

**Some Things**  
***I Think I Know***  
**About the Climate**

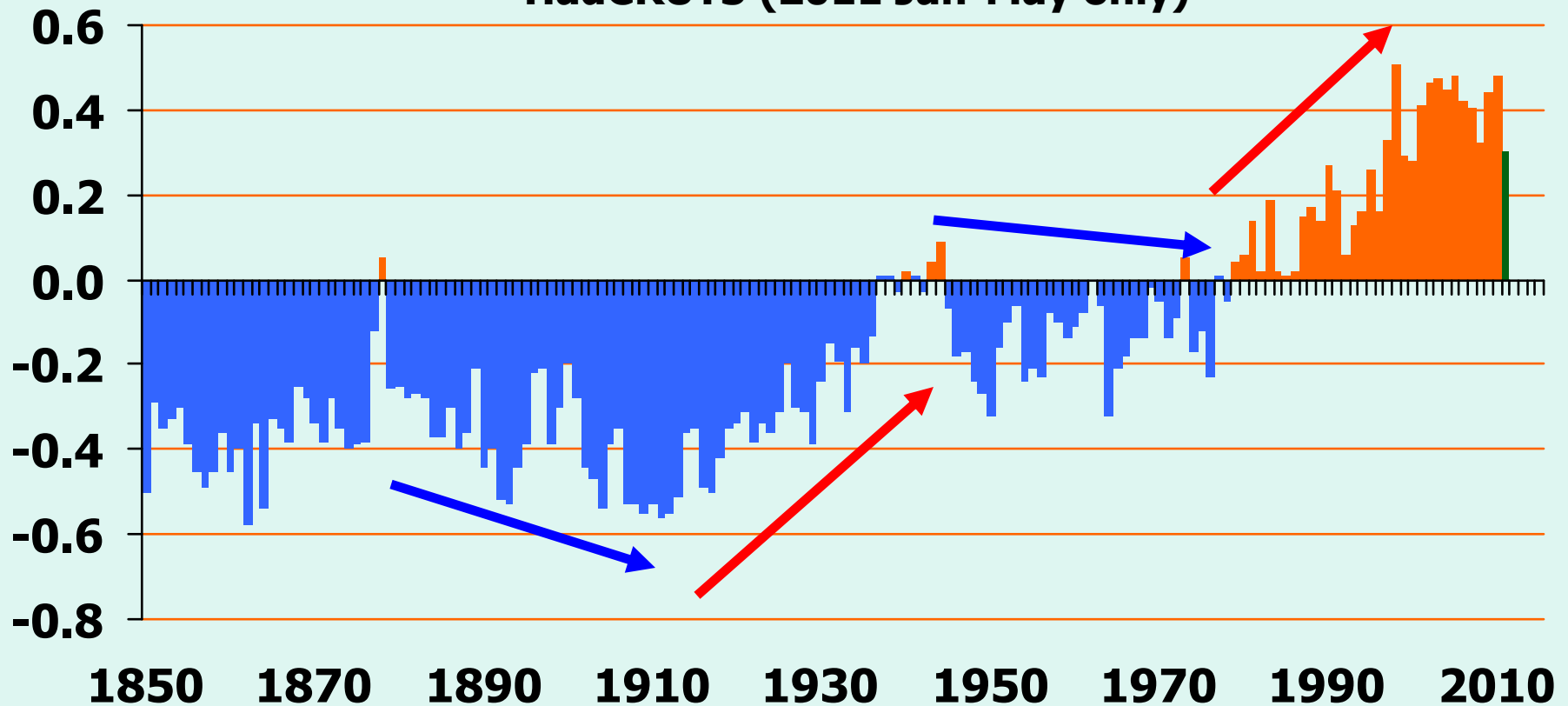
**John R. Christy**  
**University of Alabama in Huntsville**  
**Alabama State Climatologist**

**We at UAHuntsville build  
climate datasets from  
scratch to test assertions  
(hypotheses) being made  
about the climate system**

