# Satellite Data Show that there Was No Global Warming Before 1997

## Subsequent warming was discontinuous and was not caused by carbon dioxide

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**Part 1 of 2**

**Revised August 20th, 2009**
**Supersedes all previous versions..**

**Warning: This paper has been rejected by *Science,* by *Nature,* and by *PNAS*.**

**It may be hazardous to your research grant.**

# Executive Summary of Revised and Expanded Version of August 20th 2009

1. There was *no global warming at all from 1978 to 1997*. Satellite observations show that instead of rising the global temperature just oscillated during this time with a peak-to-peak amplitude of 0.4 to 0.5 degrees Celsius and a period of three to five years, about a mean value that remained unchanged for twenty years. This lack of warming *takes away any reason to reduce carbon dioxide emissions,* the supposed cause of this non-existent warming.

2. The possibility exists that satellites do not see this warming simply because the data that show warming may be cooked. It follows that all *temperature records* that show a so-called "late twentieth century warming" in the eighties and nineties *may be inflicted with massive systematic errors* of suspicious origin. Comparison with satellite data reveals the possibility that they may have been doctored by selectively raising or eliminating La Nina phase temperatures that exist in satellite records or by arbitrarily raising up blocks of temperatures. Use of these tainted temperature records as input to computers is a source of fatal computer errors in IPCC climate models that use them as a basis for climate predictions.

3. The cause of the multi-year temperature oscillations is a periodic movement of ocean waters from shore to shore, associated with the *El Nino – Southern Oscillation (ENSO)* system. It can be observed by means o***f*** radar altimetry from satellites. Driving force of these ENSO oscillations comes from the Pacific equatorial currents. Radar altimetry shows that the western terminus of these oscillations is near the Philippines and New Guinea which block the equatorial currents from reaching the Indian Ocean. Pulsating return flow via the equatorial countercurrent periodically delivers us an El Nino. The basic El Nino period is determined by the dimensions of the ocean basin itself but variability may be introduced by agents that modify the Pacific equatorial currents.

4. These ENSO oscillations were suddenly interrupted from 1997 to 1999 by *a giant warming peak,* attributed to the 1998 "super El Nino." This unusual peak sits astride a La Nina phase of ENSO, is twice as high as any other ENSO peaks were, and quickly subsides without leaving a trace. It probably originated as Indian Ocean overflow when an unusual storm surge raised the sea level in the Indonesian Passage between the oceans. Once in the Pacific it would have followed the equatorial countercurrent to the eastern shore, there to cause a super El Nino.

5. The oscillation which was interrupted by the appearance of that super El Nino picks up again after the peak has subsided and keeps on rising towards the next regular El Nino peak. But it overshoots the target temperature and reaches a level 0.2 degrees above that of other El Nino peaks that preceded it. Next, a La Nina that should have followed it fails to occur and a prolonged warm period – the *"twenty first century high"* – begins. During this warm period the temperature stagnates and does not increase despite a steady rise of atmospheric carbon dioxide. Source of this warmth is probably the same Indian Ocean overflow that brought us the super El Nino of 1998.

6. The twenty-first century high finally comes to an end with a La Nina cooling in 2007 which inaugurates the return of ENSO oscillations that were interrupted in 1998. But Hansen's "scenarios" A and B of 1988 which are based on carbon dioxide theory predict a warming for this period, not a cooling. Since the predictions of this theory are clearly wrong the theory fails as a scientific theory and must be abandoned. And this is the same theory that Hansen presented to a Senate committee in 1988 and whose publicity led to the establishment of the IPCC.

7. Finally, a word about *Al Gore and the IPCC Nobelists*. I am sorry to say that the emperor has no clothes on. A trace amount of carbon dioxide in the air does not cause global warming as required by their religion. There was no warming in the eighties and nineties and the warming that does exist started only in 1997 and is not of carbonaceous origin. And since global warming is now a dead end for them, *why not close down that Kyoto shrine of theirs* and get busy doing some real climate science?

