

ORAL ARGUMENT IS NOT YET SCHEDULED

No. 09-1322 (Lead) and Consolidated Cases (Complex)

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**In the  
United States Court of Appeals  
for the District of Columbia Circuit**

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COALITION FOR RESPONSIBLE REGULATION, INC., ET AL.,

*Petitioners,*

v.

ENVIRONMENTAL PROTECTION AGENCY AND  
LISA P. JACKSON, ADMINISTRATOR,

*Respondents.*

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On Petition for Review of 74 FED. REG. 66,496 (Dec. 15, 2009) and  
75 FED. REG. 49,556 (Aug. 13, 2010) (Consolidated)

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**CORRECTED BRIEF OF AMICI CURIAE SCIENTISTS IN SUPPORT OF  
PETITIONERS SUPPORTING REVERSAL**

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**CERTIFICATE AS TO PARTIES, RULINGS, AND RELATED CASES**

Pursuant to Circuit Rule 28(a)(1), counsel for amici curiae scientists in support of petitioners certifies as follows:

**A. Parties and Amici**

Except for the following, all parties, intervenors, and amici appearing before the district court and in this Court are listed in the Brief of Non-State Petitioners and Supporting Intervenors.

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**B. Rulings Under Review**

References to the rulings at issue appear in the Brief of Non-State Petitioners and Supporting Intervenors.

**C. Related Cases**

References to related cases appear in the Brief of Non-State Petitioners and Supporting Intervenors.

/s/ Christian J. Ward  
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**TABLE OF CONTENTS**

Certificate as to Parties, Rulings, and Related Cases ..... ii

Table of Authorities ..... vii

Glossary..... xii

Certificate of Counsel Pursuant to Circuit Rule 29(d)..... xiii

Statutes and Regulations ..... 1

Interest of Amici Curiae..... 1

Summary of the Argument..... 1

Argument..... 4

I. No Credible Observational Data Exist to Support the View That the Earth’s Climate Is Changing in an Unusual or Anomalous Fashion..... 6

    A. Recent Changes in the Earth’s Air Temperature Are Not Unusual..... 6

        1. The EPA Relied on “Adjusted” Instrumental GAST Data..... 7

        2. Satellite Temperature Data Do Not Show a “Global” Increase in the Earth’s Air Temperature..... 10

    B. Droughts, Floods, and Hurricanes Are Not Getting Worse ..... 22

    C. Sea Levels Are Not Rising Dramatically ..... 25

II. CO<sub>2</sub> Has Only a Minor Effect, at Most, on the Earth’s Climate System ..... 26

III. Climate Models That Assume CO<sub>2</sub> Is a Key Determinant of Climate Change Cannot Be Trusted to Provide Forecasts of Future Conditions That Are Adequate for Policy Analysis..... 34

IV. Climate Change Primarily Results from Natural, That Is, Non-Anthropogenic Forces and Internal Climate Variability—including Variable Solar Activity, Volcanism, and Oceanic Effects ..... 39

    A. The Sun Plays a Significant Role in Climate Variations on Short (Multi-Decadal or Shorter) Time Scales ..... 39

B. Volcanic Activity and Changes in Stratospheric Aerosols Also Affect Climate on Short (Multi-Decadal or Shorter) Time Scales.....	44
C. Oscillations in Ocean Temperatures and the Oceanic Conveyor Belt Have a Significant Effect on the Earth’s Climate. ....	46
Conclusion .....	50
Certificate of Service .....	52
Certificate of Compliance .....	53

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**GLOSSARY**

CRU..... Climate Research Unit  
EPA .....Environmental Protection Agency  
GAST ..... Global Average Surface Temperature  
IPCC..... Intergovernmental Panel on Climate Change  
NASA.....National Aeronautics and Space Administration  
NOAA .....National Oceanic and Atmospheric Administration

**CERTIFICATE OF COUNSEL PURSUANT TO CIRCUIT RULE 29(D)**

Counsel for amici curiae scientists hereby certifies, pursuant to D.C. Circuit Rule 29(d), that it is not practicable for these scientists to file a joint amicus brief with the other amici supporting petitioners and that it is thus necessary for the scientists to file a separate brief to state their views. These scientists wish to address different issues than the other amici intend to address in their brief. These scientists have expertise in a diverse number of fields implicated by this rulemaking, including climate research, weather modeling, physics, geology, statistical analysis, and engineering. In light of this expertise, these scientists' primary interest is to provide the Court with scientific data bearing directly on this rulemaking. Amici wish to address data that show the Earth's climate is not changing in an anomalous fashion; CO<sub>2</sub> atmospheric concentration has, at most, only a minor effect on temperature; global climate models forecasting a dramatic rise in temperature with increased CO<sub>2</sub> levels are extremely unreliable; and natural forces, such as the sun, volcanic activity, and oscillations in ocean temperature, explain the Earth's changing climate. Because these scientists wish to address these separate issues, it is necessary for them to file a separate brief.

/s/ Christian J. Ward

Christian J. Ward

### **STATUTES AND REGULATIONS**

All applicable provisions are contained in the Brief of Non-State Petitioners and Supporting Intervenors.

### **INTEREST OF AMICI CURIAE**

Amici are fourteen well-qualified climate scientists. *See* Circuit Rule 28(a)(1) Certificate. Amici include respected professors and scientists who have worked for government agencies and businesses. These highly-regarded scientists have expertise in a wide array of fields implicated by this rulemaking, including climate research, weather modeling, physics, geology, statistical analysis, and engineering. They have many publications in peer-reviewed journals and are acclaimed in their respective fields. Amici wish to present to this Court scientific data that bear directly on the underlying rulemaking. No party's counsel authored any part of this brief. No party, party's counsel, or other person contributed any money that was intended to fund preparing or submitting this brief.

### **SUMMARY OF THE ARGUMENT**

The data presented in this brief fatally undermine the EPA's finding that human-caused CO<sub>2</sub> emissions have already led to, or can be expected to lead to, significant adverse changes in the Earth's climate system. The EPA failed to examine this "relevant data." *FCC v. Fox Television Stations, Inc.*, 129 S.Ct. 1800, 1810 (2009) (quoting *Motor Vehicles Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983)). These data, moreover, confirm that

EPA's endangerment finding is not "rational" and therefore arbitrary and capricious. *Fox*, 129 S.Ct. at 1812.

Multiple sets of data show that the Earth's climate is not changing in an unusual or anomalous fashion. The EPA relied on instrumental data that were adjusted to exaggerate the increase in global temperatures. But other much more reliable data show that the Earth's temperature is not changing in an anomalous manner. Since 1979, when satellite data first became available, regional temperature trends have refuted the notion of global warming: the statistical trend shows no change in the tropics and a decrease in temperature in Antarctica. These satellite data are confirmed by balloon and buoy data. The only regional temperature increase can be found north of 20° North latitude. But these recent temperatures are nothing compared to those in the 1930s, which produced most of the currently existing record temperatures and heat waves in the United States and high temperatures in the Arctic. Other empirical observations substantiate these temperature data: droughts are not becoming longer and more intense, floods are not increasing, hurricanes and tropical storms are not becoming stronger, and the rate of increase in sea levels has actually been declining. Some would expect the opposite if the Earth's temperatures were increasing. At any rate, the data show that the Earth's temperatures are not increasing in an unusual fashion.

Even if the Earth's climate were changing erratically—and it is not—multiple sets of data show that CO<sub>2</sub> atmospheric concentration, at most, has only a minor effect on temperature. According to climate models relied on by the EPA, rising CO<sub>2</sub> levels should have caused a “greenhouse gas fingerprint”—that is, in the tropics, the atmosphere four to ten miles above the Earth's surface should have been steadily warming at a faster rate than lower levels of the atmosphere. But balloon data (from the creators of the climate data and models relied on by the EPA) from 7.5 miles above the Earth's surface shows no change in temperature trend. Satellite data also confirms that the temperature trend in lower levels of the atmosphere is also flat. And two different sets of tropical ocean buoy data further confirm these findings. Thus, there is no empirically validated reason why further increasing CO<sub>2</sub> levels will cause future harm.

Now that temperatures have actually been decreasing in recent years, some have begun to rely solely on climate models—instead of historical data—to argue that CO<sub>2</sub> emissions will change the Earth's climate in the future. This assertion is belied by the data just mentioned, because (1) the Earth's climate is not changing in an anomalous fashion and (2) CO<sub>2</sub> does not significantly affect the Earth's climate system. Moreover, these global climate models do not perform well in simulating the climate and forecasting the impact of increased levels of CO<sub>2</sub>. Kevin Trenberth, a lead author of a United Nations report in favor of CO<sub>2</sub>



regulation, admitted this many times, frankly stating: “The fact that we cannot account for what is happening in the climate system makes any consideration of geoengineering quite hopeless as we will never be able to tell if it is successful or not! It is a travesty!” Tellingly, these CO<sub>2</sub> climate models did not forecast the recent decline in global temperatures.

In actuality, data establish that various other factors cause typical, short-term (multi-decadal or shorter) changes in the Earth’s climate system. The sun, volcanic activity, and oscillations in ocean temperature behavior, for example, can all affect the Earth’s temperature over relatively short and long time scales. The Earth’s climate may be changing, as it always naturally has, but the data do not establish that any changes are caused by CO<sub>2</sub> emissions.

#### **ARGUMENT**

The fundamental issue facing the EPA regarding its endangerment finding was whether human-caused CO<sub>2</sub> emissions—or other “greenhouse gases”<sup>1</sup>—had already led to, or could be reasonably expected in the future to lead to, significant adverse changes in the Earth’s climate system. To justify the current endangerment finding, the theory underlying the EPA’s finding—that higher atmospheric CO<sub>2</sub> levels, with some appropriate level of confidence, will reliably

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<sup>1</sup> While this amicus brief only specifically addresses CO<sub>2</sub>, much of the data in this brief also bears on whether other gases—including the other five gases that were part of EPA’s endangerment finding—have led to or could lead to significant adverse changes in the Earth’s climate system.

lead to predicted and measurably higher global average surface temperatures (GAST)—must withstand rigorous scientific analysis.

This theory can only be validated by testing the “null hypothesis” that CO<sub>2</sub> is only a minor player in the Earth’s climate system. If this null hypothesis cannot be soundly rejected, there is no basis for regulating CO<sub>2</sub>, particularly given the enormously negative implications of such regulation regarding the nation’s energy, economic, and national security. To test this null hypothesis, one must examine at least four questions:

1. Is the Earth’s climate changing in an unusual or anomalous fashion?
2. Does the science permit rejection of the hypothesis that CO<sub>2</sub> is only a minor player in the Earth’s climate system?
3. Can climate models that assume CO<sub>2</sub> is a key determinant of climate change provide forecasts of future conditions that are adequate for policy analysis?
4. Can we reject the hypothesis that the primary drivers of the Earth’s climate system will continue to be natural (non-anthropogenic) forces and internal climate variability?

Indeed, a group of well-respected scientists told the EPA that it needed to address these questions before it could make an endangerment finding.<sup>2</sup> Many different fields of knowledge and academic skills are required to definitively answer these questions. Yet, the EPA failed to address these questions and thereby ignored

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<sup>2</sup> See Exhibit 1 to Scientists’ Reply in Support of Motion for Leave to Participate as Amici Curiae.

data showing that CO<sub>2</sub> is only a minor player in the Earth's climate system. Accordingly, these data fatally undermine the basis for EPA's intended CO<sub>2</sub> regulation.

**I. NO CREDIBLE OBSERVATIONAL DATA EXIST TO SUPPORT THE VIEW THAT THE EARTH'S CLIMATE IS CHANGING IN AN UNUSUAL OR ANOMALOUS FASHION.**

Despite significant increases in atmospheric CO<sub>2</sub> levels, no anomalous climate change has resulted. Atmospheric CO<sub>2</sub> levels have increased by 23% over the last 50 years.<sup>3</sup> If atmospheric CO<sub>2</sub> levels have had more than a minor effect on the Earth's climate system, one would expect to see this reflected in the relevant empirical climate data on (1) the Earth's air temperature, (2) droughts, (3) floods, (4) hurricanes, and (5) sea levels. But this empirical data actually shows that there has not been any anomalous climate change.

**A. Recent Changes in the Earth's Air Temperature Are Not Unusual.**

Had the EPA carefully examined satellite data measuring the Earth's air temperature, it would have been forced to conclude that the Earth's air temperature increase had been almost entirely north of 20° North and was not changing in an erratic fashion. Instead, the EPA relied on data depicting the GAST that was

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<sup>3</sup> NOAA, Earth System Research Laboratory: Global Monitoring Division, *Trends in Atmospheric Carbon Dioxide*, [ftp://ftp.cmdl.noaa.gov/ccg/co2/trends/co2\\_annmean\\_mlo.txt](ftp://ftp.cmdl.noaa.gov/ccg/co2/trends/co2_annmean_mlo.txt) (NOAA's computed annual CO<sub>2</sub> data). All websites referenced in this brief were last visited on May 27, 2011.

conspicuously adjusted to show an alarming recent increase in the Earth's air temperature.<sup>4</sup> In fact, EPA relied on GAST data created by the Climate Research Unit of the University of East Anglia (Hadley CRU),<sup>5</sup> which has been severely tarnished—at the very least—by “Climategate,” in which researchers’ private e-mails were made public. *See, e.g.*, Andrew C. Revkin, *Hacked E-Mail Is New Fodder for Climate Dispute*, N.Y. TIMES, Nov. 20, 2009, <http://www.nytimes.com/2009/11/21/science/earth/21climate.html> (“In one e-mail exchange, a scientist writes of using a statistical ‘trick’ in a chart illustrating a recent sharp warming trend.”); *A Climate Absolution?*, WALL ST. J., July 16, 2010, [http://online.wsj.com/article/SB10001424052748703394204575367483847033948.html?mod=WSJ\\_Opinion\\_LEADTop](http://online.wsj.com/article/SB10001424052748703394204575367483847033948.html?mod=WSJ_Opinion_LEADTop) (adjusted data “were ‘misleading’ because the attempt, in the words of CRU director Phil Jones, to ‘hide the decline’ in some of the data had not been made clear to readers”).

### **1. The EPA Relied on “Adjusted” Instrumental GAST Data.**

The EPA—and the United Nations Intergovernmental Panel on Climate Change (IPCC)—relied heavily on instrumental GAST data<sup>6</sup> to conclude that CO<sub>2</sub>

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<sup>4</sup> *Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act*, 74 Fed. Reg. 66,496, 66,517 (Dec. 15, 2009) (Endangerment Finding).