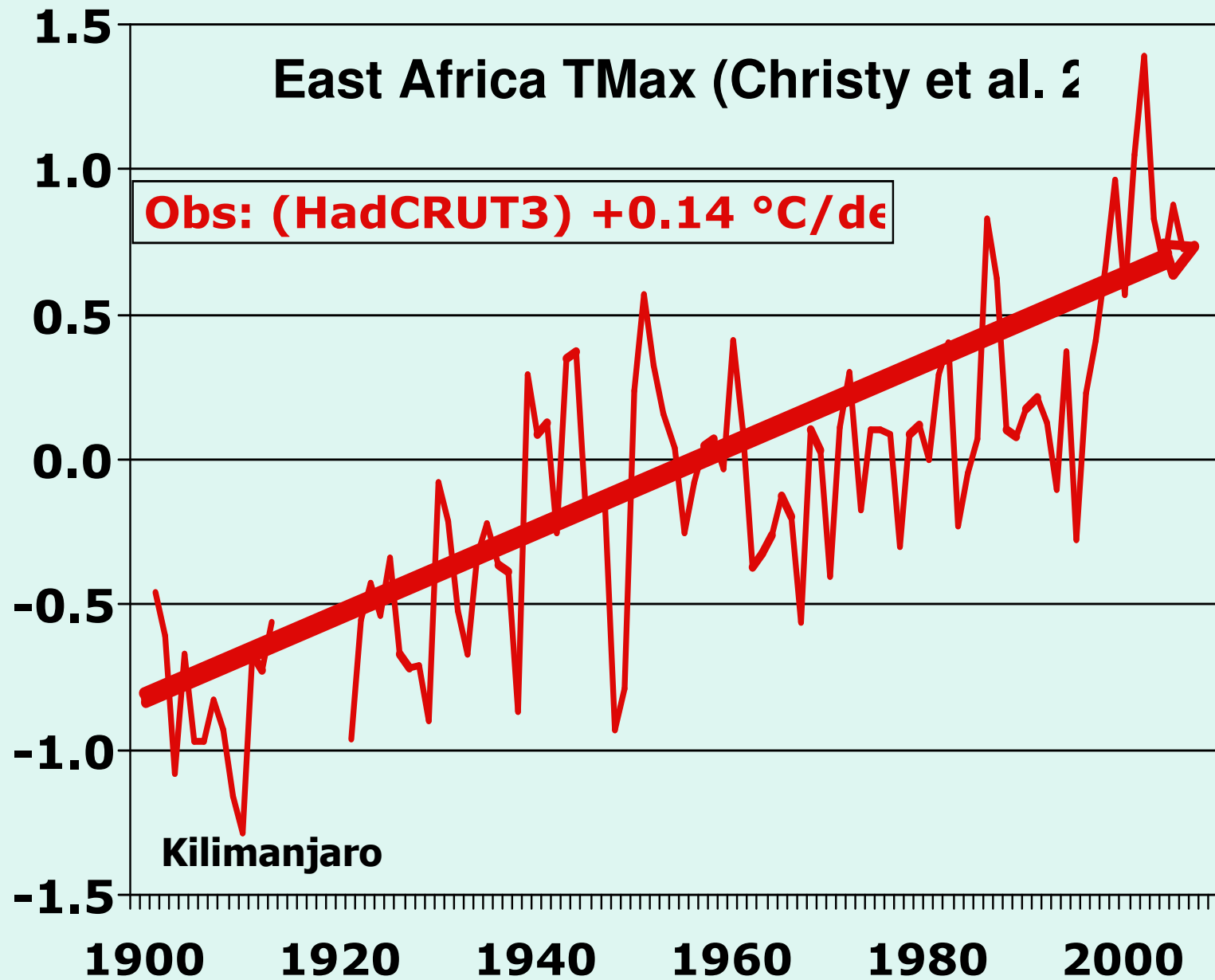
# "Global" Surface Temperature

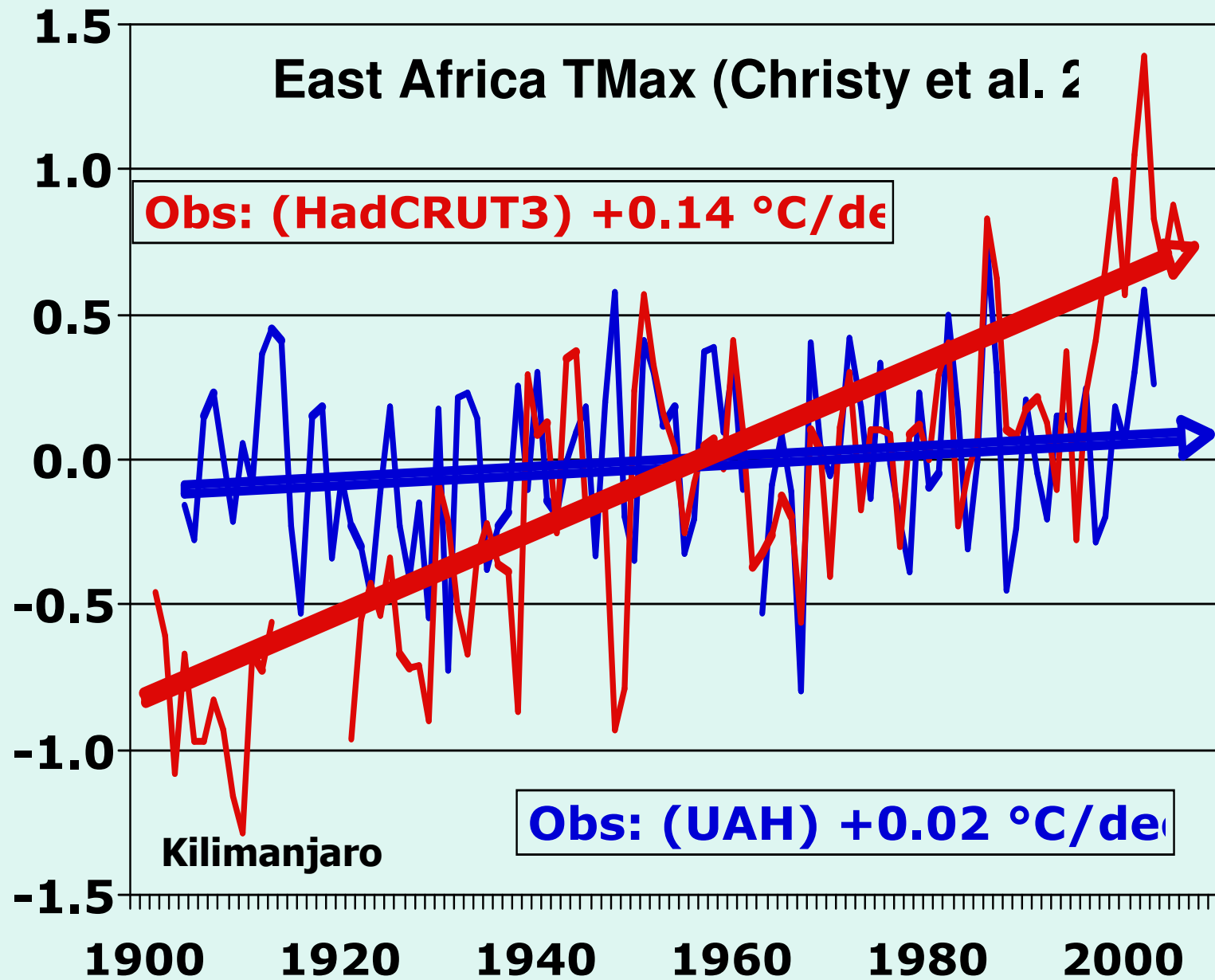
**Tmean is Average of Day and Night**

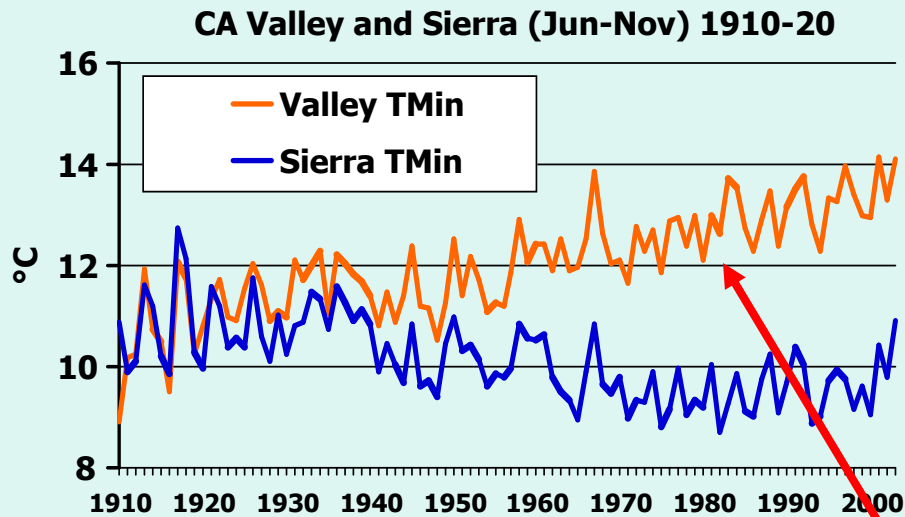
HadCRUT3 (2011 Jan-May only)



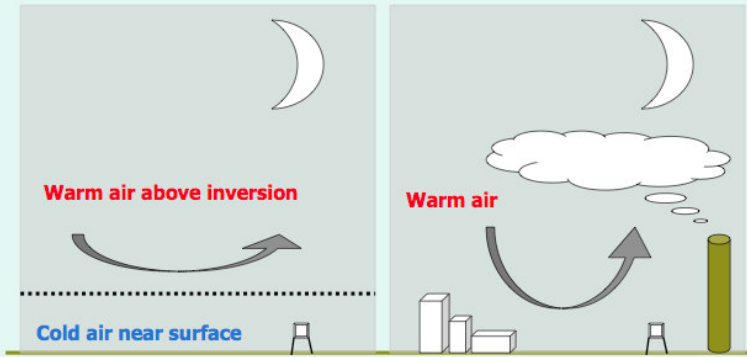
**CO2 up 38% at current rate of 0.6% per year**





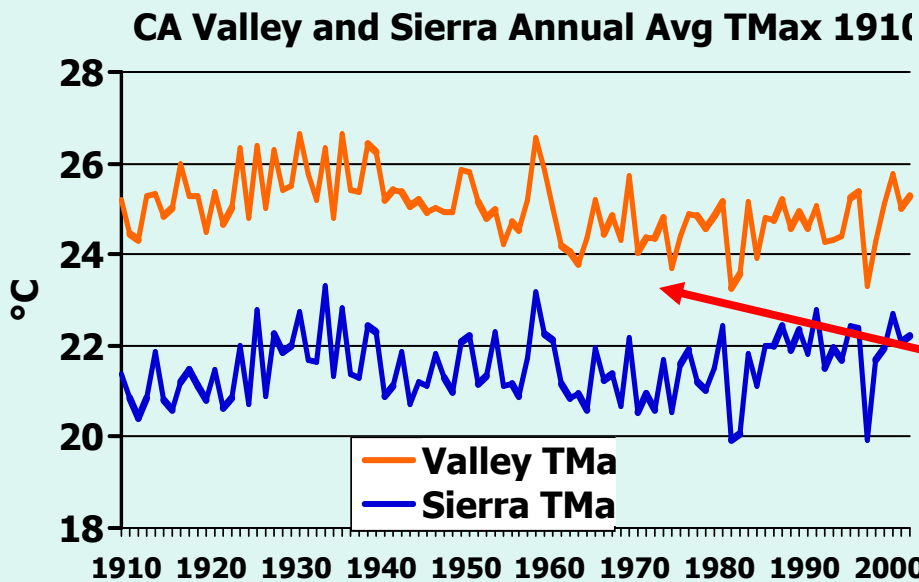


## Night Surface Temp



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

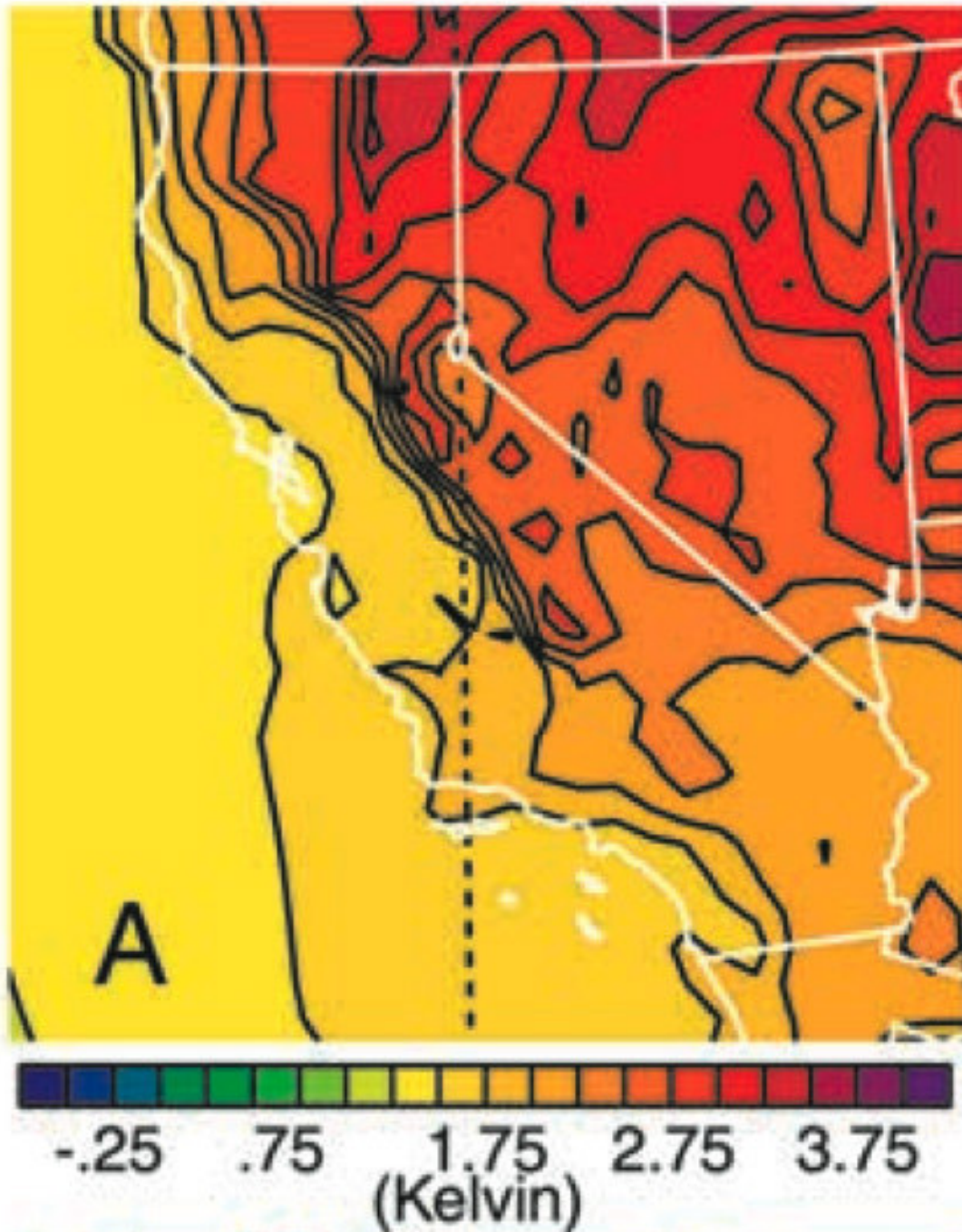
Buildings, heat releasing surfaces, aerosols, greenhouse gases, etc. can disrupt the delicate inversion, mixing warm air downward - affecting TMin.