## Abstract.

**A full analysis of satellite-measured lower tropospheric temperatures indicates that none of the global temperature variations from 1978 to 2008 can be attributed to the effect of carbon dioxide as a greenhouse gas. What satellites do show is a period of global climate oscillations from 1978 to 1997, in synch with the warm (El Nino) and cool (La Nina) phases of the well-known ENSO oscillation. But this same period has been called the "late twentieth century warming" period and according to Hansen's testimony in 1988 that warming was caused by the rise in atmospheric carbon dioxide from human activities. Since satellites do not see it as a warming the records showing it must be considered suspect. A possible way to get a steadily rising temperature curve from a satellite curve is to selectively raise the La Nina phase temperatures or to eliminate La Nina phase temperatures entirely. Examples of both exist. Cause of the ENSO oscillations is large-scale periodic movement of ocean waters from shore to shore which has a global temperature influence. They are powered by Pacific equatorial currents which terminate near the Philippines and New Guinea. A pulsating return flow of warm water piled up by these currents returns to us by the equatorial countercurrent and periodically delivers us an El Nino. The El Nino period is determined by the dimensions of the ocean basin itself. ENSO oscillations are accompanied by massive, periodic transfers of heat from the oceans to the atmosphere and back again which are detectable even in land-based temperature records. This oscillatory period ended with a giant warming peak known as the "super El Nino" of 1998. It does not belong to the oscillatory ENSO system but straddles its La Nina phase. Its most likely source is Indian Ocean overflow, caused by an unusual storm surge near the Indonesian Passage and channeled to the Eastern Pacific by the equatorial countercurrent. After it subsides the interrupted ENSO oscillation resumes without missing a beat. But thanks to the injection of warm Indian Ocean water, the global temperature now rises to a plateau 0.2 degrees above previous peaks. The expected oscillatory downturn that should have followed also fails to occur and the temperature stagnates at the El Nino maximum level for six years. Carbon dioxide theory would require the temperature to rise during these years which did not happen. The "twenty-first century high" finally ends with a La Nina cooling in 2007 that bottoms out in 2008. The La Nina cooling signifies the resumption of ENSO oscillations that existed before the super El Nino showed up. They should control our climate from this point on. This cooling totally contradicts greenhouse warming theory. Carbon dioxide as a greenhouse gas cannot explain either the lack of warming before 1997, or the giant "El Nino that should not be there," or the abrupt runup of temperature from 1999 to 2001, or the stasis of the twenty first century high, and least of all can it explain cooling that ended the twenty-first century high. Lack of warming before 1997 is particularly serious because it would negate Hansen's 1988 testimony to Congress. But thanks to the authority of Hansen's group at NASA these temperatures cannot be questioned. Their computers are still spewing out predictions based on this phony warming and producing GIGO which nevertheless gets published by sweetheart editors of serious scientific journals. But a giant gap has opened up between temperature predictions based on carbon dioxide theory and reality. The scientific theory that carbon dioxide is causing present warming or has caused any measurable warming in our lifetime must be considered false because its predictions are false and do not agree with observed facts. It should be abandoned and all actions based upon its predicted effects must likewise be abandoned. Quijotic carbon dioxide policies like the Kyoto Protocol and the cap-and-trade laws built on such false premises should be the first to be closed down and proposals for extending Kyoto at Copenhagen should be stopped before any more damage is done.**

## Is the World Warming?

There is no shortage of global temperature graphs on the web, an example of which is shown in Figure 1. It is taken from NOAA's web site and purports to show how world temperature has behaved from 1880 to 2008. A similar curve is used by the IPCC. The origin of the data is not stated beyond claiming that it combines land and ocean measurements. The values shown are yearly "anomalies" or deviations from the mean of a stated period and show how much below or above that mean the year's temperature strayed. The blue line is a running or

