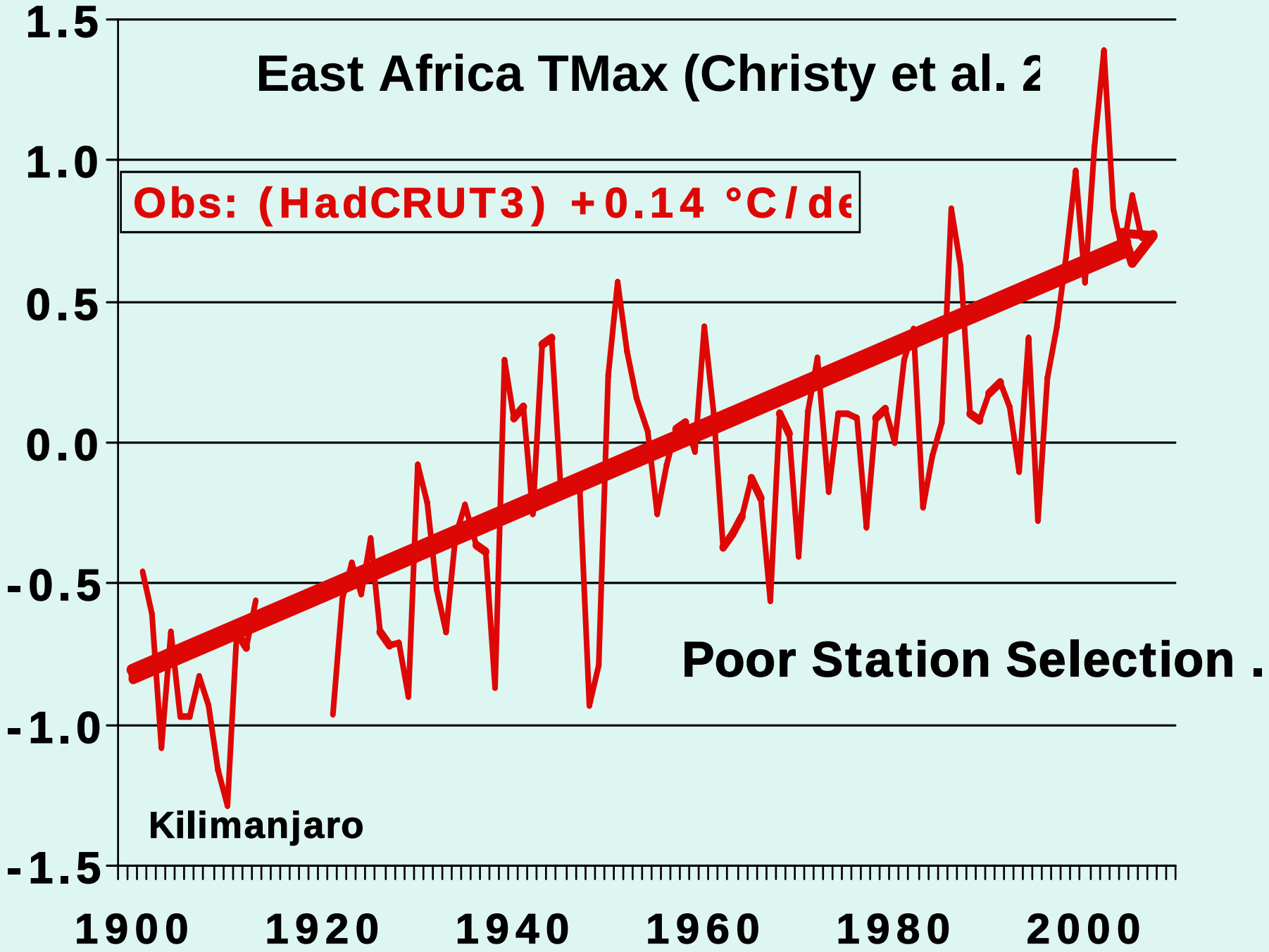
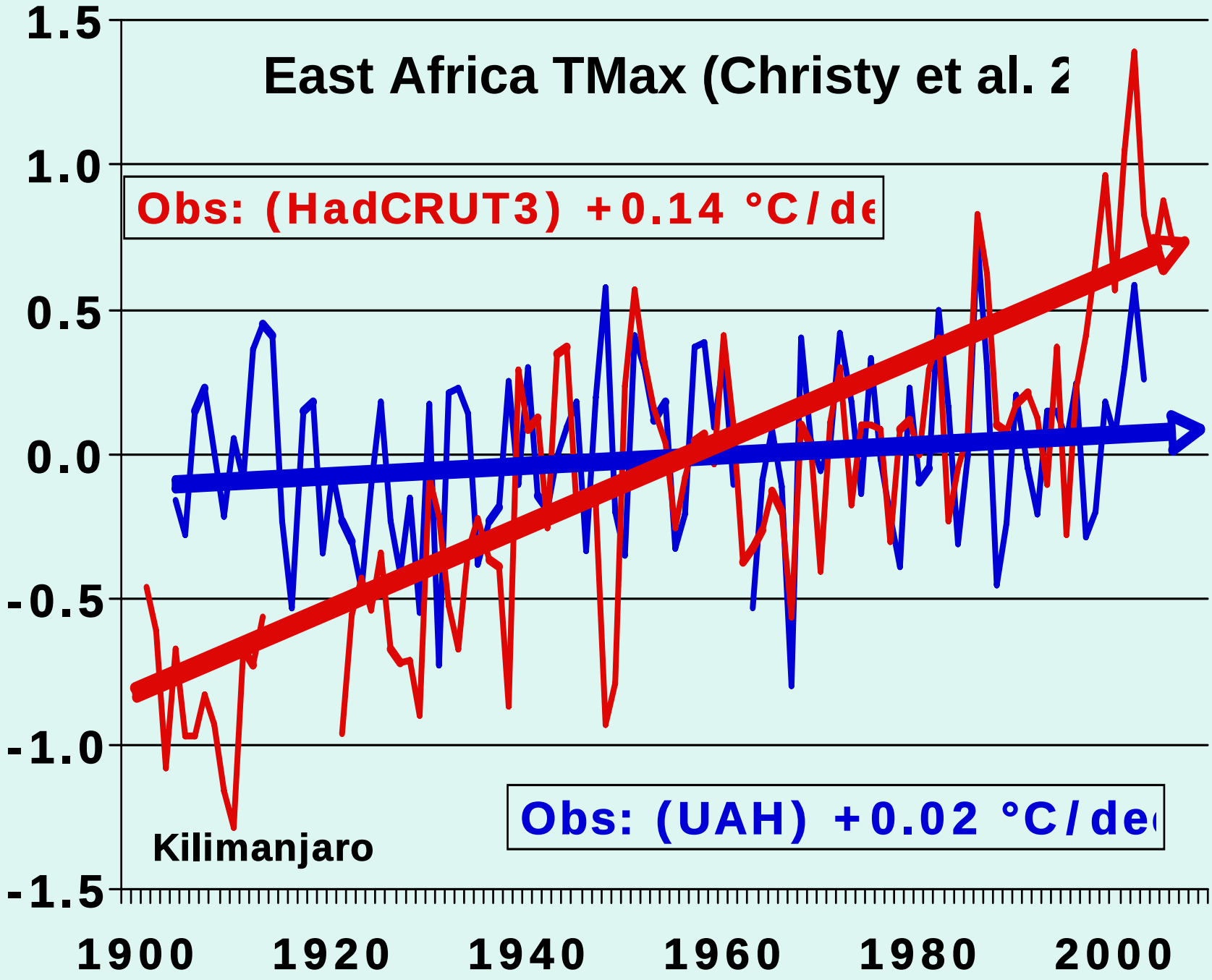
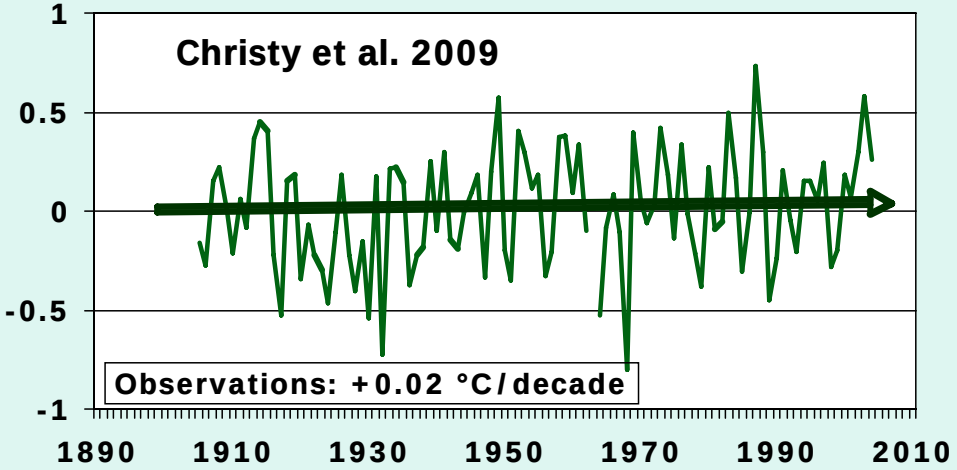
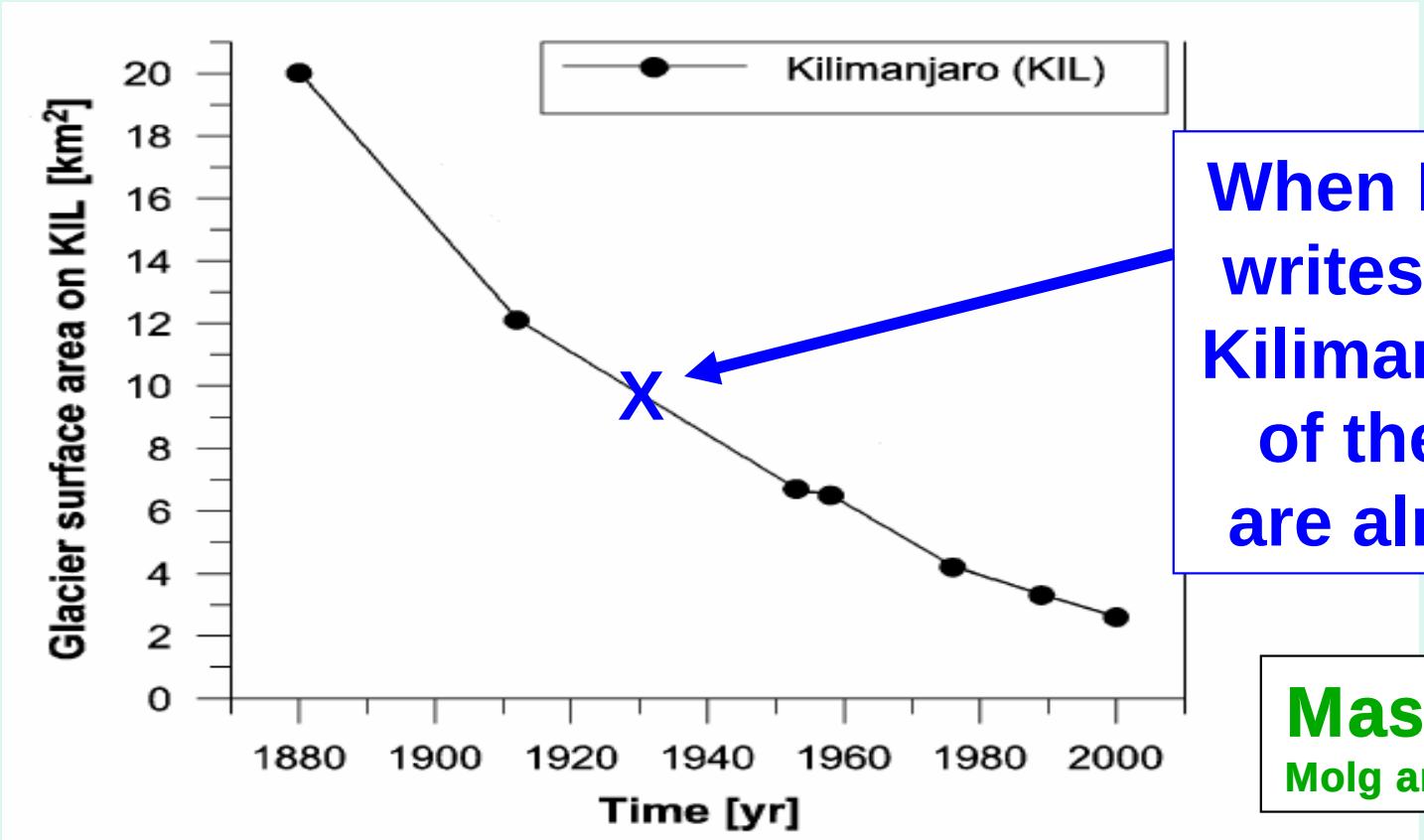