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

**Daytime temperatures tell more accurate story**

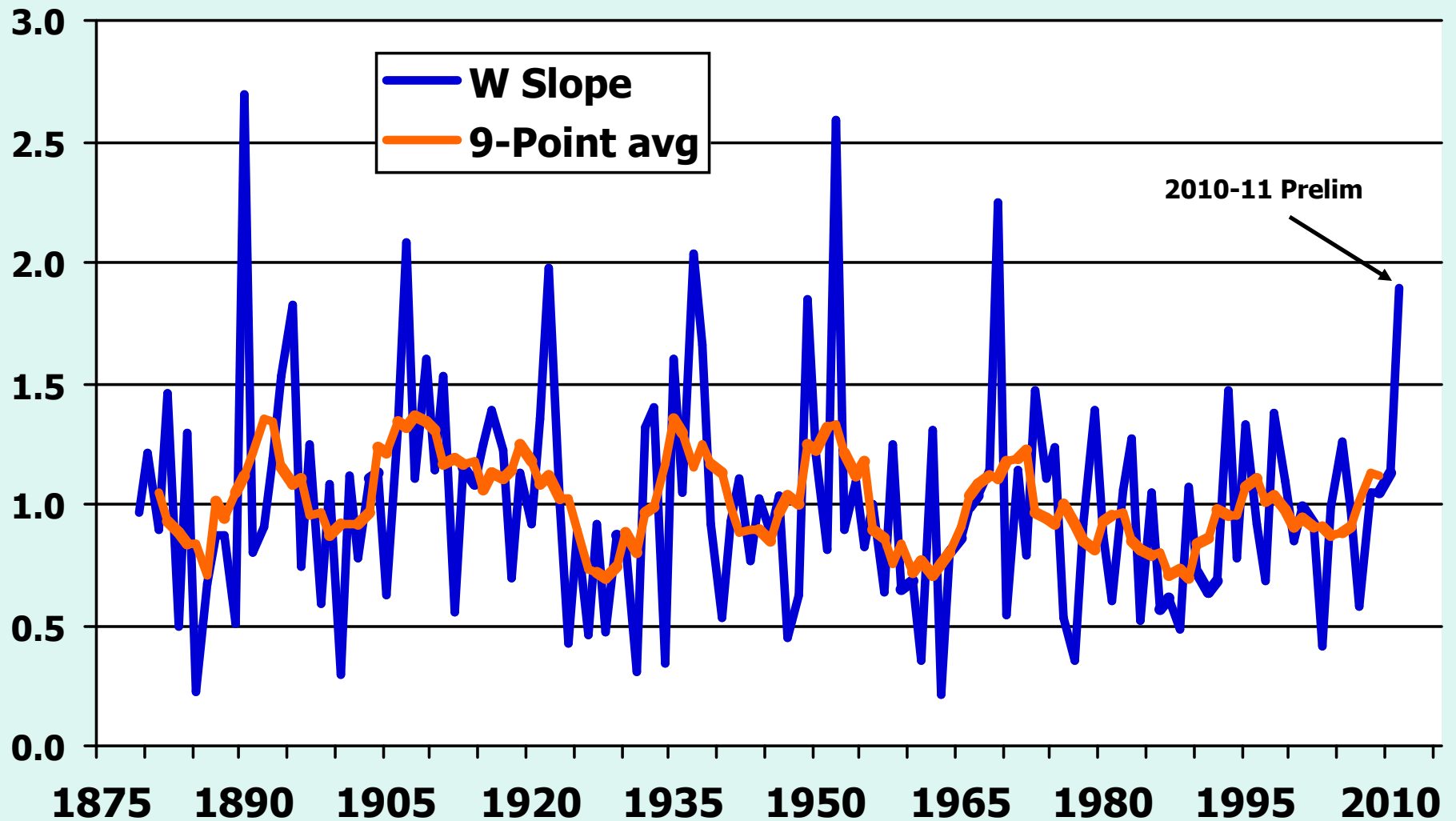
**Christy 2002, Christy et al. 2006, 2007, 2009, Pielke et al 2008, Walters et al. 2007**



**Sierras  
warm  
faster than  
Valley in  
model  
simulations**

**Snyder et al. 2002**

**Western Slope Sierra Nevada Snowfall**  
**133 Years: 1878-79 to 2010-11**  
**Average = 1.0**





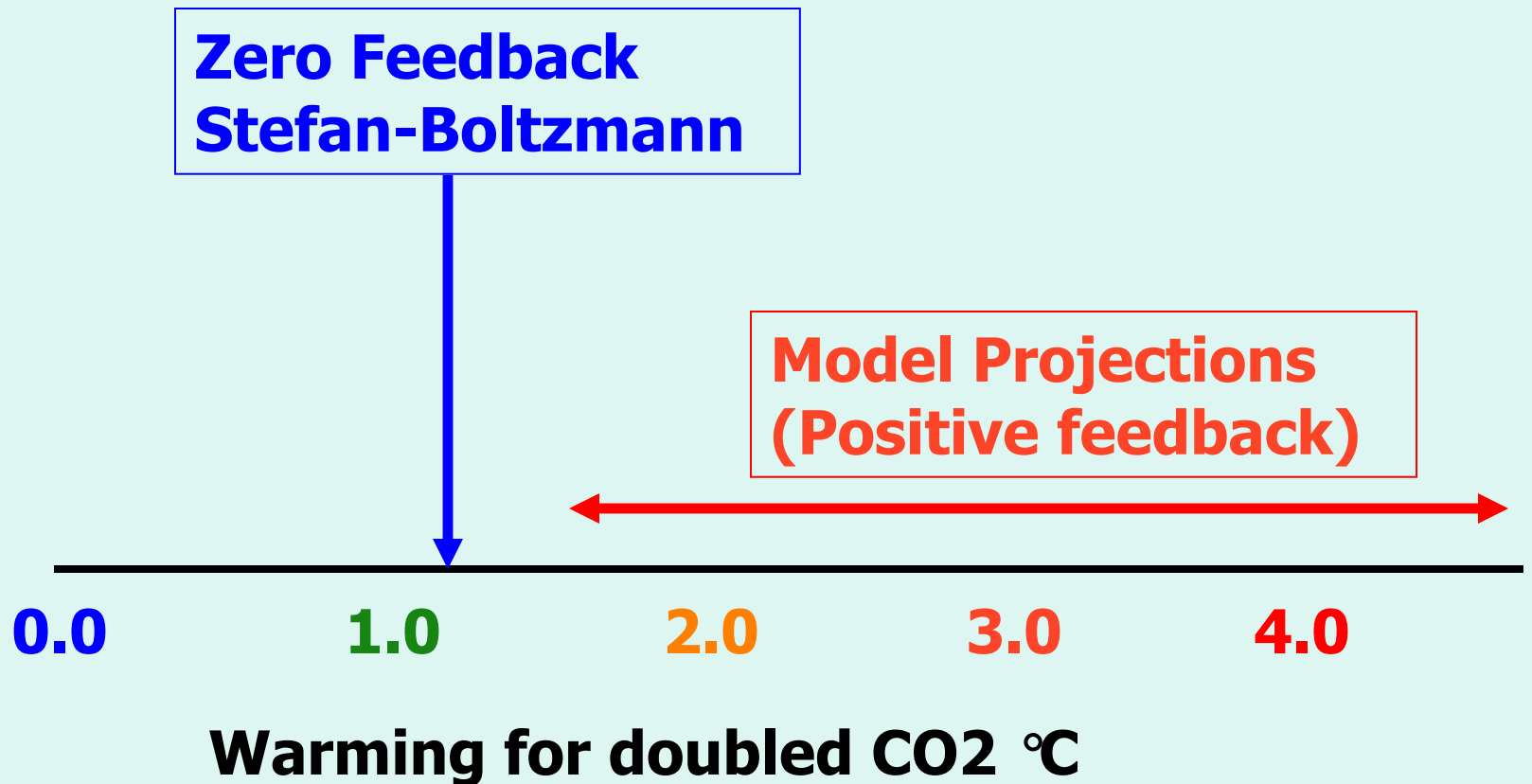
**Fundamental issue is to discover how sensitive the climate system is to rising concentrations of CO<sub>2</sub> and other greenhouse gases**

**Zero Feedback  
Stefan-Boltzmann**

**0.0      1.0      2.0      3.0      4.0**

**Warming for doubled CO<sub>2</sub> °C**

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**Zero Feedback  
Stefan-Boltzmann**

