Alarmists Bizarrely Claim "Just what AGW predicts" about the Record High Global Sea Surface Temperatures
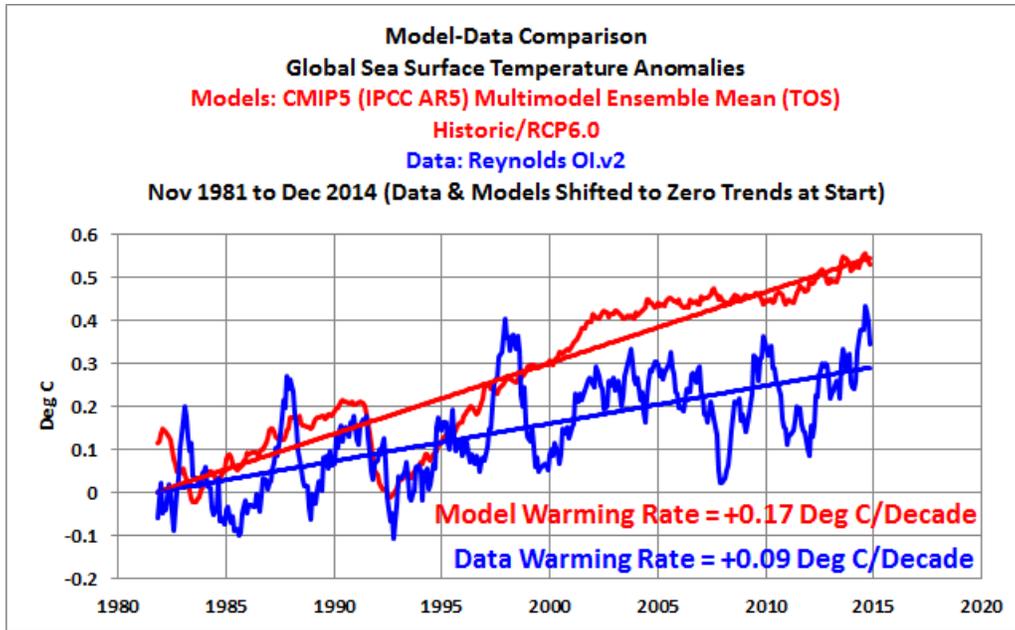
This post is the annual model-data comparison of satellite-era sea surface temperatures. (For the most-recent longer-term model-data comparison of sea surface temperature data, see the post [IPCC Still Delusional about Carbon Dioxide](#).) We're taking a slightly new direction by presenting sea surface temperatures (modeled and observed) in absolute form, not anomalies, in the time-series graphs. Sea surface temperature anomalies are still used, however, for the trend maps and for the graphs showing trends on a zonal-mean (latitude-average) basis.

The initial reason for the switch to absolute sea surface temperatures was the unwarranted complaints about the model-data comparison I've been presenting recently, in which the models and data are shifted so that the trend lines intersect at zero in the first month of the time-series graph. See Figure 1. As you will soon discover, I'm being kind to the modelers with that graph.

Model-Data Comparison
Global Sea Surface Temperature Anomalies
Models: CMIP5 (IPCC AR5) Multimodel Ensemble Mean (TOS)
Historic/RCP6.0
Data: Reynolds OI.v2
Nov 1981 to Dec 2014 (Data & Models Shifted to Zero Trends at Start)

Model Warming Rate = +0.17 Deg C/Decade
Data Warming Rate = +0.09 Deg C/Decade

Climate Models Almost Double The Observed Warming Rate Of The Global Ocean Surfaces. Climate Scientists Are Also Still Looking For About 50% Of The Heat That Is Supposed To Be Stored In The Oceans. The "Missing Heat" And Doubling Of Ocean-Surface Warming Suggest The Model Sensitivities Are At Least Two-Times Too High.

Bob Tisdale

Figure 1

But the use of sea surface temperatures instead of anomalies point to addition problems with the models as you will soon discover.

I've also included a note at the end of this post regarding the misinformation about sea surface temperature datasets being spread by the queen of the trolls…guess who?

The title of the post includes a quote from a well-known alarmist…and sometimes troll at my blog ClimateObservations. (See the comment here.) Of course, all predictions of global warming are based on climate models. As we've illustrated and discussed numerous times in recent years, climate model simulations of sea surface temperatures are far from reality. That is, they're modeling the surface temperatures of a virtual planet but those surface temperatures have no similarities to Earth…no similarities at all to (1) the actual warming and cooling rates, (2) the patterns of those trends, and (3), as you'll discover in this post, the absolute temperatures. It would be nice if climate modeling agencies might try to simulate the surface temperatures of this planet, not some other one. That way, their models might have some value. Right now, they don't serve any purpose…other than to illustrate how poorly they simulate Earth's climate.

To that end, I'm going to repeat the opening of last year's model-data comparison of sea surface temperature anomalies Maybe the IPCC's Modelers Should Try to Simulate Earth's Oceans.

The climate models stored in the CMIP5 archive are supposed to be simulations of Earth's climate, but the simulated sea surface temperatures of the models used by the IPCC for their 5th Assessment Report are definitely not of this planet. 70% of the Earth is covered by oceans, seas and lakes. Because the models show no skill at being able to simulate the rates of warming and cooling of the surfaces of the global oceans over the past 32+ years, and because the models show no skill at being able to reproduce the spatial patterns of that warming and cooling, all of which drive temperature and precipitation patterns on land, any and all projections of future climate are based on modeled worlds that have no similarity to the real world. In other words, the projections are meaningless.

PRELIMINARY INFORMATION

The sea surface temperature dataset being used in this post is NOAA's Optimum Interpolation (OI) Sea Surface Temperature (SST) v2 (aka Reynolds OI.v2). We're using it because (1) it is the longest running satellite-enhanced sea surface temperature dataset available, (2) its satellite data are bias adjusted based on temperature measurements from ship inlets and from buoys (both moored and drifting), and (3), most importantly, NOAA's Reynolds OI.v2 data have been called "a good estimate of the truth". See Smith and Reynolds (2004) Improved Extended Reconstruction of SST (1854-1997). The authors stated about the Reynolds OI.v2 data (my boldface):

> Although the NOAA OI analysis contains some noise due to its use of different data types and bias corrections for satellite data, **it is dominated by satellite data and gives a good estimate of the truth**.

Additional notes about my choice of sea surface temperature datasets. (1) Though satellite data are not included in the new NOAA ERSST.v4 data, Reynolds OI.v2 data are used for quality control of the new ERSST.v4 dataset. See the post Quick Look at the DATA for the New NOAA Sea Surface Temperature Dataset. (2) Along with HADISST data, Reynolds had been used (past tense) in the GISS Land-Ocean Temperature Index data until early in 2013, but GISS switched to NOAA's ERSST.v2 data to bring their long-term trends into line with the NCDC and HADCRUT datasets. During the satellite era, the change from Reynolds OI.v2 to ERSST.v3b data had little impact. See the post A Look at the New (and Improved?) GISS Land-Ocean Temperature Index Data. Reynolds OI.v2 data (along with HADISST) are still available for presentations at the GISS Map-Making Webpage. (3) Reynolds OI.v2 data are also used in a number of reanalyses, including CMCC C-GLORS, ECMWF ORAS4, ECMWF

ORAS3, GFDL, GLORYS2V1, GMAO and NCEP/GODAS. See the Reanalysis.org webpage Overview of current ocean reanalyses.

Because the NOAA NOMADS website is no longer operational (permanently?) the Reynolds OI.v2 sea surface temperature data presented in this post are from the KNMI Climate Explorer…as are the model simulations of sea surface temperatures.

The climate models presented in this post are those stored in the CMIP5 archive, which was used by the IPCC for their 5th Assessment Report (AR5). The CMIP5 climate model outputs of sea surface temperature are available through the KNMI Climate Explorer, specifically through their Monthly CMIP5 scenario runs webpage, under the heading of Ocean, ice and upper air variables. Sea surface temperature is identified as "TOS" (temperature ocean surface). For consistency with past posts, the "CMIP5 mean" and the Historic/RCP6.0 scenario are being used. The RCP6.0 scenario is the closest to scenario A1B used for the CMIP3 models (used by the IPCC for the 4th Assessment Report). And once again we're using the model mean because it represents the forced component of the climate models; that is, if the forcings used by the climate models were what caused the surfaces of the oceans to warm, the model mean best represents how the ocean surfaces would warm in response to those forcings. For a further discussion, see the post On the Use of the Multi-Model Mean.

Because the model-data comparisons are in absolute terms, annual data are being presented. The Reynolds OI.v2 data start in November 1981 so the comparisons run from 1982 to 2014…33 years.

The linear trends in the graphs are as calculated by EXCEL. And the trend maps were produced at the KNMI Climate Explorer.

TREND MAPS

Figure 2 presents maps of the modeled and observed warming and cooling rates of the surfaces of the global oceans for the period of 1982 to 2014, the satellite era. The color-coded contour levels are presented in deg C/year. The model mean is presented in the left-hand map and the observed warming rates are presented in the right-hand one.   There are no similarities between the spatial patterns of the modeled and observed trends. The models show the greatest warming near the equator, while in the real world, the greatest warming has occurred at mid and high latitudes. The North Atlantic in the real world warmed at the highest rate. That warming of the North Atlantic is associated with the Atlantic Multidecadal Oscillation.

Modeled and Observed Warming Rates of Global Sea Surface Temperature Anomalies (1982-2014)
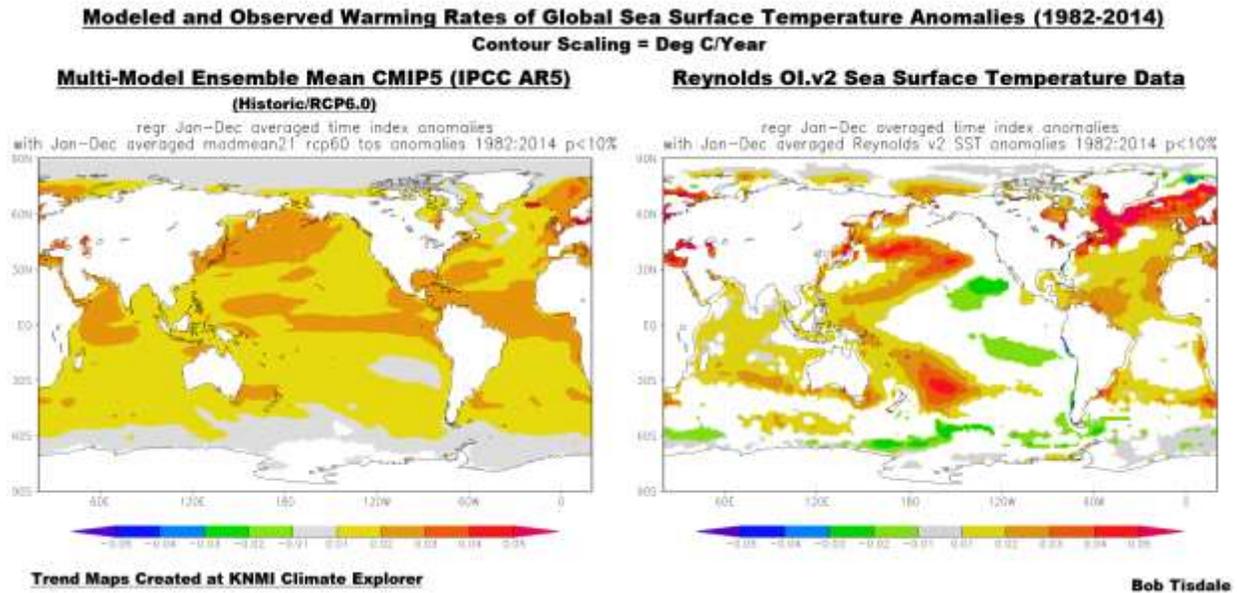Contour Scaling = Deg C/Year

Figure 2

The model mean does not present that additional warming in the North Atlantic, which indicates that the recent additional warming of the North Atlantic has occurred naturally; that is, the Atlantic Multidecadal Oscillation is not a process forced by factors that are used to make the oceans warm in the models. We'll discuss and illustrate this later in this post.