East Africa TMax (Christy et al. 2
Obs: (HadCRUT3) +0.14 °C/de
Poor Station Selection .
Kilimanjaro
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
1900
1920
1940
1960
1980
2000


East Africa TMax (Christy et al. 2
Obs: (HadCRUT3) +0.14 °C/de
Obs: (UAH) +0.02 °C/de
Kilimanjaro
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
1900
1920
1940
1960
1980
2000

East Africa TMax





When Hemingway writes "Snows of Kilimanjaro"—half of the "snows" are already gone

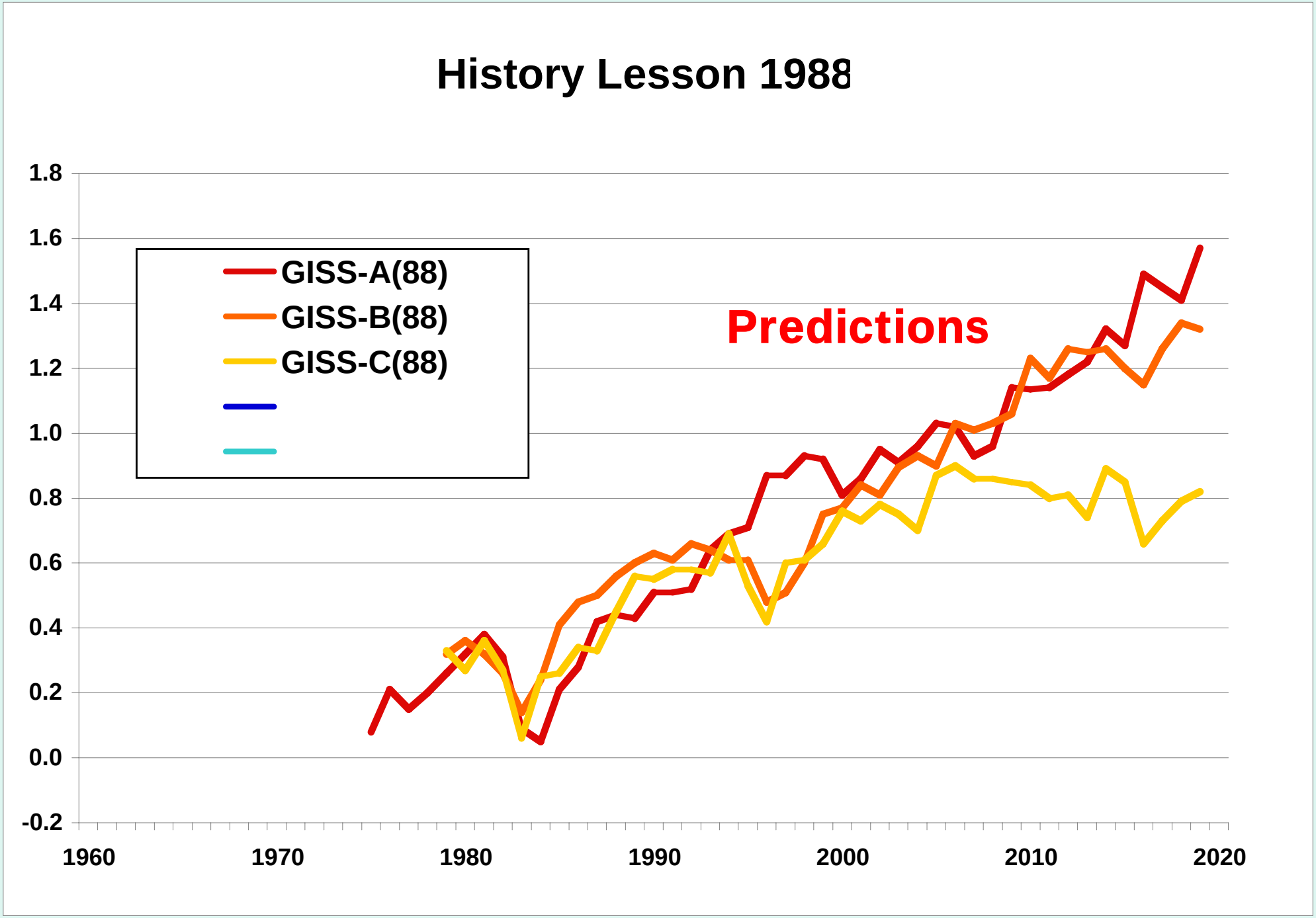
Mass Gain in 2006

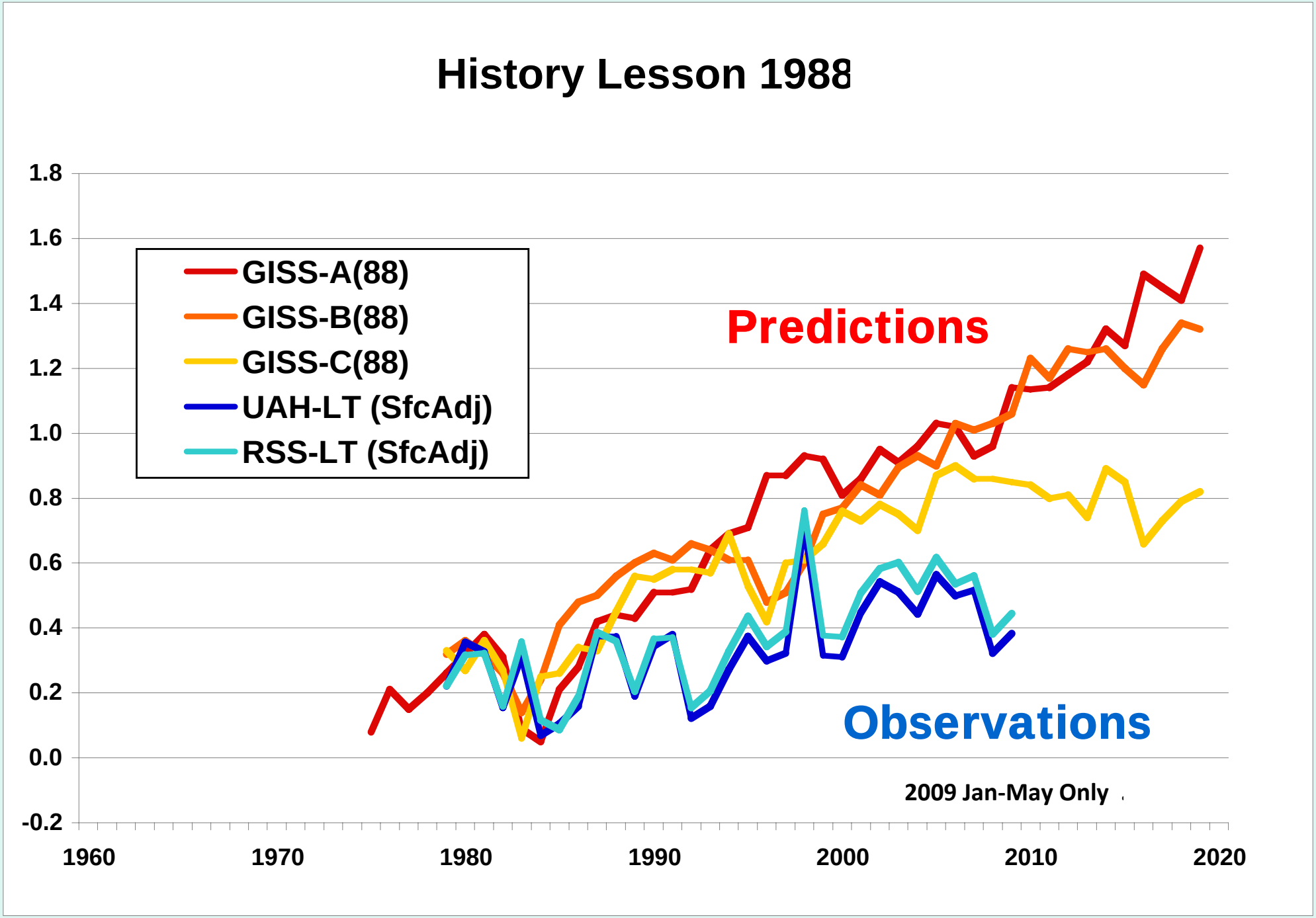
Molg and Kaser 2007

Testing Hypotheses on Global Warming

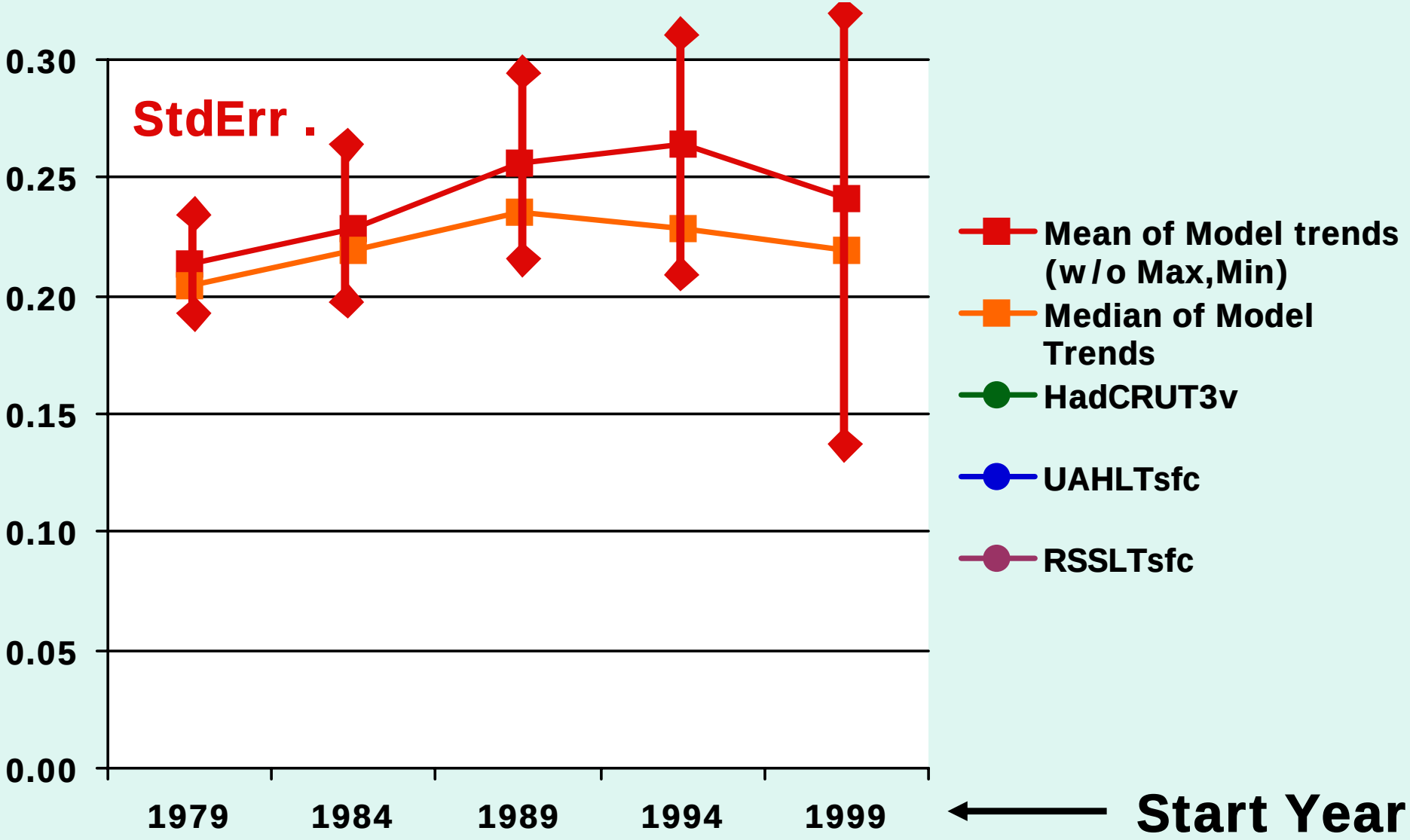
Testing Assertions based on Climate Models

Climate models overstate the warming


History Lesson 1988
GISS-A(88)
GISS-B(88)
GISS-C(88)
Predictions
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
1960
1970
1980
1990
2000
2010
2020


History Lesson 1988
GISS-A(88)
GISS-B(88)
GISS-C(88)
UAH-LT (SfcAdj)
RSS-LT (SfcAdj)
Predictions
Observations
2009 Jan-May Only
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
1960
1970
1980
1990
2000
2010
2020

Trends ending in 2008 with various start years
IPCC AR4 Model Runs (22 models) vs. Obs.