**Analysis  
(~zero to  
negative  
feedback)**

**Model Projections  
(Positive feedback)**

**0.0**

**1.0**

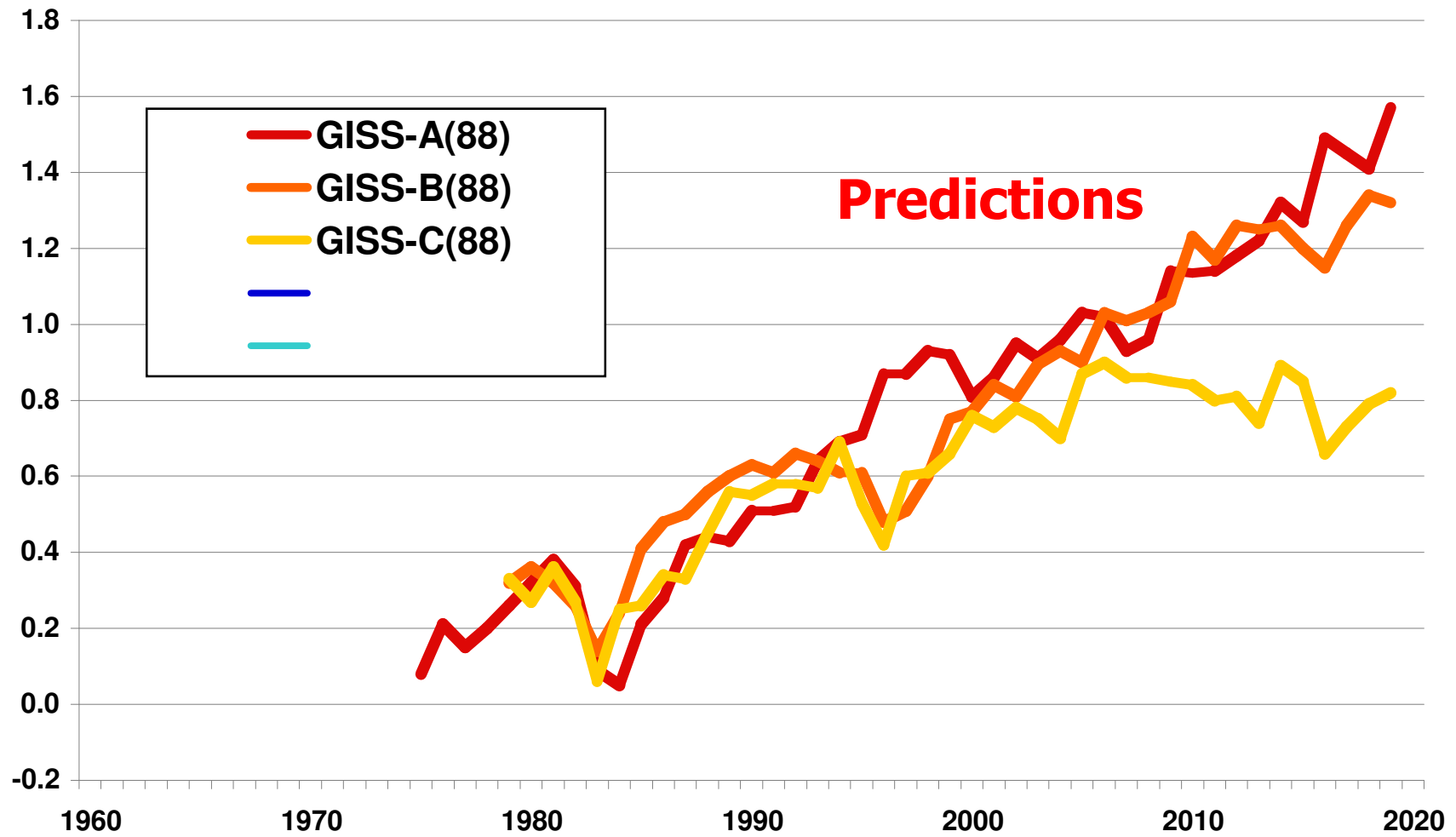
**2.0**

**3.0**

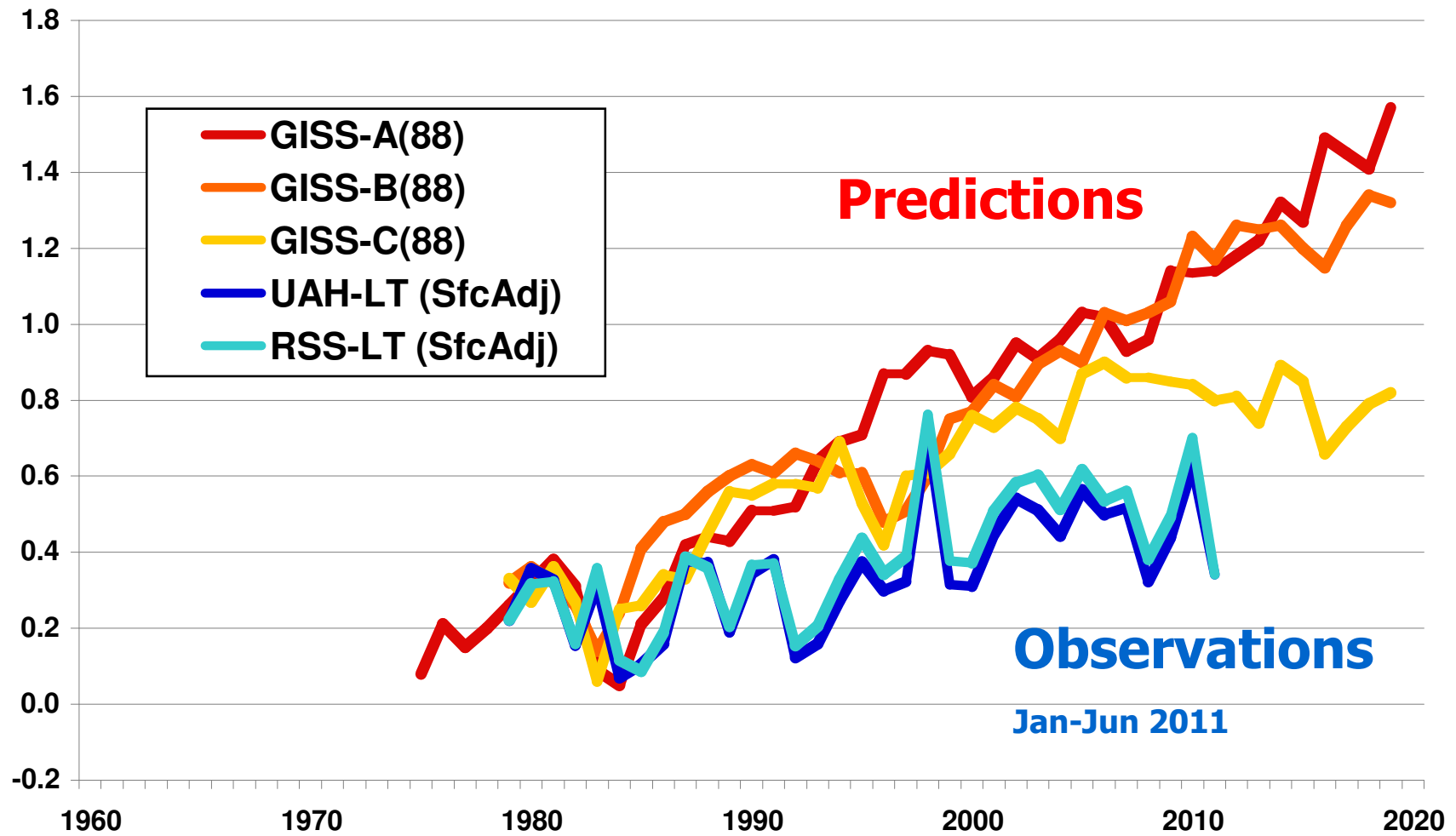
**4.0**

**Warming for doubled CO<sub>2</sub> °C**

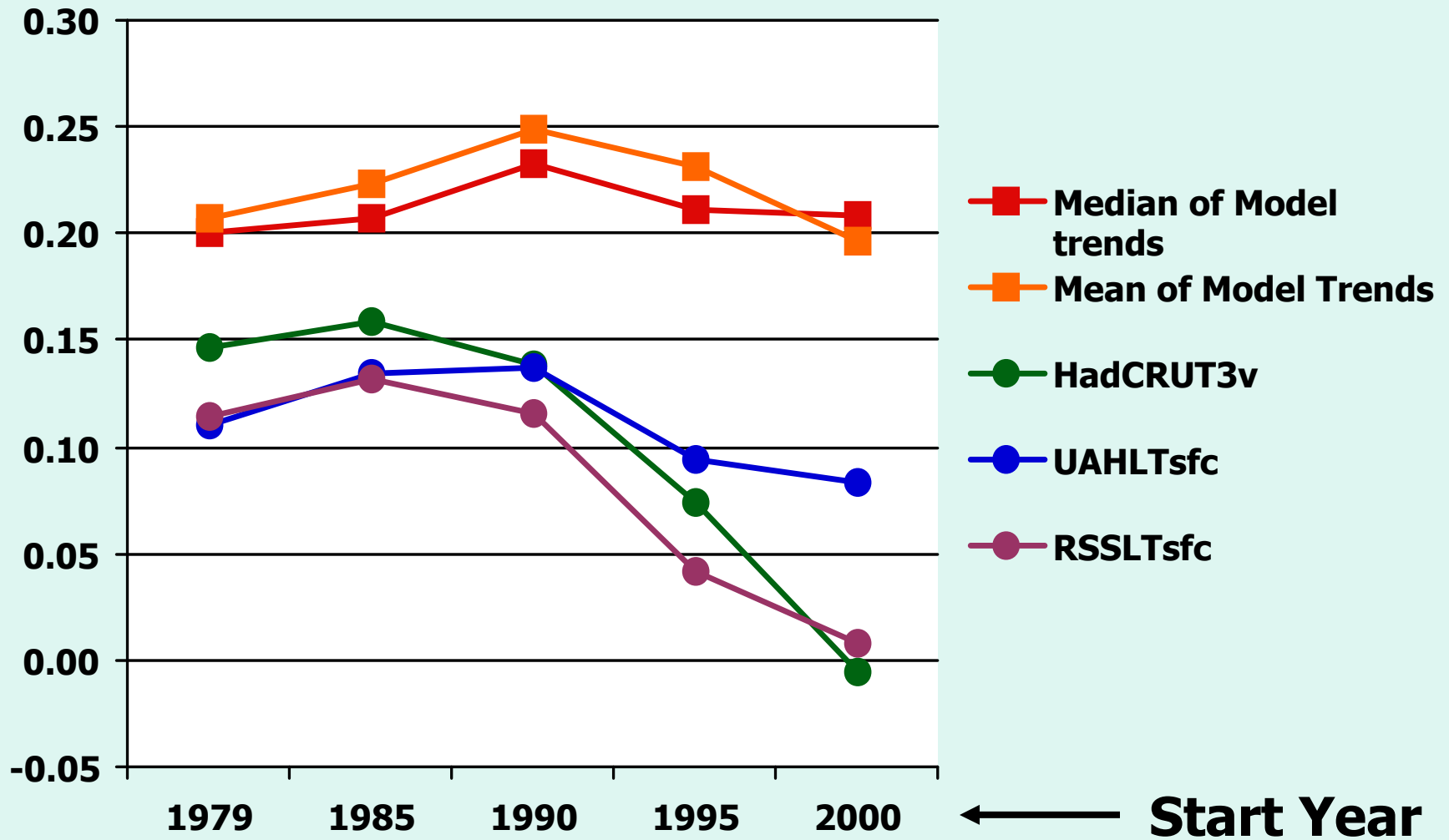
# History Lesson 1988



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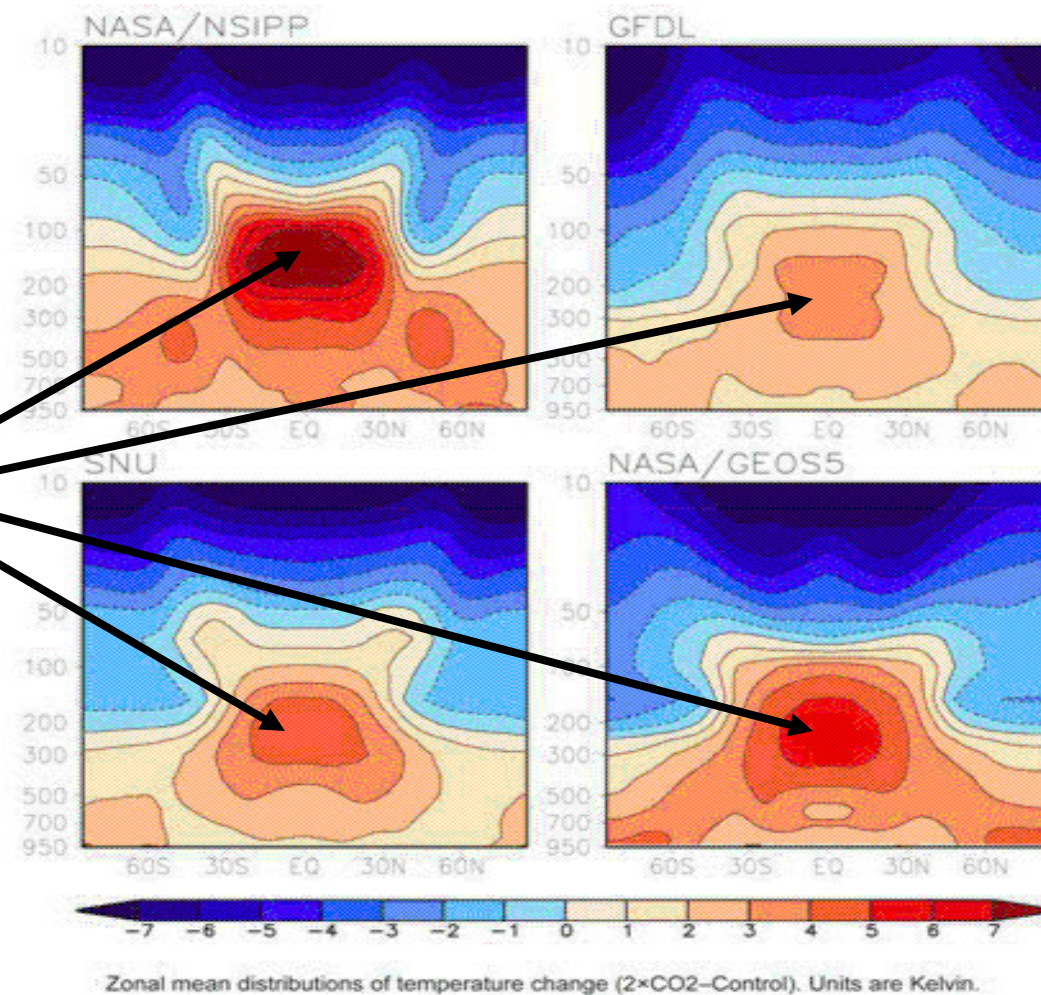