The observed "C-shaped" pattern of warming in the Pacific is the result of the dominance of El Niño events during this period. El Niño events release sunlight-produced warm water from below the surface of the western tropical Pacific. That warm water temporarily floods into the eastern tropical Pacific, primarily along the equator, during El Niño events. At the end of the El Niños, the leftover warm water is driven west by the renewed trade winds and by other ocean processes. The leftover warm water collects in the Kuroshio-Oyashio Extension (east of Japan) and along the South Pacific Convergence Zone (east of Australia and New Zealand). As a result of that process, the observed sea surface temperatures of the East Pacific Ocean (from the dateline to Panama) and of the tropical Pacific (24S-24N, 120E-80W) show little warming in over 33 years. Because the climate models do not properly simulate El Niño and La Niña processes, they do not create the spatial patterns of warming and cooling in the Pacific. Keep in mind, the Pacific Ocean covers more of the surface of the Earth than all of the continental land masses combined, and the modelers show no skill at simulating how and where or why the surface of the Pacific Ocean warmed.
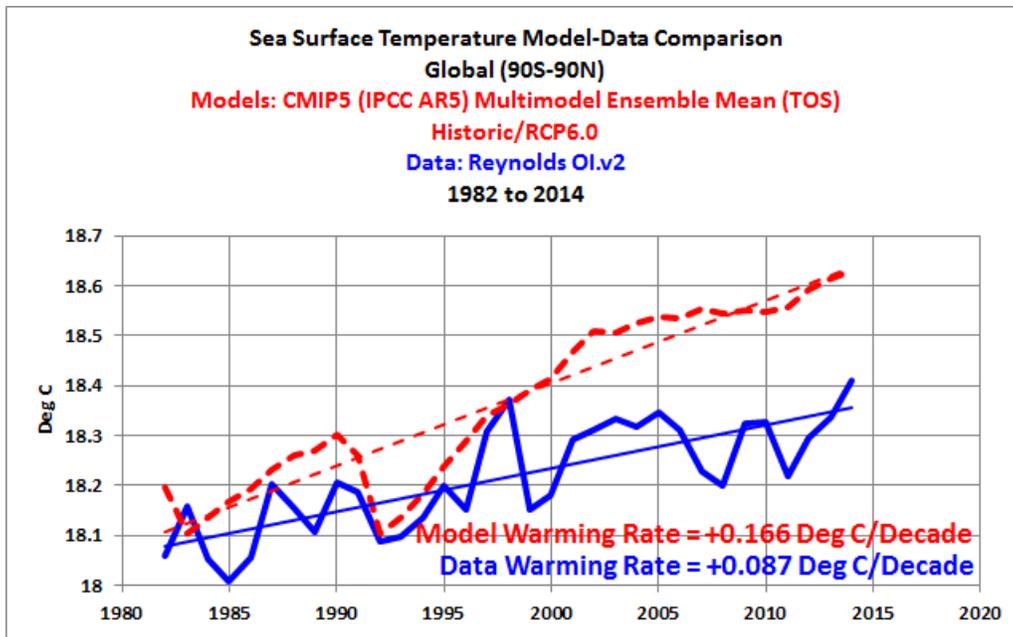
The spatial patterns of the warming of the ocean surfaces dictate the spatial patterns of warming of the surface air over land, and those patterns of ocean warming and cooling

contribute to the precipitation patterns on the continents. Because the climate models cannot simulate the spatial patterns of the warming of sea surfaces, one wonders how the modelers expect to properly simulate the warming of land surface air or the precipitation that occurs there.

For almost two decades, the IPCC has claimed that they have found the "fingerprints" of human-induced global warming. Because they're using their climate models as the basis for those claims, it looks like they need a new method of fingerprint analysis. There are no similarities between the modeled and observed fingerprints shown in Figure 2.

GLOBAL TIME-SERIES

Figure 3 presents the model-data comparison for global satellite-era sea surface temperatures, not anomalies. It's obvious that global sea surfaces were warmer in 2014 than they were in 1998, by about 0.04 Deg C, according to the Reynolds OI.v2 data. It should be well known by now that those record highs were caused primarily by an unusual weather event in one ocean basin. This will be confirmed as we continue with this data presentation. (Also see the discussion at the end of the post about the record highs.) The difference between modeled and observed warming rates through 2013 (see graph here) was approximately 0.082 deg C/decade. Now with the 2014 data, the difference is 0.079 deg C/decade. In other words, the uptick in global sea surface temperatures in 2014 did little to reduce the divergence between the models and the real world.

Sea Surface Temperature Model-Data Comparison
Global (90S-90N)
Models: CMIP5 (IPCC AR5) Multimodel Ensemble Mean (TOS)
Historic/RCP6.0
Data: Reynolds OI.v2
1982 to 2014

Model Warming Rate = +0.166 Deg C/Decade
Data Warming Rate = +0.087 Deg C/Decade

Climate Models Almost Double The Observed Warming Rate Of The Global Ocean Surfaces. Climate Scientists Are Also Still Looking For About 50% Of The Heat That Is Supposed To Be Stored In The Oceans. The "Missing Heat" And Doubling Of Ocean-Surface Warming Suggest The Model Sensitivities Are At Least Two-Times Too High.

Bob Tisdale

Figure 3

Notice how the trends lines for the models and data in Figure 3 do not quite intersect at the start. As I noted earlier, any complaint about my model-data comparison in Figure 1 is unwarranted.

I've also included the same notes in Figure 3 as in Figure 1. The data show the oceans warmed at a rate of 0.087 deg C/decade for the last 33 years (the satellite era), but the models indicate they should have warmed at almost twice that rate if they were warmed by manmade greenhouse gases.

Phrased another way, manmade greenhouse gases in the climate models were expected to warm the surfaces of the global oceans at a rate of 0.166 deg C/decade for the past 33 years, but those anthropogenic greenhouse gases in the real world caused an observed warming of only 0.087 deg C/decade. That's a monumental difference between hypothesis and reality. Now consider that this time period (1982-2014) includes naturally enhanced warming of the sea surfaces of the North Atlantic and North Pacific (see the post Multidecadal Variations and Sea Surface Temperature Reconstructions) and you'll begin to understand the full extent of the model failings.

Another fact to consider: the data existed while the modelers were preparing their climate models for the CMIP5 archive. In other words, the modelers knew their goals. And the best the modelers could do was almost double the warming rate of the surface of the global oceans. That's an atrocious modeling effort.

TRENDS ON A ZONAL-MEAN (LATITUDE-AVERAGE) BASIS PER OCEAN BASIN

Figures 4 through 8 are model-data trend (warming and cooling rate) comparisons of sea surface temperature anomalies for the global oceans and for the Pacific, Atlantic, and Indian Oceans. But they aren't time-series graphs. Looking from left to right along the horizontal (x) axis, the South Pole is at "-90", the equator is "0" latitude, and the North Pole is at "90". The units of the vertical (y) axis are degrees C per decade—based on the calculated linear trends. Each data point represents the linear trend (warming or cooling rate) in degrees C per decade for a 5 degree latitude band, where, for example, the data point at -82.5 (82.5S) latitude represents the linear trend of the high latitudes of the Southern Ocean surrounding Antarctica (85S-80S). The data points representing the trends then work northward (left to right) in 5-degree increments through each of the ocean basins (80S-75S, then 75S-70S, then 70S-65S, and so on) using the longitudes for each ocean basin. The average temperatures of latitude bands are called the "zonal mean" temperatures by climate scientists; thus the use of that term in the title blocks.

Figure 4 presents the modeled and observed warming and cooling rates of the global oceans on a latitude-average (zonal-means) basis. The climate models underestimate the observed warming at high latitudes of the Northern Hemisphere, but they overestimate the warming in the tropics and in the mid-to-high latitudes of the Southern Hemisphere. And the models do not capture the cooling of ocean surfaces at the high latitudes of the Southern Hemisphere. There should be little wonder why models cannot simulate sea ice losses in the Arctic Ocean and sea ice gains in the Southern Ocean surrounding Antarctica.

Model-Data Comparison
Global Sea Surface Temperature Anomalies
Zonal Mean - Linear Trend (Deg C/Decade)
Models: Multi-Model Mean TOS CMIP5 (Historic/RCP6.0)
Data: Reynolds OI.v2
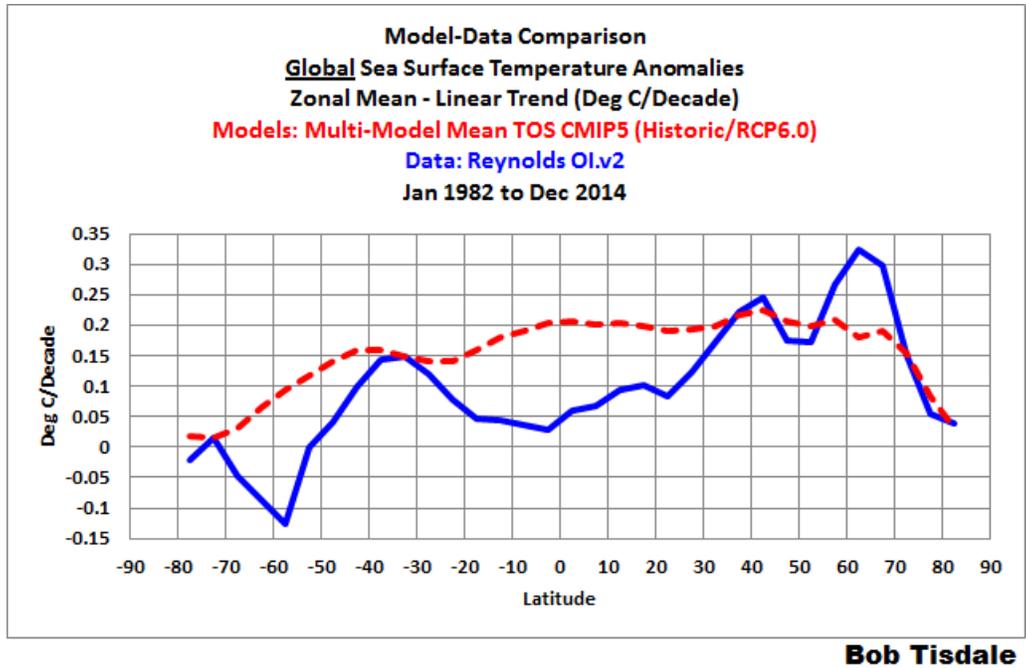Jan 1982 to Dec 2014

Bob Tisdale

Figure 4

<u>The differences between modeled and observed warming and cooling rates strongly suggest two things: (1) that ocean circulation processes in climate models are flawed. This will become even more apparent when we look at the trends for the individual ocean basins. (2) that the sensitivity of climate models to carbon dioxide and other forcings is too high.</u>

Figure 5 shows the observed and modeled sea surface temperature trends for the Pacific Ocean (longitudes of 125E-90W) on a zonal-mean basis. At and just south of the equator, observed sea surface temperatures cooled since January 1982. And the highest observed warming occurred at the mid-latitudes of the North and South Pacific. The models, unfortunately, do not create that spatial pattern. The models show much more warming in the tropics than observed. The models also overestimate the warming at the high latitudes of the North Pacific and they show warming in the Pacific portion of the Southern Ocean, while the observations show cooling there over the past 33 years.

Model-Data Comparison
Pacific Ocean (125E-90W) Sea Surface Temperature Anomalies
Zonal Mean - Linear Trend (Deg C Per Decade)
Models: Multi-Model Mean TOS CMIP5 (Historic/RCP6.0)
Data: Reynolds OI.v2
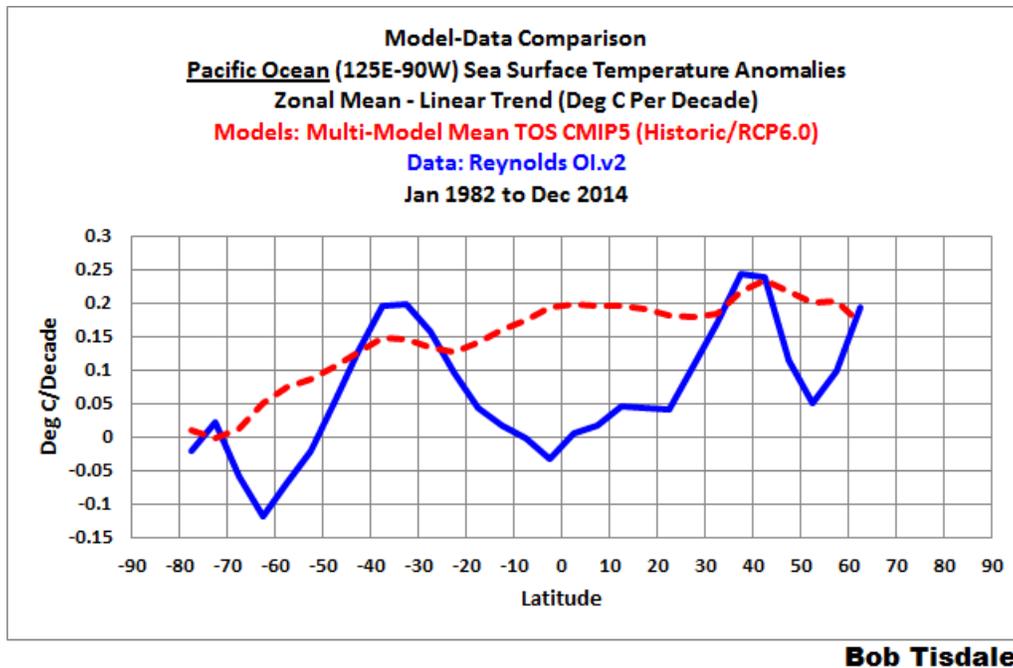**Jan 1982 to Dec 2014**

Bob Tisdale

Figure 5

How can climate scientists/modelers hope to simulate the patterns of warming on land when they can't simulate the warming patterns of the largest ocean on this planet?