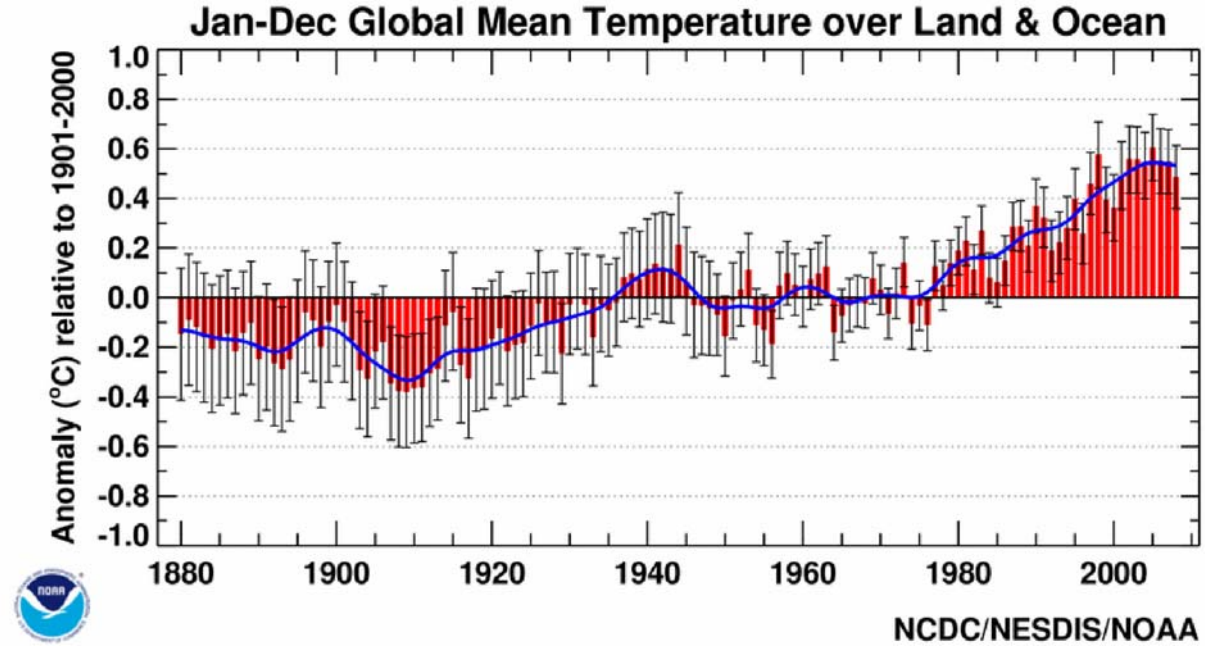


**Figure 1. World temperature history from 1880 to 2008 according to NOAA**

multi-year average whose purpose is to get rid of random variations that are thought to only confuse the issue. As a result, the giant 1998 "super El Nino" is averaged out of existence and the cooling in 2008 is ignored. The right side of the graph, starting in late seventies, shows a dramatic runup of temperature referred to as late twentieth century warming. It is this warming that is meant when "global warming" is referred to by those who think it needs to be controlled. It behooves us to note here that it had a definite beginning, for in the sixties and seventies there was no warming whatsoever as the graph shows. For the sake of argument I put the start of this warming roughly at 1977, for in 1975 The New York Times [1] could still write that "a major cooling of the climate" was "widely considered inevitable" because it was "well established" that the Northern

Hemisphere climate "has been getting cooler since about 1950." This definite beginning is important because this warming appears in testimony given to the Senate by James Hansen in 1988. He was convinced that carbon dioxide as a greenhouse gas was responsible for this warming and already in 1987 had constructed a computer program whose output he showed. First he fitted his curves to available data points, all of ten years worth, and from there extrapolated them out to the year 2020. Carbon dioxide was an adjustable parameter and he showed three "scenarios," curves A, B, and C, of how it influences the future. The first showed what happens when relatively high amounts of $CO_2$ are added to the atmosphere, the second when moderate amounts are added, and third one showed a rosy future when no more is permitted after 2000. He scared the press, who were out in force, and the public too. The publicity from that hearing made the IPCC possible. But it is not well known that this was not his first but his second appearance in front of that committee. The first one had been in November 1987 when it was cold, no one wanted to hear about warming, and the media responded with a yawn. This did not please Senator Wirth, the subcommittee chairman. But if at first you don't succeed, try, try again, and so he did. He called up the Weather Bureau to find out what the warmest day in Washington, D.C. was. It was June 23$^{rd}$ so he scheduled a new hearing for that date. And to make sure that air conditioning was not working properly his staff went out at night and opened all the windows in the hearing room [2]. Their efforts were successful: the television crew, the star witness, and the audience sweated profusely, and the message about global warming was on all television screens that night. But what was the substance of this message that is credited with starting the global warming craze? He testified that a warming trend was in existence and that its cause was the increasing amounts of carbon dioxide we were putting into the atmosphere. Both assertions were false. What was true was that carbon dioxide was indeed increasing steadily. What was not true was that it was the cause of this warming. And worse yet, it turns out that satellites cannot even detect that warming he was talking about. But even if you let him have this warming the fact is that in the sixties and seventies which preceded Hansen's warming - a good twenty year time span - there had been no warming whatsoever. Carbon dioxide, however, was then already in the air and was slowly increasing at the rate it still does today (Figure 2). And now here is a question: if carbon dioxide really is the cause of this warming how do you then explain the fact that a gas whose behavior is predictable, a trace gas that has been in the air for decades without causing any trouble, suddenly changes its behavior and