<sup>5</sup> *See id.*

<sup>6</sup> *See id.*

emissions were causing the Earth's temperature to rise.<sup>7</sup> This GAST data, though, was adjusted in the past to show a substantial increasing trend in the Earth's air temperature that correlates—remarkably well—with the rise in atmospheric CO<sub>2</sub> levels.<sup>8</sup> Specifically, both Hadley CRU and NASA adjusted the GAST data for the years 1920 to 1980 in a manner purporting to show that the Earth was actually cooler during those 60 years than what Hadley CRU and NASA had previously represented. The Hadley CRU adjustment can be seen below in Figure 1; the NASA adjustment can be seen in Figure 2.<sup>9</sup>

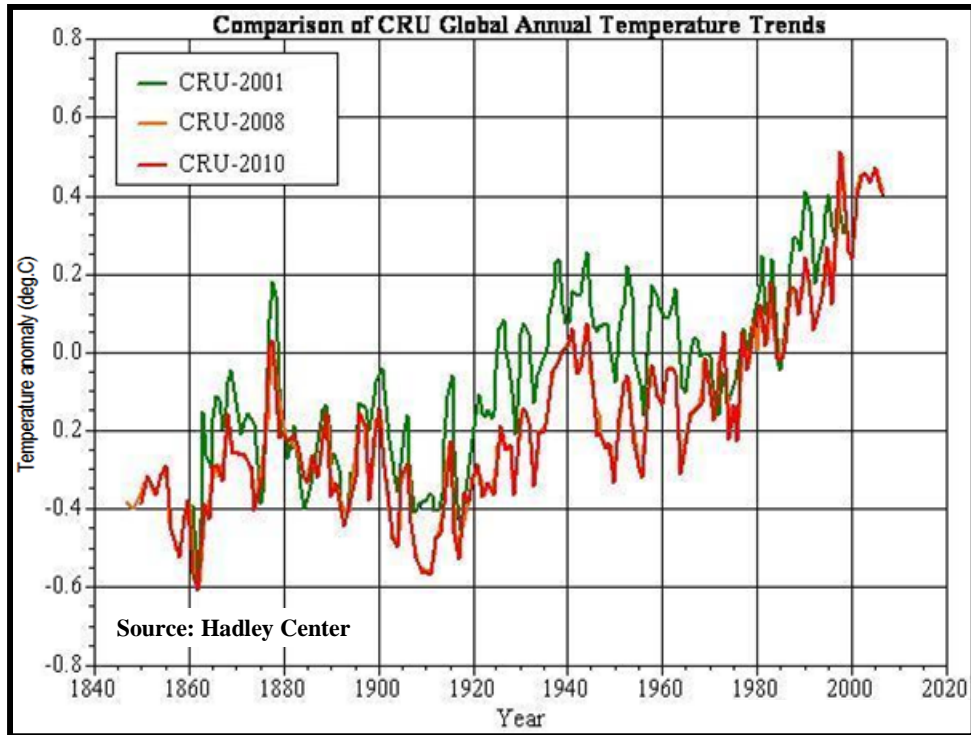
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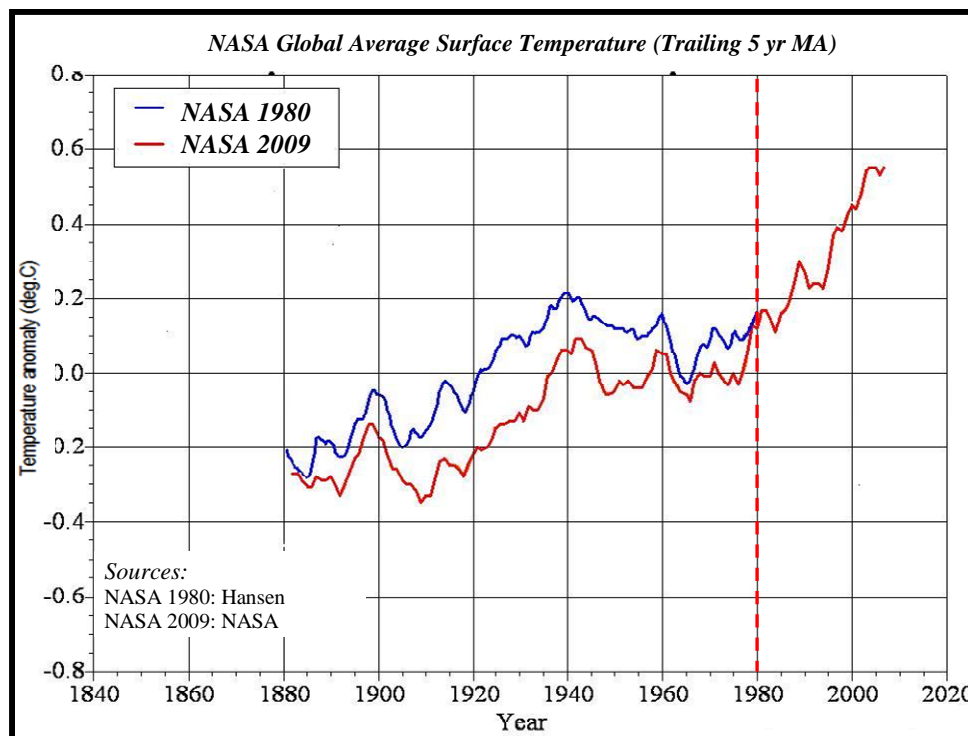
<sup>7</sup> See NOAA Satellite and Info. Serv., *Global Surface Temperature Anomalies: National Oceanic and Atmospheric Administration, National Climate Data Center*, [www.ncdc.noaa.gov/cmb-faq/anomalies.php](http://www.ncdc.noaa.gov/cmb-faq/anomalies.php) (NOAA GNCH data); see also NASA, Goddard Inst. for Space Studies, *Global Land-Ocean Temperature Index in 0.01 Degrees Celsius, Base Period: 1951-1980*, <http://data.giss.nasa.gov/gistemp/tabledata/GLB.Ts+dSST.txt> (NASA GISS data); Met. Office Hadley Ctr., *HadCRUT3 Diagnostics*, <http://www.metoffice.gov.uk/hadobs/hadcrut3/diagnostics/global/nh%2Bsh/monthly> (Hadley CRU data).

<sup>8</sup> See Scripps Inst. of Oceanography, *Mauna Loa Observatory, Hawaii, Monthly Average Carbon Dioxide Concentration (Data from Scripps CO<sub>2</sub> Program)*, [http://scrippsco2.ucsd.edu/images/graphics\\_gallery/original/mlo\\_record.pdf](http://scrippsco2.ucsd.edu/images/graphics_gallery/original/mlo_record.pdf) (CO<sub>2</sub> concentration data compiled by the Climate Research Unit of the University of East Anglia (Hadley CRU)); Climate Research Unit, Univ. of East Anglia, *Global Temperature Record*, <http://www.cru.uea.ac.uk/cru/info/warming/> (global surface air temperatures).

<sup>9</sup> The data are shown as monthly “anomalies,” where anomalies are constructed by subtracting some base period average from actual temperature values, here all in degrees Celsius.

Figure 1



**Figure 2**

By adjusting these older (mostly pre-1980) temperatures downward, this, of course, increased the disparity between temperatures before and after 1980—suggesting an alarming upward trend in the Earth’s air temperatures correlated with increasing CO<sub>2</sub> levels.

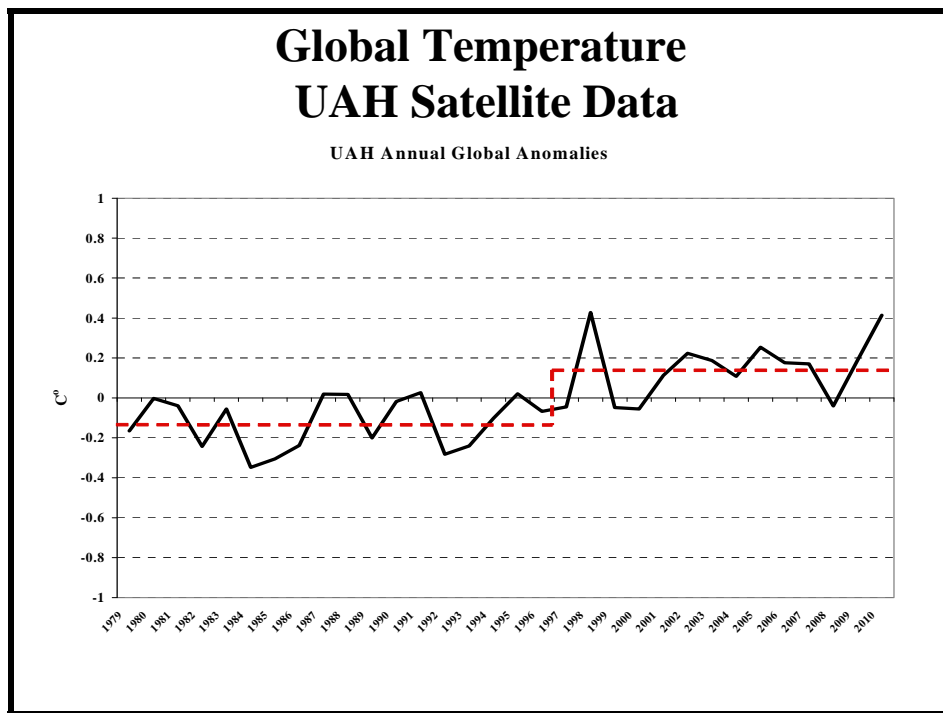
## **2. Satellite Temperature Data Do Not Show a “Global” Increase in the Earth’s Air Temperature.**

In 1979, satellite-based temperature data became available, and these data do not show a “global” increase in the Earth’s air temperature. Satellite data provide a cross check on global warming claims by NOAA, NASA, and the Hadley CRU, both in terms of its regional nature and overall extent. Since no credible scientists

contend that the satellite data have been manipulated, they are thus the most reliable data for exploring regional temperature trends.

The National Space Science and Technology Center’s satellite data is depicted in Figure 3.<sup>10</sup> It shows that temperatures have increased since 1998. While the trend line would be upward sloping, a statistically more accurate depiction would be a step function in 1998 (the recent two upward spikes are strong El Niños).

**Figure 3**



As will be shown below, when one considers satellite temperature data, since 1979 when the satellite data first became available, regional temperature

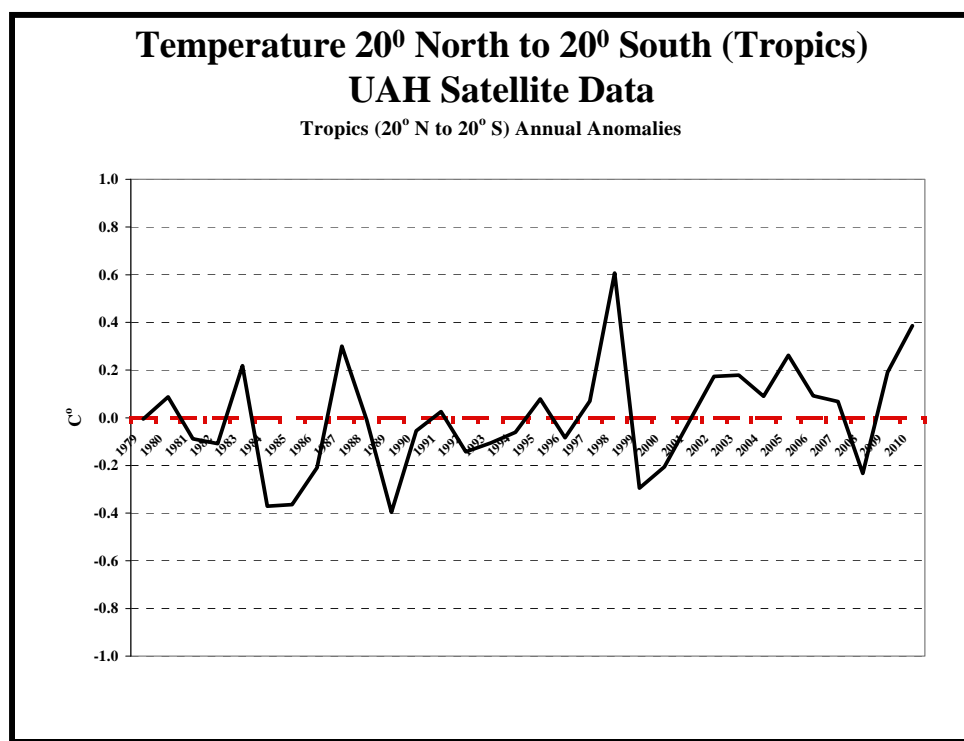
<sup>10</sup> See Nat’l Space Science & Tech. Ctr., <http://www.nsstc.uah.edu/public/msu/t2lt/uahncdc.lt>.



trends have been very different, with no action in the tropics and all the warming really concentrated north of 20° North. In other words, since all regions did not warm, there has been *no global warming since at least 1979*. And, as will be shown, even the warming in the Northern Hemisphere is not anomalous, as 100-year record high temperatures are not being broken.

*Tropics.* There has been no change in temperature trend in the tropics (latitudes of 20° North to 20° South), as shown in Figure 4.<sup>11</sup>

**Figure 4**

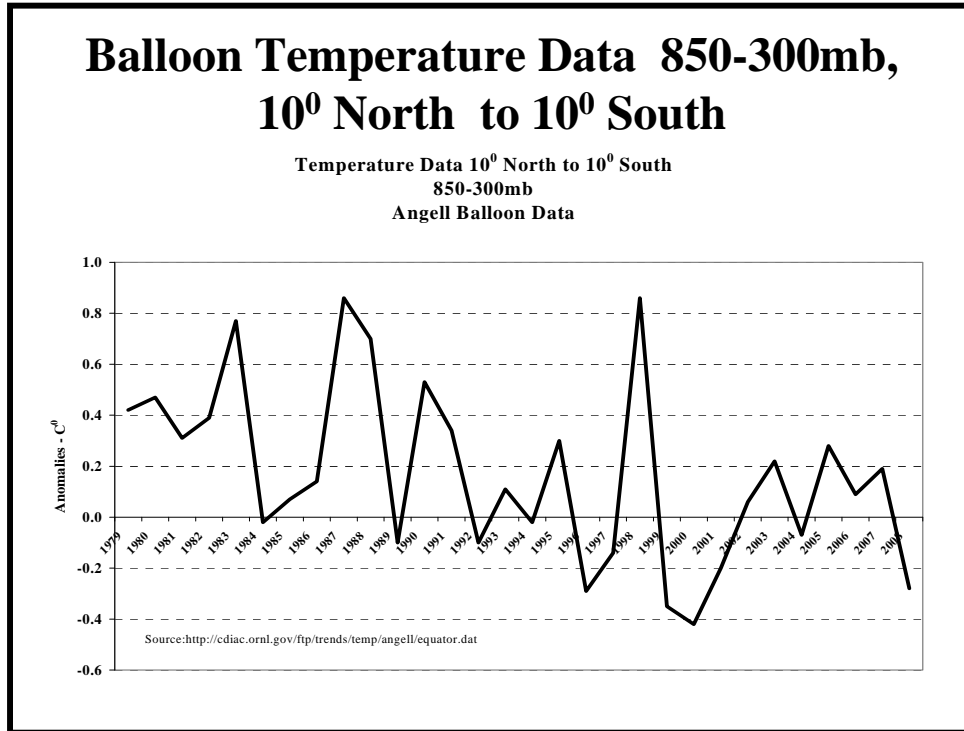


And the satellite data shown in Figure 4 is corroborated by data from balloons and buoys—as depicted in Figures 5 and 6, respectively.<sup>12</sup> In fact, the balloon data

<sup>11</sup> See *id.*

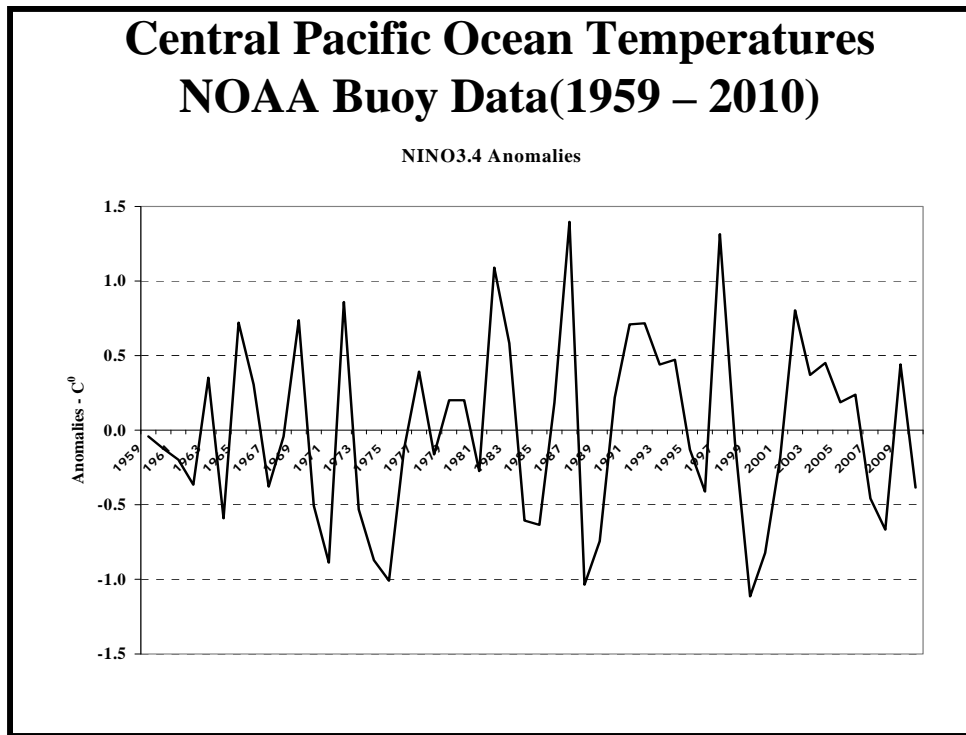
trends down, while the buoy data trend going back to 1959, like the satellite data, is flat.