What causes the mid-latitudes to warm, while the tropics show little warming?

Short answer: El Niño and La Niña processes.

Longer answer: The observed warming trends at mid-latitudes, with no warming near the equator, suggest warm water was distributed poleward in both hemispheres by ocean currents. That happens in the Pacific when El Niño events dominate, which was the case during this period. That is, a period during which El Niño events dominate causes the additional distribution of warm water toward the mid-latitudes. Refer to Figure 6, which is a comparison of Pacific trends on a zonal-mean basis for the periods of 1944 to 1975 and 1976 to 2011. It's Figure 8-32 from my ebook *Who Turned on the Heat?* From 1944 to 1975, El Nino and La Niña events were more evenly matched, but slightly weighted toward La Niña. During that period, less naturally (sunlight) created warm water was released from below the surface of the tropical Pacific by El Niños and distributed toward the poles. But from 1976-2011, El Niño events dominated, so more warm tropical waters were distributed from below the surface of the tropical Pacific to the mid-latitudes. I've highlighted the differences between the two periods.
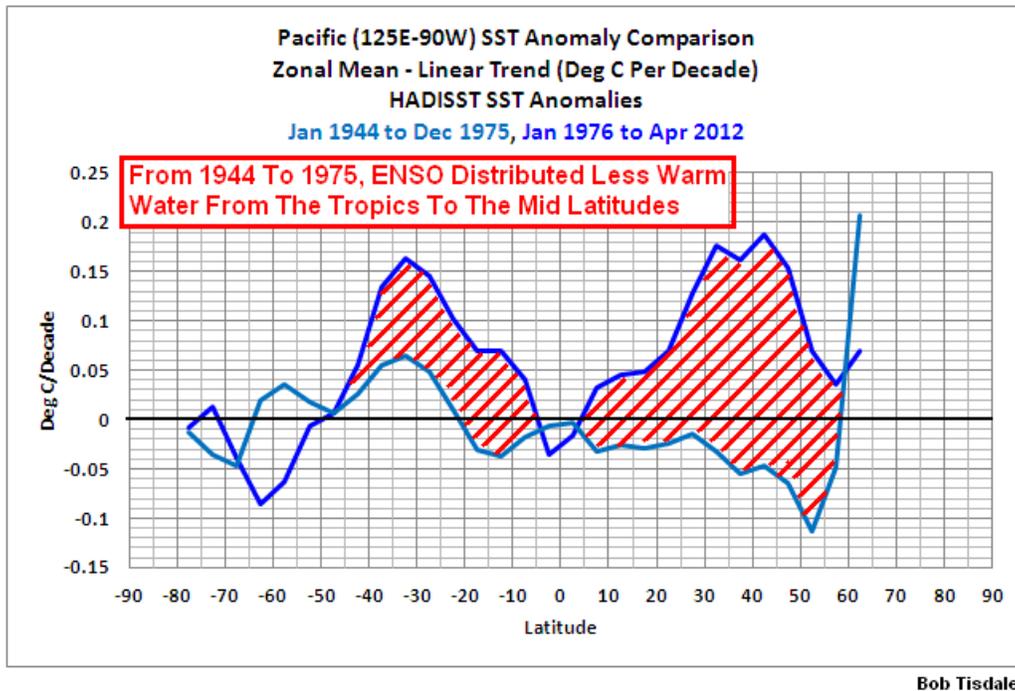
Figure 6

Phrased differently, the observed warming pattern in the Pacific is one associated with El Niño and La Niña events (ENSO). ENSO helps the Pacific distribute heat (created by sunlight) from the tropics to the mid latitudes, and into adjoining ocean basins. The differences between the modeled and observed warming patterns should be caused by the failures of the models to properly simulate basic ENSO processes. Those failings are well known to the climate science community. Two papers that present model failings at simulating ENSO are:

- Guilyardi et al. (2009) [Understanding El Niño in Ocean-Atmosphere General Circulation Models](#), and
- Bellenger et al (2012) [ENSO representation in climate models: from CMIP3 to CMIP5](#)

And Figures 5 and 6 above help to show why it is important for the models to simulate ENSO processes.

In the post [Axel Timmermann and Kevin Trenberth Highlight the Importance of Natural Variability in Global Warming…](#), we discussed and illustrated how the unusual warming event in the eastern extratropical Pacific was, in fact, a 2-year event and that it had a compounding effect. The impacts of that warming event can be seen in an animation of the plots of zonal mean sea surface temperature trends for the Pacific, for the periods of 1982-2012, 1982-2013 and 1982-2014. See Animation 1. The 30+ year trends at the mid-to-high latitudes of the North Pacific were a little higher in 1982-2013 than they

were for 1982-2012, and noticeably higher in 1982-2014. Also note the impact of the El Niño-like conditions this year in the tropical Pacific on the trends for 1982-2014.

[Animation 1](#)

Figure 7 shows the modeled and observed trends in sea surface temperature anomalies for the Atlantic Ocean (longitudes 70W-20E) from Jan 1982 to December 2014. The models overestimate the warming in the South Atlantic and underestimate it North Atlantic, especially toward the high latitudes.   In fact, the models show just about the same warming trends from 40S to 70N—that is, the models show the Atlantic Ocean should have warmed at about 0.15 to 0.2 deg C/decade for the last 33 years for the latitudes of 40S to 70N—while the observed trends change greatly over those latitudes. Again, how can the climate scientists/modelers hope to create the warming and precipitation patterns on adjoining land masses when they can't simulate the warming pattern of the surface of the Atlantic?
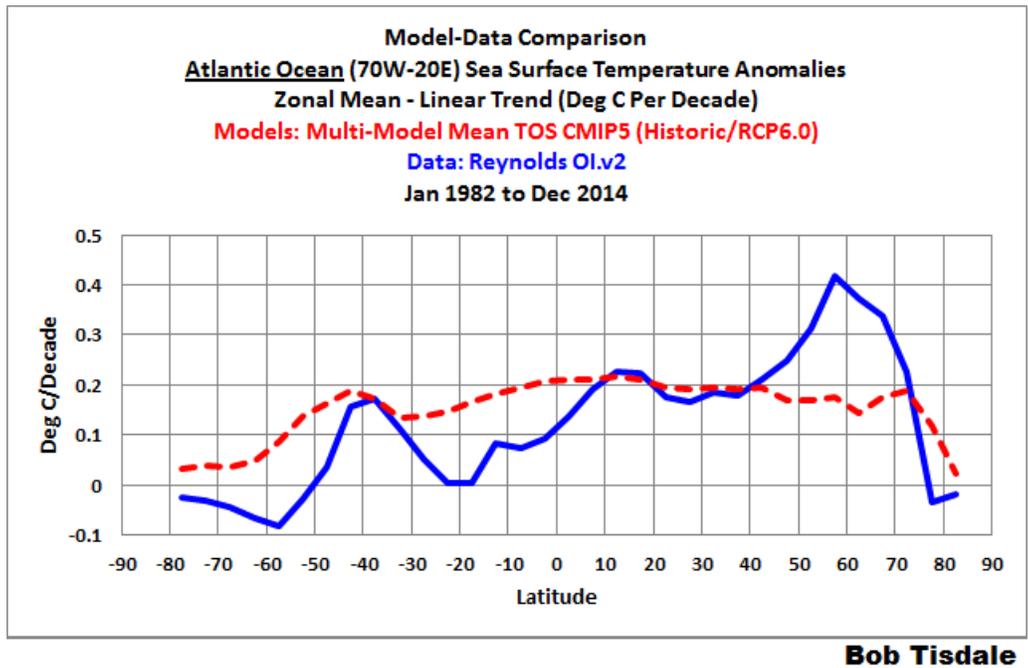

Figure 7

The last of the trend graphs on a zonal-mean basis is for the Indian Ocean, Figure 8. The models, basically, show way too much warming at most latitudes. As a result, the same problem problems exist in the models for the warming and precipitation patterns on land masses adjacent to the Indian Ocean.
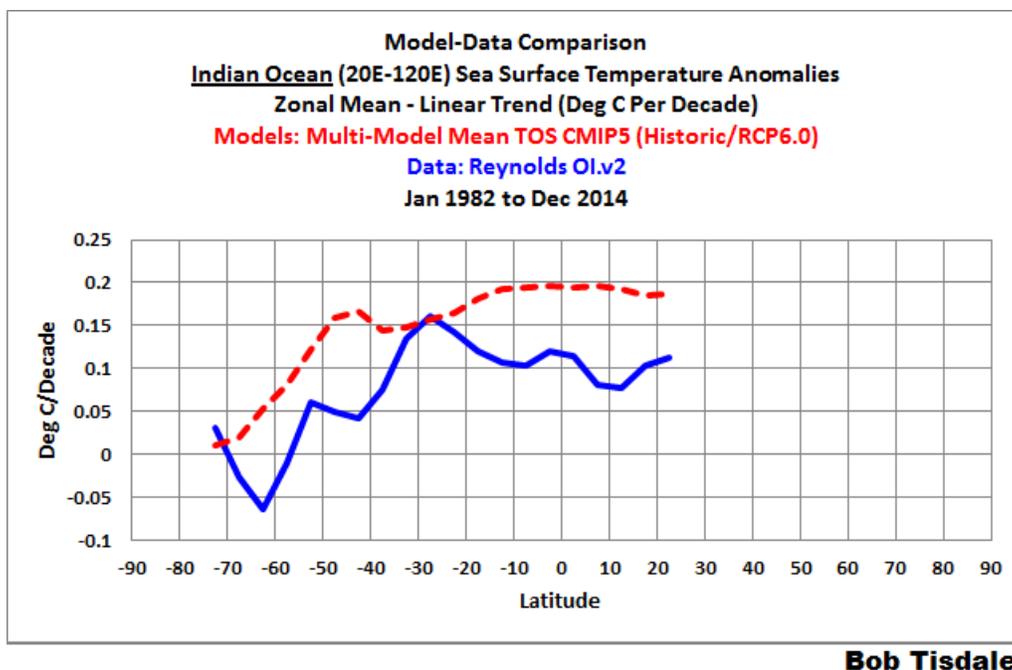
Figure 8

TIME SERIES – TROPICAL AND EXTRATROPICAL SEA SURFACE TEMPERATURES

In earlier model-data comparisons of satellite-era sea surface temperatures (see the posts here and here), I've compared the data and model outputs for the Northern and Southern Hemispheres. For this post and the preceding one (here), I've divided the global data into three subsets: the tropical oceans (24S-24N), and the extratropical oceans of the Northern Hemisphere (24N-90N) and the Southern Hemisphere (90S-24S).

The reason: In June of 2013, Roy Spencer presented model-data comparisons of the warming of the tropical mid-troposphere prepared by John Christy. See Roy's posts EPIC FAIL: 73 Climate Models vs. Observations for Tropical Tropospheric Temperature and STILL Epic Fail: 73 Climate Models vs. Measurements, Running 5-Year Means. The models grossly overestimated the warming rates of the mid-troposphere in the tropics. So I thought it would be worthwhile, since the tropical oceans (24S-24N) cover 76% of the tropics and about 46% of the global oceans, to confirm that the models also grossly overestimate the warming of sea surface temperatures of the tropical oceans.