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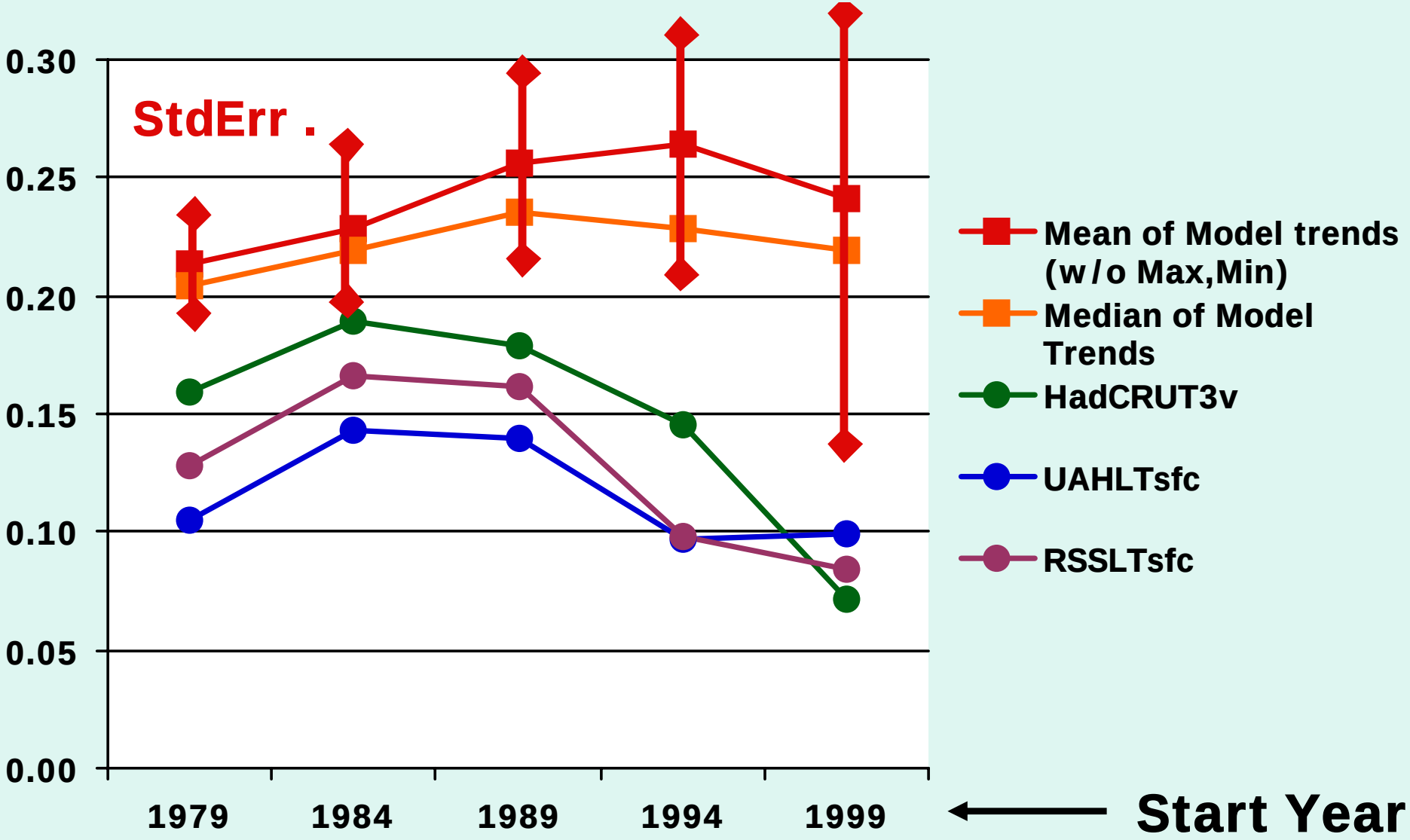
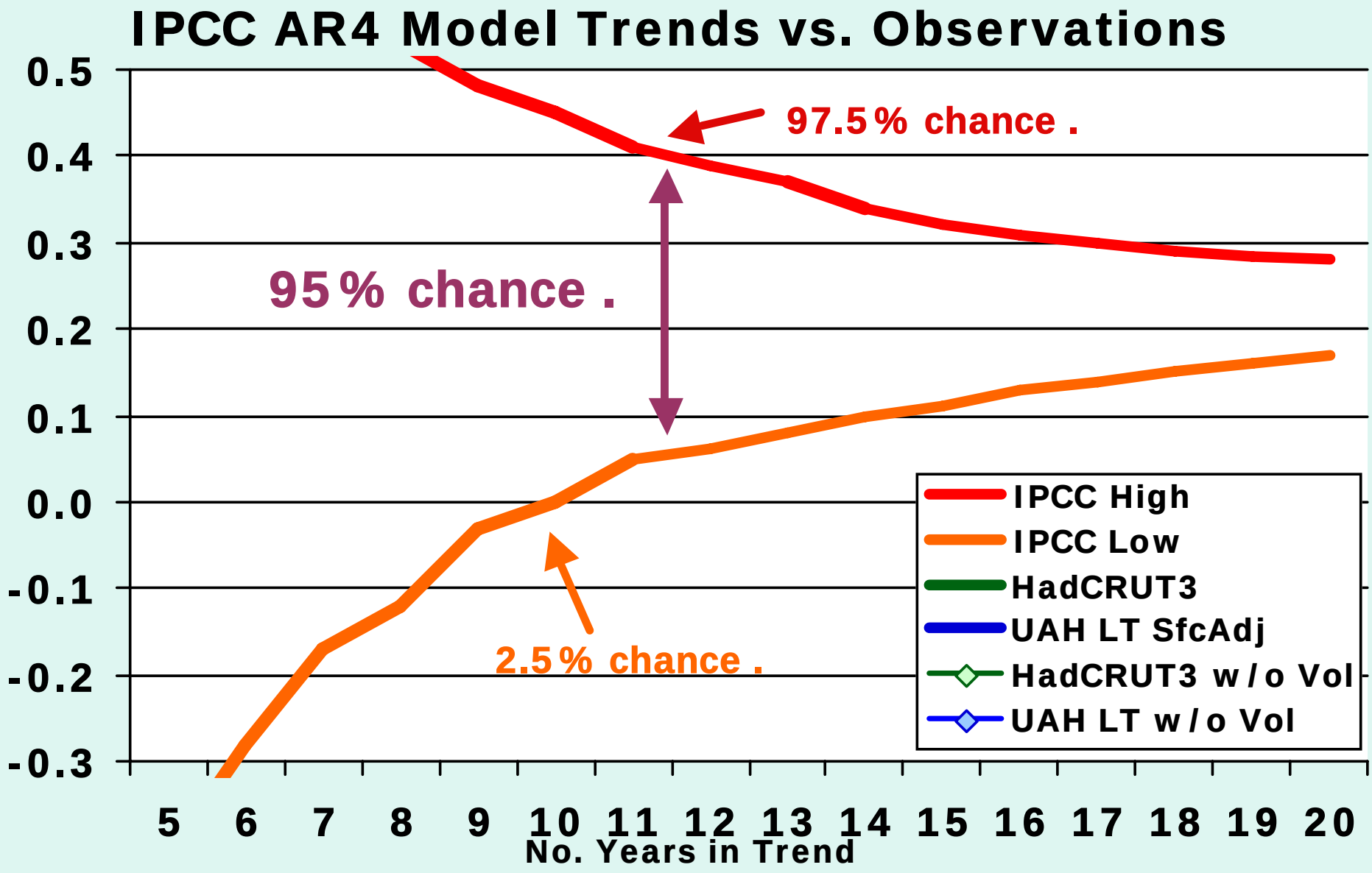
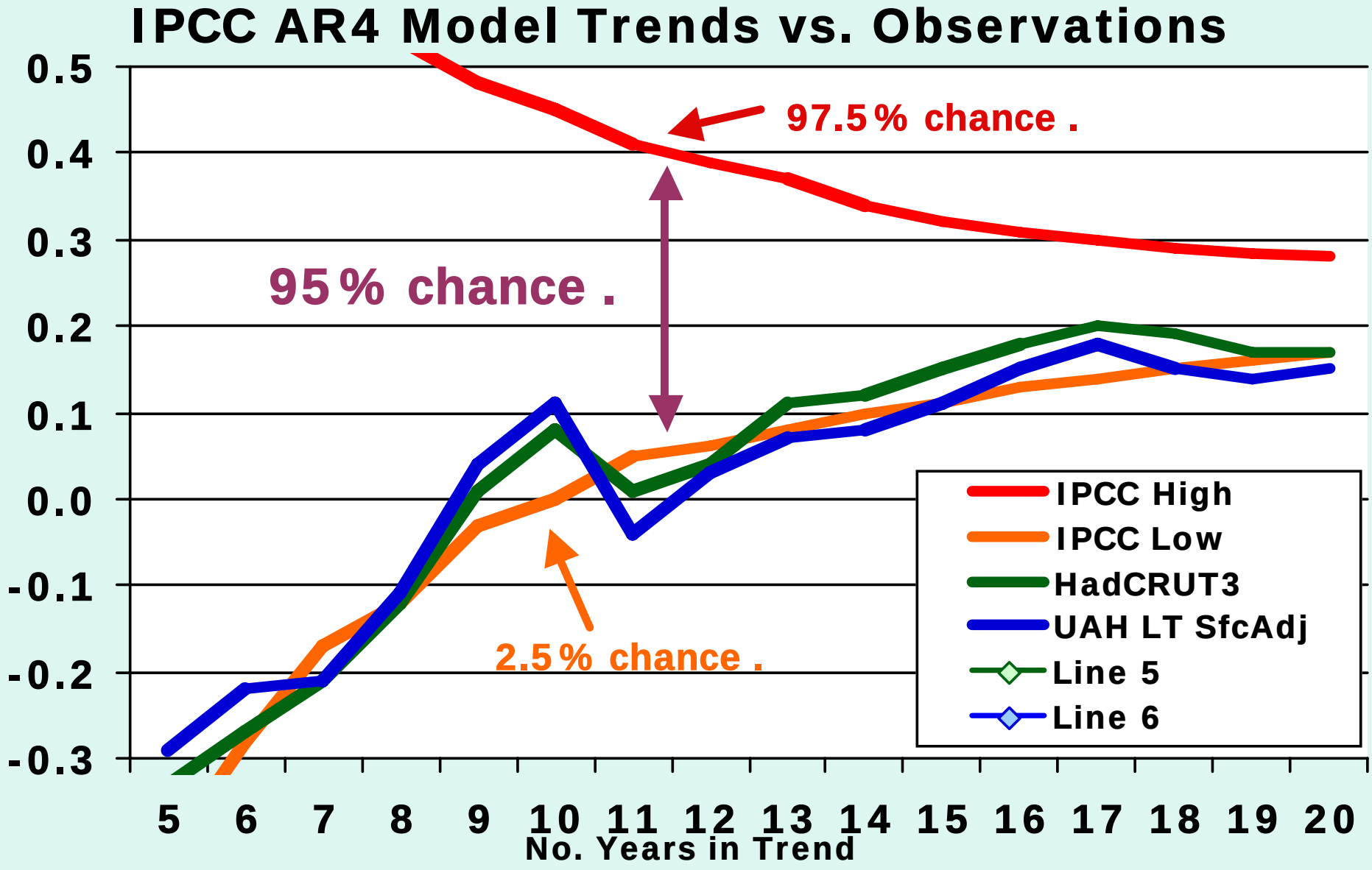
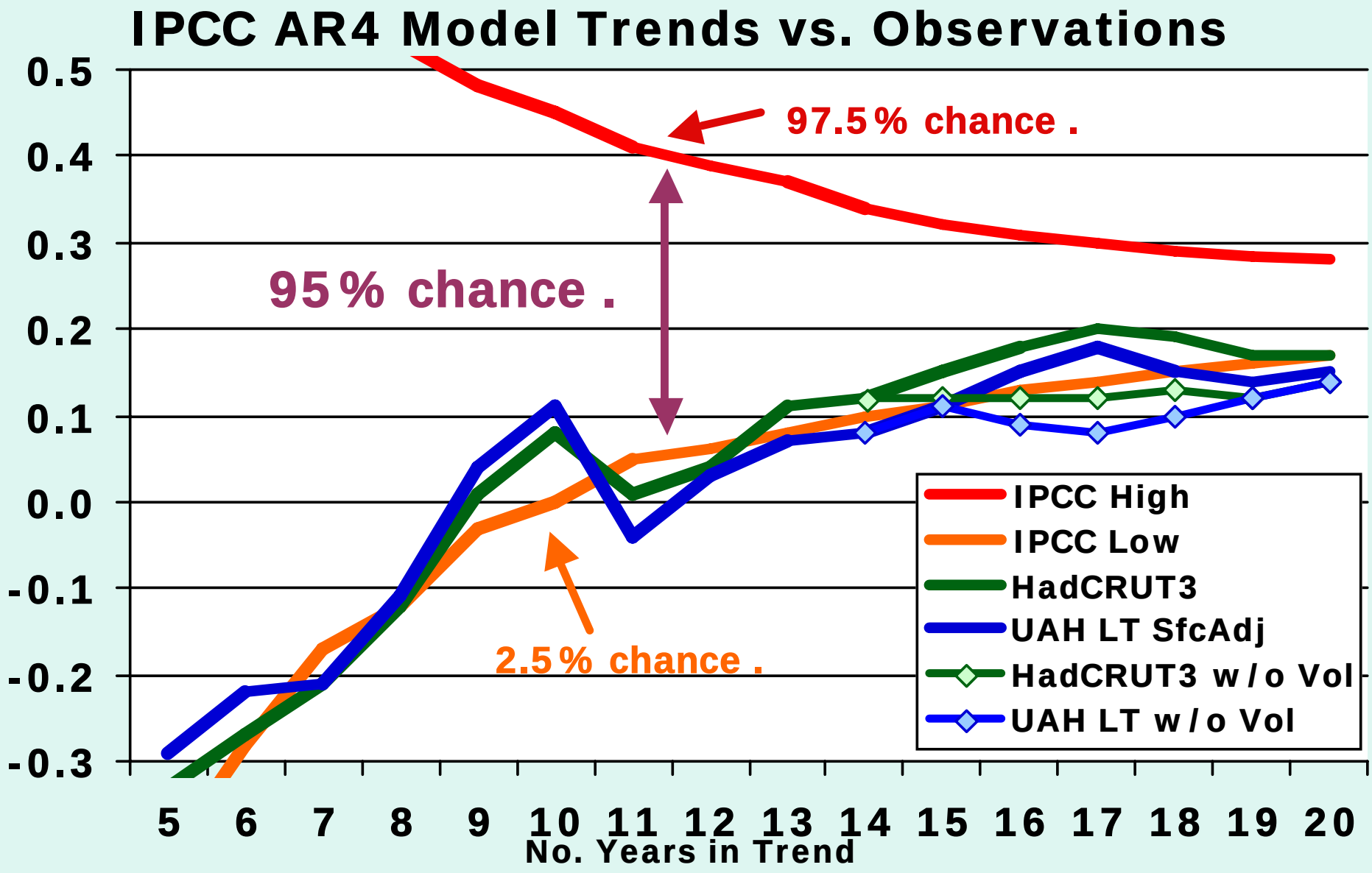



IPCC AR4 Model Trends vs. Observations
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
97.5% chance .
95% chance .
2.5% chance .
IPCC High
IPCC Low
HadCRUT3
UAH LT SfcAdj
HadCRUT3 w/o Vol
UAH LT w/o Vol
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
No. Years in Trend


IPCC AR4 Model Trends vs. Observations
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
97.5% chance .
95% chance .
2.5% chance .
IPCC High
IPCC Low
HadCRUT3
UAH LT SfcAdj
Line 5
Line 6
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
No. Years in Trend