starts warming up the world? It's simple: it just takes powerful voodoo to do this and Hansen had it in him. Science it is not, a miracle maybe, a founding miracle for the global warming religion. Yet Hansen's testimony was enough to spark the inception of

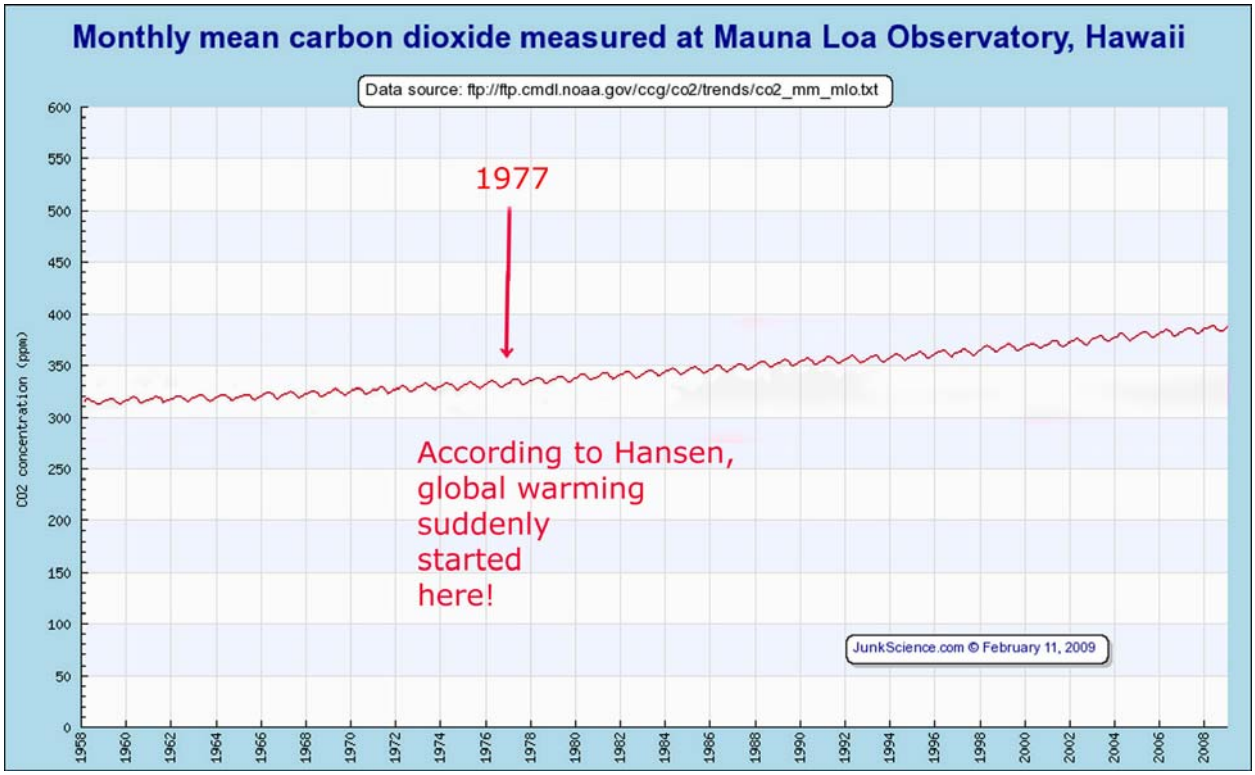


**Figure 2. Measured concentrations of carbon dioxide in the air, from 1958 to 2008**

the IPCC. IPCC today believes that this warming is real, that it is caused by the greenhouse effect of carbon dioxide, and that it will lead to disastrous climate change by the end of the century. And thanks to Hansen's voodoo science, as the concentration of carbon dioxide in the air increases so does global temperature. Hence, we must fight it by such measures as the Kyoto Protocol, carbon taxes, cap-and-trade laws, etc. But is this really true? Carbon dioxide is a trace component of the atmosphere and it did not start increasing in the seventies but much earlier than that. And now we find that satellite measurements, reported to be accurate within plus or minus 0.03 degrees Celsius, [3][4] have been contradicting ground-based measurements for years but this fact is strangely discounted by Al Gore and the IPCC Nobelists.

## Introduction to Satellite Data

The satellite record itself is complicated and since a full analysis of it is still not available I will attempt to fill this gap here. After examining available satellite sources I chose to use two of them, UAH MSU [5] and RSS MSU [6], for this study because their results are highly consistent with one another and they are as free of spurious data as possible. Using two sources instead of one has the further advantage that random errors in the two data sets are not correlated and tend to cancel one another. It wasn't always so rosy, however, for RSS was originally started up to keep UAH "honest" when their original data gave temperatures lower than expected by experts. But that problem was soon resolved when it was realized that UAH had failed to account for the effect of the decay of satellite orbits on their measurements. Both data sets are now highly concordant and cover the period from 1978 to the present [Figure 3] with a precision and accuracy not possible with ground-based observations. The data are derived from measurements of Oxygen microwave emission line intensities from the lower troposphere which are thermally excited and hence are a proxy for the atmospheric