It should come as no surprise that the models did overestimate the warming of the sea surface temperatures of the tropical oceans over the past 33 years. See Figure 9. In fact, the models overestimated the warming by a wide margin. The data indicate the sea surface temperatures of the tropical oceans warmed at a not-very-alarming rate of

0.06 deg C/decade, while the models indicate that, if the surfaces of the tropical oceans were warmed by manmade greenhouse gases, they should have warmed at 3 times that rate, at 0.19 deg C/decade. For 46% of the surface of the global oceans (about 33% of the surface of the planet), the models tripled the observed warming rate.
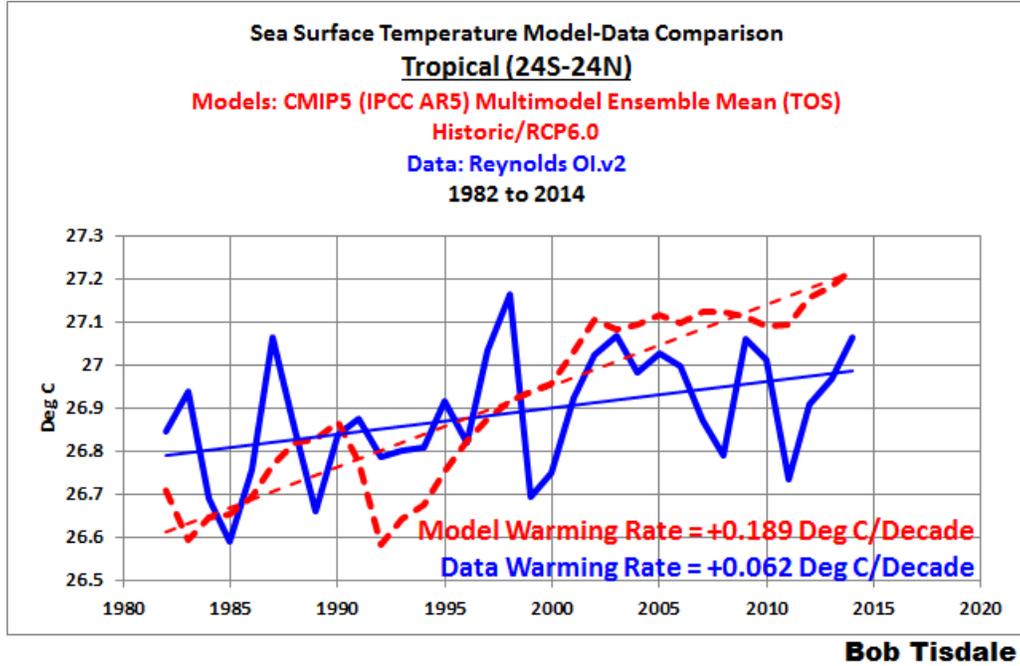

Figure 9

For the extratropical oceans of the Southern Hemisphere (90S-24S), Figure 10, the observed warming rate is also extremely low at 0.06 deg C/decade. On the other hand, the climate models indicate that if manmade greenhouse gases were responsible for the warming of sea surface temperatures in this region, the oceans should have warmed at a rate of 0.12 deg C/decade, effectively, doubling that observed trend. The extratropical oceans of the Southern Hemisphere cover about 33% of the surface of the global oceans (about 23% of the surface of the planet) and the models double the rate of warming.
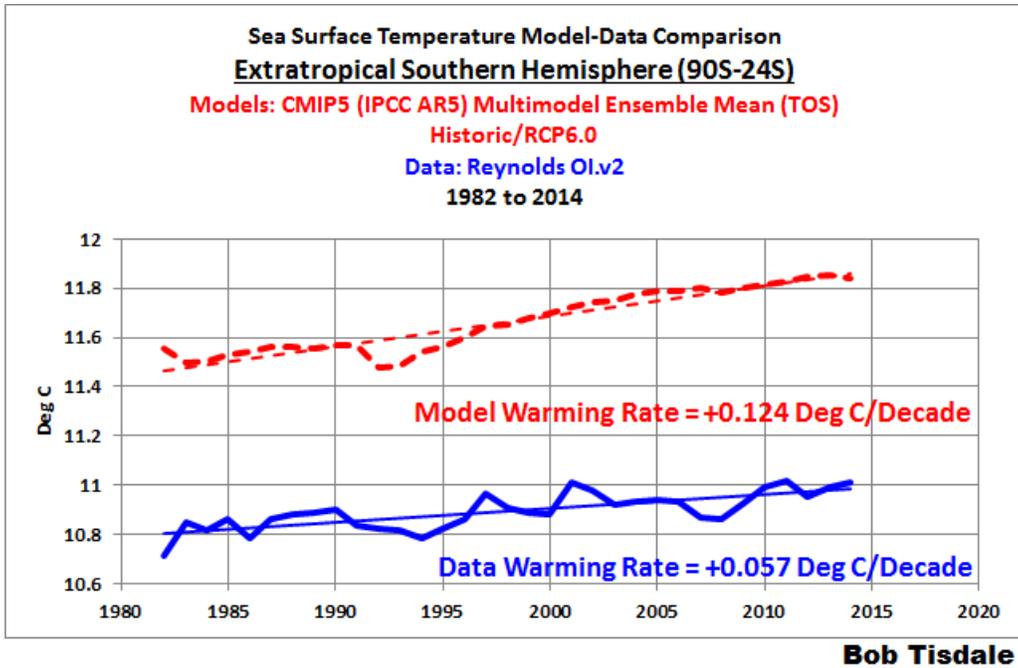
Figure 10

And the climate models seem to get the warming rate of sea surface temperatures just about right for the smallest portion of the global oceans, the extratropical Northern Hemisphere (24N-90N). See Figure 11. The extratropical oceans of the Northern Hemisphere cover only about 21% of the surface of the global oceans (about 15% of the surface of the Earth).
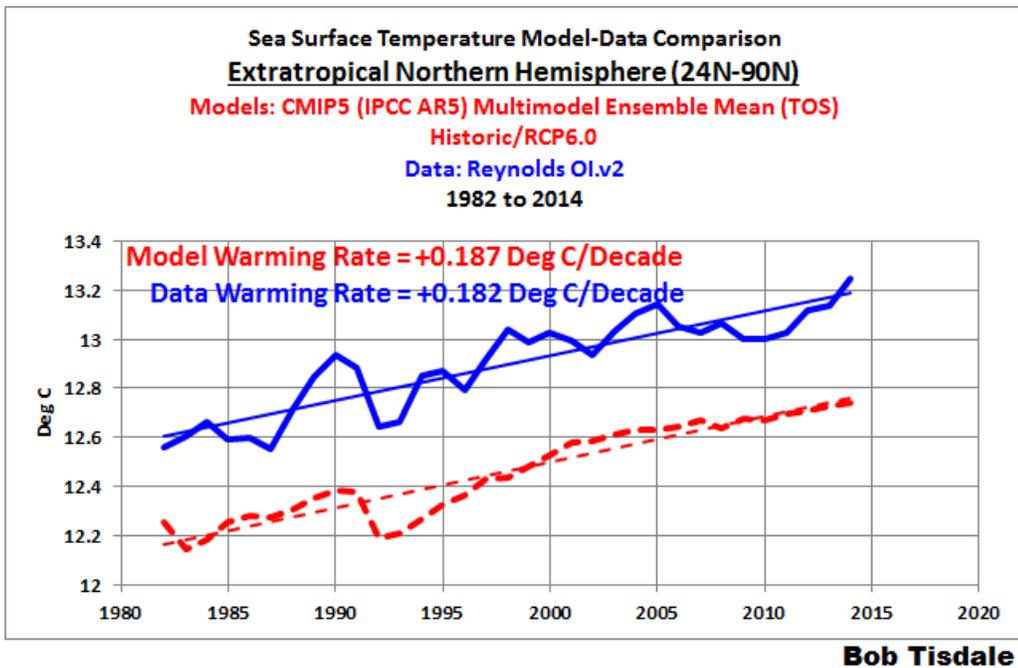
Figure 11

Unfortunately for the modelers, they underestimated the warming of the surface of the extratropical North Atlantic (Figure 12), and overestimated the warming in the extratropical North Pacific (Figure 13), so they accomplished the overall warming of the extratropical Northern Hemisphere incorrectly. No surprise there.
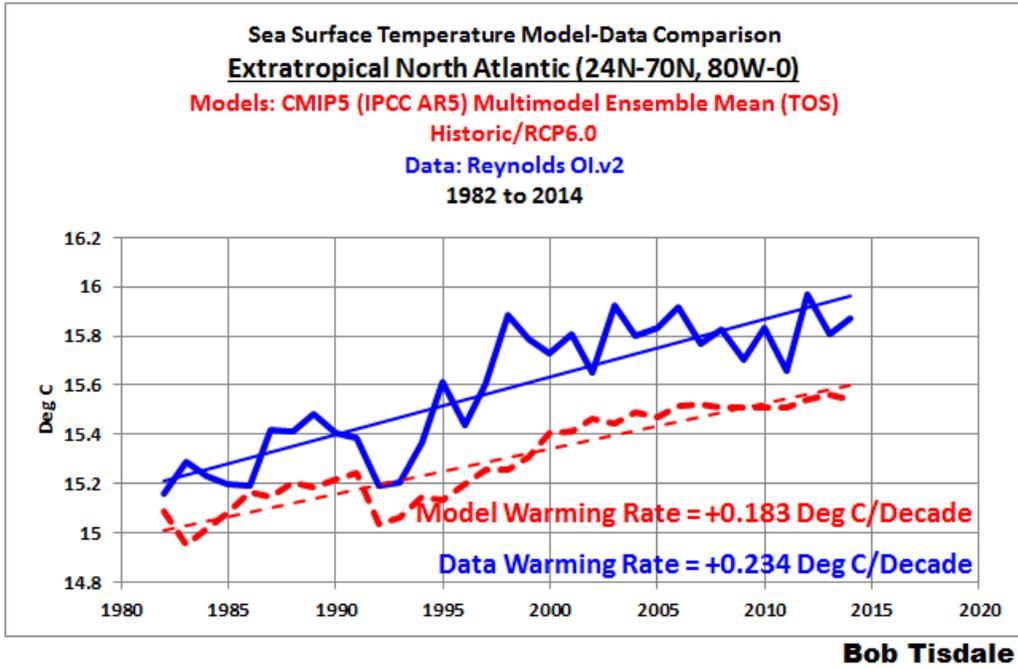

Sea Surface Temperature Model-Data Comparison
Extratropical North Atlantic (24N-70N, 80W-0)
Models: CMIP5 (IPCC AR5) Multimodel Ensemble Mean (TOS)
Historic/RCP6.0
Data: Reynolds OI.v2
1982 to 2014

Model Warming Rate = +0.183 Deg C/Decade
Data Warming Rate = +0.234 Deg C/Decade

Bob Tisdale

Figure 12

# # # # # # #

Sea Surface Temperature Model-Data Comparison
Extratropical North Pacific (24N-65N, 100E-100W)
Models: CMIP5 (IPCC AR5) Multimodel Ensemble Mean (TOS)
Historic/RCP6.0
Data: Reynolds OI.v2
1982 to 2014

Model Warming Rate = +0.202 Deg C/Decade
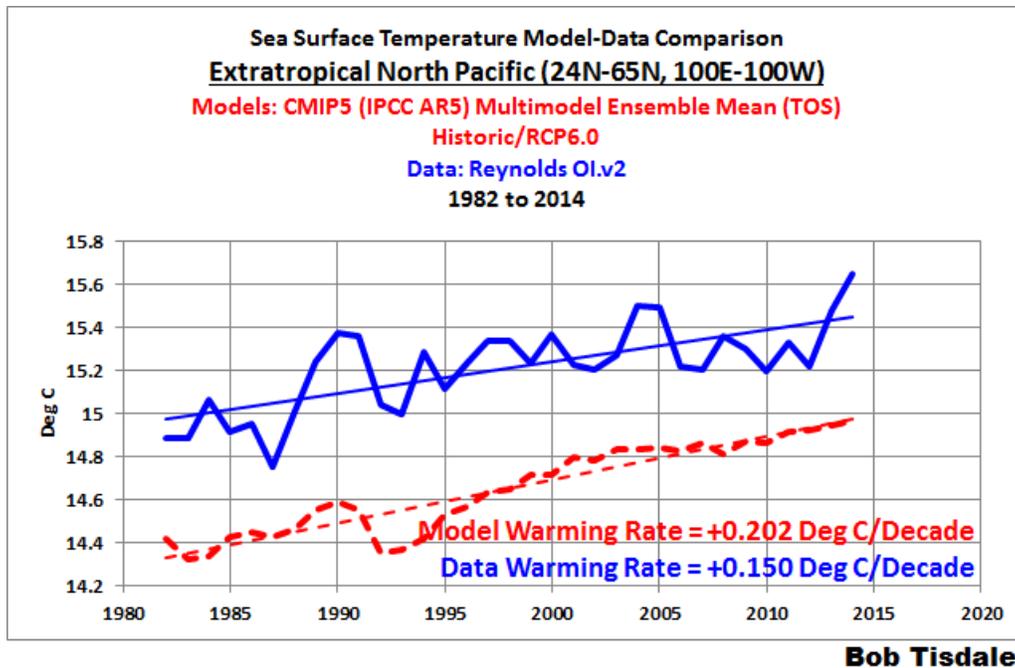Data Warming Rate = +0.150 Deg C/Decade

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Figure 13

Now note the similarities between the modeled and observed surface temperatures (not trends) of the tropical oceans (Figure 9). The average observed tropical sea surface temperatures for the period of 1982 to 2014 are only 0.02 deg C cooler than the models. Now note the differences between the models and observations in the extratropics of the Southern (Figure 10) and Northern (Figure 11) Hemispheres. For the period of 1982 to 2014, the modeled sea surface temperatures in the Southern Hemisphere are too warm by almost 0.8 deg C, and in the Northern Hemisphere, the modeled sea surface temperatures are too cool by 0.4 deg C. Those are further indications that ocean circulation in climate models is flawed.