IPCC AR4 Model Trends vs. Observations
0.5
0.4
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97.5% chance .
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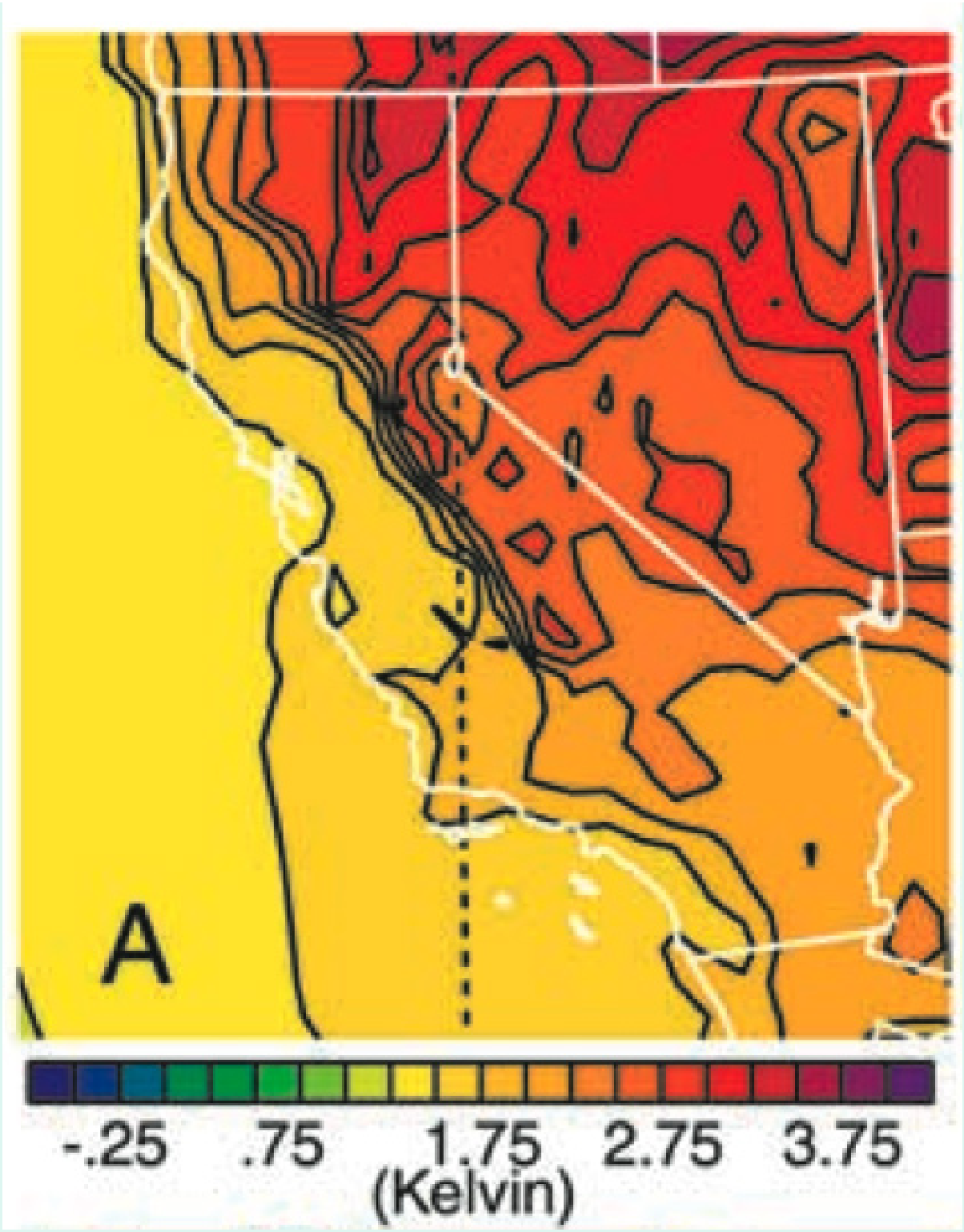
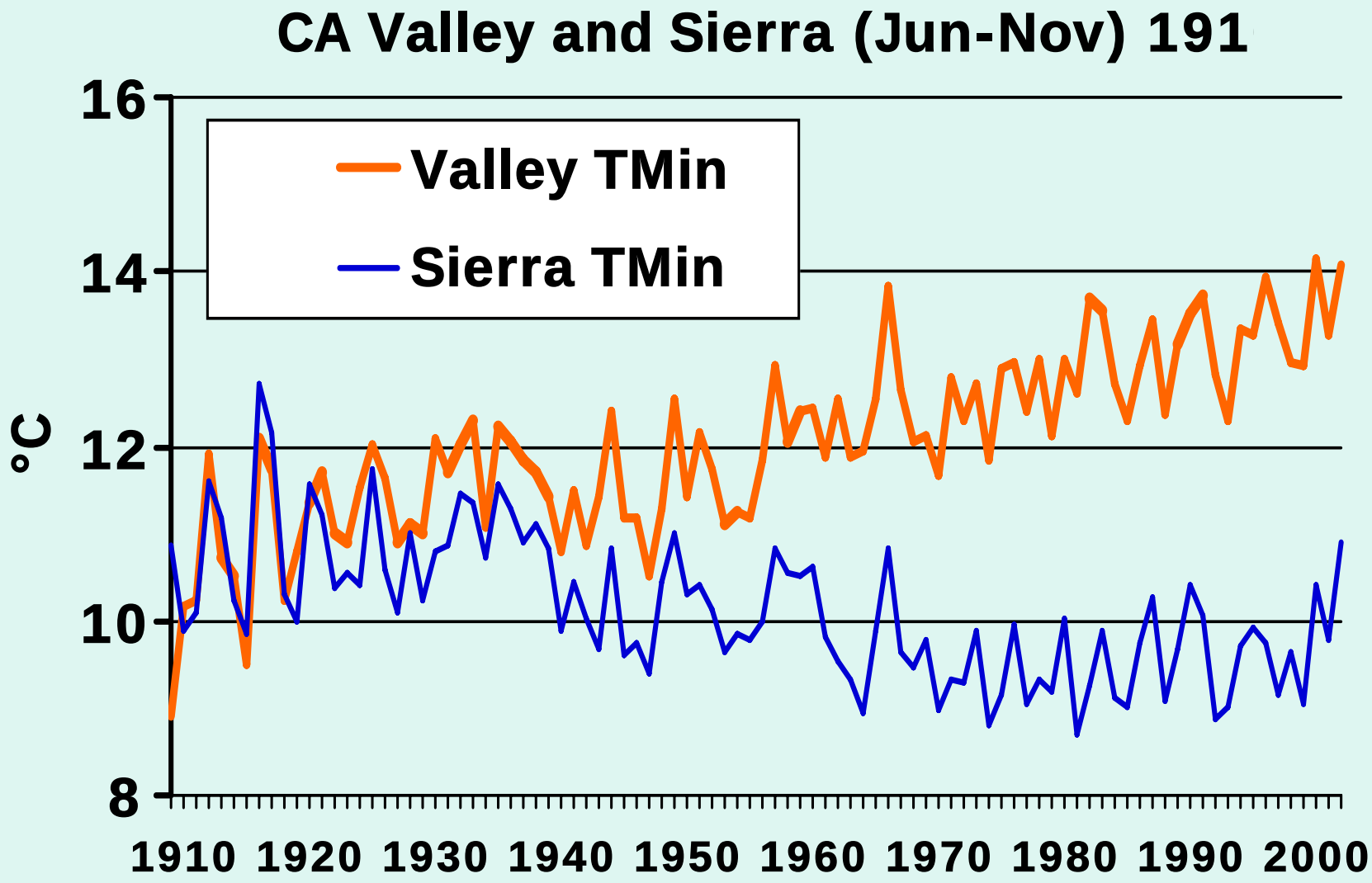
HadCRUT3 w/o Vol
UAH LT w/o Vol
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
No. Years in Trend



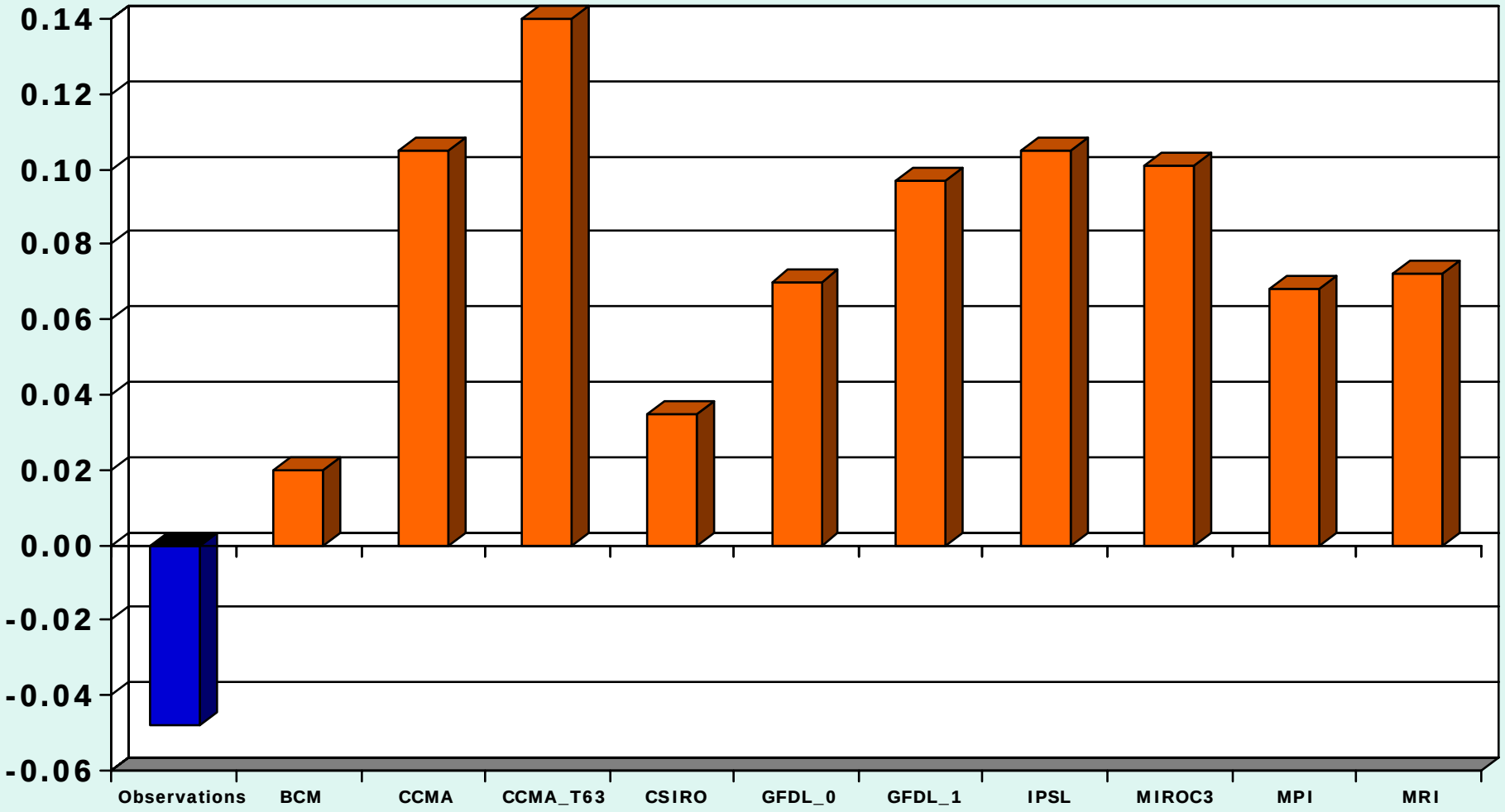
Sierras warm faster than Valley in model simulations