**Figure 5**



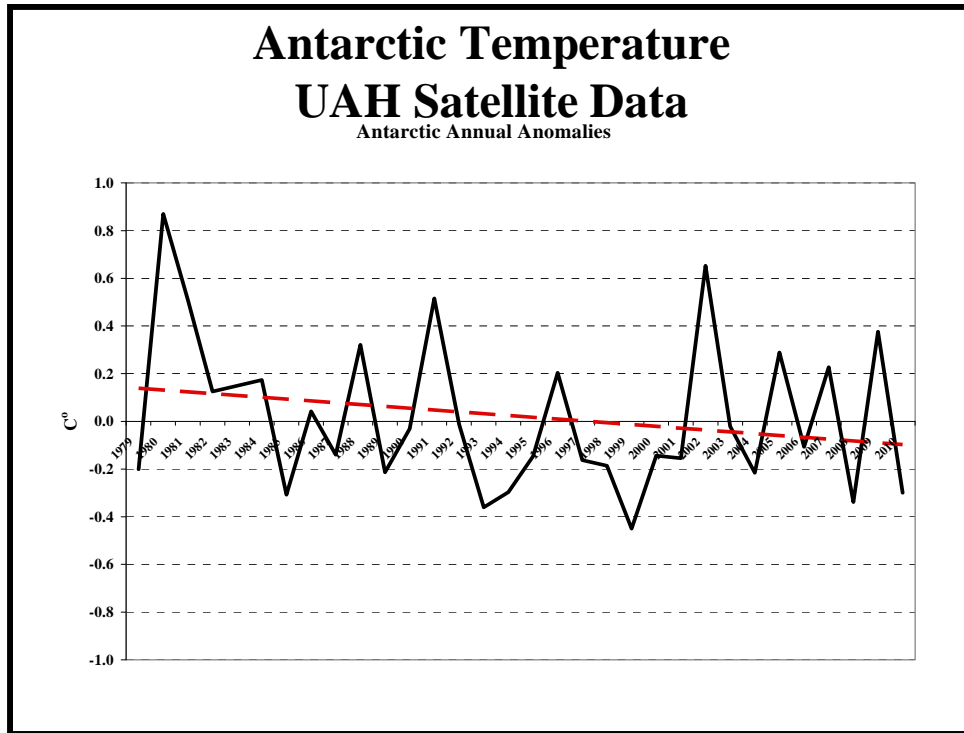
<sup>12</sup> See Carbon Dioxide Information Analysis Ctr., U.S. Dept. of Energy, *Annual & Seasonal Global Temperature Deviations in the Troposphere & Low Stratosphere, 1958-2008* (Apr. 2009), <http://cdiac.ornl.gov/ftp/trends/temp/angell/equator.dat> (balloon data); NOAA, *AMO Mean from the Kaplan SST V2*, [www.cdc.noaa.gov/data/correlation/amon.us.long.mean.data](http://www.cdc.noaa.gov/data/correlation/amon.us.long.mean.data) (buoy data).

Figure 6



*Southern Hemisphere South of 20° South.* Antarctic temperatures show no warming, as seen in Figure 7.

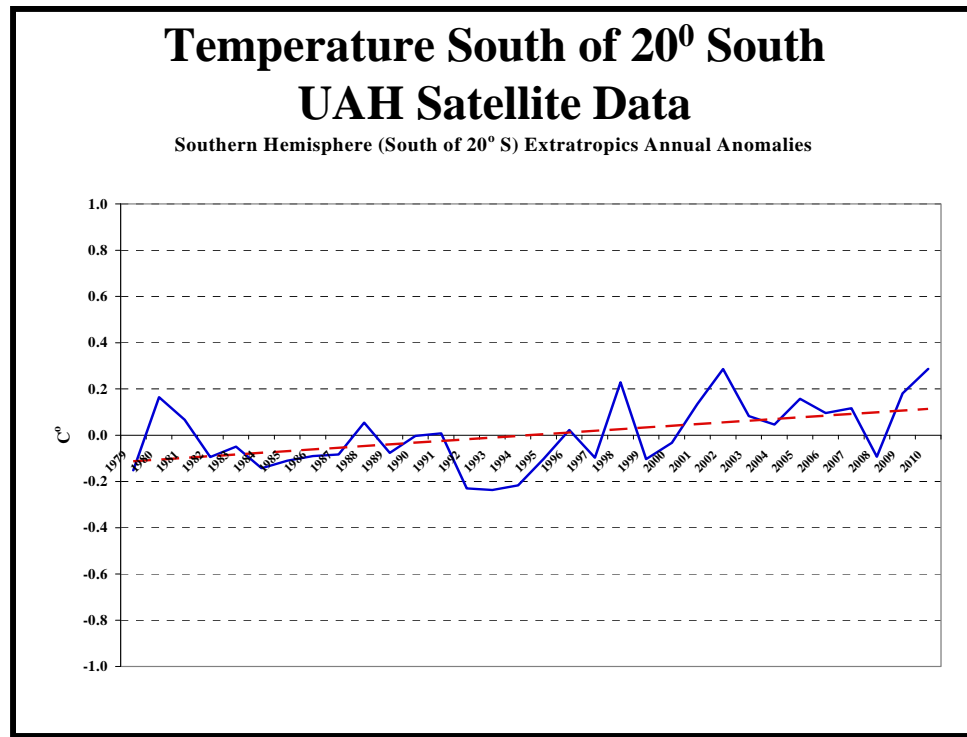
Figure 7



And the temperature data for the entire region south of 20° South, represented in Figure 8, shows very little warming.<sup>13</sup>

<sup>13</sup> See note 10, *supra*.

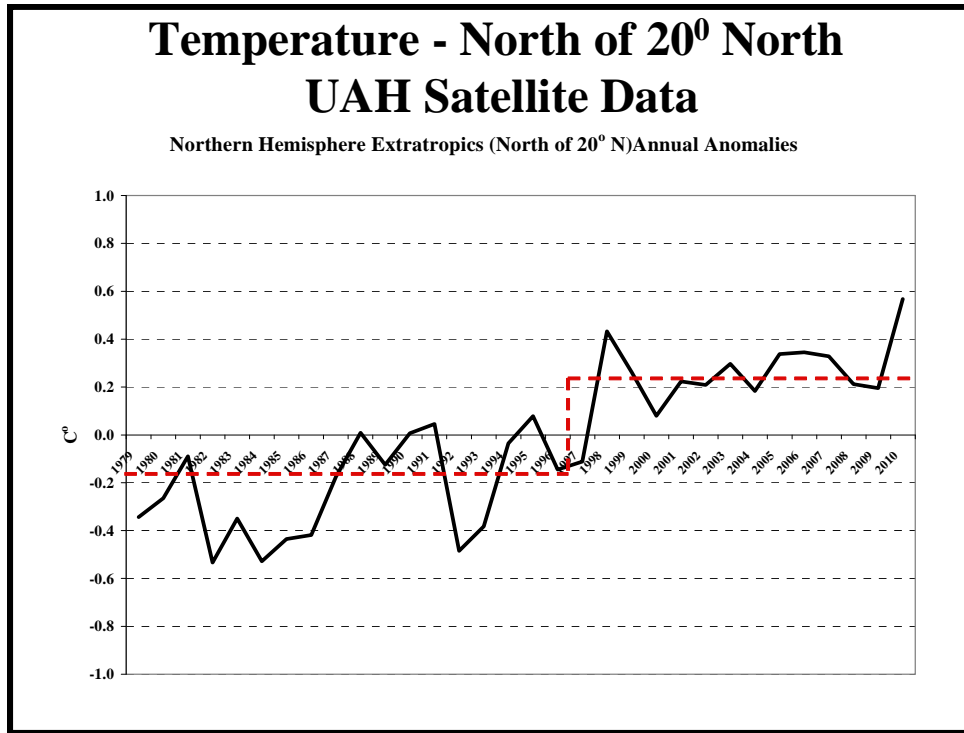
Figure 8



*Northern Hemisphere North of 20° North.* As shown in Figure 9, the north of 20° North temperature pattern is basically the same as the global pattern (see Figure 3), with a larger step up function.<sup>14</sup>

<sup>14</sup> See *id.*

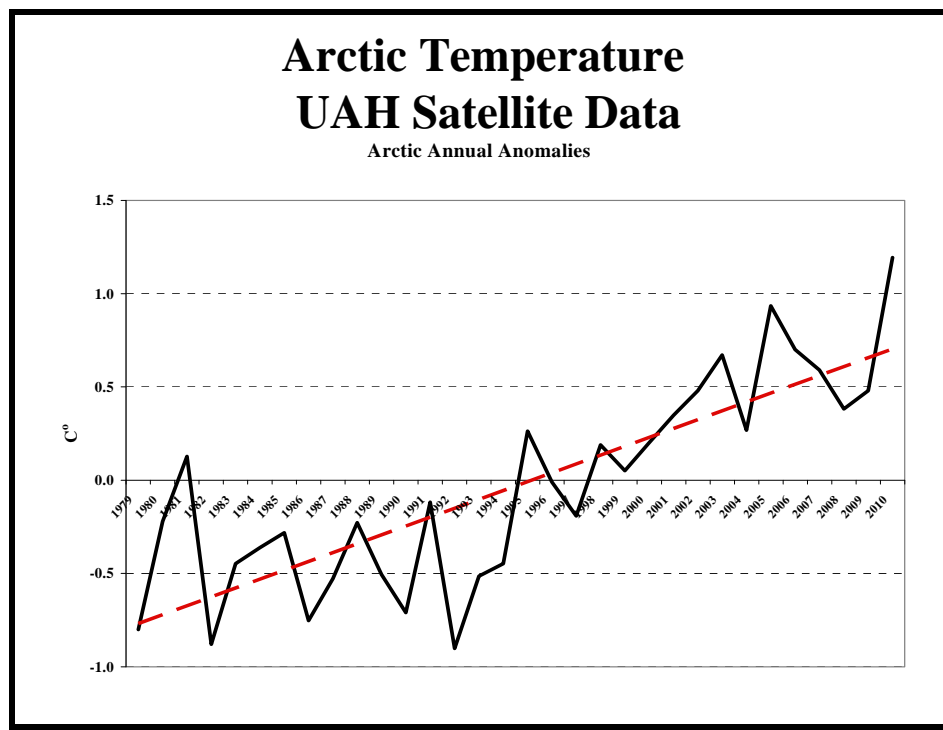
Figure 9



Admittedly, Arctic temperatures have continued to rise (*see* Figure 10).<sup>15</sup>

<sup>15</sup> *See id.*

Figure 10

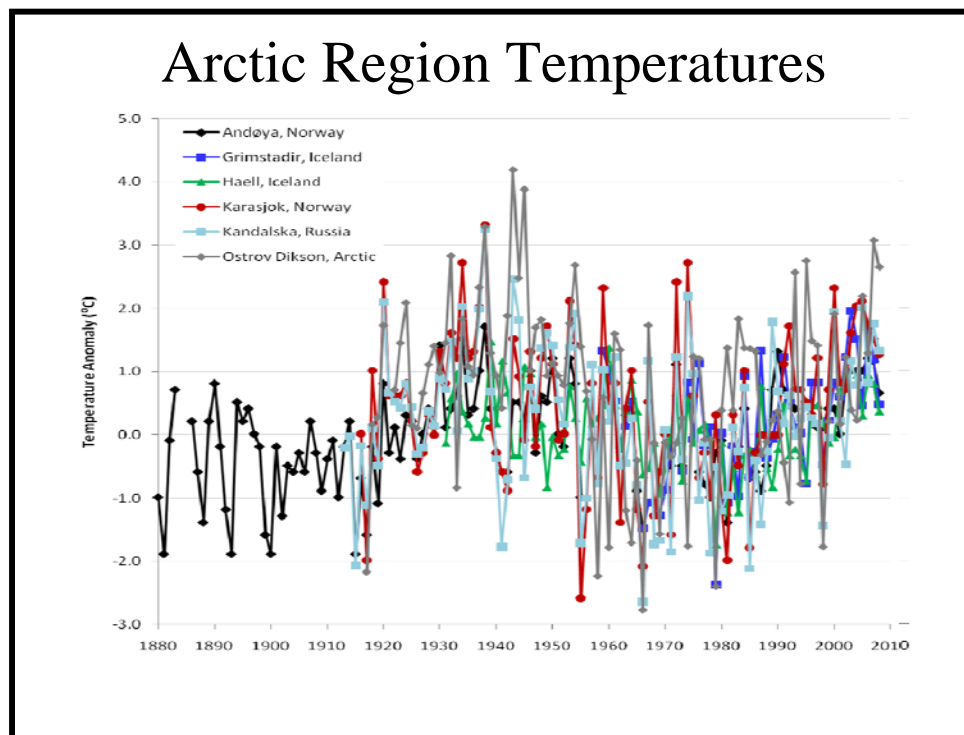


Despite the fact that temperatures recently have risen in the Arctic and the rest of the Northern Hemisphere outside the tropics, these temperatures are not anomalous, as 100-year record-high temperatures are not being broken in the Arctic or, for example, the United States. In the Arctic, Figure 11 shows temperatures starting to rise in the late 1970s, but the peak temperatures were higher in the late 1930s.<sup>16</sup> Note that the reliability of these distinct city temperature records, taken as a whole, is beyond question because these are six

<sup>16</sup> See Verity Jones, *Arctic Ice Rebound Predicated*, ICECAP: FROZEN IN TIME (Oct. 17, 2010), [http://icecap.us/index.php/go/new-and-cool/arctic\\_ice\\_rebound\\_predicted/](http://icecap.us/index.php/go/new-and-cool/arctic_ice_rebound_predicted/) (plotted NOAA data).

independent, separately maintained, temperature records having roughly the same pattern.