# Trends ending in 2011 with various start years IPCC AR4 Model Runs (22 models) vs. Obs.

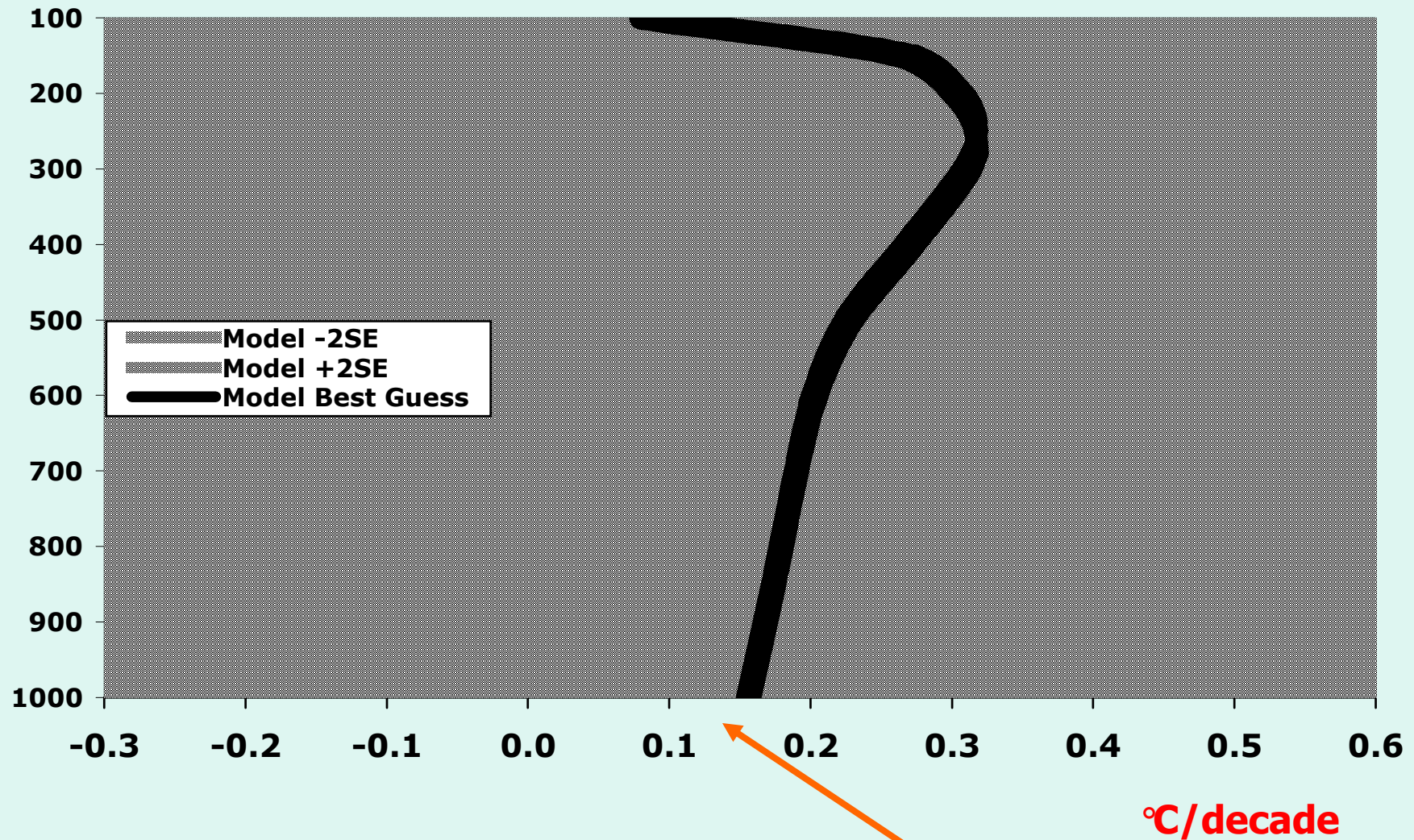


# Vertical Temperature Change due to Greenhouse Forcing in Models

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



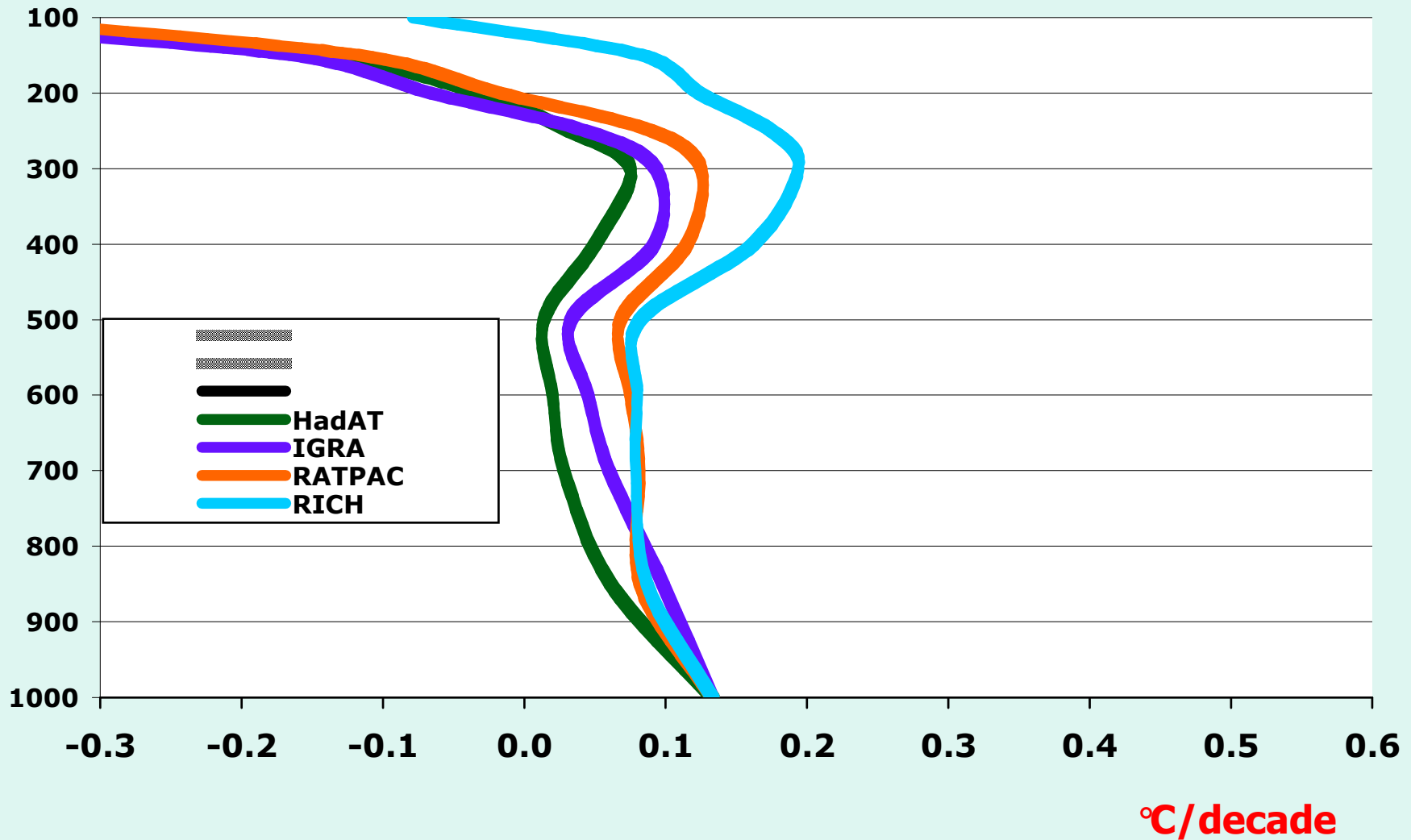
## Models: Mean and Standard Error



**Best Estimate** of Models - given surface trend close to **observed**

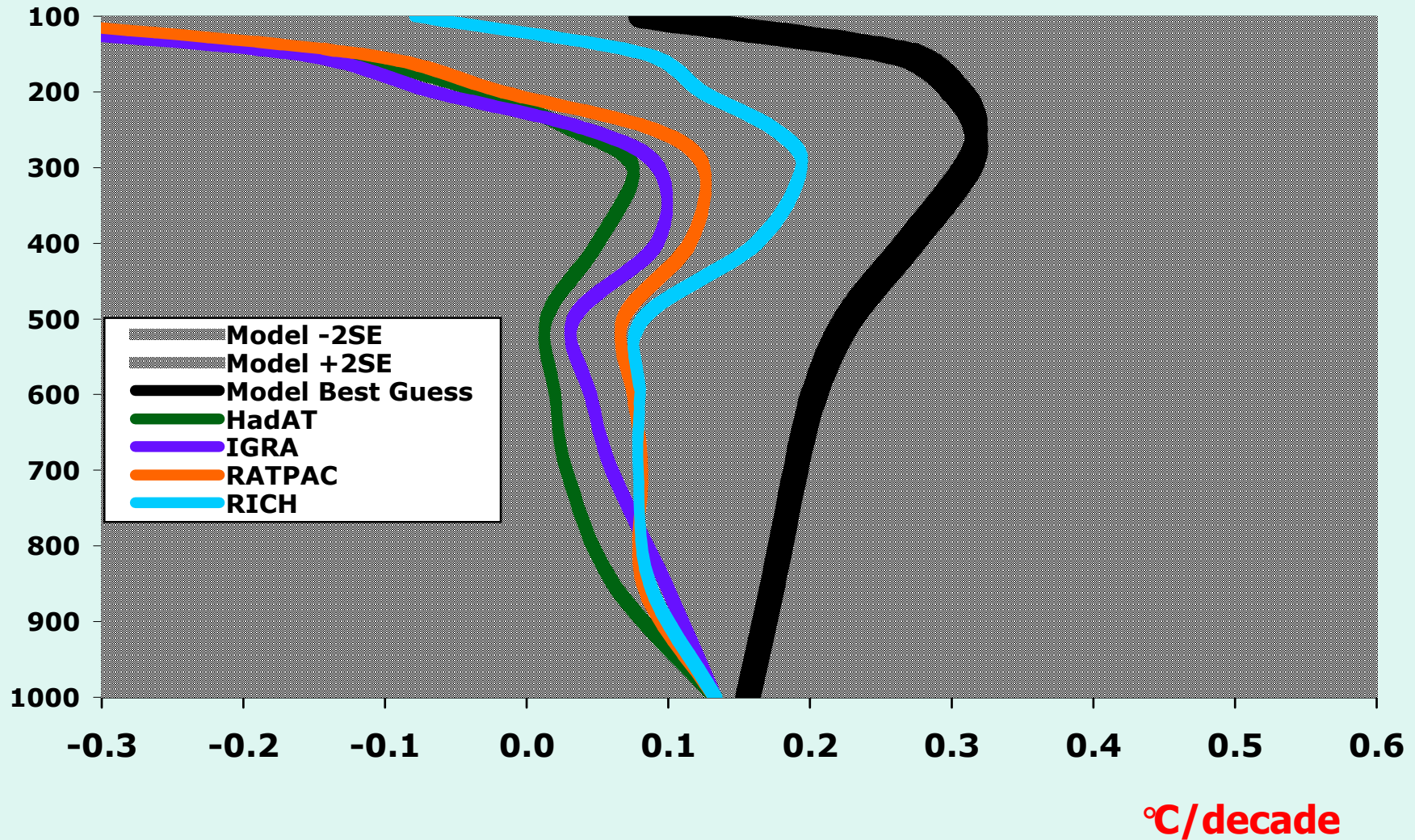


# Observations: Four "corrected" Datasets



Upper air trends of four observed datasets are significantly cooler in this apples to apples comparison

