Building Climate Datasets for Testing Claims of Human Impacts from Climate*

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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.

References


Christy, J.R., W.B. Norris, K. Redmond, and K.P. Gallo, 2006, Methodology and Results of Calculating Central California Surface


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AAPG 9 June 2009

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Consensus is not Science

Michael Crichton
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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 Land

Line 1
Satellite Land

Land Surface Temperatures overstate warming
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.

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East Africa Tmax (Christy et al. 2

Obs: (HadCRUT3) +0.14 °C/d

Poor Station Selection.
East Africa Tmax (Christy et al. 2)

Observations (HadCRUT3): +0.14 °C/decade

Observations (UAH): +0.02 °C/decade

Kilimanjaro

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

Predictions

GISS-A(88)
GISS-B(88)
GISS-C(88)
History Lesson 1988

- GISS-A(88)
- GISS-B(88)
- GISS-C(88)
- UAH-LT (SfcAdj)
- RSS-LT (SfcAdj)

Predictions

Observations

2009 Jan-May Only
Trends ending in 2008 with various start years
IPCC AR4 Model Runs (22 models) vs. Obs.

Start Year

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

- 97.5% chance.
- 95% chance.
- 2.5% chance.
IPCC AR4 Model Trends vs. Observations

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95% chance.
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IPCC AR4 Model Trends vs. Observations

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- 95% chance.
- 2.5% chance.
Sierras warm faster than Valley in model simulations.
CA Valley and Sierra (Jun-Nov) 1910-2000

Valley TMin

Sierra TMin

Christy et al. 2006, 2007
Mean Surface Temperature
Southeast USA 1899-2003

Observation Models
No. Alabama Summer TMax Temperatures 1893-2008

Observations: -0.12 °C/decade

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
Radiosonde values at 100 hPa range from -0.39 to -0.49

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

Net Impact if all US 0.01°C 2100
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

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“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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• What would be the impact of building 1000 nuclear power plants and putting them on-line by 2020?
  – (average 1.4 gigawatt output each)
Net Effect of 10% CO2 emission reduction to A1B Scenario (~1000 Nuclear Plants by 2020)

- **A1B Emissions**
- **10% Reduction A1B**

Net Impact 0.07°C 2050
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 inhibitor.
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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