**Figure 11**



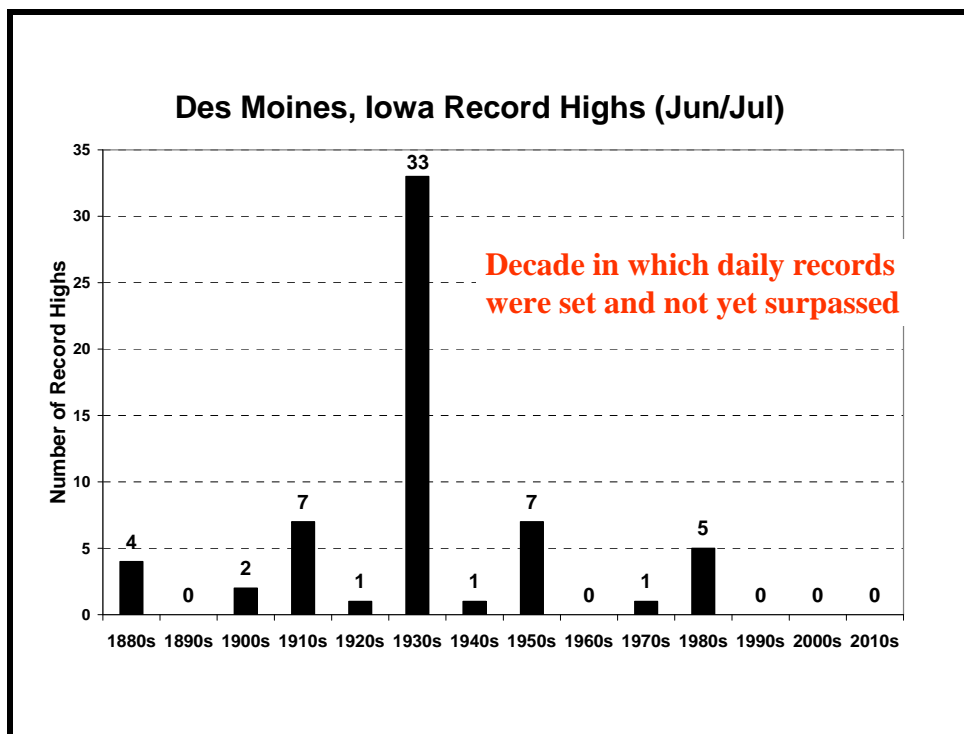
Nor are record-high temperatures being broken in the United States, contrary to the EPA's statements. To use an excellent example from the middle of the country, Figure 12 shows that Des Moines, Iowa, has not set any record highs in the last twenty years.<sup>17</sup> Detroit, Boston, and many more cities show the same pattern.<sup>18</sup> There has been no cherry-picking of cities as shown in Figure 13.

<sup>17</sup> See NOAA Nat'l Weather Serv. Forecast Office, *Des Moines, IA*, <http://www.crh.noaa.gov/dmx/scripts/monthdisp.php>.

<sup>18</sup> See NOAA Nat'l Weather Serv. Weather Forecast Office, *Detroit/Pontiac, MI: NWS-DTX Monthly Climate Data*, <http://www.crh.noaa.gov/dtx/cms.php?n=monthlyrec> (Detroit) (data function);



**Figure 12**



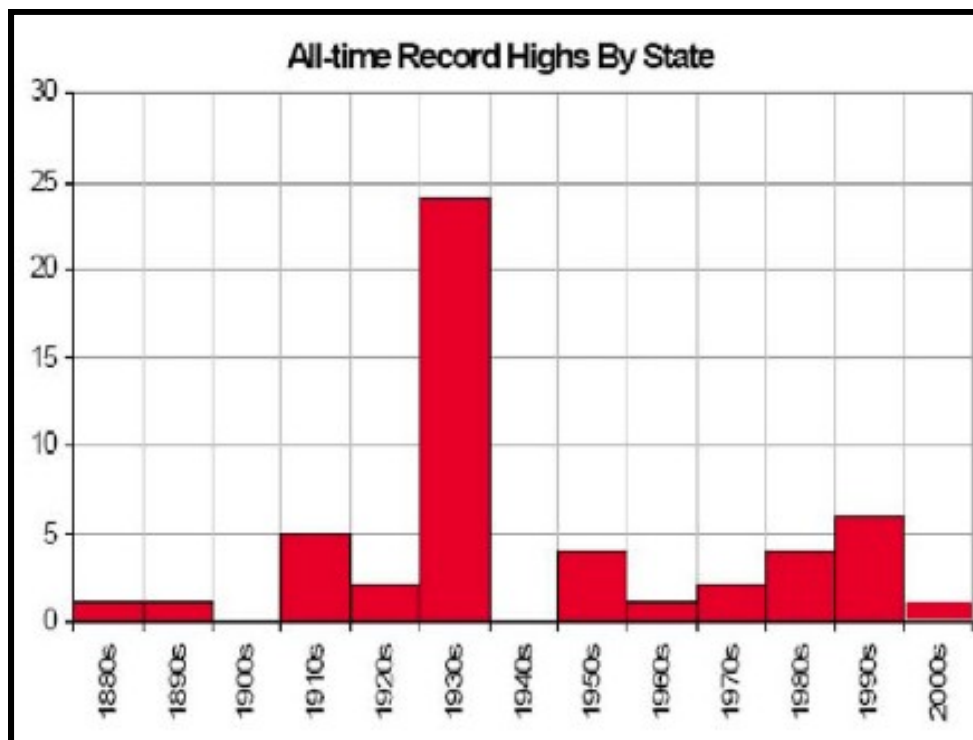
Indeed, heat waves peaked in the 1930s and have been usually benign recently (see Figure 13).<sup>19</sup>

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NOAA Nat'l Weather Serv. Forecast Office, *Boston, MA: Observed Weather Reports*, <http://www.weather.gov/climate/index.pho?wfo=box> (Boston) (data function).

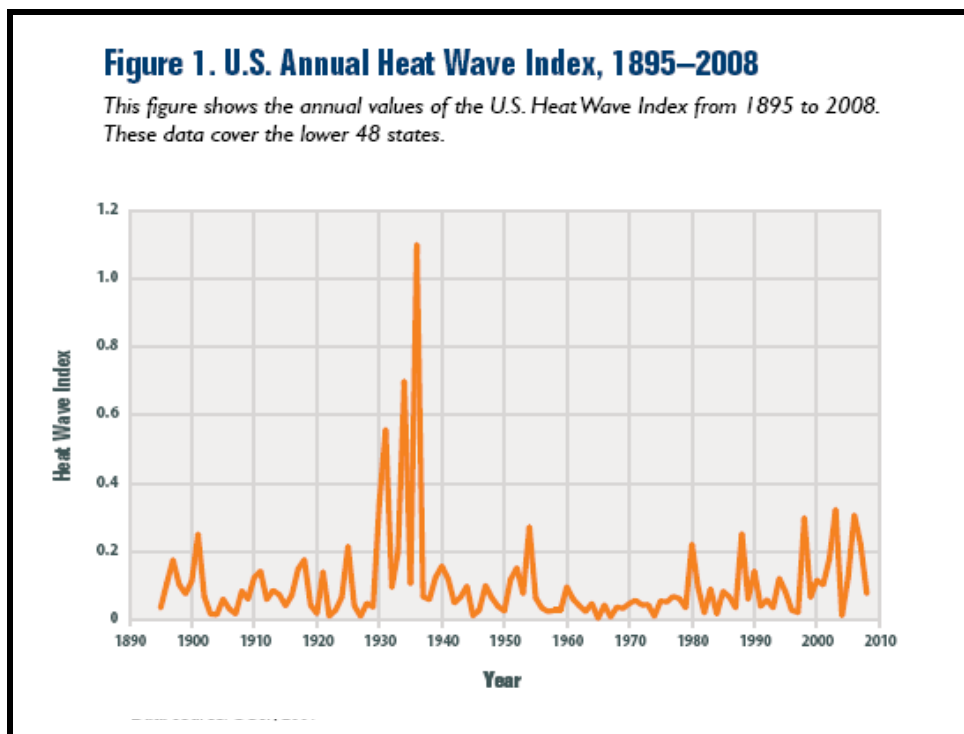
<sup>19</sup> See Chart at EPA-HQ-OAR-2009-0171-3187.3.

**Figure 13**



The U.S. Annual Heat Wave Index through 2009 shown in Figure 14 also clearly reconfirms that United States temperatures are not anomalous and that the bulk of the current records were established in the 1930s.<sup>20</sup>

<sup>20</sup> See EPA, *Climate Change Indicators in the U.S.* at 24, [http://epa.gov/climatechange/indicators/pdfs/ClimateIndicators\\_full.pdf](http://epa.gov/climatechange/indicators/pdfs/ClimateIndicators_full.pdf).

**Figure 14**

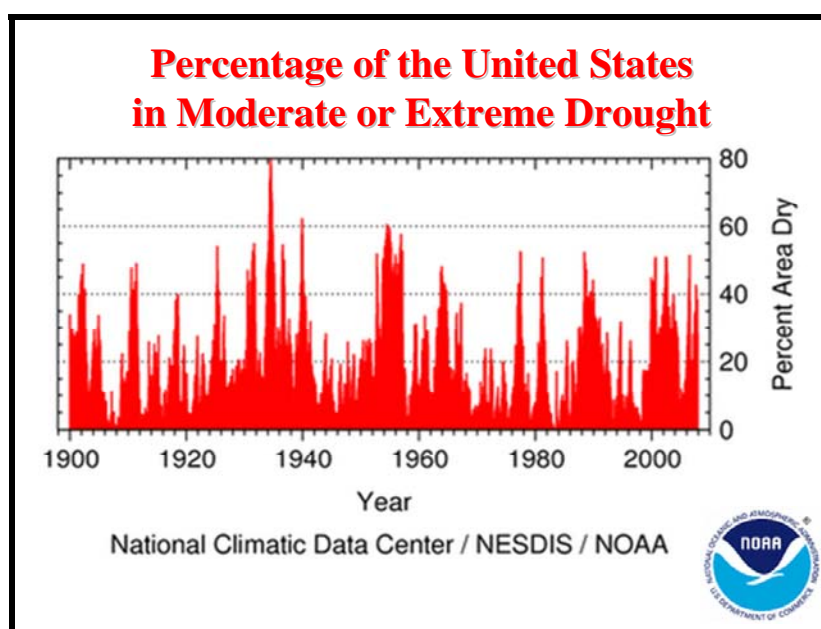
In short, the instrumental GAST (1850 to date) data are simply *not credible* in that claims of recent record setting temperatures are not valid. *The highly credible satellite data, from 1979 to date, do not show “global” warming.* And finally, multiple independent data sets (satellite, balloon, and buoy) show no warming at the Equator where the greenhouse gas impact on temperatures is expected to be most evident, as discussed in Part II.

### **B. Droughts, Floods, and Hurricanes Are Not Getting Worse.**

If increased CO<sub>2</sub> were really causing an increase in the Earth’s air temperature, some would expect these increased temperatures, in turn, would cause worse droughts, floods, and hurricanes. But U.S. empirical data show that

droughts (*see* Figure 15 below), floods (*see* Figure 16), and hurricanes (*see* Figures 17-18) are not getting worse.<sup>21</sup> U.S. data regarding droughts, floods, and hurricanes are particularly relevant given its location in a region that has experienced modest warming. At any rate, there is no apparent unusual climate behavior.

**Figure 15**



<sup>21</sup> See NOAA Satellite & Info. Serv., *State of the Climate Drought: April 2011* (National Oceanic and Atmospheric Administration, National Climatic Data Center), <http://www.ncdc.noaa.gov/sotc/drought/> (data for figures 15 and 16); NOAA Satellite & Info. Serv., *North Atlantic*, <http://lwf.ncdc.noaa.gov/img/climate/research/2006/ann/atlantic-2006-ace.png> (data for figure 17); NOAA Atlantic Oceanographic & Meteorological Laboratory, *Chronological List of All Hurricanes Which Affected the Continental United States: 1851-2009*, <http://www.aoml.noaa.gov/hrd/hurdat/ushurrlist18512009.txt> (data from figure 18).

Figure 16

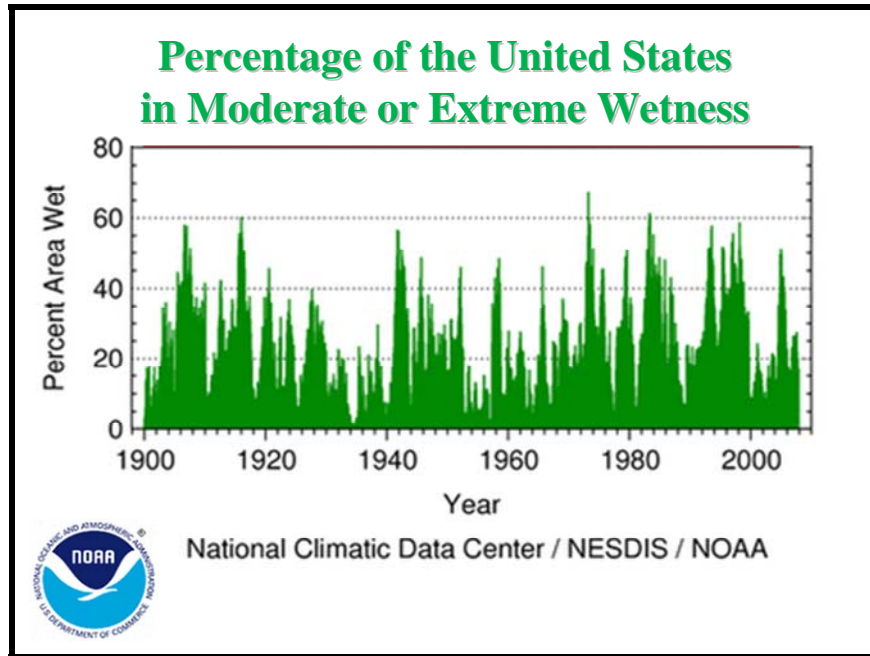
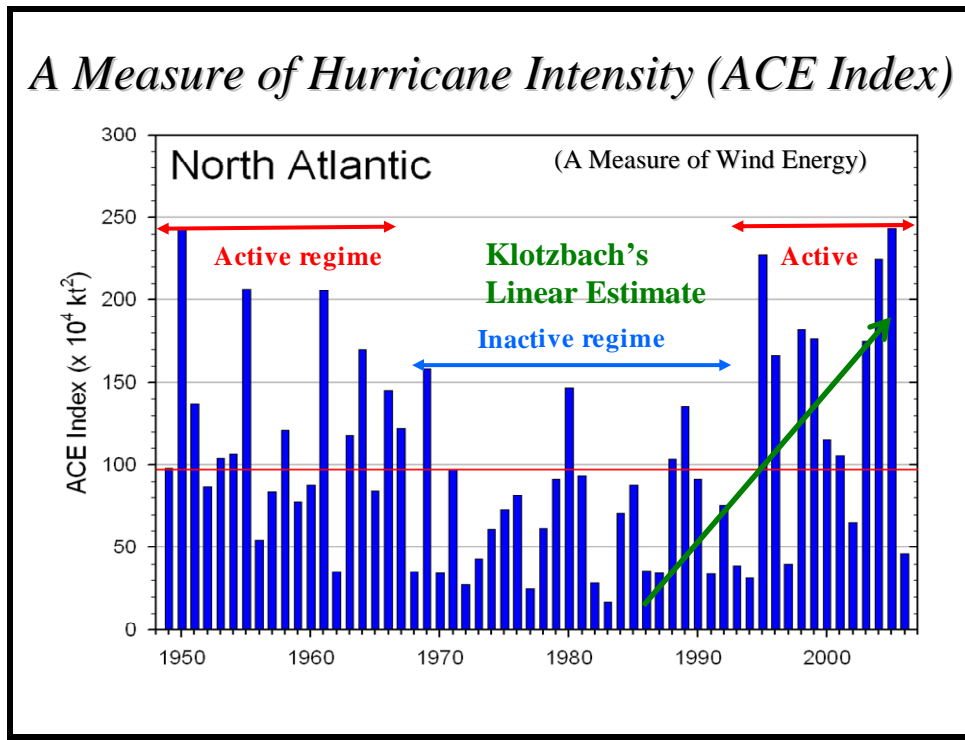
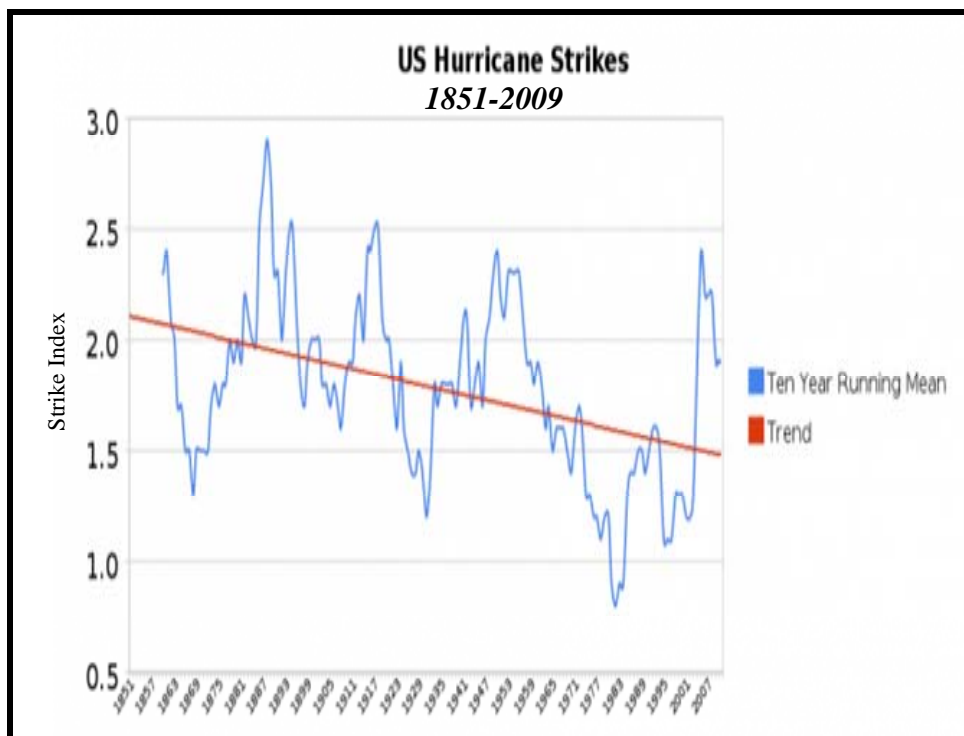