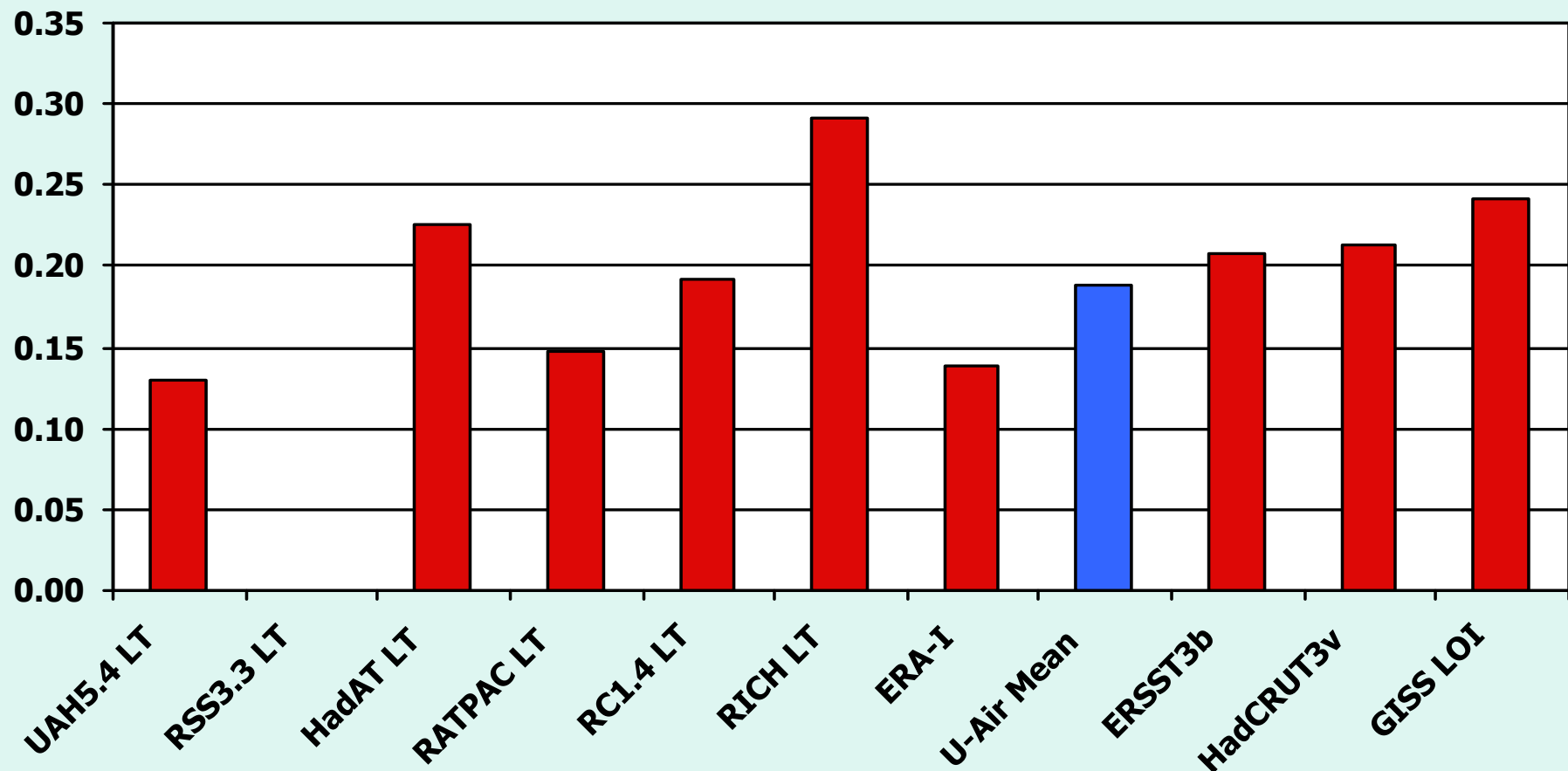
## Models vs. Obs



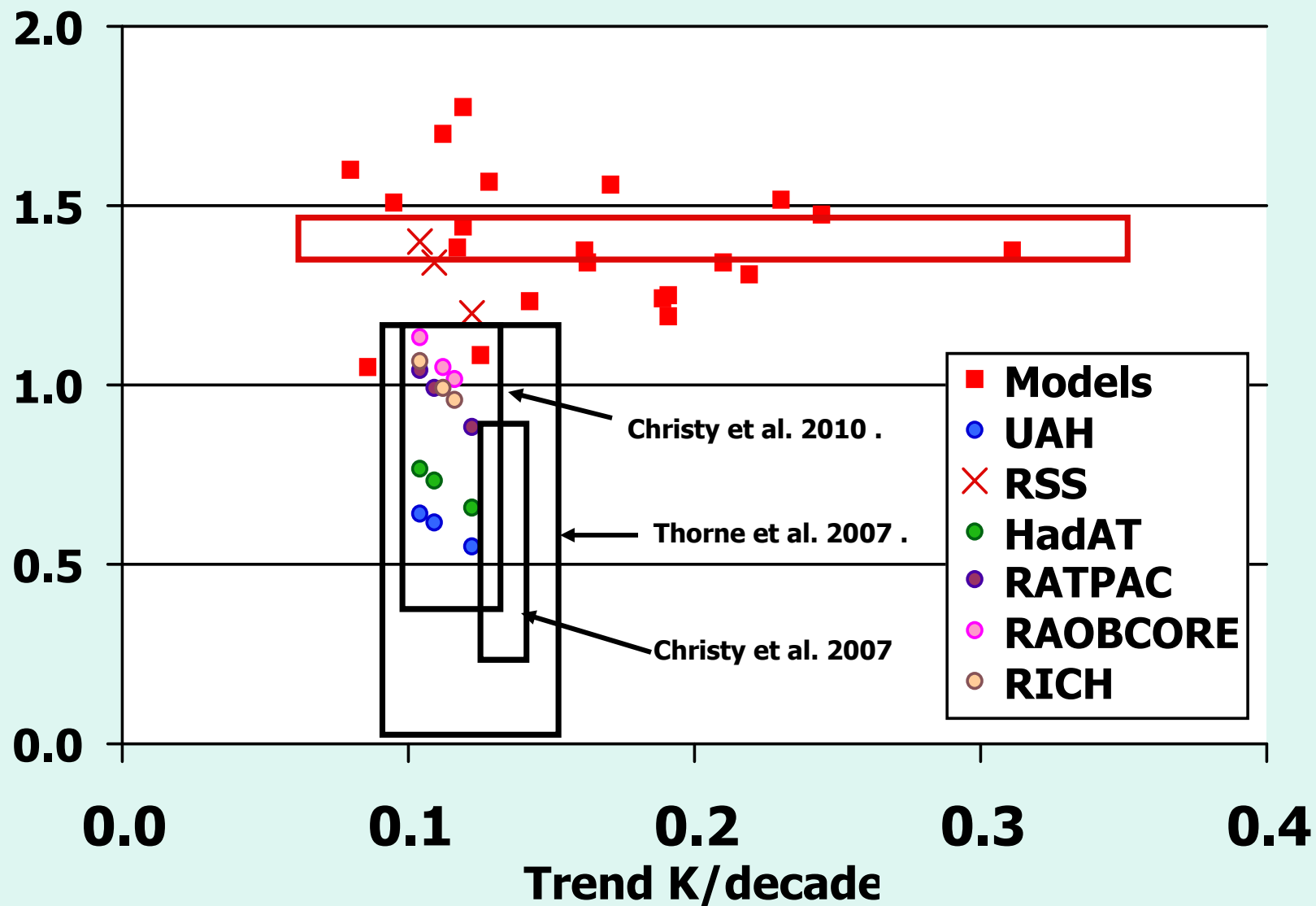
Upper air trends of four observed datasets are significantly cooler in this apples to apples comparison (Douglass et al. 2007).

**RSS Tropical Lower Tropospheric data have spurious warming in the 1990s. Below is warming in RSS relative to all other datasets (1996-7 minus 1991-1989)**

**Christy and Norris 2006, 2009; Christy et al. 2007, 2010, 2011; Klotzbach et al. 2008; Randal and Herman 2008.**



# Ratio Trop/Tsfc Christy et al. 2010 .



## **Klotzbach et al. 2010**

*Table 2 displays the new per decade linear trend calculations [of difference between global surface and troposphere using model amplification factor] ... over land and ocean. **All trends are significant at the 95% level.***