TIME SERIES – ATLANTIC OCEAN

Figure 14 presents the model-data comparison of the sea surface temperature anomalies for the Atlantic Ocean. They do a reasonable job here. The modeled warming rate is slightly more than the observations. In fact, of the three major ocean basins, the models perform best in the Atlantic. And the difference between the modeled and observed (1982-2014) average sea surface temperatures (not trends) is only about 0.16 deg C, with the models too warm.
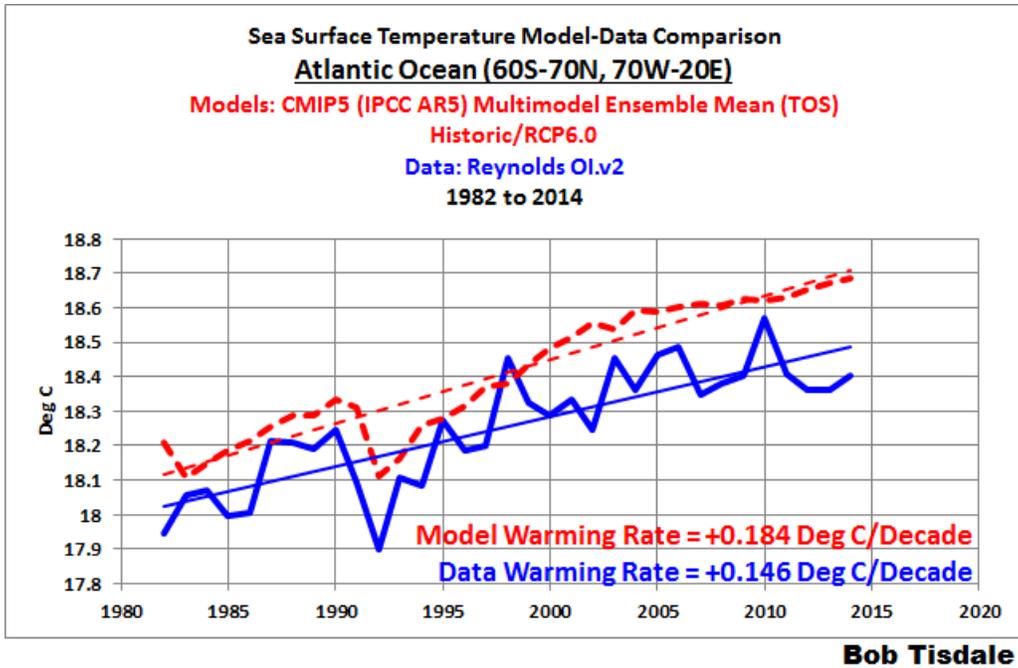
Figure 14

But the models accomplish the warming rates and the temperatures incorrectly. While they do a reasonable job of approximating the warming rates of the North Atlantic surfaces (Figure 15), the models overestimate the warming rates of sea surfaces in the South Atlantic (Figure 16) by a huge margin. Note also how the average modeled sea surface temperature for 1982 to 2014 (not trend) in the North Atlantic is too low, and too high in the South Atlantic.
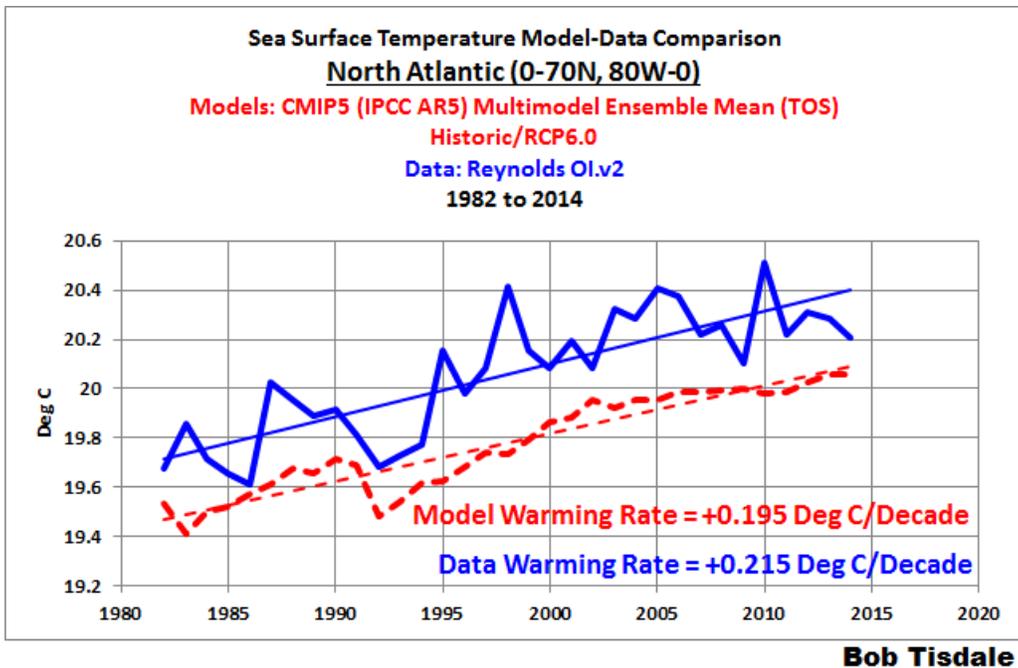
Figure 15

# # # # # # #

Sea Surface Temperature Model-Data Comparison
South Atlantic (60S-0, 70W-20E)
Models: CMIP5 (IPCC AR5) Multimodel Ensemble Mean (TOS)
Historic/RCP6.0
Data: Reynolds OI.v2
1982 to 2014

Model Warming Rate = +0.167 Deg C/Decade

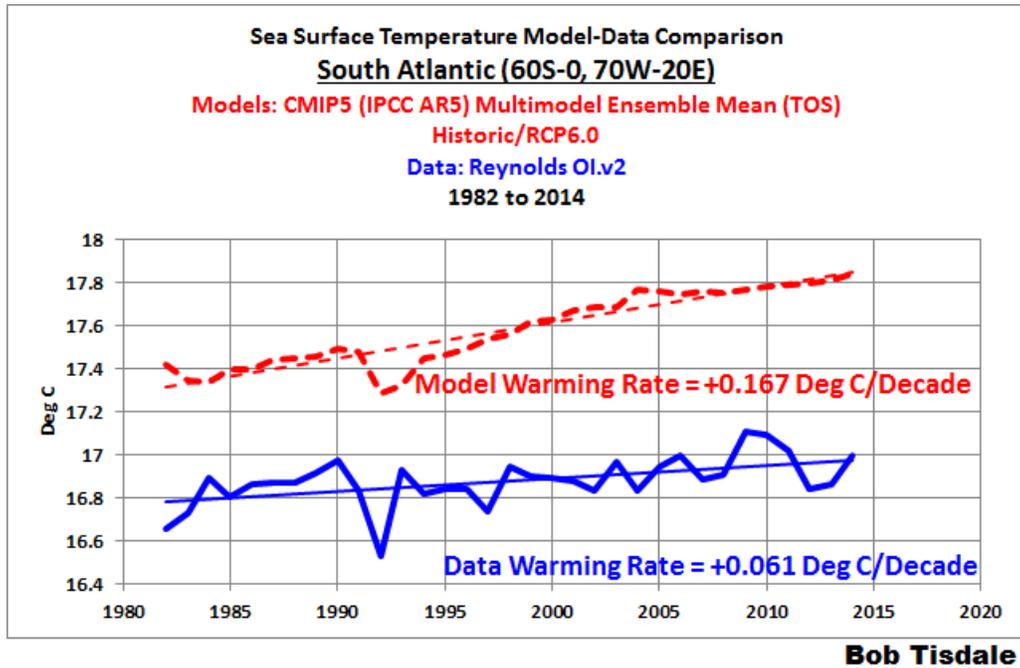Data Warming Rate = +0.061 Deg C/Decade

Bob Tisdale

Figure 16

Last, note how the sea surface temperatures in the North and South Atlantic, and in the Atlantic basin as a whole, were nowhere close to record highs this year.

TIME SERIES – PACIFIC OCEAN

Figure 17 is the model-data comparison for the sea surface temperatures of the largest ocean on our planet, the Pacific. The models more than double (2.4 times) the warming rate for the surface of the Pacific Ocean…and that's with the record highs this year.
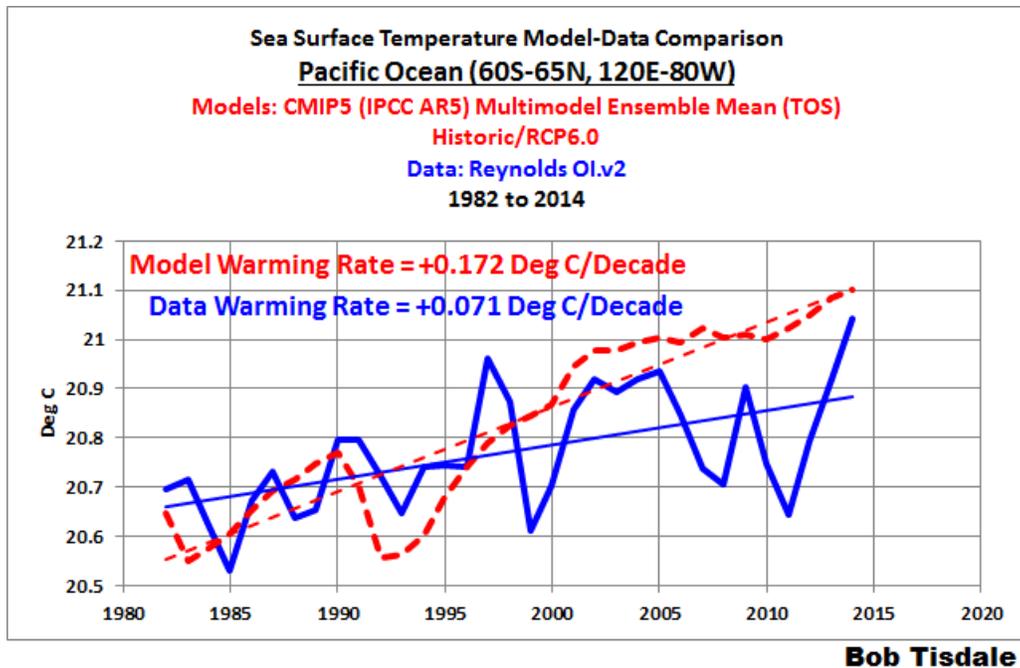
Figure 17

The Pacific Ocean covers almost 33% of the surface of the globe. It covers more of the Earth than the continental land masses combined. And climate models overestimate the warming there by 2.4 times. Yet somehow we're supposed to believe all of the IPCC's predictions of gloom and doom when, after more than 2 decades of modeling efforts, the best the modeling agencies around the globe can do is have their models more than double the warming rate of the surface of the largest ocean on this water-covered planet.

The models perform poorly in the North Pacific (Figure 18), more than doubling the warming rate there, and that's with the unusual weather event this year that resulted in the extreme sea surface temperatures in the eastern extratropical North Pacific.

Sea Surface Temperature Model-Data Comparison
North Pacific (0-65N, 100E-90W)
Models: CMIP5 (IPCC AR5) Multimodel Ensemble Mean (TOS)
Historic/RCP6.0
Data: Reynolds OI.v2
1982 to 2014

Model Warming Rate = +0.199 Deg C/Decade
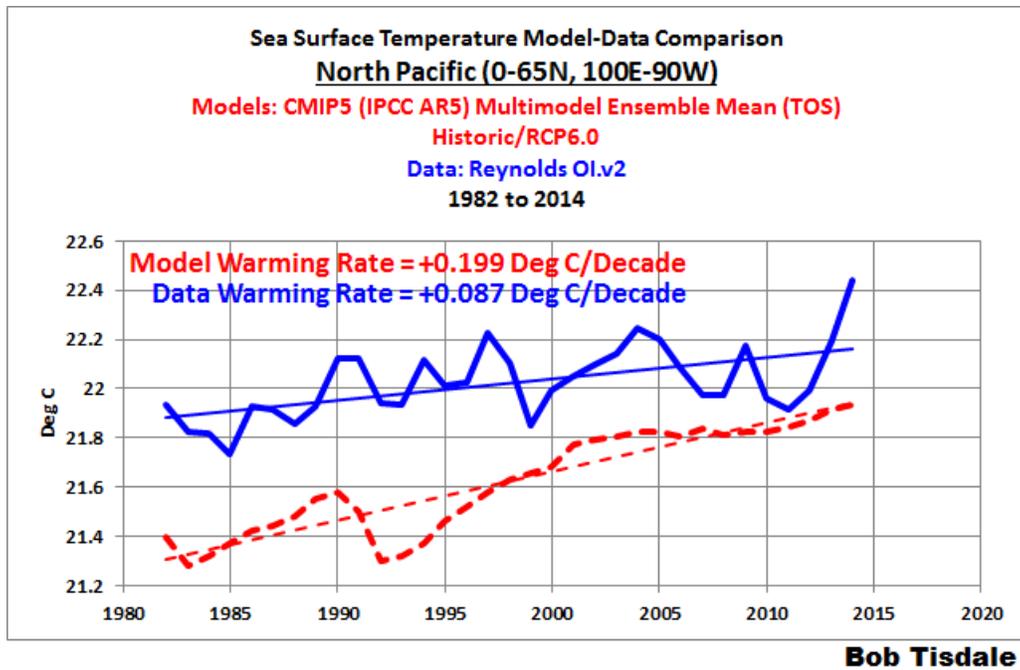Data Warming Rate = +0.087 Deg C/Decade

Bob Tisdale

Figure 18

In the South Pacific (Figure 19), the models more than tripled the observed warming rate. Also note how the sea surface temperatures of the South Pacific were also nowhere close to record highs. So far, it's the North Pacific that caused the record high sea surface temperatures in the Pacific, in the Northern Hemisphere and globally.