Snyder et al., 2002



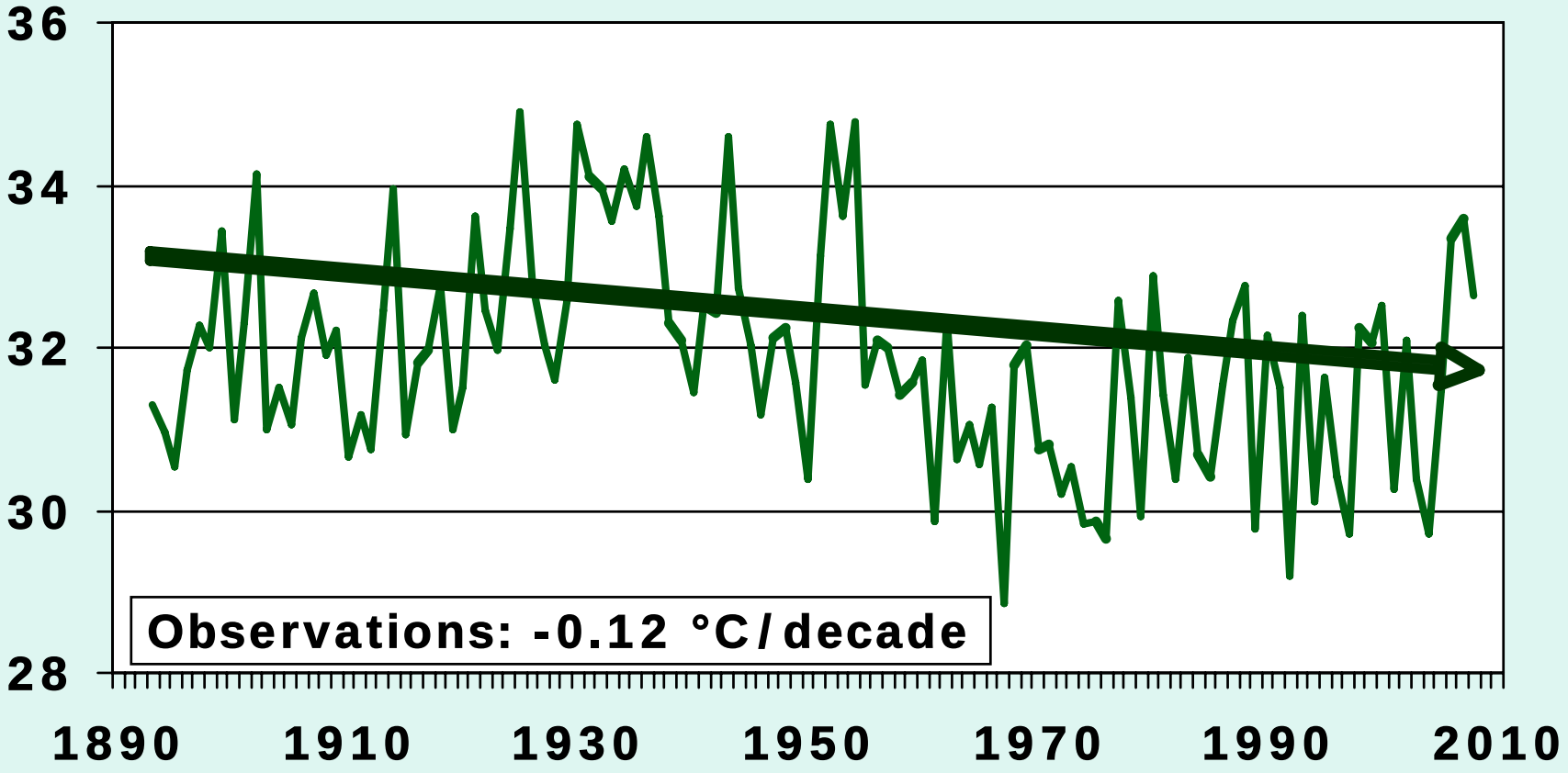
Christy et al. 2006, 2007

Mean Surface Temperature Southeast USA 1899-2003



Observation **Models**

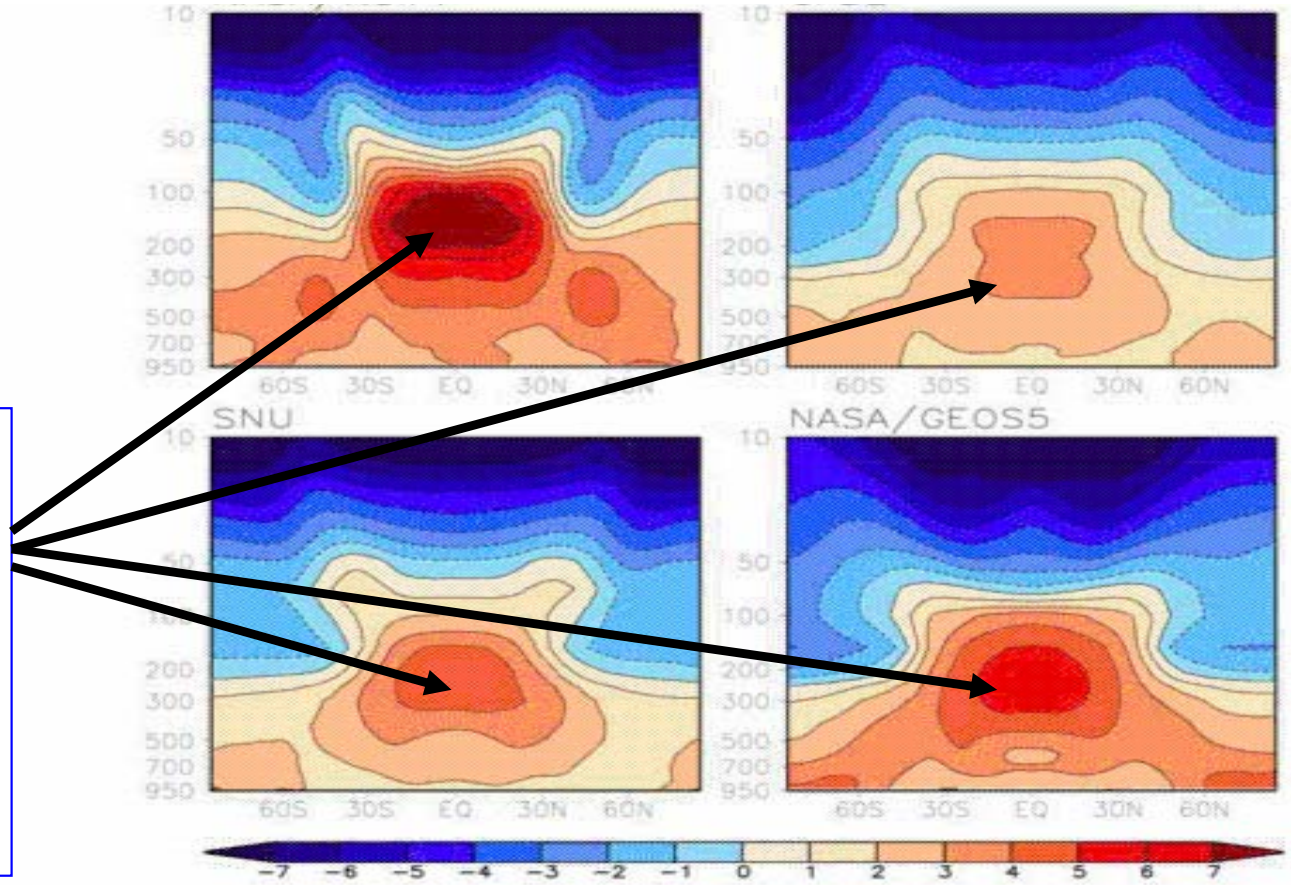
No. Alabama Summer TMax Temperatures 1893-2008



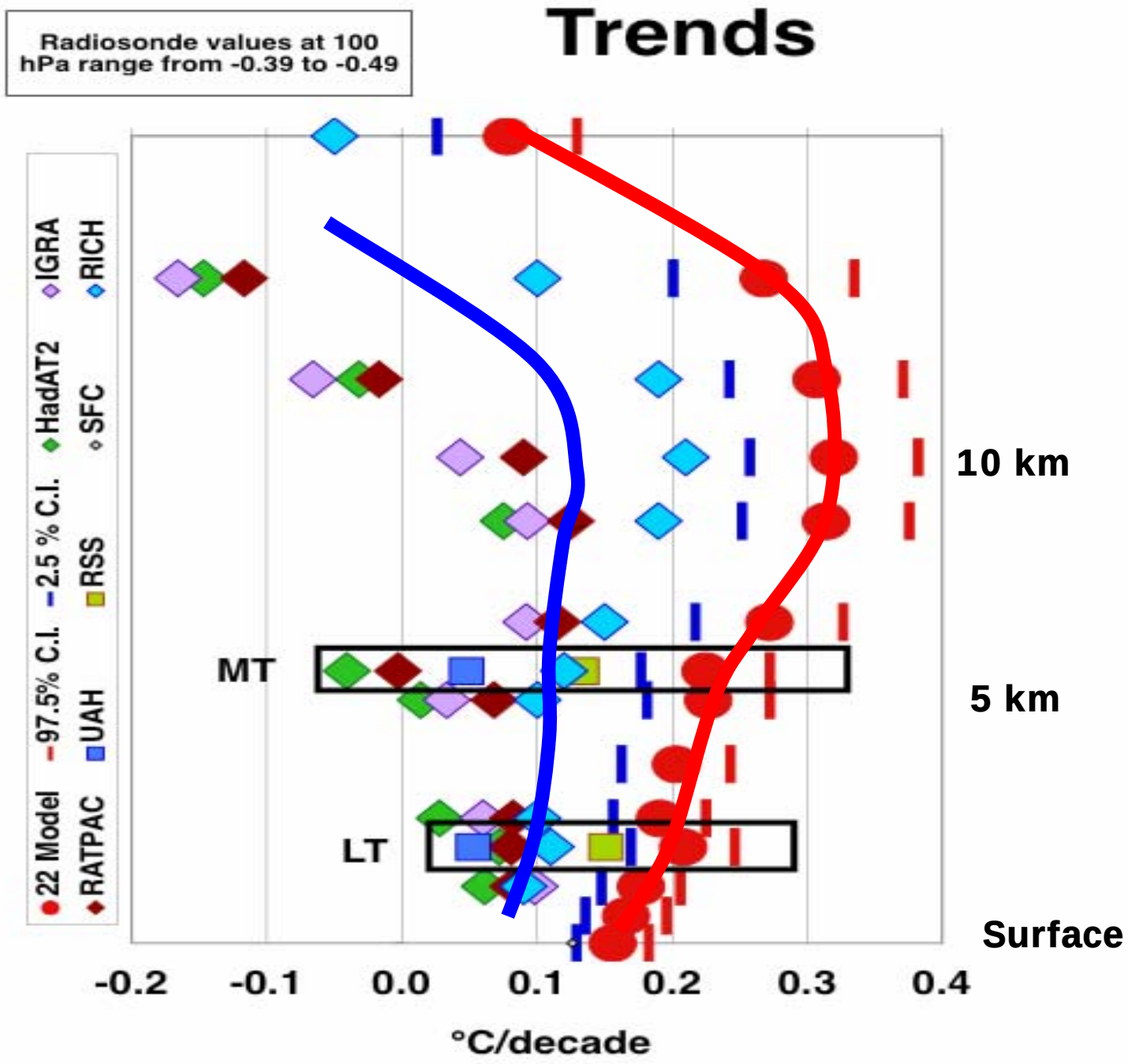
Christy 2002, updated to 2008

Vertical Temperature Change due to Greenhouse Forcing in Models

Model Simulations of Tropical Troposphere Warming: About 2X surface
Lee et al. 2007