## **Christy et al. 2010**

*[Our observational] result **is inconsistent with model projections** which show that significant amplification of the modeled surface trends occurs in the modeled tropospheric trends.*

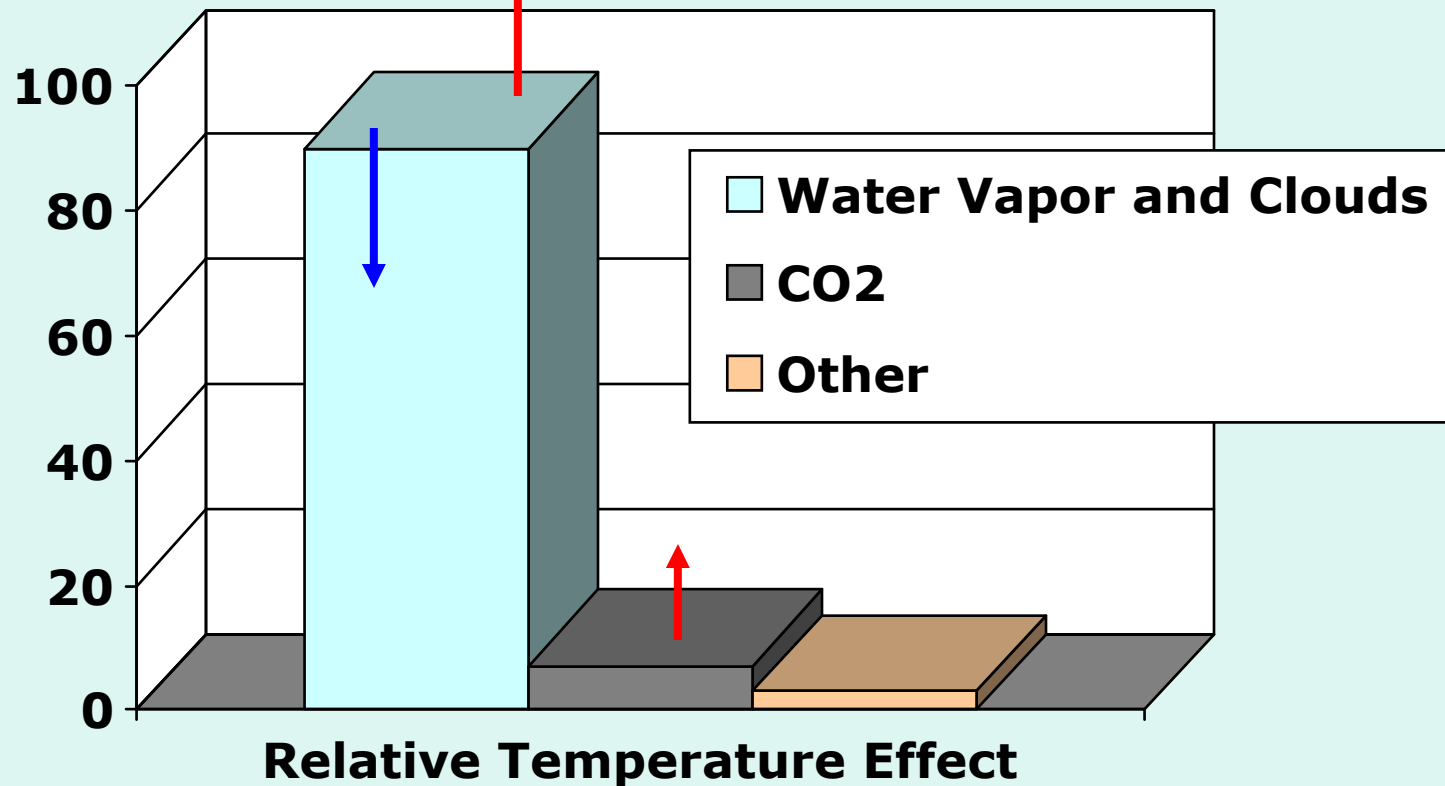
## **McKittrick et al. 2010**

*Over the interval 1979-2009, model-projected temperature trends are two to four times larger than observed trends in both the lower and mid-troposphere and the differences are statistically significant at the 99% level. [Note: recalculated Santer et al. 2008 method, and even with surface trend variation found Santer et al.'s result is not verified.]*

## Response of Clouds and Water Vapor (shortwave and longwave) to Increasing CO2

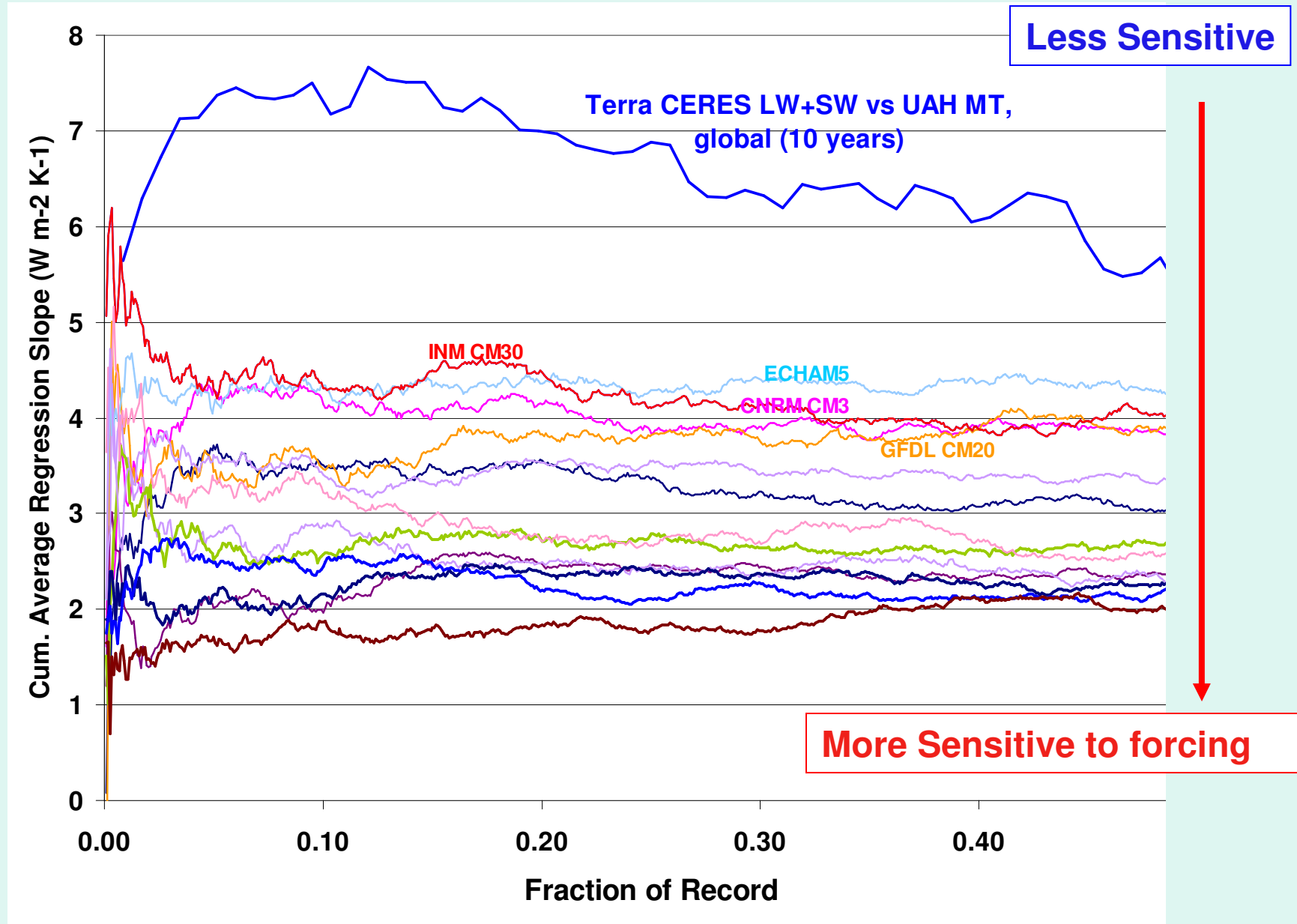
**Negative Feedback?**  
(mitigates CO2 impact)