Sea Surface Temperature Model-Data Comparison
South Pacific (60S-0, 120E-70W)
Models: CMIP5 (IPCC AR5) Multimodel Ensemble Mean (TOS)
Historic/RCP6.0
Data: Reynolds OI.v2
1982 to 2014

Model Warming Rate = +0.146 Deg C/Decade

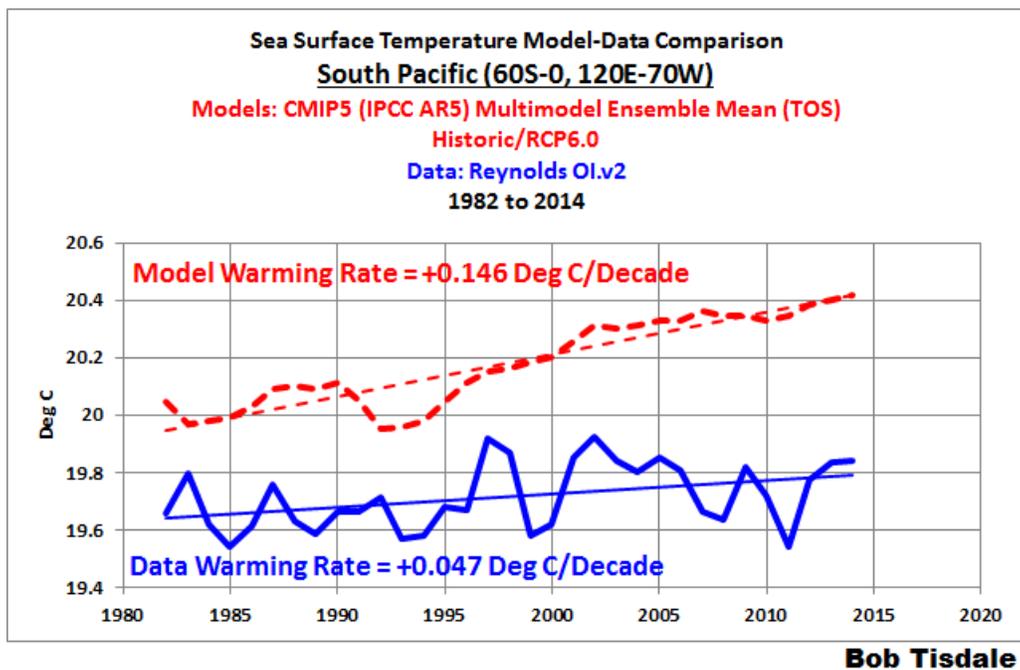Data Warming Rate = +0.047 Deg C/Decade

Bob Tisdale

Figure 19

And like the Atlantic basin, the average modeled sea surface temperatures (not trends) for 1982 to 2014 in the North Pacific are too low, and too high in the South Pacific.

While we're discussing the Pacific Ocean, let's confirm a few things that were blatantly obvious in the trend maps in Figure 2.

The model-data comparison for the tropical Pacific (24S-24N, 120E-80W) is shown in Figure 20. The surface of the tropical Pacific shows very little warming in 33 years. According to the models, if manmade greenhouse gases were responsible for the warming of the surface of the global oceans, the tropical Pacific should have warmed at a rate of 0.18 deg C/decade, but the tropical Pacific has warmed very little.
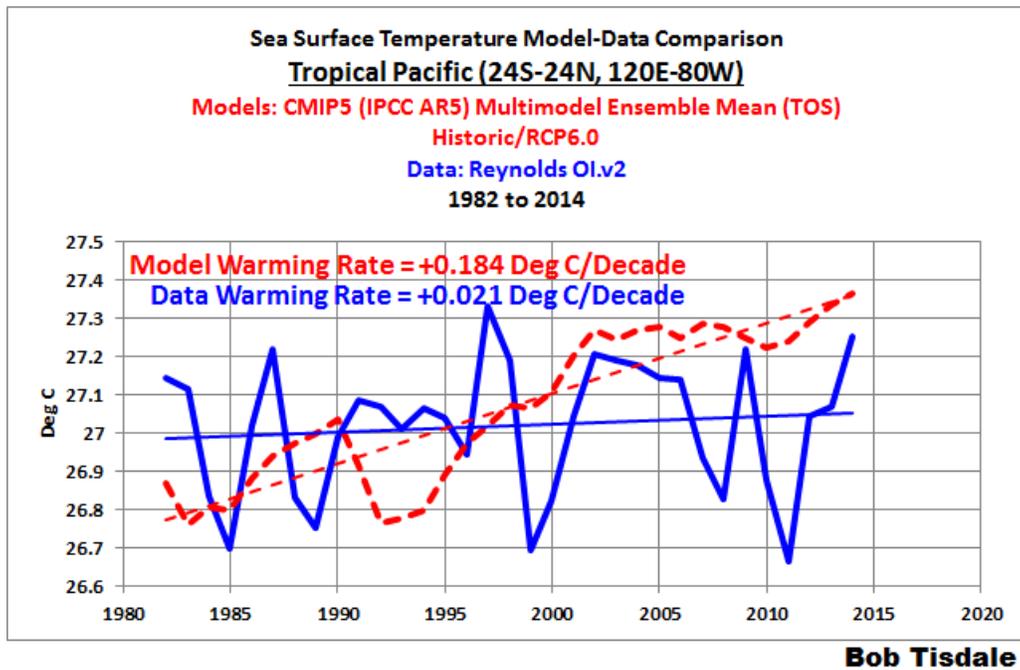

Figure 20

Note also how the sea surface temperatures for the tropical Pacific indicate an El Niño evolved in 2014. This contribution to the record high sea surface temperatures was illustrated and discussed in the post Did ENSO and the "Monster" Kelvin Wave Contribute to the Record High Global Sea Surface Temperatures in 2014?

The last of the Pacific subsets is the East Pacific, Figure 21. For this comparison, I've extended the coordinates into the Southern and Arctic Oceans. With the coordinates of 90S-90N, 180-80W, the East Pacific covers about 33% of the surface of the global oceans, or about 23% of the surface of the globe. It, too, shows very little warming in 33 years. Note also how the average sea surface temperature (not trend) for the East Pacific for the period of 1982 to 2014 is too high, by almost 0.3 deg C.
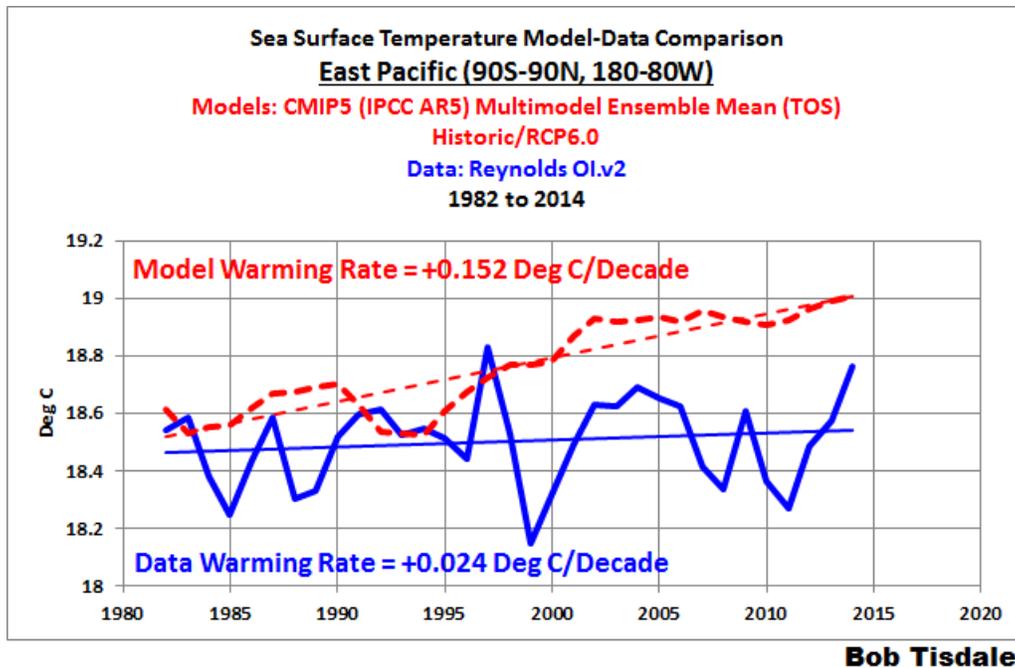
Figure 21

Now consider two things that happened in 2014: (1) the unusual warming event in the eastern extratropical North Pacific (a.k.a. the blob) and (2) the El Niño conditions in the eastern tropical Pacific. (While El Niño conditions did not exist in the NINO3.4 region for much of the year, they did exist in the NINO3 and NINO1+2 regions, both of which are in the East Pacific.) The East Pacific was strongly impacted by those two conditions this year, yet the warming rate there for the past 3+ decades is extremely low. That extremely low warming rate contradicts the models, which indicate that the surface of the East Pacific should have warmed at a rate of about 0.15 deg C/decade…if they were warmed by manmade greenhouse gases.

Not too mysteriously, manmade greenhouse gases have had little impact on two (overlapping) portions of the largest ocean on Earth: the tropical Pacific (Figure 20) and the East Pacific (Figure 21).

TIME SERIES – INDIAN OCEAN

The models also performed poorly at simulating the warming rate of the sea surface temperatures of the Indian Ocean, Figure 22, with the models showing way too much warming.
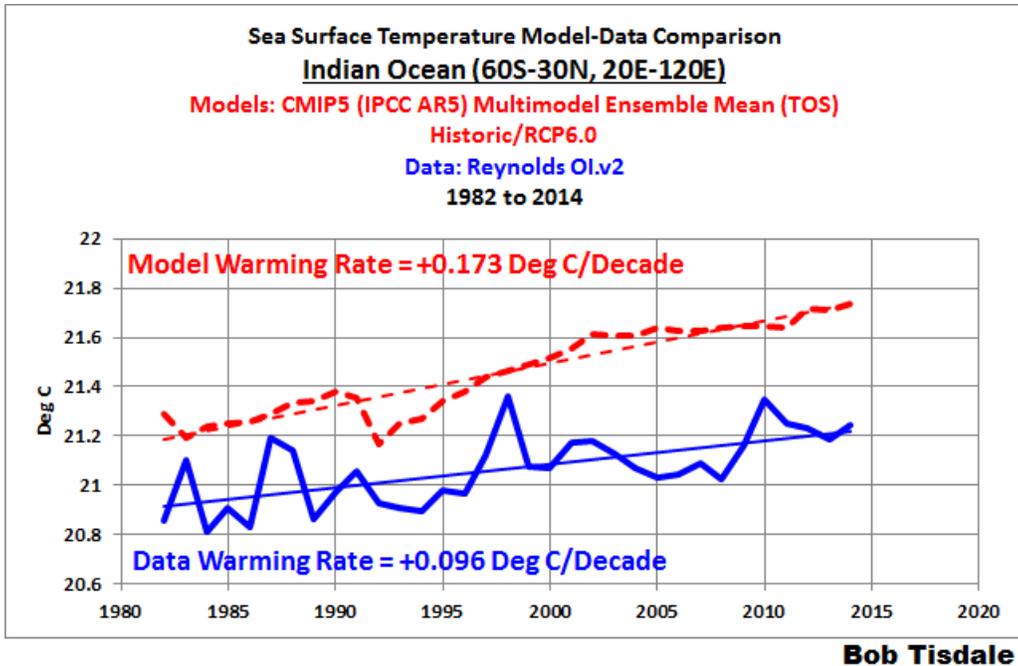
Figure 22

Note also how, on average (1982-2014), the modeled sea surfaces for the Indian Ocean are too warm by about 0.4 deg C.