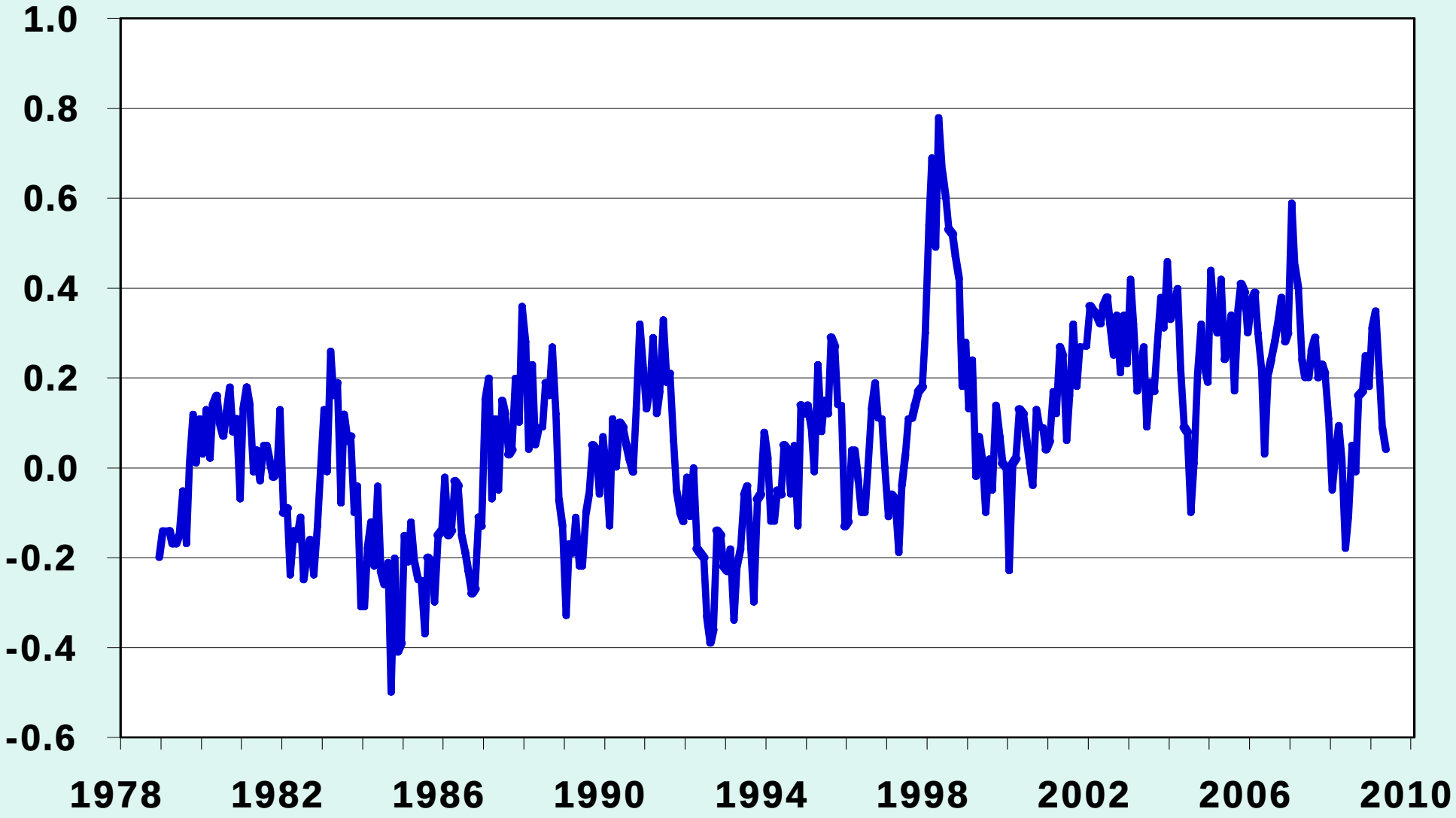


Zonal mean distributions of temperature change (2×CO2–Control). Units are Kelvin.



Douglass et al., 2007

Global Bulk Atmospheric Temperatures
UAH Satellite Data



Warming rate 50% of model projections

Christy and Norris 2006, 2009, Christy et al. 2007

Evidence Thus Far

- **Global surface temperature is rising, but in a way inconsistent with model projections of GHG forcing**
- **Overall decline in ice mass, with sea level rise of about 1” per decade**
- **Severe weather not becoming more frequent**

The Dilemma of “doing something about global warming”

- **Meet significant growth in energy demand**
- **Reduce CO2 emissions substantially and thus “manage the climate”**

What did California do?

- **Force a limit on emissions of Light Duty Vehicles**
- **California AB 1493 seeks to reduce tail-pipe emissions of CO2 by 26% by 2016**
- **11 NE States adopted AB 1493**
- **Trial in Federal Court (Burlington VT) to address the engineering, legal and climate issues of AB 1493, April-May 2007**

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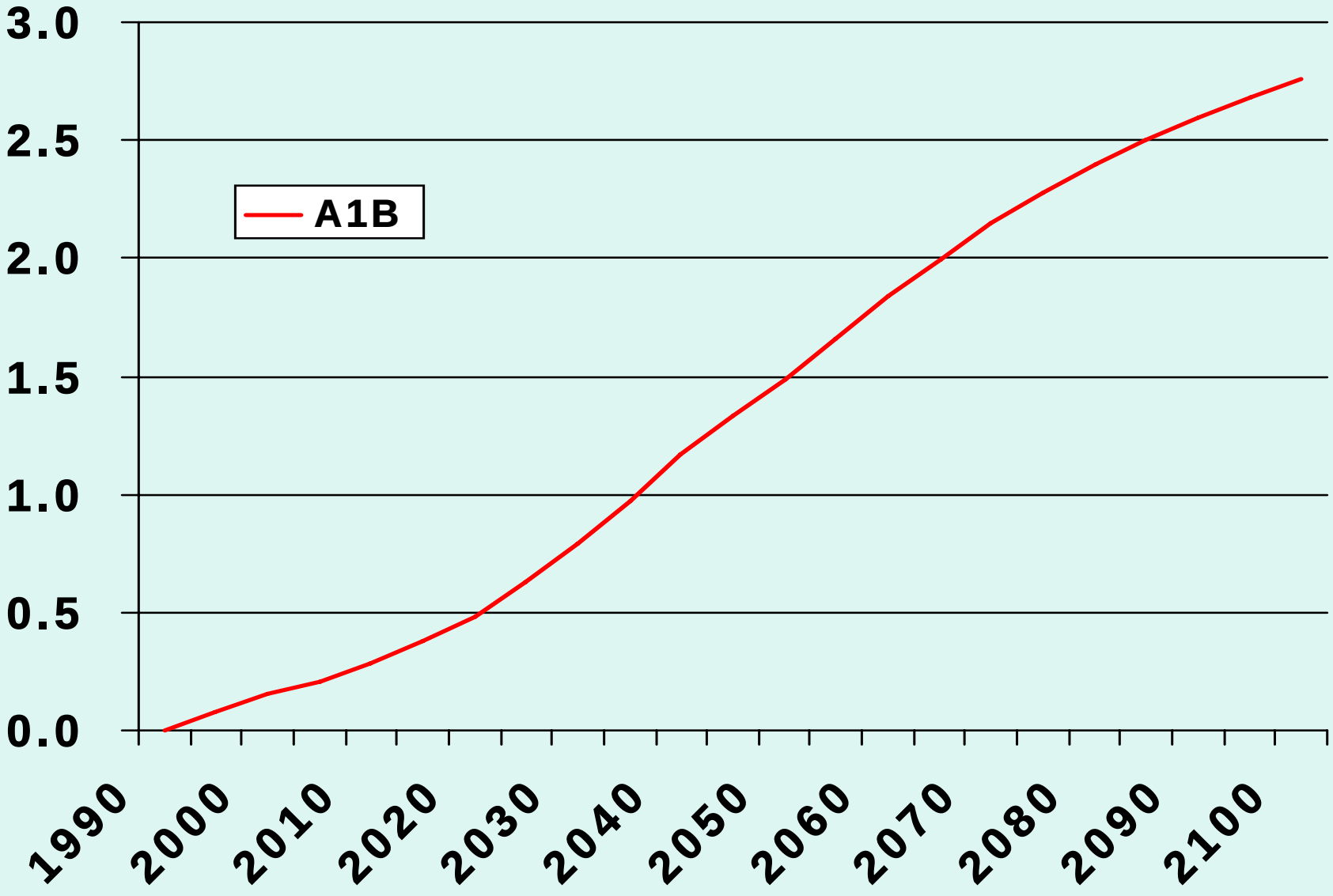
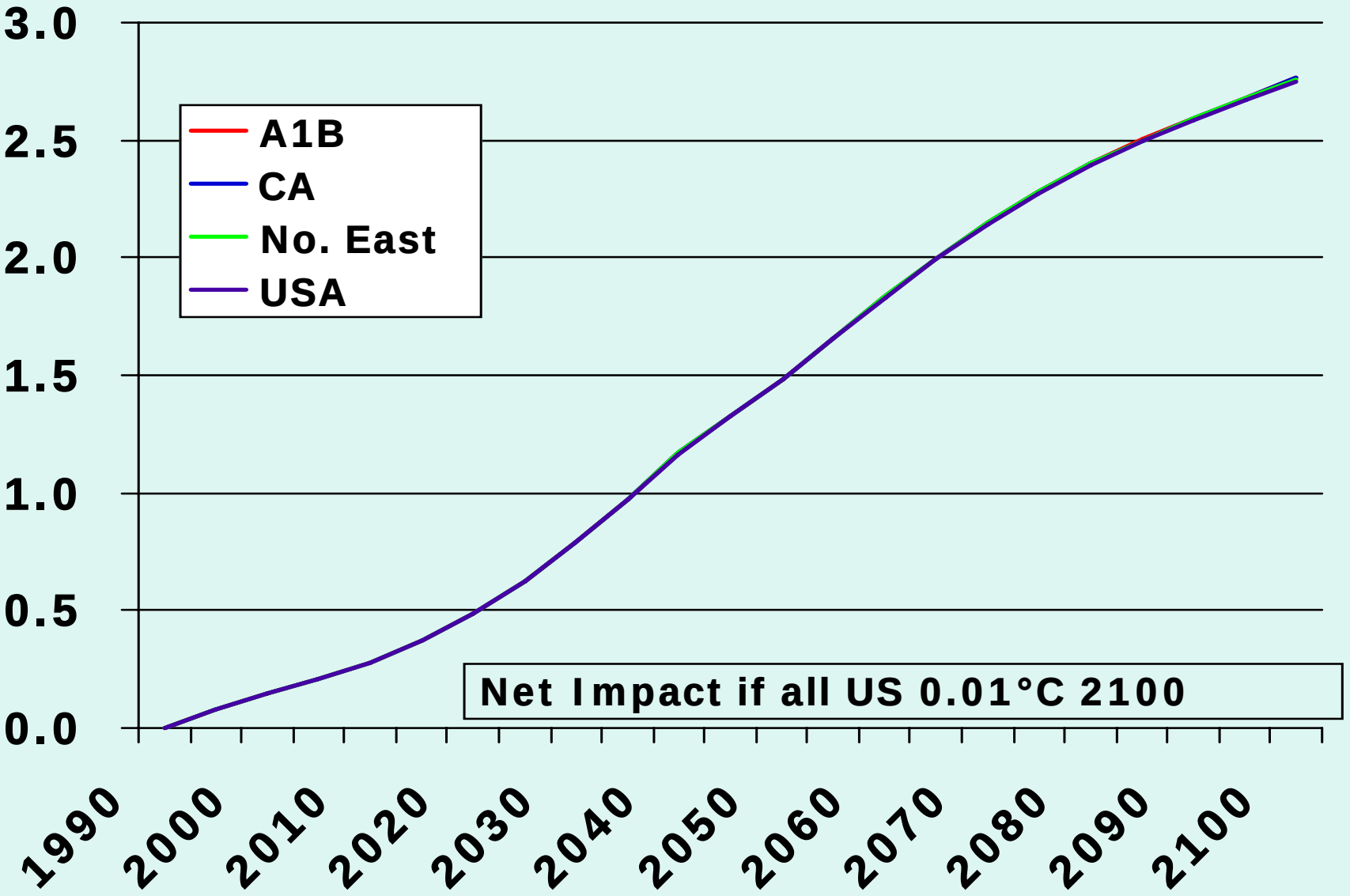
IPCC “Best Estimate”