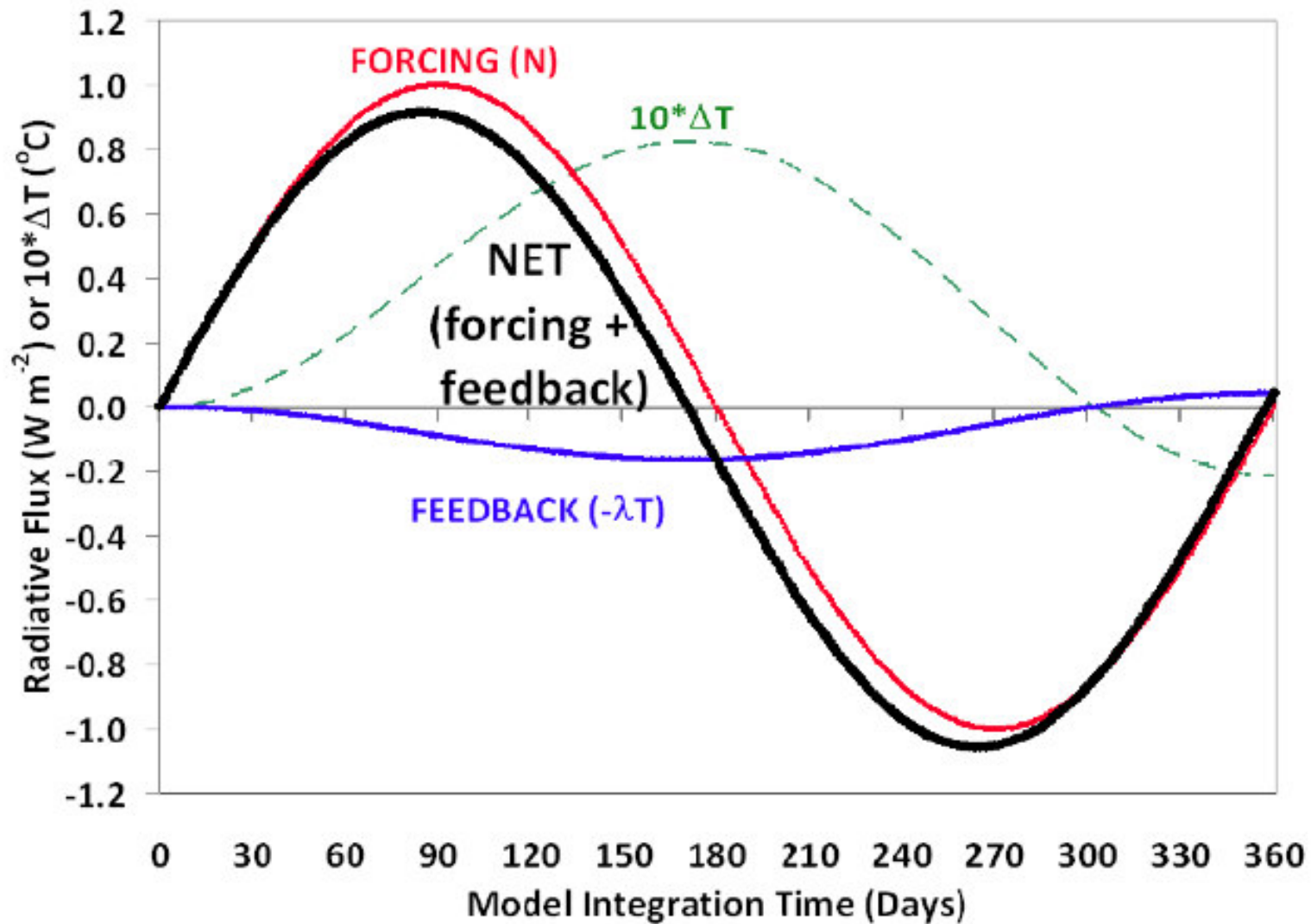
**Positive Feedback?**  
(enhances CO2 impact - models)



# The Real Climate System Behaves Very Differently from IPCC Climate Models

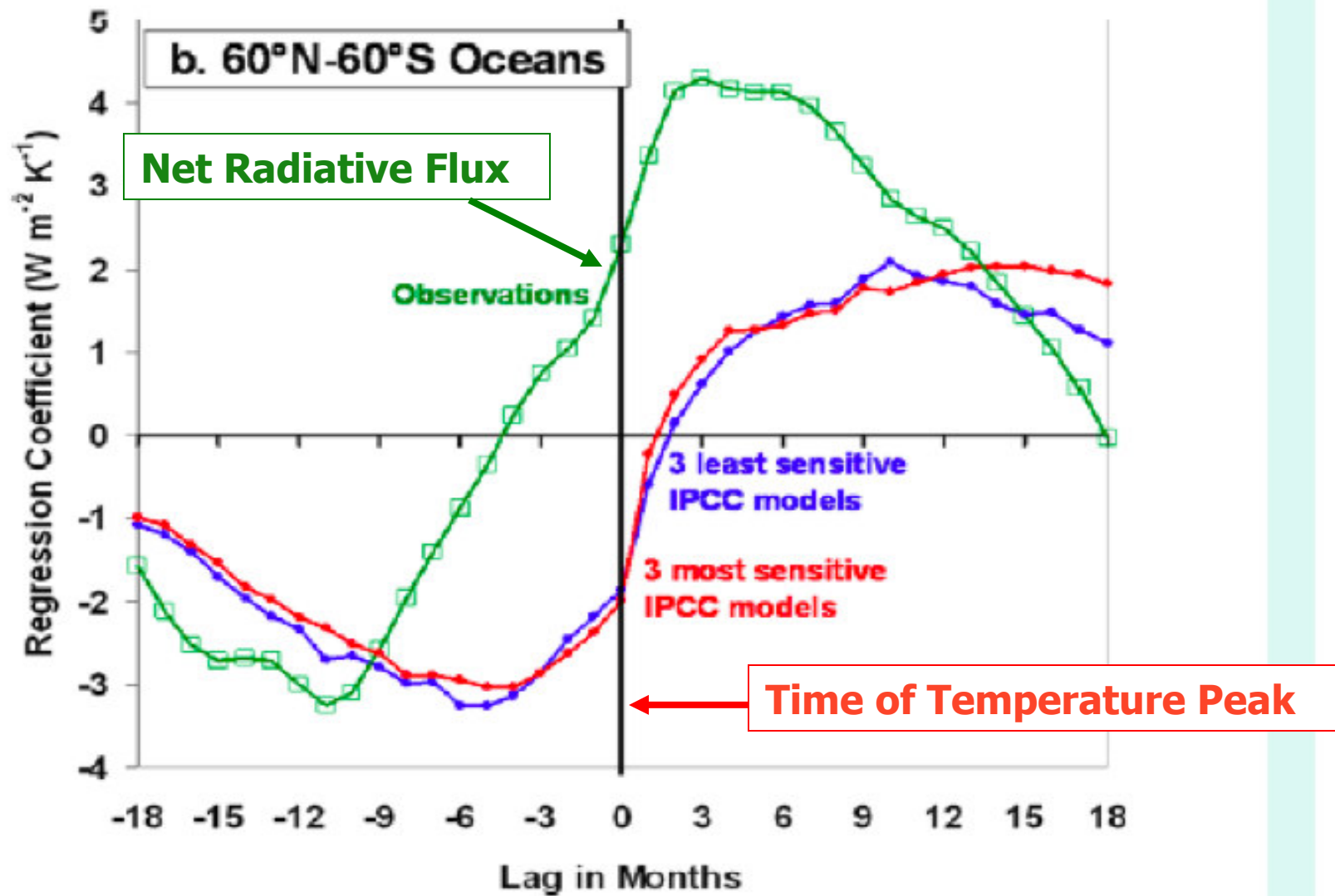
Analyses derived from Spencer and Braswell 2010 .





**Spencer and Braswell 2011**





**Spencer and Braswell 2011**  
**Interannual climate sensitivity**

## **Testing Hypothesis (assertions) about Climate UAHuntsville builds datasets from scratch**

- 1. Popular surface temperature datasets tend to be poor metrics for checking on the greenhouse effect - and they are often poorly measured as well**
2. Warming is occurring but at a rate and in a manner that is inconsistent with model projections of enhanced greenhouse warming
3. Sensitivity research suggests the climate is less sensitive to CO<sub>2</sub> increases than depicted in models due to unaccounted-for negative cloud feedbacks

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# Scenario 50% and 80% reduction in US CO<sub>2</sub> emissions by 2050 Climate Sensitivity of 1.5°C