TIME SERIES – POLAR OCEANS

Figure 23 is the model-data comparison of the sea surface temperatures of the Arctic Ocean. The models captured the warming rate of the Arctic Ocean sea surface temperatures reasonably well, but averaged over the period of 1982-2014, the modeled sea surface temperatures (not trends) were too low, by about 0.66 deg C.
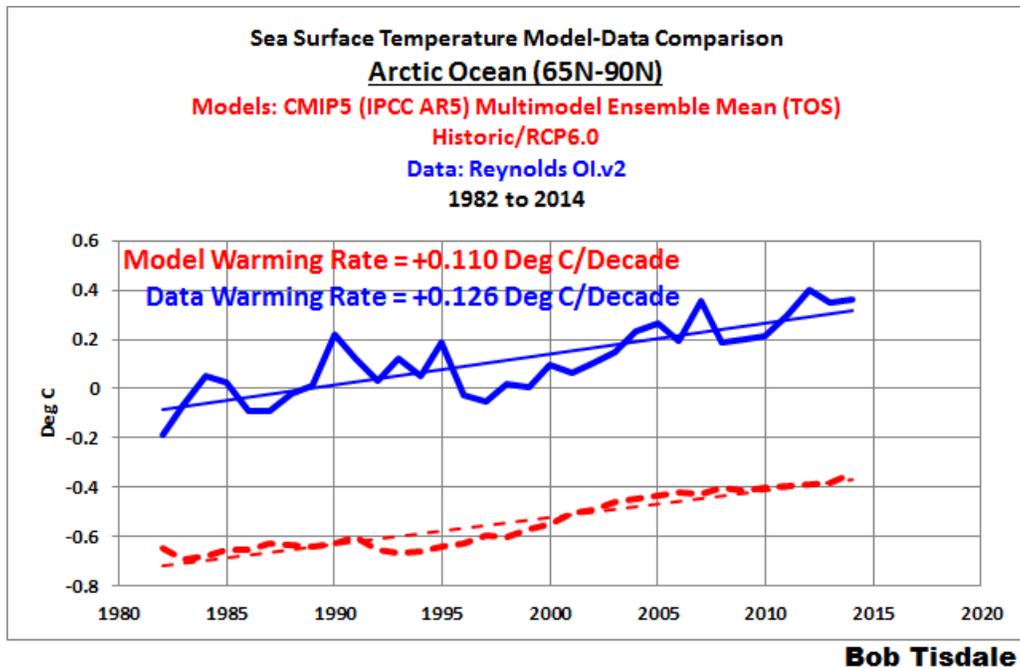
Figure 23

Note also how the sea surface temperatures of the Arctic Ocean were warm but not at record highs this year.

At the other end of the globe, the models failed miserably. The models indicate that the surface of the Southern Ocean (Figure 24) should have warmed over the past 33 years, but the sea surface temperatures there cooled in that time. Note also how the modeled sea surface temperatures are too high, by a little bit more than 0.9 deg C.
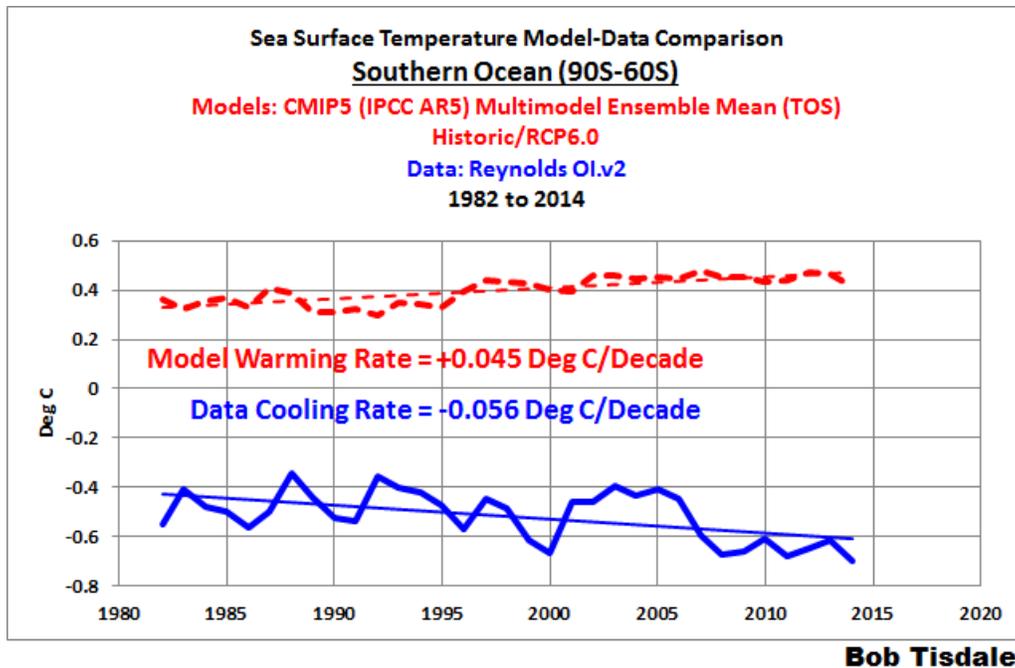
Figure 24

The sea surfaces of the Southern Ocean were nowhere close to record highs this year.

THE ATLANTIC MULTIDECADAL OSCILLATION IS NOT A FORCED COMPONENT OF THE CLIMATE MODELS

The North Atlantic has an additional mode of natural variability called the Atlantic Multidecadal Oscillation. We've discussed it in numerous posts over the past few years. (See the posts under the category of Atlantic Multidecadal Oscillation here.) If you're not familiar with the Atlantic Multidecadal Oscillation see the NOAA **Frequently Asked Questions About the *Atlantic Multidecadal Oscillation (AMO)*** webpage and the posts:

- An Introduction To ENSO, AMO, and PDO — Part 2
- Multidecadal Variations and Sea Surface Temperature Reconstructions

Over some multidecadal periods, the sea surfaces of the North Atlantic warm faster than the rest of the global oceans, and during other multidecadal periods, the North Atlantic sea surfaces warm slower than the rest of the global oceans and can cool dramatically. For much of the period of November 1981 to December 2014, the sea surface temperatures of the North Atlantic were on one of their naturally occurring upswings.

(I'll try to head off an argument: The title of Booth et al. (2012) Aerosols implicated as a prime driver of twentieth-century North Atlantic climate variability explains their findings.

Refer to the discussion of Booth et al. (2012) under the heading of ON THE HADGEM2-ES AMO SIMULATION in the post here. The HADGEM2-ES model used by Booth et al. (2012) does a pretty poor job of simulating the AMO as shown in the illustration here from that post. Booth et al. also failed to account for a couple of other factors that drive the Atlantic Multidecadal Oscillation.)

There are a number of ways to present the Atlantic Multidecadal Oscillation. The NOAA ESRL simply detrends the North Atlantic sea surface temperature anomalies. That's the most common way. Another way: Trenberth and Shea (2006) subtracted global sea surface temperature anomalies, excluding the polar oceans, (60S-60N) from sea surface temperature anomalies of the North Atlantic (0-60N, 80W-0). That method accounts for the additional variability of the North Atlantic data above the variations in the global data.

We can use the same long-term sea surface temperature reconstruction used by Trenberth and Shea (2005), HADISST, and subtract the global data (and model outputs) from the North Atlantic data (and model outputs). Like Trenberth and Shea we'll use latitudes of 60S-60N for the global oceans and the coordinates of 0-60N, 80W-0 for the North Atlantic.   See Figure 25. Obviously, the models do not simulate the additional multidecadal variability of the North Atlantic.
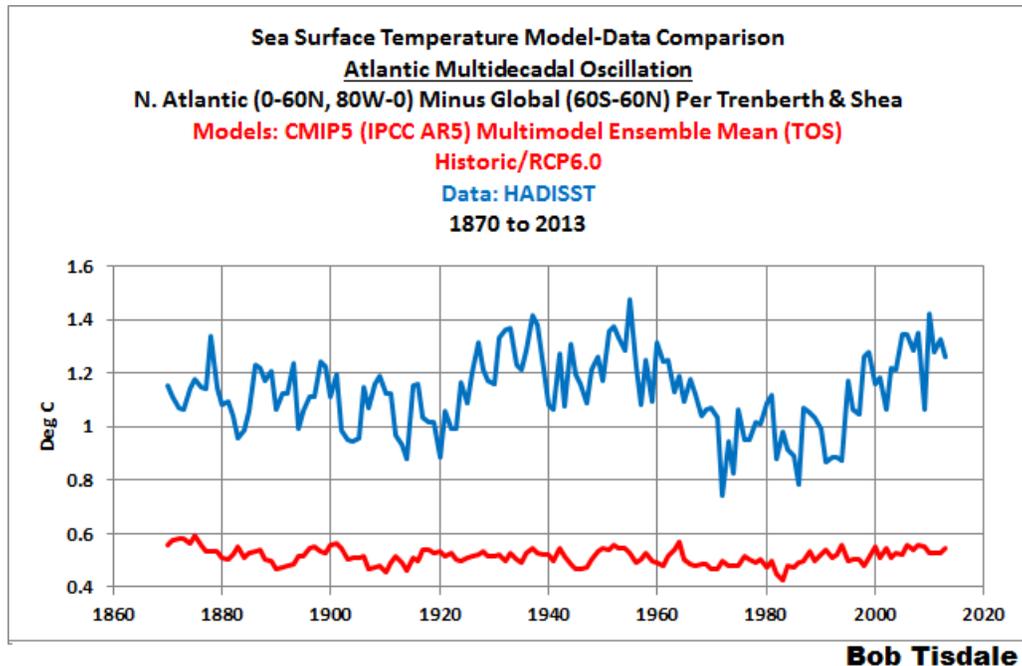

Figure 25

And for those interested, there is no Atlantic Multidecadal Oscillation projected into the future. See Figure 26.
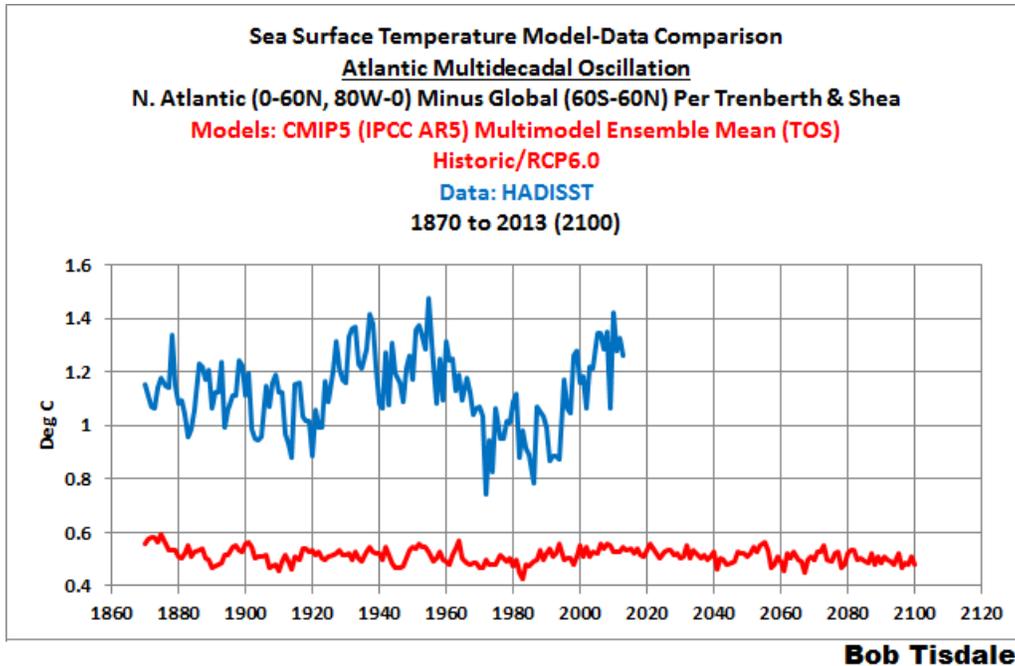
Figure 26

Referring to Figure 25 again, if the model-mean had produced the observed differences in the warming and cooling rates of the North Atlantic and the global oceans, then we would have to conclude that the Atlantic Multidecadal Oscillation was a forced component of the models. Because the model mean does not show the great difference in warming and cooling rates, the additional variability of the North Atlantic has to be caused by naturally occurring factors that are not used force the operation of the models. Thus the heading for this section: *The Atlantic Multidecadal Oscillation is Not a Forced Component of the Climate Models*.