Figure 17

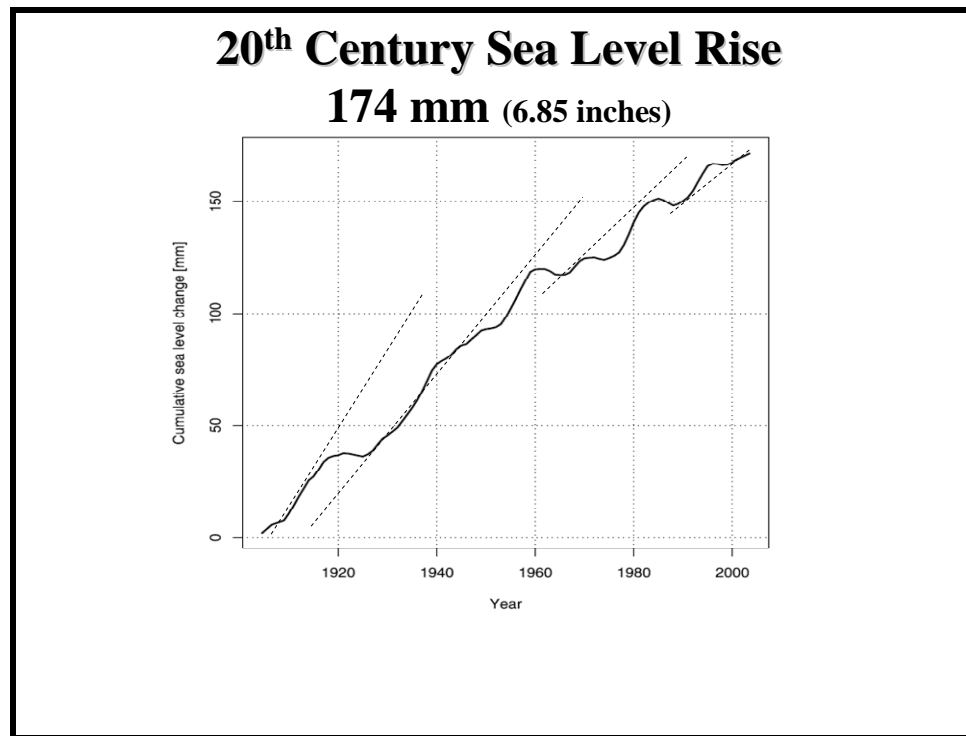


**Figure 18**

### C. Sea Levels Are Not Rising Dramatically.

Moreover, nothing unusual is happening with respect to the long term rise in sea levels. As shown in Figure 19, while CO<sub>2</sub> has continued rising, the rate of increase (in inches per year) in sea levels has been steadily declining (as shown by the rightward shift in the dotted trend lines).<sup>22</sup>

<sup>22</sup> See S.J. Holgate, *On the Decadal Rates of Sea Level Change During the Twentieth Century*, 34 GEOPHYSICAL RESEARCH LETTERS (Jan. 4, 2007), <http://www.joelschwartz.com/pdfs/Holgate.pdf>.

**Figure 19**

In sum, relevant climate data on (1) the Earth's air temperature, (2) droughts, (3) floods, (4) hurricanes, and (5) sea levels all show behavior that has not been anomalous.

**II. CO<sub>2</sub> HAS ONLY A MINOR EFFECT, AT MOST, ON THE EARTH'S CLIMATE SYSTEM.**

Even if it could be shown that the Earth's air temperatures are changing abnormally—and that cannot be shown—the data confirm that, at most, CO<sub>2</sub> only has a minor effect on the Earth's temperature. But correlation does not prove causation. Even if CO<sub>2</sub> concentration and surface temperature both rose from 1979 to 1998 as the EPA has asserted, this does not prove that CO<sub>2</sub> caused these temperature increases.

In fact, the literature suggests that past CO<sub>2</sub> increases lagged temperature increases, and empirical evidence to date does not support a “tipping point.”<sup>23</sup> Moreover, empirical evidence does not support the view that higher atmospheric CO<sub>2</sub> levels are harming the oceans.<sup>24</sup>

Therefore, this brief will focus on data that shows there is no “greenhouse gas fingerprint”—a critical assumption in EPA’s climate models that predict CO<sub>2</sub> will cause an increase in the Earth’s temperature.

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<sup>23</sup> “We found that the start of the CO<sub>2</sub> increase thus lagged the start of the [temperature] increase by  $800 \pm 600$  years.” Eric Monnin et al., *Atmospheric CO<sub>2</sub> Concentrations over the Last Glacial Termination*, SCIENCE, Volume 291, Jan. 5, 2001, at 112-114, <http://www.sciencemag.org/content/291/5501/112.abstract>. (atmospheric CO<sub>2</sub> concentrations over the last glacial termination).

Additionally, data refutes the notion that there is a threshold level of CO<sub>2</sub> emissions—colloquial called a “tipping point”—where the Earth will not be able to manage CO<sub>2</sub> emissions. Fossil fuel burning has resulted in annual CO<sub>2</sub> emissions rising from less than 1.25 ppm in 1959 to over 4 ppm today (approximately 8% per year). See GREGG MARLAND ET AL., *GLOBAL CO<sub>2</sub> EMISSIONS FROM FOSSIL-FUEL BURNING, CEMENT MANUFACTURING AND GAS FLARING: 1751-2005* (Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, 2008). But the Earth’s oceans and land mass have on average continually absorbed about 42% of these fossil fuel burning related emissions. See J.P. Wallace, A. Finizza & J. D’Aleo, *A Simple KISS Model to Examine the Relationship Between Atmospheric CO<sub>2</sub> Concentration, and Ocean & Land Surface Temperatures, Taking into Consideration Solar and Volcanic Activity, as Well as Fossil Fuel Use*, in EVIDENCE-BASED CLIMATE SCIENCE (forthcoming Sept. 2011).

<sup>24</sup> “Claims of impending marine species extinctions driven by increases in the atmosphere’s CO<sub>2</sub> concentration do not appear to be founded in empirical reality.” See *Ocean Acidification Database*, CO<sub>2</sub> SCIENCE, <http://www.co2science.org/data/acidification/results.php> (“Results and Conclusions” section of the Ocean Acidification Database maintained by the Center for the Study of Carbon Dioxide and Global Change).



Climate models relied on by the EPA (and others like the UN IPCC) are based on the theory that, because of increased atmospheric CO<sub>2</sub> levels (which are up about 23% from 1959 through 2010),<sup>25</sup> a particular “greenhouse gas fingerprint” should be apparent in the empirical temperature data. The “greenhouse effect” is the process in which the Earth’s atmosphere warms the surface through the absorption and emission of infrared radiation. The assumed fingerprint requires that, in the tropics (latitudes of 20° or 30° North to South), the atmosphere between 6 km (four miles) to 16 km (ten miles) above the Earth should have been steadily warming, and warming faster than the atmosphere below four miles and the surface itself. Figure 20 illustrates this assumed tropical temperature trend behavior. The darkest reds are where the temperatures are assumed to be rising the fastest: namely, between roughly 6 to 16 km and 20° North to 20° South. The atmosphere below 6 km is assumed to be trending upward at a lesser rate. (Blue areas are assumed to be cooling.)

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<sup>25</sup> See note 3, *supra* (annual CO<sub>2</sub> content computed by NOAA).

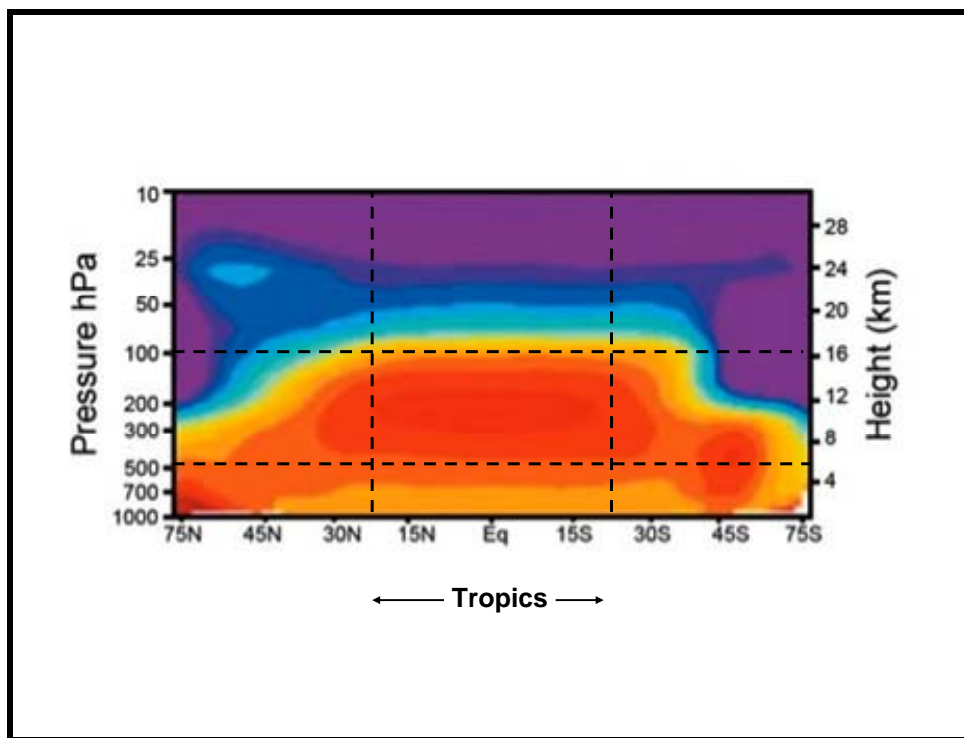
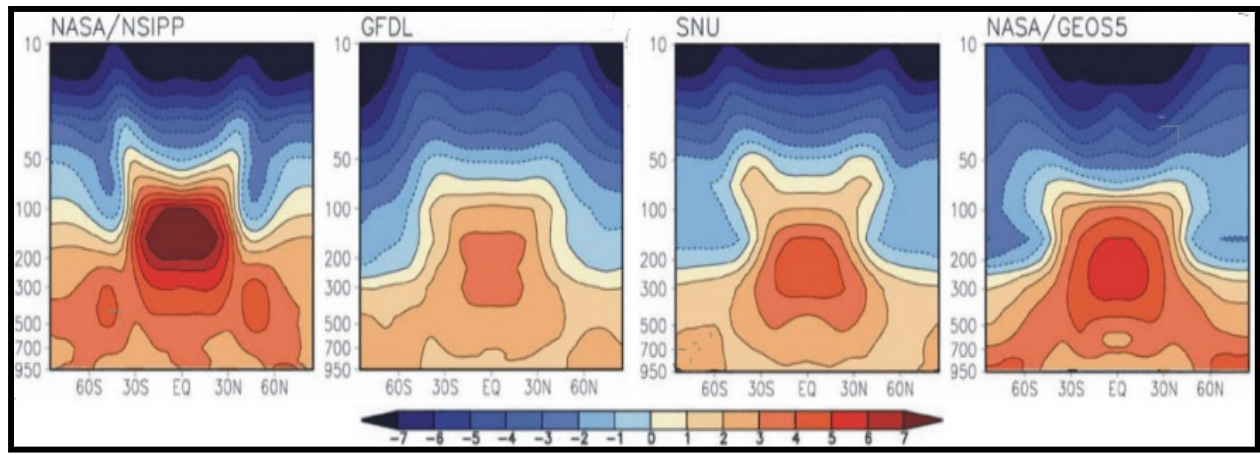
**Figure 20**

Figure 21 illustrates how the greenhouse gas fingerprint<sup>26</sup> has been characterized in the models; all four models assume the tropical hot spot to be in the 100-500 mb—or roughly 4-10 mile—range.<sup>27</sup>

<sup>26</sup> See Myong-In Lee et al., *A Moist Benchmark Calculation for the Atmospheric General Circulation Models*, 21 J. OF CLIMATE 4934 (2007), <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.141.110&rep=rep1&type=pdf>.