California AB 1493
26% CO2 reduction LDV 2016



The temperature impact on global temperatures if the *entire world* adopted AB 1493 is an undetectable 0.03°C.

Latest sensitivity results suggest the impact is even smaller.

Judge William Sessions III Ruling 12 Sept 2007

AB 1493 is legal

Pg 46

"Plaintiffs' expert Dr. Christy estimated that implementing the regulations across the entire United States would reduce global temperature by about 1/100th (.01) of a degree by 2100. Hansen did not contradict that testimony."

Questions

- **What *could* make a "dent" in forecasted global temperatures?**
- **What would be the impact of building 1000 nuclear power plants and putting them on-line by 2020?**
  - **(average 1.4 gigawatt output each)**

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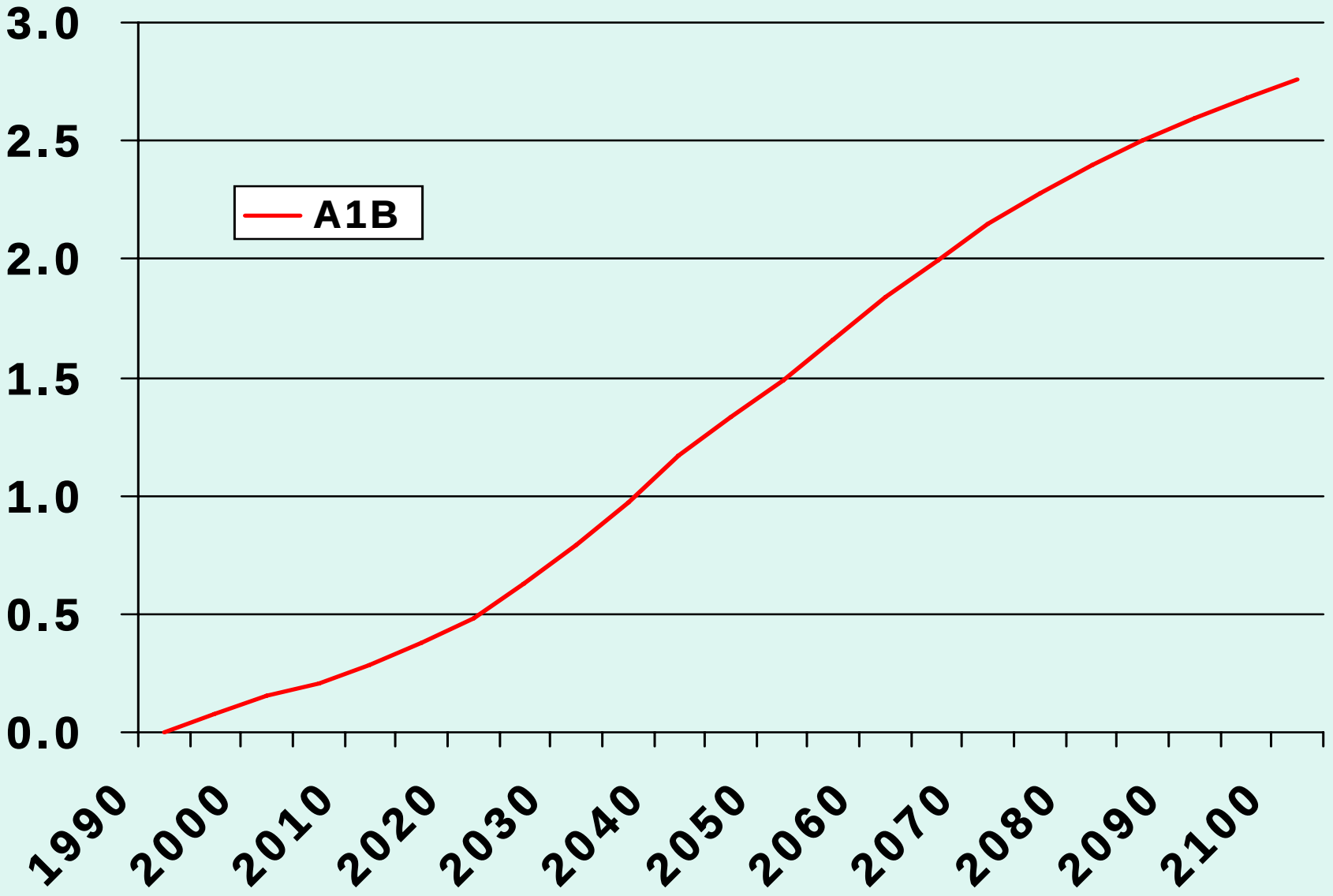
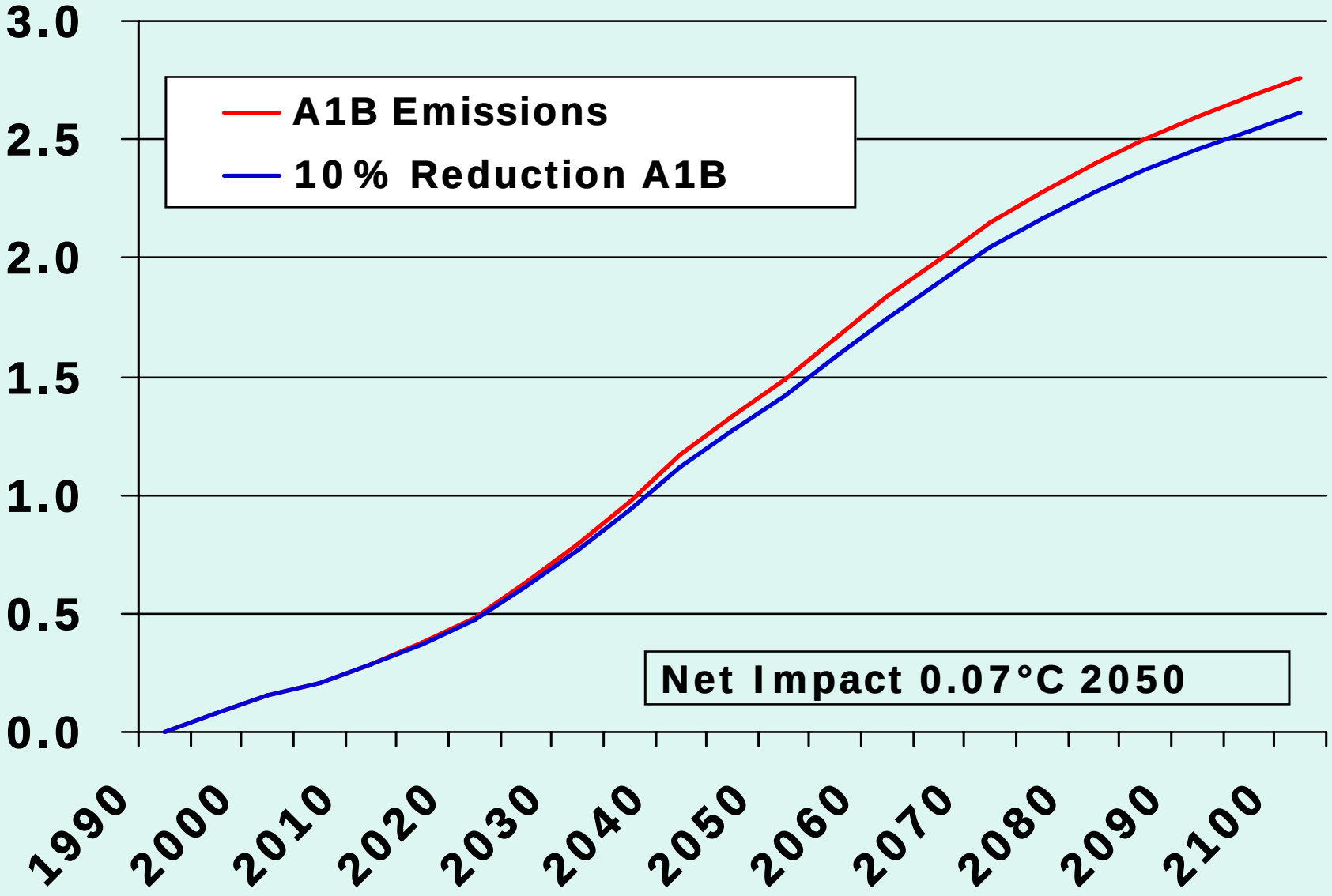


Net Effect of 10% CO2 emission reduction to A1B Scenario (~1000 Nuclear Plants by 2020)



Main Points:

Without energy, life is brutal and short.

Proposed "do-something-about-global-warming" initiatives will not detectably alter whatever the climate is going to do.

Making energy more expensive is a regressive tax and an economic development inhibiter

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Without energy, life is brutal and short.

Proposed “do-something-about-global-warming” initiatives will not detectably alter whatever the climate is going to do.

Making energy more expensive is a regressive tax and stops economic development

‘We should always begin our scientific assessments with this statement, “At our present level of ignorance, we think we know …’ ”

Paraphrase of Mr. Richard Mallory
Physics Teacher
Hoover High School, Fresno CA
1968