Curiously, the climate science community acknowledges the importance of the Atlantic Multidecadal Oscillation. The climate scientists who run the blog RealClimate note on their [Atlantic Multidecadal Oscillation](#) webpage:

> *A multidecadal (50-80 year timescale) pattern of North Atlantic ocean-atmosphere variability whose existence has been argued for based on statistical analyses of observational and proxy climate data, and coupled Atmosphere-Ocean General Circulation Model ("AOGCM") simulations. This pattern is believed to describe some of the observed early 20th century (1920s-1930s) high-latitude Northern Hemisphere warming and some, but not all, of the high-latitude warming observed in the late 20th century. The term was introduced in a summary by Kerr (2000) of a study by Delworth and Mann (2000).*

Yet the climate models used by the IPCC for their 5th Assessment Report cannot simulate the additional multidecadal variability of the North Atlantic as shown in Figures 25 and 26. And the modeled difference between the sea surface temperature of the North Atlantic and Global Oceans is too small.

A FOREWARNING TO TROLLS

I've already addressed one of the anticipated complaints about my model-data presentation of global sea surface temperature anomalies in Figure 1 by showing when the model-data comparison is presented in absolute terms, Figure 3, the trend lines do not even intersect. I've also documented why I presented Reynolds OI.v2 data in this post. Refer to the heading of *Preliminary Information*.

And I suspect that some of you might link Sou's (Miriam O'Brien's) recent HotWhopper post on sea surface temperature trends (archived copy) [Bob Tisdale is in a tizz over record hot seas](#). Once again, Miriam has expressed her misunderstandings about a topic and her willingness, or need, or want, to mislead her readers.

Note the sea surface temperature datasets she presented and that her source was the KNMI Climate Explorer for two of them. In addition to the Reynolds OI.v2 data, Miriam presented NOAA's ERSST.v3b, and the UKMO's HADSST3 data. Her intent was to show that the Reynolds OI.v2 data had a cool bias. My Figure 27 is a screen capture of the sea surface temperature datasets available from KNMI Climate Explorer ([here](#)).

Sea Surface Temperature Datasets Available at KNMI Climate Explorer

SST	1870-now: HadISST1 1° reconstruction
	1854-now: NCDC v4 ERSST reconstruction, (v3b)
	1850-2006: Hadley Centre HadSST3.1.1.0 5°
	1800-2007: 2° ICOADS v2.5 SST, number of obs
	1982-now: 1° Reynolds OI v2 SST, v1
	1980-now: TAO buoys SST, Air Temperature

Figure 27

It's difficult to overlook the first sea surface temperature dataset on the list: [HADISST from the UKMO](#). HADISST dataset is a statistically infilled dataset that incorporates satellite data from 1982 to present. It is preferred by many scientists for short-term and long-term studies of global sea surface temperatures. In fact, if you were to perform a [Google Scholar](#) search of HADISST, you'd get about 2900 results, which is more than the 2500 results shown for NOAA's ERSST dataset. HADSST only returns 319 results.

So why did Sou exclude HADISST from her presentation? See Figure 28. A reasonable guess is that HADISST shows a noticeably lower warming rate than Reynolds OI.v2 data during the satellite era, and the lower trend of the HADISST data would destroy all of her complaints about the Reynolds OI.v2 data. For the period of November 1981 to September 2014 (HADISST updates are delayed a few months), Reynolds OI.v2 global sea surface temperature anomalies show a linear trend of +0.087 deg C/decade, while HADISST shows a linear trend of +0.073 deg C/decade.
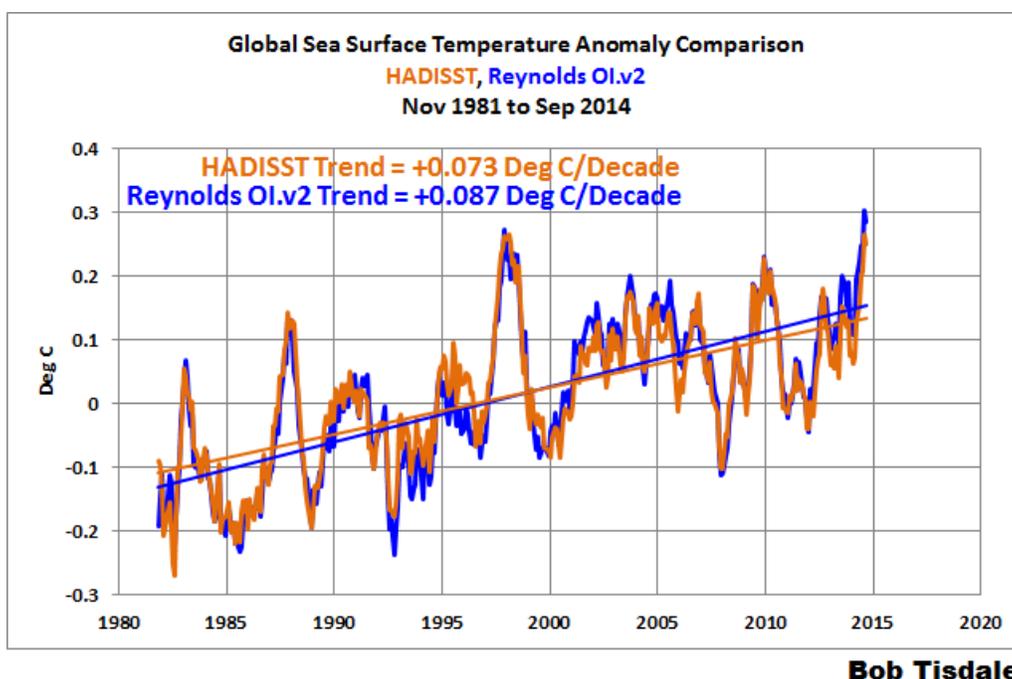

Figure 28

Even though my presentation was of satellite-era data and only satellite-era data, Sou (Miriam O'Brien) then goes on to rant about long-term sea surface temperature data. Obviously, she overlooks the fact that I've presented model-data comparisons of long-term sea surface temperature anomalies in posts such as IPCC Still Delusional about Carbon Dioxide.

Also note how Miriam jockeys the end date of the model simulations to try to lower the warming rates of the models. How silly can she be? And how silly can her followers be for not calling her attention to her obvious attempts to mislead. And she shifts to a discussion of using the base years of 1961 to 1990, when it is impossible to use those base years for the Reynolds OI.v2 sea surface temperature data (it starts in 1981 because it's a satellite-era dataset). This is typical of Miriam who often goes off on tangents in an effort to redirect and misdirect her readers. Last, but not least, Miriam nonsensically misrepresents my argument about the record highs this year by saying "the seas are only getting hotter because they are getting hotter", when, in fact, my

arguments have always been that there are naturally caused, naturally fueled coupled ocean-atmosphere processes that can and do cause ocean warming at the surface and to depth.   See the next section. (There are numerous other flaws in her arguments, but they would take another post because this discussion is too long as it is.)

So, trolls, if you link Miriam's post to this thread, we'll likely laugh at you. I know I will, because I thought Miriam O'Brien's post [Bob Tisdale is in a tizz over record hot seas](#) was one of the funniest posts she has written so far to date. Her need to mislead her readers always makes me laugh.

ON THE RECORD HIGH SEA SURFACE TEMPERATURES IN 2014

Again, of the individual ocean basins, only the North Pacific had record high sea surface temperatures this year, and the weather event there was strong enough to cause record warm sea surfaces globally, in the Pacific as a whole and in the Northern Hemisphere.

We've been discussing the record high sea surface temperatures since the [June Sea Surface Temperature (SST) Update](#).   We identified the location of the unusual weather event, the likely reasons for the record high sea surface temperatures and the fact that climate models could not explain that warming in the post [On The Recent Record-High Global Sea Surface Temperatures – The Wheres and Whys](#). We discussed the topic further in other posts including [Axel Timmermann and Kevin Trenberth Highlight the Importance of Natural Variability in Global Warming…](#)   Our discussions of the unusual warming event in the eastern extratropical North Pacific were confirmed by the 2014 paper by Johnstone and Mantua (here) which was presented in the post [Researchers Find Northeast Pacific Surface Warming (1900-2012) Caused By Changes in Atmospheric Circulation, NOT Manmade Forcings](#). Jim Johnstone, one of the authors of the paper, joined us on the thread of the cross post at WUWT and provided a link to [his webpage](#). There you can find a link to the paper. Also see his comment [here](#) for an update on the recent unusual warming event in the extratropical North Pacific.   Under the heading of *NE Pacific coastal warming due to changes in atmospheric circulation* at [his webpage](#), Jim Johnstone updated one of the graphs from their paper and wrote:

> ***C. Jan 1980 - Nov 2014.***   *NE Pacific monthly coastal SST anomalies (red) and SST modeled from regional SLP. Recent warming from Jan 2013 to Nov 2014 occurred in response to low SLP over the NE Pacific, consistent with long-term forcing. Gray bars mark data beginning in January 2013 that were not included in the study. Negative SLP anomalies generate anomalous cyclonic winds, reducing the mean anticyclonic flow and winds speeds throughout the Arc. The drop in wind speeds reduces evaporation rates, producing positive surface latent heat fluxes and SST increases.*

Also refer to the NOAA summary and FAQ webpage about Johnstone and Mantua (2014) for discussions about the paper in less-technical terms.

As we've been saying for years, coupled ocean-atmosphere processes can and do cause regional warming, which, in turn, lead to the warming of sea surfaces globally.

ADDITIONAL READING

This post presented evidence that the hypothesis of human-induced global warming is flawed, because the models that serve as the foundation for the hypothesis are flawed…fatally flawed. Further, as we've been illustrating and discussing for more than 6 years, ocean heat content data and satellite-era sea surface temperature data both indicate that natural processes are responsible for the warming of the oceans, at the surface and to depth. An overview of this can be found in my illustrated essay "The Manmade Global Warming Challenge" (42mb). Much more detail about the natural warming of the global oceans can be found in my ebook *Who Turned on the Heat? – The Unsuspected Global Warming Culprit: El Niño-Southern Oscillation*. See the post here for an introduction to *Who Turned on the Heat?*

This post presented how poorly climate models simulate sea surface temperatures during the satellite era. Climate models also do not simulate land surface air temperatures properly in many parts of the globe. They do not simulate precipitation well. Climate models also do not properly simulate long-term variations in global surface temperatures. And there are numerous peer-reviewed papers and journal letters by climate scientists that present many other flaws in climate models. These flaws are collected in my ebook *Climate Models Fail*. See the post here for an additional overview.

And if you enjoyed this post or learned something from it, I would be very thankful for a contribution to my tip jar. It took about a week to prepare this post. And if you're reading this post at WattsUpWithThat, please remember Anthony's tip jar (here), too.

Work on my new book is progressing very slowly, but it is progressing.

CLOSING

We live on an ocean-covered planet, yet somehow the whens, there wheres, and the extents of the warming of the surfaces of our oceans seems to have eluded climate modelers. For the past few years, we have been presenting how poorly the climate models (used by the IPCC) simulate sea surface temperatures—long-term comparisons (example here) and for the satellite-era. But in those cases, we presented modeled and observed sea surface temperature anomalies. In this post, we presented satellite-era sea surface temperatures, not anomalies, and this has pointed to other climate model

failings, which further suggest that simulations of basic ocean circulation processes in the models are flawed.

Depending on the ocean basin, there are large differences between the modeled and observed ocean surface temperatures. The actual ocean surface temperatures, along with numerous other factors, dictate how much moisture is evaporated from the ocean surfaces, and, in turn, how much moisture there is in the atmosphere…which impacts the moisture available (1) for precipitation, (2) for water vapor-related greenhouse effect, and (3) for the negative feedbacks from cloud cover. In other words, failing to simulate sea surface temperatures properly impacts the atmospheric component of coupled ocean-atmosphere models. That, of course, is in addition to the poor simulations by models of sea surface warming and cooling rates and their spatial patterns, which also impact atmospheric circulation in models.

As I noted earlier in the post, *climate model simulations of sea surface temperatures are far from reality. That is, they're modeling the surface temperatures of a virtual planet but those surface temperatures have no similarities to Earth…no similarities at all to (1) the actual warming and cooling rates, (2) the patterns of those trends, and (3), as [you've discovered] in this post, the absolute temperatures. It would be nice if climate modeling agencies might try to simulate the surface temperatures of this planet, not some other one. That way, their models might have some value. Right now, they don't serve any purpose…other than to illustrate how poorly they simulate Earth's climate.*

Regards.

PS

~~Yes, this post was long and there were many illustrations, but there was lots to discuss…and I actually reduced the size of this post before publishing it. Many readers like copies of my longer posts in pdf format. Please check back in a day or two for a link to a pdf copy.~~