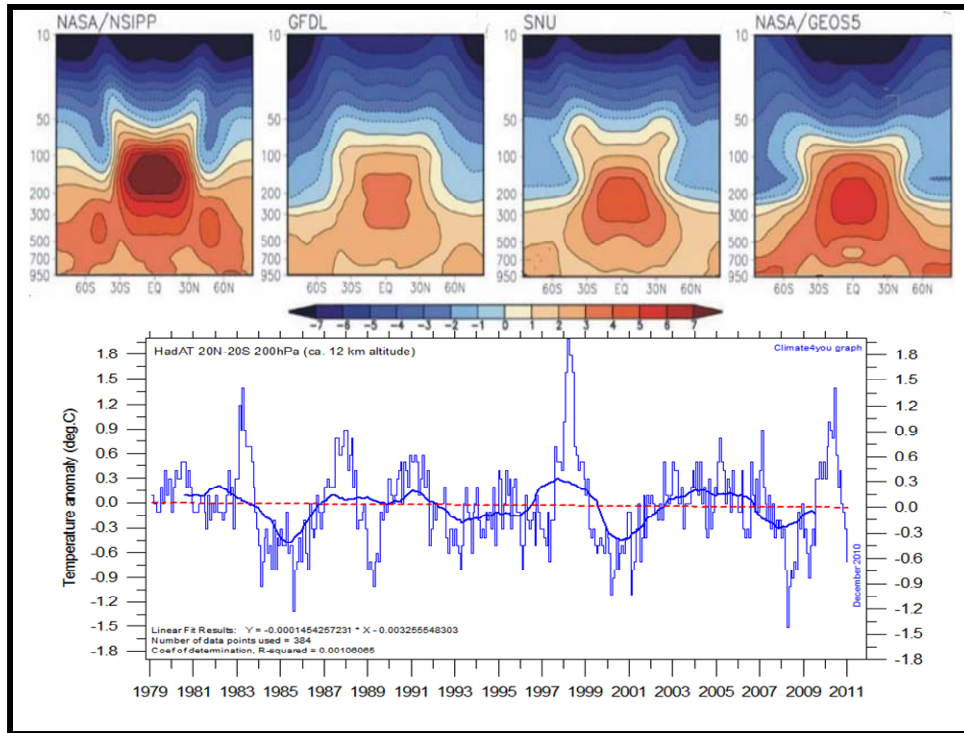
<sup>27</sup> See *id.* at 4950. These models are similar to the UN IPCC 19-model “ensemble” referenced in U.S. Climate Change Science Program, *Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences, Synthesis and Assessment Product 1.1*, at 104 (April 2006) (Table 5.1), <http://www.climatechange.gov/Library/sap/sap1-1/finalreport/sap1-1-final-all.pdf>; see also *id.* at 111 (Figure 5.4G, showing a similar result).

**Figure 21**

But *four different independent temperature records* reject the existence of this “greenhouse gas fingerprint.” Balloon data *from the Hadley CRU<sup>28</sup>* shows (in Figure 22) that there is no trend in temperatures (that is, the data has a flat trend line) in the tropics at 200 mb (7.5 mi)—even though the fingerprint theory and the EPA’s climate models would require an upward sloping trend.

<sup>28</sup> *Temperature Change Above Equator, Climate4you*  
<http://www.climate4you.com> (for chart and raw data, follow “Global Temperatures” hyperlink; then follow “Temperature change above Equator” hyperlink).

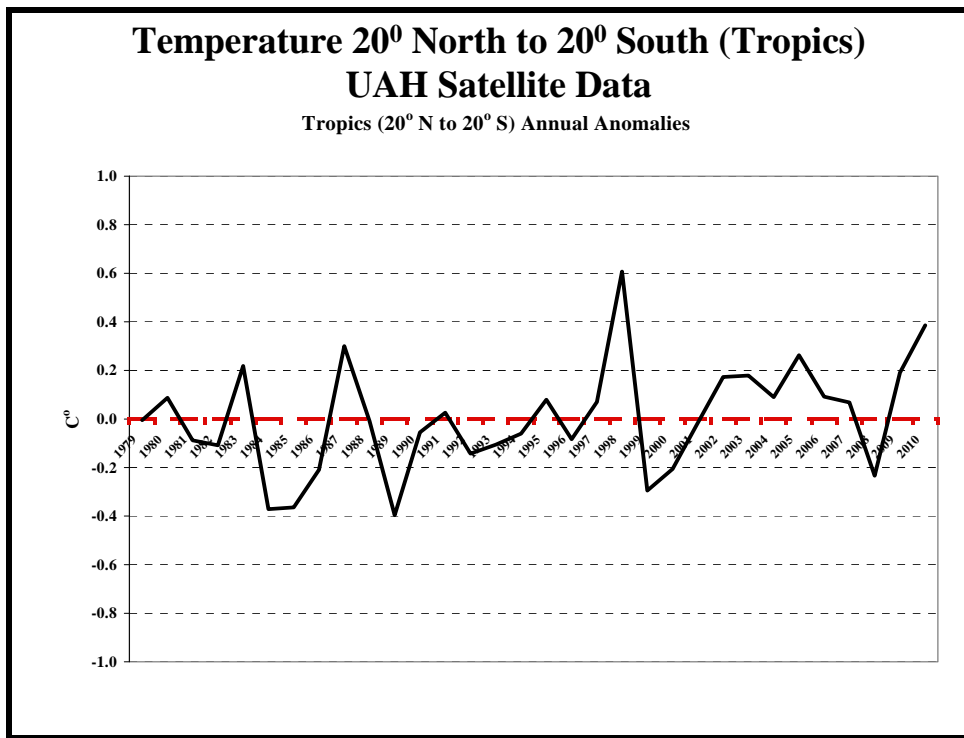
Figure 22



With no change in temperature at higher levels of the atmosphere, one would also expect no statistically significant upward sloping temperature trend at lower atmospheric levels. And that is exactly what satellite data from the National Space Science and Technology Center show in Figure 23: no trend in the lower troposphere.<sup>29</sup>

<sup>29</sup> See note 10, *supra*.

Figure 23



Buoy data also reject the greenhouse gas fingerprint, as the data show that there has no been warming at the ocean surface in the tropics. Figure 24 shows no changing trend in Central Pacific (between 5° North and 5° South) buoy temperatures beginning in 1959.<sup>30</sup> And Figure 25 indicates, if anything, a downward sloping trend in newer deep diving (upper 300 meters) buoy data.<sup>31</sup>

<sup>30</sup> See NOAA, note 12, *supra*.

<sup>31</sup> Ole Humlum, *Climate4you*, <http://www.climate4you.com> (go to “Ocean” then “Average sea temperatures in the upper 300m at Equator in the Pacific”); see NOAA, *Equatorial Upper 300m Temperature Average Anomaly Based on 1981-2010* *Climatology* (deg C), [http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/ocean/index/heat\\_content\\_index.txt](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ocean/index/heat_content_index.txt) (data cited by Humlum).

Figure 24

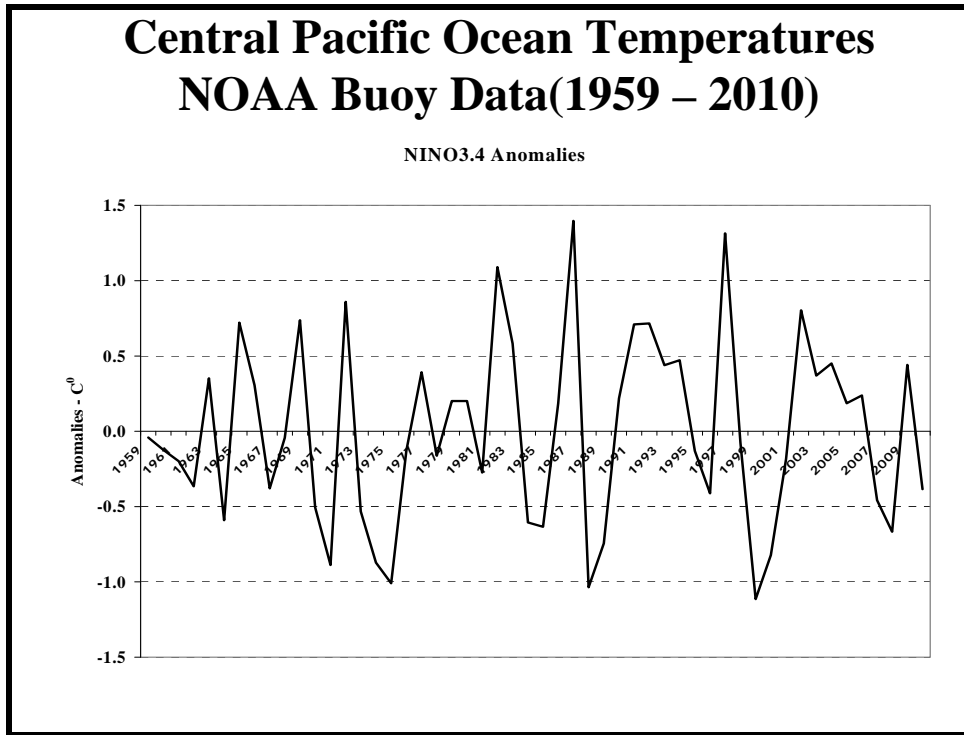
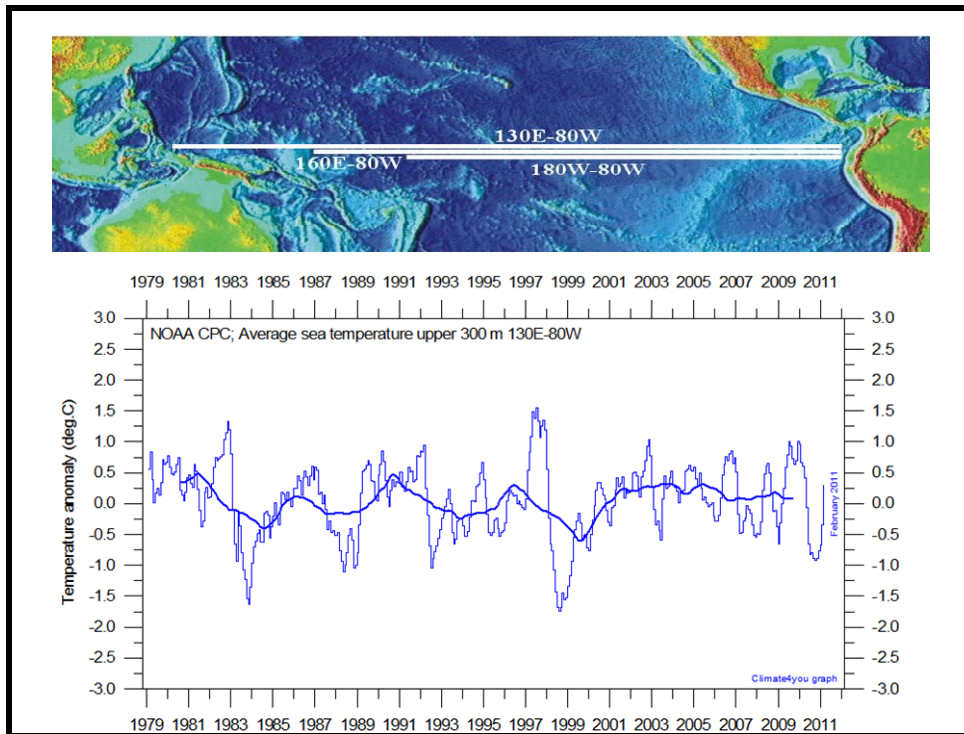


Figure 25



In summary, the greenhouse gas theory as implemented in the models through a greenhouse gas fingerprint is soundly rejected by a robust, internally consistent, set of empirical temperature data. This data set is based on satellite, balloon, and buoy temperature measurement technology managed by separate teams of scientists. This fact, coupled with the fact that the data all tell the same story, confirms that *the assumed fingerprint is simply missing*, thus fatally undermining EPA's climate models.

In short, the scientific evidence and experimental data to date suggest that (1) the Earth's climate system has not been behaving in an anomalous fashion; and, (2) as of today, there is no known, credible reason why further increasing CO<sub>2</sub> levels will cause future harm. Had EPA properly considered the theoretical evidence and empirical data, it would have had very good reason to seriously question the predictive ability of the climate models upon which it heavily relied for its endangerment finding.

**III. CLIMATE MODELS THAT ASSUME CO<sub>2</sub> IS A KEY DETERMINANT OF CLIMATE CHANGE CANNOT BE TRUSTED TO PROVIDE FORECASTS OF FUTURE CONDITIONS THAT ARE ADEQUATE FOR POLICY ANALYSIS.**

Given that, over the past decade, temperature trends are now falling or at least leveling off—even under the Hadley CRU's data<sup>32</sup>—the argument for CO<sub>2</sub> regulation now rests solely on the validity of the climate models relied upon by

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<sup>32</sup> See CRU, note 8, *supra*.

EPA and UN IPCC. This is particularly true regarding EPA's confidence in the models' forecast reliability.<sup>33</sup>

But EPA's climate models are not reliable for many reasons. For example, these models all assume a greenhouse gas fingerprint that is predicated on "positive feedbacks," resulting from more water vapor, fewer low- to mid-level clouds, and more high clouds.<sup>34</sup> However, many scientists believe just the opposite is happening.<sup>35</sup> Moreover, as explained in Part II, there is no greenhouse gas fingerprint, so the climate models posit feedback, leading to increased tropic temperatures, that does not exist.

Tellingly, while a number of scientists have commented on the failure of the climate models,<sup>36</sup> even *advocates* of CO<sub>2</sub> regulation have admitted that these

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<sup>33</sup> See *Endangerment Finding*, 74 Fed. Reg. at 66,518, 66,519, 66,523, 66,525, 66,530, 66,536.

<sup>34</sup> See Contribution of Working Group I to the Fourth Assessment Report of the IPCC, *Climate Change 2007: The Physical Science Basis*, at 33 (2007) (models "all predict a positive cloud feedback (Figure 8.14) but strongly disagree on its magnitude"), [http://www.ipcc.ch/publications\\_and\\_data/ar4/wg1/en/contents.html](http://www.ipcc.ch/publications_and_data/ar4/wg1/en/contents.html); see also *id.* at §§8.6.2.3, 8.6.3.2.

<sup>35</sup> See, e.g., Roy W. Spencer & William D. Braswell, *Potential Bias in Feedback Diagnosis from Observational Data: A Simple Model Demonstration*, 21 J. OF CLIMATE 5624, 5624-28 (2008), <http://journals.ametsoc.org/doi/full/10.1175/2008JCLI2253.1>.

<sup>36</sup> See, e.g., John R. Christy et al., *What Do Observational Datasets Say About Modeled Tropospheric Temperature Trends Since 1979?*, 2 REMOTE SENSING 2148, 2148-69 (2010), <http://www.mdpi.com/2072-4292/2/9/2148/pdf>; Ross McKittrick et al., *Panel and Multivariate Methods for Tests of Trend Equivalence in Climate Data Sets*, 11 ATMOSPHERIC SCI. LETTERS 270, 270-77 (2010), <http://onlinelibrary.wiley.com/doi/10.1002/asl.290/abstract>.



climate models do not work. Kevin Trenberth, a lead author of the UN IPCC's report on this issue, conceded that the models have failed:

“None of the models used by IPCC are initialized to the observed state and *none of the climate states in the models correspond even remotely to the current observed climate . . .*”<sup>37</sup>

Further, in an October 2009 e-mail exchange between IPCC assessment authors Kevin Trenberth and Michael Mann, they bemoan the failure of the climate to warm since 1998—as the models had projected continued warming beyond 1998:

Trenberth (copying Mann): “How come you [Tom Wigley] do not agree with a statement that says we are no where close to knowing where energy is going or whether clouds are changing to make the planet brighter. We are not close to balancing the energy budget. *The fact that we can not account for what is happening in the climate system makes any consideration of geoengineering<sup>[38]</sup> quite hopeless as we will never be able to tell if it is successful or not! It is a travesty!*”

Mann: “[W]e can easily account for the observed surface cooling in terms of the natural variability seen in the CMIP3 ensemble (i.e. the observed cold dip falls well within it). So in that sense, we can ‘explain’ it. But this raises the interesting question, is there something going on here w/ the energy & radiation budget which is inconsistent with the modes of internal variability that leads to similar temporary cooling periods within the models. I’m not sure that this has been addressed—has it?”

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<sup>37</sup> Kevin Trenberth, *Predictions of Climate* (June 4, 2007), [http://blogs.nature.com/climatefeedback/2007/06/predictions\\_of\\_climate.html](http://blogs.nature.com/climatefeedback/2007/06/predictions_of_climate.html).

<sup>38</sup> When Trenberth says “geoengineering,” he means efforts to “reduce emissions . . . or reduce the amount of carbon dioxide in the atmosphere.” EPA-HQ-OAR-2009-0171-11696.1 at ES-25 (Oct. 14, 2009).