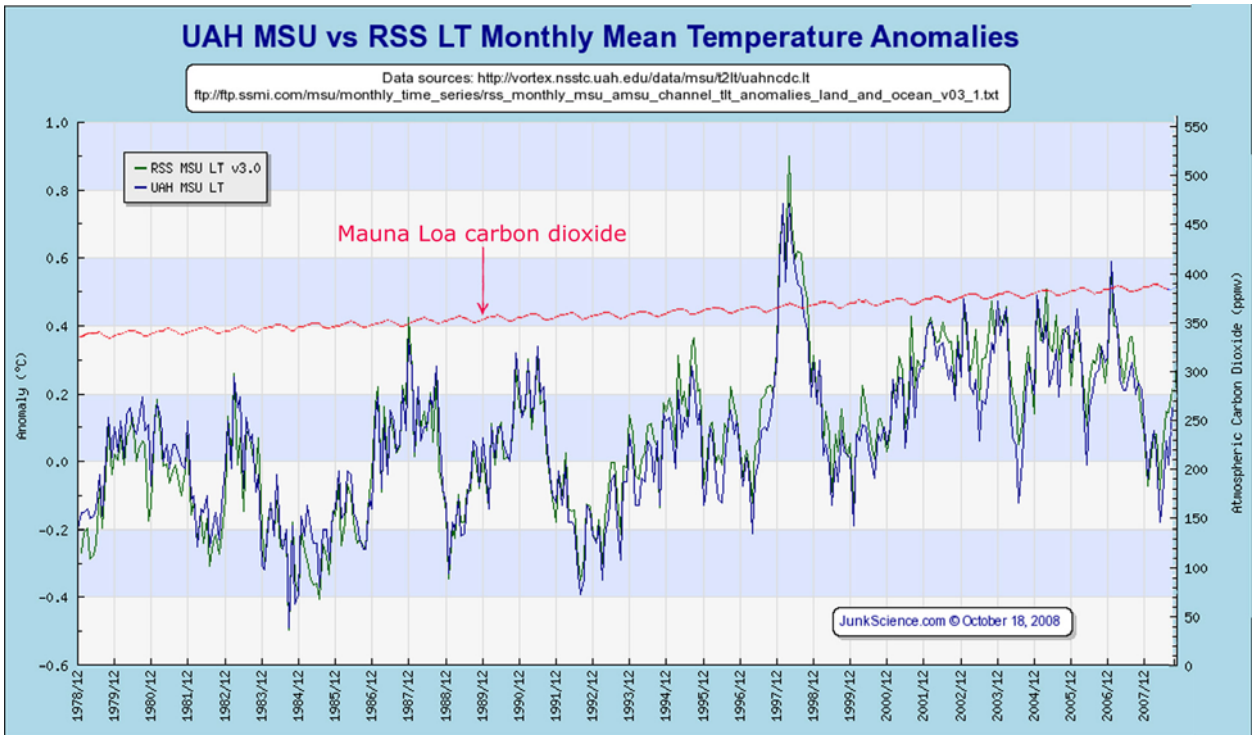


**Figure 3. Lower tropospheric mean monthly temperature anomalies from UAH MSU and RSS MSU satellite observations from 1978 to 2008, plotted on a common graph.**

temperature at that level. This lower troposphere is warmed both by convection from the ground up, which is in turn warmed by the sun, and *in situ* by the primary greenhouse effect as the greenhouse gases absorb ground radiation and are warmed thereby. Mid-troposphere data show features similar to lower troposphere, indicating that considerable mixing occurs. This mixing is also how the primary greenhouse warming of the troposphere is transmitted to the ground (or the ocean, as the case may be). On a common graph [7] the lower troposphere data from UAH and RSS fall very close to or on top of one another as shown in Figure 3. The graph is jagged, with many peaks small and large, and the question is what to make of all this mess. The first thing that comes to mind is to draw the best straight line through that pesky noise,

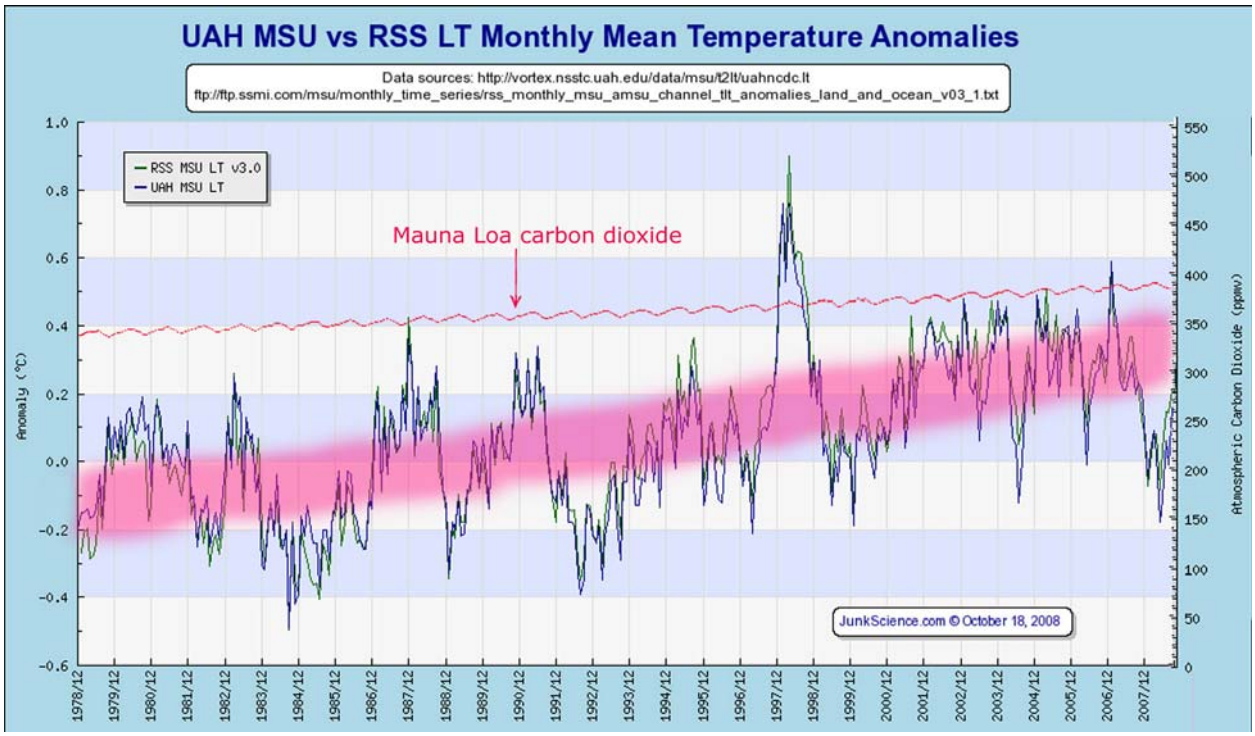


**Figure 4. Same data with a possible linear trend drawn in.**

as in Figure 4. Doing this results in a trend line with an upward slope, exactly what global warming is supposed to be all about. But should you let it go at that you would be wrong because you would be ignoring information and throwing out data just because you expect a trend. To get at that information we have more work to do.

## Previous Analyses of Satellite Data

One way to make better sense of this record is to simply average out small variations by looking at annual means. This has been done and published records showing the annual mean temperature curve exist. Figure 5 shows such annual means (I hand traced it