Trenberth: “*Saying it is natural variability is not an explanation. What are the physical processes? Where did the heat go?*”<sup>39</sup>

Furthermore, these climate models have not been validated by the well-documented rules set forth by academic forecasting professionals. Professors Kesten Green and Scott Armstrong, recognized experts in forecasting principles, performed an audit on Chapter 8, the key modeling chapter in the UN IPCC report.<sup>40</sup> They determined that the UN IPCC report violated 72 of the 89 applicable, generally-accepted forecasting principles (81%)—and 60 of these 72 violations were “clear violations.” This is a dismal result that confirms the unreliability of the climate models on which EPA has relied.

Finally, in the ultimate test, these climate models failed to forecast the recent decline in temperatures. Given the continuous increase in atmospheric CO<sub>2</sub> levels, coupled with the assumed positive feedbacks, it should not be surprising that the climate models relied upon by EPA would yield unreliable forecasts.

In 2007, the UN IPCC’s four different model forecast scenarios—based on varying assumptions—all predicted a dramatic rise in GAST, which has yet to

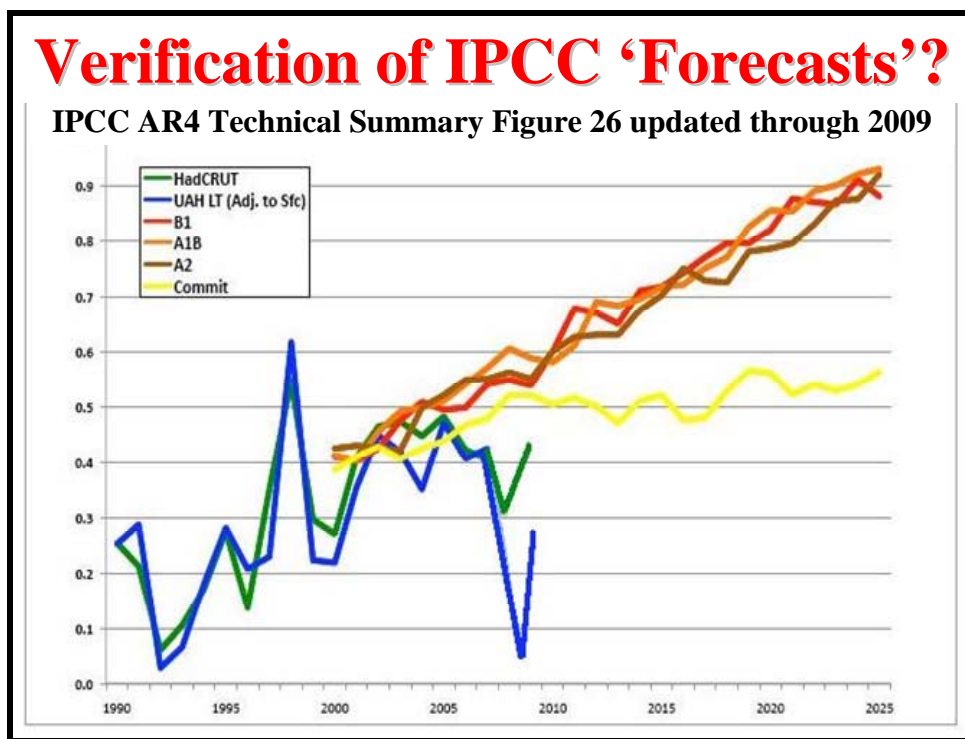
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<sup>39</sup> *Id.* (emphases added).

<sup>40</sup> See Kesten C. Green & J. Scott Armstrong, *Global Warming: Forecasts by Scientists Versus Scientific Forecasts*, 18 ENERGY & ENV’T 997, 997-1021 (2007), <http://multi-science.metapress.com/content/cx27431844018158/?p=fb8d88510526427891c84353bff0282e&pi=8>. The forecasting principles used by Green and Armstrong are available at *Forecasting Principles*, <http://www.forecastingprinciples.com>.

occur.<sup>41</sup> Figure 26 below shows these four forecast scenarios (in yellow, brown, orange, and red), all of which call for a future dramatic rise in GAST since CO<sub>2</sub> levels are expected to continue to rise rapidly. This is despite nearly a decade of temperature trend leveling in Hadley CRU temperature data (in green), and an outright decline in satellite temperature data (in blue). Of course, all these forecasts are based on a still missing greenhouse gas fingerprint. See Part II, *supra*.

Figure 26



<sup>41</sup> See ICECAP, IPCC AR4 TS Fig. 26 Updated, <http://icecap.us/images/uploads/ipccchart.jpg>. Note: the “Commit” scenario portrayed in the chart (in yellow) is the draconian curtailment of CO<sub>2</sub> emissions at the year 1992 level.

The bottom line is that these climate models do not provide reliable forecasts of how increased atmospheric CO<sub>2</sub> levels affect the Earth's temperature. This is hardly surprising because the models have been calibrated to fit dubious historical temperature data, *see* Part I, *supra*, using a greenhouse gas fingerprint missing in the real world, *see* Part II, *supra*.

**IV. CLIMATE CHANGE PRIMARILY RESULTS FROM NATURAL, THAT IS, NON-ANTHROPOGENIC FORCES AND INTERNAL CLIMATE VARIABILITY—INCLUDING VARIABLE SOLAR ACTIVITY, VOLCANISM, AND OCEANIC EFFECTS.**

Since Parts I, II, and III make clear that the atmospheric CO<sub>2</sub> level is only a minor determinant, at best, of the Earth's climate, one may be left wondering “what is really driving changes in the Earth's climate?” To address the question, one must at least consider natural forces, such as the sun, volcanic activity, and oscillations in ocean temperature behavior.<sup>42</sup> Shown below are just some of the most relevant theoretical and empirical data that establish that all three affect the Earth's climate.

**A. The Sun Plays a Significant Role in Climate Variations on Short (Multi-Decadal or Shorter) Time Scales.**

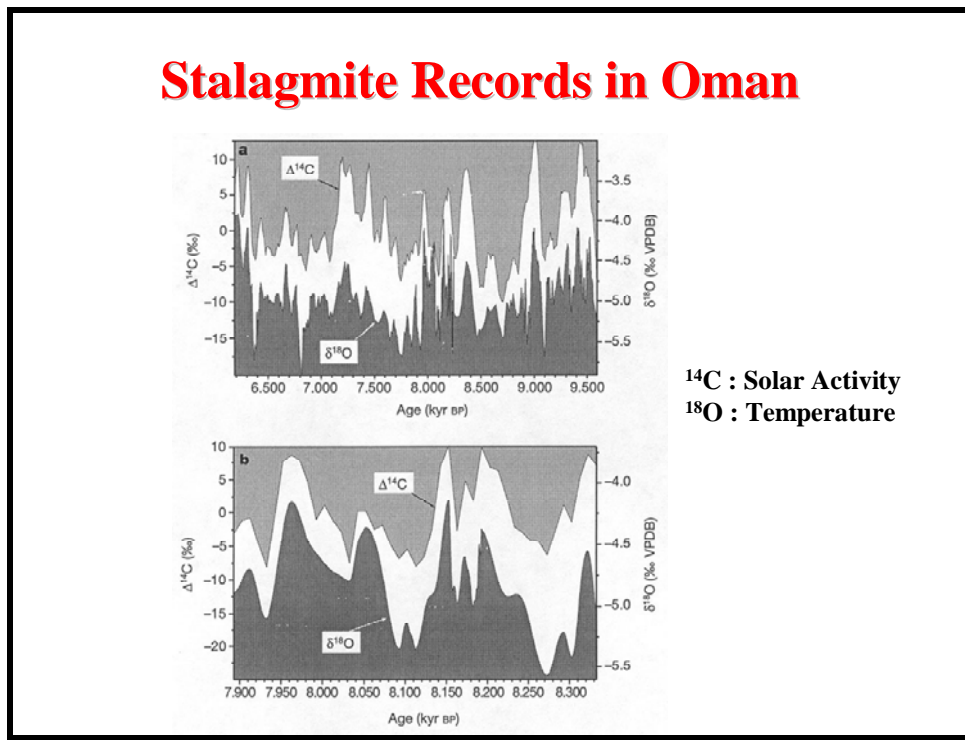
To begin with, based on empirical temperature data and related historical information going back many thousands of years, there would seem to be little doubt that the sun has had a major impact on the Earth's GAST. For example, the

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<sup>42</sup> *See* Exhibit 1 to Scientists' Reply in Support of Motion for Leave to Participate as Amici Curiae at 4.

stalagmite record in Figure 27<sup>43</sup> quite visually shows a remarkably close positive relationship between changes in  $^{14}\text{C}$  (proxy for solar activity) and changes in  $^{18}\text{O}$  (proxy for temperature) over a period of more than 3,000 years.<sup>44</sup>

**Figure 27**



However, as discussed above, correlation between two well-accepted proxy variables is a necessary, but not sufficient, condition to prove causality. Causality

<sup>43</sup> See U. Neff et al., *Strong Coherence Between Solar Variability and the Monsoon in Oman Between 9 and 6 kyr Ago*, NATURE, Volume 411, May 17, 2001, at 290-93, <http://www.nature.com/nature/journal/v411/n6835/pdf/411290a0.pdf>.

<sup>44</sup> See Nir J. Shaviv, *Cosmic Rays and Climate*, <http://www.sciencebits.com/CosmicRaysClimate#Neff> (proxy descriptions on Figure 1).

is demonstrated in Table 1 below,<sup>45</sup> which shows the result of empirical solar and temperature data analysis coupled with a review of historical records regarding various temperature-related events.

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<sup>45</sup> See David Whitehouse, *Can the Sun Save Us from Global Warming?*, BELFAST TELEGRAPH, Dec. 5, 2007, <http://www.belfasttelegraph.co.uk/lifestyle/can-the-sun-save-us-from-global0warming-13499697.html>.

**Table 1**

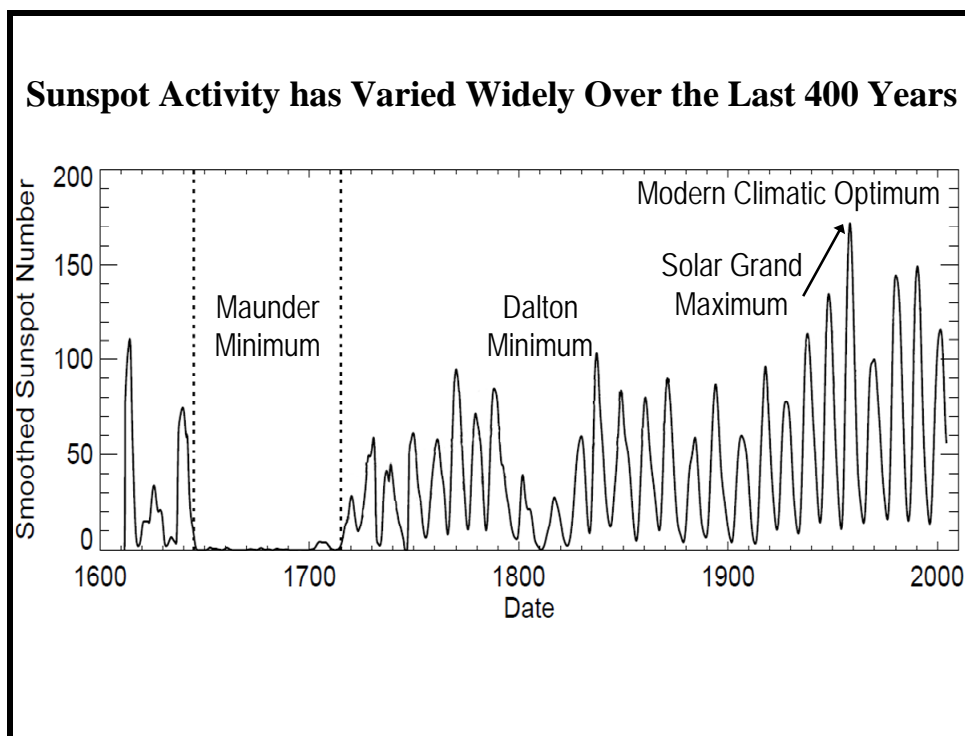
<b>Solar Activity</b>	<b>Time Period</b>	<b>Temperature Regime</b>	<b>Relevant Event</b>
<b>Medieval Solar Maximum</b>	<b>1075-1240</b>	<b>Medieval Warm Period</b>	<b>Greenland and North America settled by Vikings</b>
<b>Spörer Solar Minimum</b>	<b>1420-1530</b>	<b>Colder Temperatures</b>	<b>Greenland settlements abandoned. End of Medieval Warm Period.</b>
<b>Maunder Solar Minimum</b>	<b>1645-1715</b>	<b>Colder Temperatures</b>	<b>Coincident with the “Little Ice Age”</b>
<b>Dalton Solar Minimum</b>	<b>1790-1820</b>	<b>Colder Temperatures</b>	<b>End of the “Little Ice Age”</b>
<b>Modern Climate Optimum</b>	<b>1890-2000</b>	<b>Warmer Temperatures</b>	<b>Recent warming trend</b>
<b>Modern Solar Minimum (?)</b>	<b>2000-????</b>	<b>Colder Temperatures (?)</b>	<b>Delay of the next solar cycle may be the start of a new minimum?</b>

As shown in Figure 28, when sunspot activity is low, less of the sun’s energy affects the Earth and its temperature.<sup>46</sup> To illustrate this, compare Table 1 and Figure 28 and note that the Maunder Minimum time period (1645-1715)

<sup>46</sup> David H. Hathaway & Robert M. Wilson, *What the Sunspot Record Tells Us About Space Climate*, SOLAR PHYSICS, Volume 224, Oct. 2004, at 5, 11, <https://www.cfa.harvard.edu/~wsoon/ChristopherMonckton08-d/HathawayWilson04.pdf>.

corresponds to the Little Ice Age and that the most recent warming period began in the late 1800s.

**Figure 28**



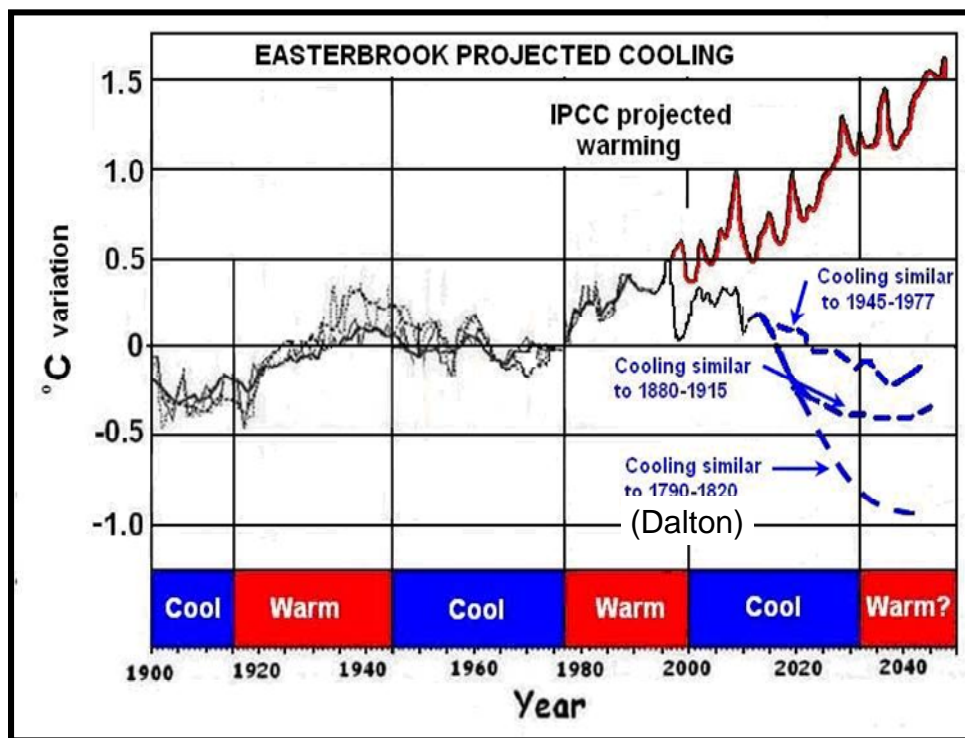
In fact, there is reason to believe that the sun may now move into another “minimum” state, like the Maunder or Dalton Minimums shown in Figure 28. After all, three out of the 20 years with the highest spotless days since 1849 occurred in 2007, 2008, and 2009.<sup>47</sup>

<sup>47</sup> See Solaemon’s *Spotless Days Page*, <http://users.telenet.be/j.janssens/Spotless/Spotless.html#Number> (“Top 25 of years with most number of spotless days since 1849”); Solar Influences Data Analysis Ctr., *Sunspot Data*, <http://sidc.oma.be/sunspot-data/> (data cited by Solaemon’s *Spotless Days Page*).