from a slide by Fred Goldberg), superposed on the satellite data. But instead of simplifying the graph it becomes more complicated and harder to understand.

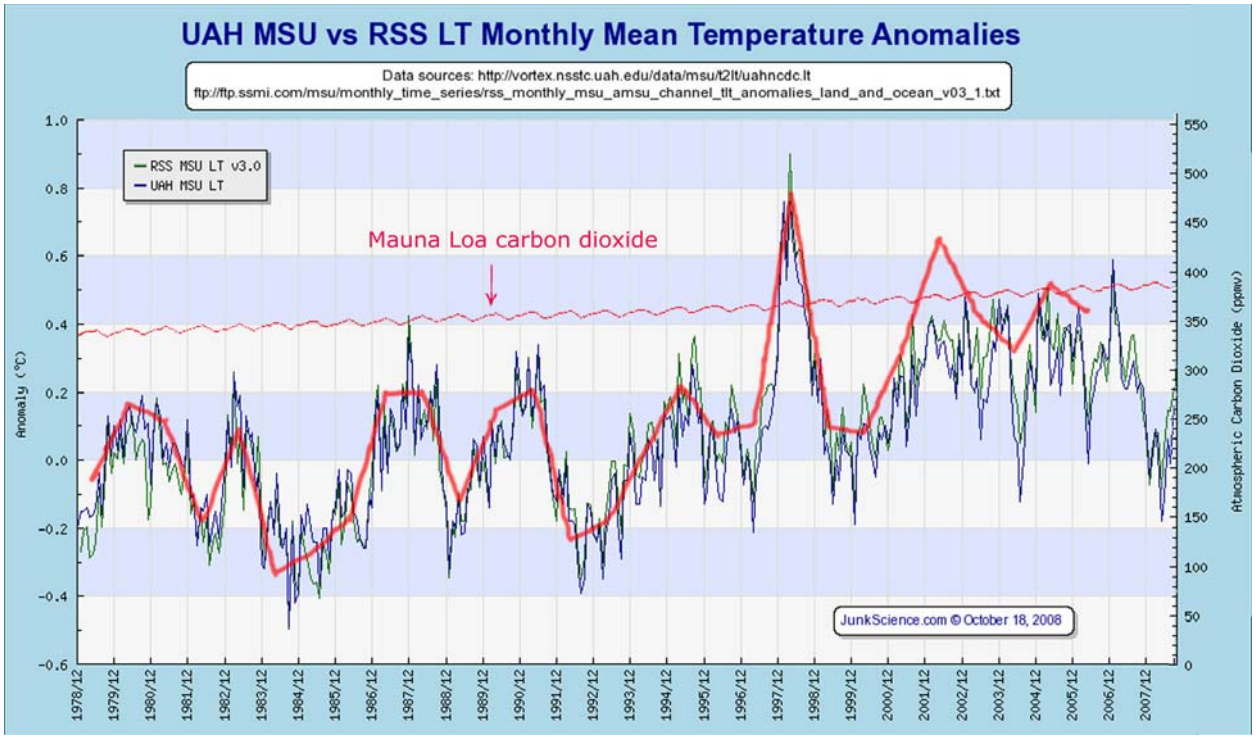


**Figure 5. Yearly averages (red), adapted from Fred Goldberg and superposed on satellite data**.

Now prominent ups and downs of temperature appear, apparently real but something that carbon dioxide never predicted, and climatologists have had a field day trying to explain them. Figure 6 shows proposed common identifications that I am aware of. I count five El Ninos, four La Ninas, three volcanoes and the "Super El Nino" of 1998 in this graph. This gives us a total of thirteen separate *ad hoc* causes that explain almost all