Figure 29 below shows estimates of the outlook for GAST depending on the sun's behavior and contrasts it with the UN IPCC's projection.<sup>48</sup> Clearly, there is an enormous difference of opinion as to the outlook for GAST. But, there can be no doubt about the importance of the sun's role.<sup>49</sup>

**Figure 29**



**B. Volcanic Activity and Changes in Stratospheric Aerosols Also Affect Climate on Short (Multi-Decadal or Shorter) Time Scales.**

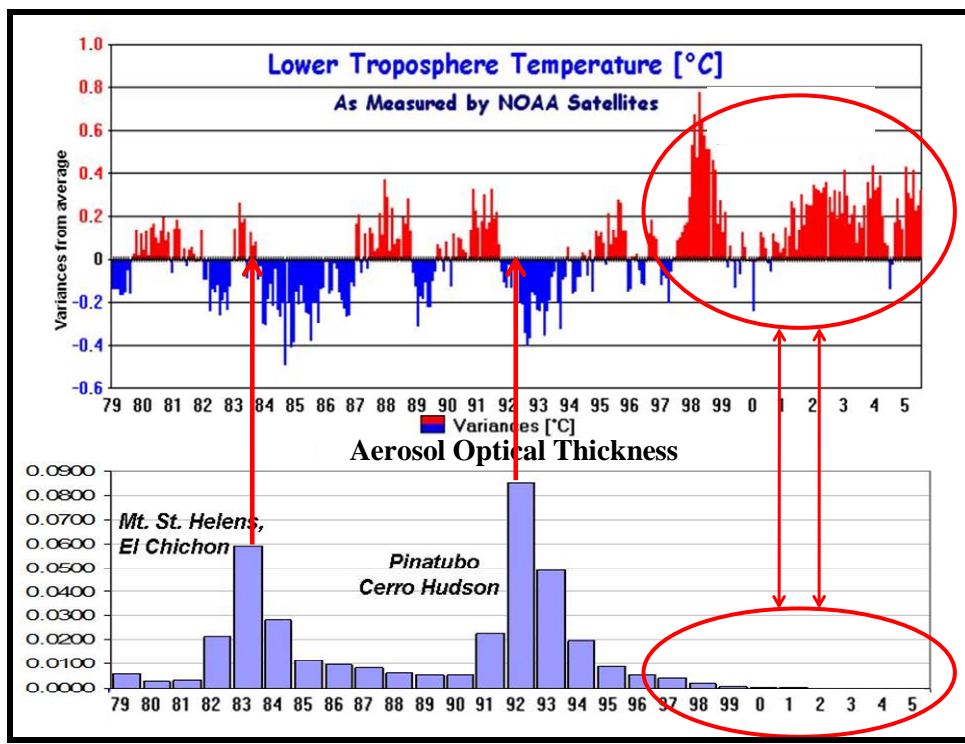
Major volcanic eruptions clearly reduce the Earth's temperatures for three or four years. Figure 30 shows the variance from average lower troposphere

<sup>48</sup> Don Easterbrook, *We Are Cooling?*, <http://www.naturalclimatechange.us/Power%20Points/we%20are%20cooling-%20Easterbrook.htm> (slide 25).

<sup>49</sup> See Wallace, note 23, *supra*.

temperatures as well as the volcanic eruption generated aerosols.<sup>50</sup> Between 2000 and 2008,<sup>51</sup> the lowest levels of stratospheric volcanic aerosols have been observed since records began in 1979, which has facilitated higher temperature levels.

**Figure 30**



<sup>50</sup> Temperature data cited at Figure 23. See note 10, *supra*. Aerosol data at NOAA, *Black Carbon and Sulfate Aerosol Optical Thickness*, <http://sos.noaa.gov/datasets/Atmosphere/aerosols.html>.

<sup>51</sup> See NOAA, *GMD Lidar: Mauna Loa, Hawaii*, [http://www.esrl.noaa.gov/gmd/obop/mlo/programs/gmdlidar/mlo/gmdlidar\\_mlo.html](http://www.esrl.noaa.gov/gmd/obop/mlo/programs/gmdlidar/mlo/gmdlidar_mlo.html).

**C. Oscillations in Ocean Temperatures and the Oceanic Conveyor Belt Have a Significant Effect on the Earth's Climate.**

Oceans cover approximately 72% of the Earth's surface and oceanic "oscillation" effects can influence both short and long term climate variability. This is a very complex subject, but this brief will focus on three key points associated with the three major ocean-driven cycles: ENSO (El Niño/Southern Oscillation), PDO (Pacific Decadal Oscillation), and AMO (Atlantic Multidecadal Oscillation).

*ENSO (El Niño/Southern Oscillation).* The Southern Oscillation Index (SOI) is the difference in normalized atmospheric pressures at the surface between Darwin, Australia and Tahiti. This index is very highly correlated (over -0.90) with temperatures in the Tropical Pacific (*see* Figure 6).<sup>52</sup> However, as has already been noted, this tropical region in the Pacific has no significant long-term trend.

*PDO (Pacific Decadal Oscillation).* Unlike the stable, flat trend of the Tropical Pacific, the pattern of temperature trends in the Northern Pacific (PDO) behaves in a chaotic fashion. As illustrated in Figure 31,<sup>53</sup> every 20 or 30 years, the Northern Pacific switches back and forth between a warm El Niño and a cold

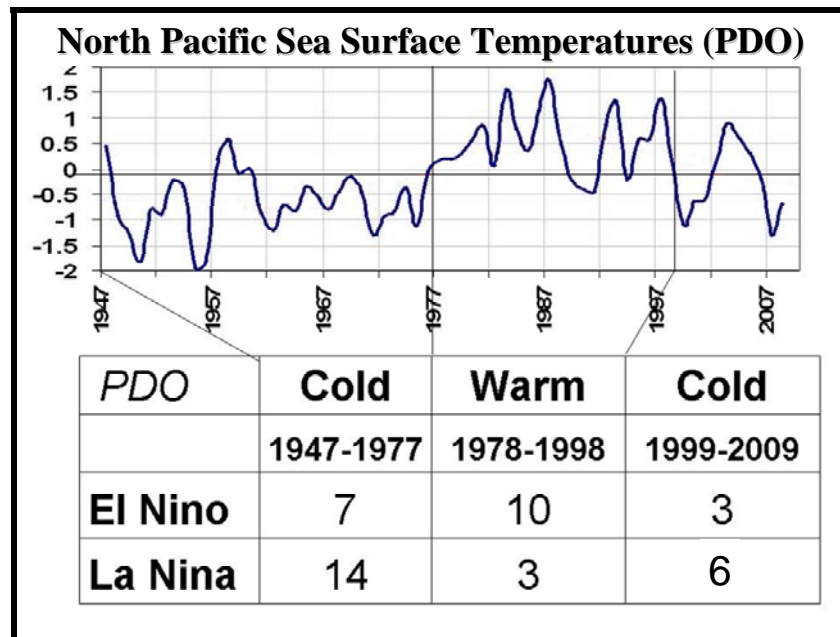
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<sup>52</sup> See PETER MÜLLER & HANS VON STORCH, COMPUTER MODELLING IN ATMOSPHERIC AND OCEANIC SCIENCES: BUILDING KNOWLEDGE 102 (2004).

<sup>53</sup> See Nathan Mantua, *Updated Standardized Values for the PDO Index, Derived as the Leading PC of Monthly SST Anomalies in the North Pacific Ocean, Poleward of 20N*, <http://jisao.washington.edu/pdo/PDO.latest>.

La Niña “central tendency.” When the central tendency is El Niño, there are more, longer, and stronger El Niños and vice versa. In Figure 31, note that a flip from cold La Niña to warm El Niño central tendency can easily increase Northern Pacific average temperatures quickly by over 1 degree Celsius.

**Figure 31**



Pacific Ocean temperature behavior can therefore be summarized as follows:

- The Central Pacific does not have a statistically significant trend (1954 to date).
- The Northern Pacific temperature behaves in a chaotic fashion switching back and forth (every 20-30 years) between warmer El Niño and colder La Niña central tendencies.
- From the mid 1970s to 1998, the North Pacific was in a warmer El Niño central tendency.

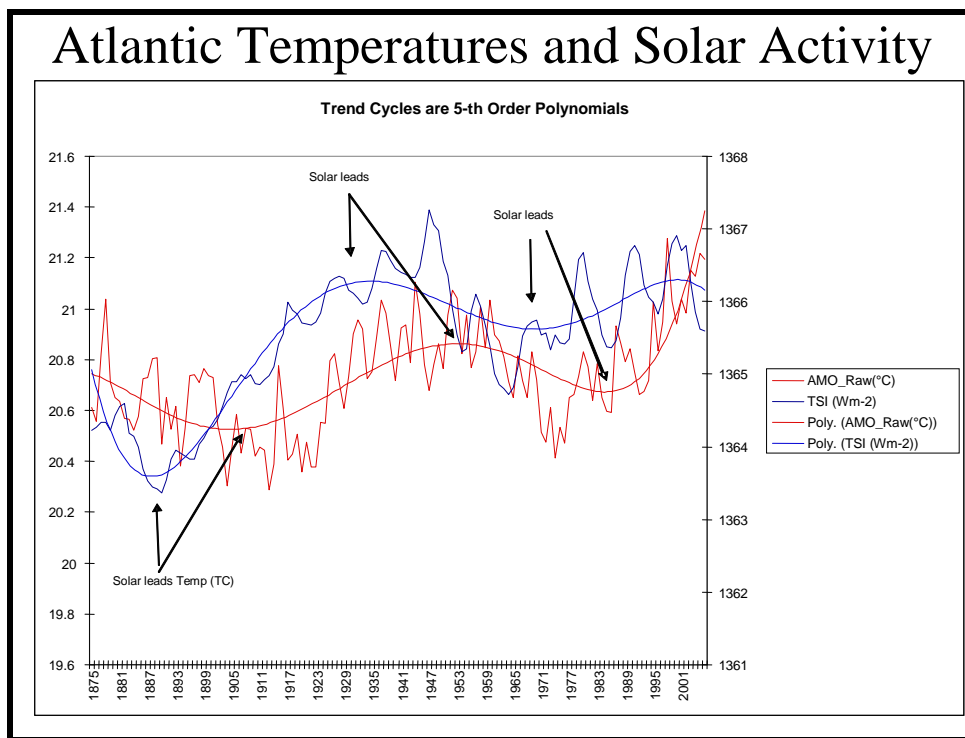
This chaotic behavior of the North Pacific makes reliable long term GAST forecasting far more difficult because it is hard to predict a shift in central tendency, which can lead to a quite significant (1 degree Celsius or more) change in this very large ocean's temperature.

*AMO (Atlantic Multidecadal Oscillation).* Finally, as shown in Figure 32, where TSI is a measure of solar energy impacting the Earth, the North Atlantic's temperature (AMO) behavior is much more predictable over the long term, assuming that one has a reliable solar TSI outlook.<sup>54</sup> Unfortunately, the uncertainty associated with TSI forecasts is legion.

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<sup>54</sup> TSI is Total Solar Irradiance. Willie W.-H. Soon, *Variable Solar Irradiance as Plausible Agent for Multidecadal Variations in the Arctic-wide Surface Air Temperature Record of the Past 130 Years*, 32 *GEOPHYSICAL RESEARCH LETTERS* at 6712 (2005). AMO is the raw, untrended Atlantic Multidecadal Oscillation data. See NOAA, note 12, *supra* (buoy data).

Figure 32



In short, at best, someday scientists may be able to provide a useful set of scenarios regarding the entire Earth’s climate. In any event, ocean oscillation matters a great deal.

\* \* \*

Thus, natural factors ultimately can explain the recent warming period from 1979 to 1998. Satellite data confirms a modest warming (0.3C).<sup>55</sup> The now obvious natural-factor explanations are:

- The Northern Pacific was warming due to an El Niño central tendency. See Part IV.C, *supra*.

<sup>55</sup> See Figure 3’s step height.

- Solar activity, as measured by TSI, was increasing. *See id., supra* (Figure 32).
- Thus, Atlantic Ocean (and other) temperatures were increasing. *See id., supra.*
- Volcanic activity impacts were minor since 1995, enhancing warming. *See Part IV.B., supra.*

All of these natural factors contributed to a modest global-scale warming between 1979 and 1998. Shortly after 1998, a temperature trend leveling/decline occurred consistent with (1) the shift in 1999 to a colder La Niña central tendency (*see* Figure 31) and (2) a decrease in solar activity (*see* Figure 32).

So where does GAST go from here? As stated above, someday scientists may be able to provide a useful set of scenarios regarding the long-term GAST outlook. But for now, highly relevant empirical data confirm that the primary drivers of the Earth's climate system have been, and will continue to be, natural (non-anthropogenic) forces—including variable solar activity, volcanism, and oceanic effects.

### CONCLUSION

For these reasons and those discussed more fully in petitioners' briefs, the Endangerment Rule and Reconsideration Denial should be vacated and remanded.

Respectfully submitted,

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ATTORNEYS FOR AMICI CURIAE SCIENTISTS  
IN SUPPORT OF PETITIONERS



**CERTIFICATE OF SERVICE**

I hereby certify that on the 8th day of June 2011, I electronically filed the foregoing Brief of Amici Curiae Scientists with the clerk of court for the U.S. Court of Appeals for the District of Columbia Circuit using the electronic case filing system of the court. (This brief was originally filed and served as an attachment to a motion for leave on May 27, 2011 with a one-item appendix. This version of the brief omits the appendix and corrects the two citations thereto to instead cite to and exhibit to amici's reply in support of their motion for leave. No other changes have been made.) The electronic case filing system sent a "Notice of Electronic Filing" to the attorneys of record who have consented to accept this Notice as service of this document by electronic means. I also certify that I have further served the foregoing document upon the following counsel who have not consented to ECF via first class mail.

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**CERTIFICATE OF COMPLIANCE**

1. This brief complies with the type-volume limitations of Federal Rule of Appellate Procedure 32(a)(7)(B) because this brief contains 6,688 words, excluding the parts of the brief exempted by Federal Rule of Appellate Procedure 32(a)(7)(B)(iii).

2. This brief complies with the typeface requirements of Federal Rule of Appellate Procedure 32(a)(5) and the type-style requirements of Federal Rule of Appellate Procedure 32(a)(6) because this brief has been prepared in a proportionally spaced typeface using Microsoft® Office Word 2007 in 14-Point Times New Roman font.

/s/ Christian J. Ward

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