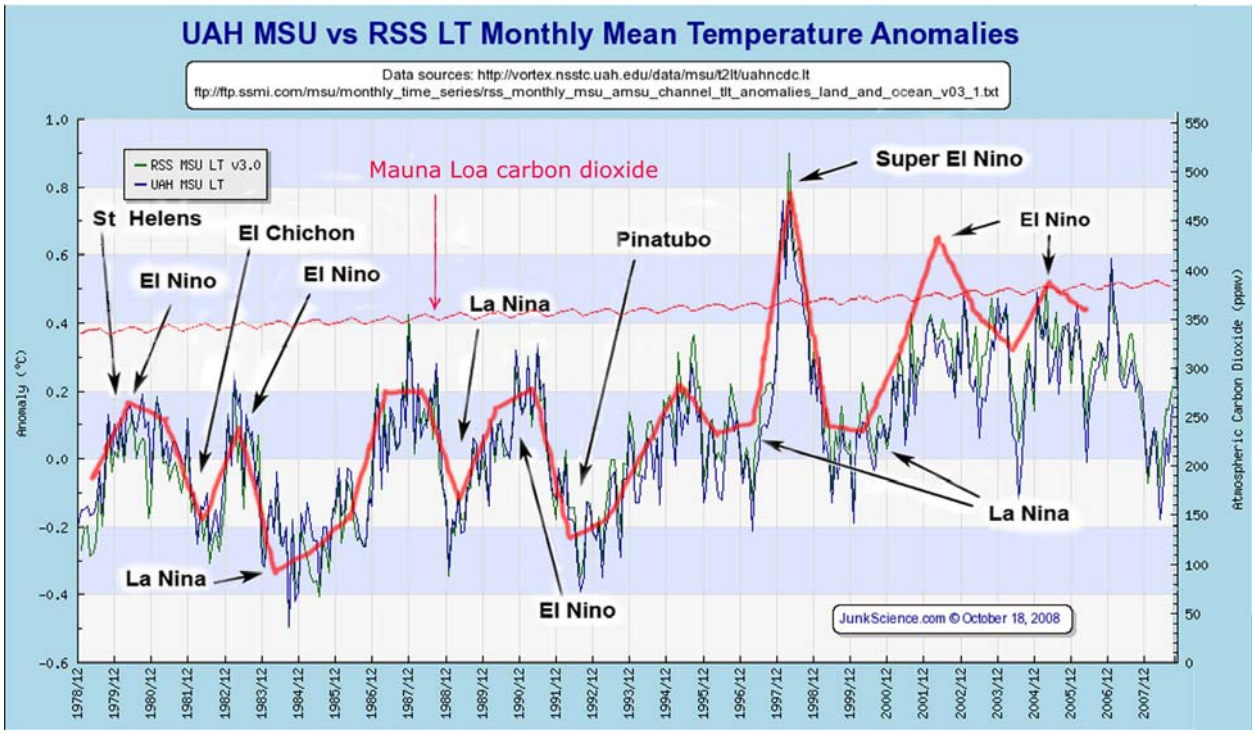


**Figure 6. Common identifications made of causes for temperature fluctuations, after Fred Goldberg (8).**

the vagaries of our climate, and they all know just how to cooperate to make us think the globe is warming. But does this explain it all? Actually no, for something is still not explained: the small oscillations eliminated by averaging have a life of their own. Even the smallest peaks in the record that look like noise are not noise because they show up in both data sets, and somehow a complete explanation must account for them as well.

## Making Sense of Observations

Fortunately we humans are good at pattern recognition and when attention is drawn to this conundrum we see immediately that we are dealing with a superposition of two separate, independently oscillating systems. All this is easy to grasp when the larger, multi-year oscillations are outlined by a light red band whose width corresponds to the

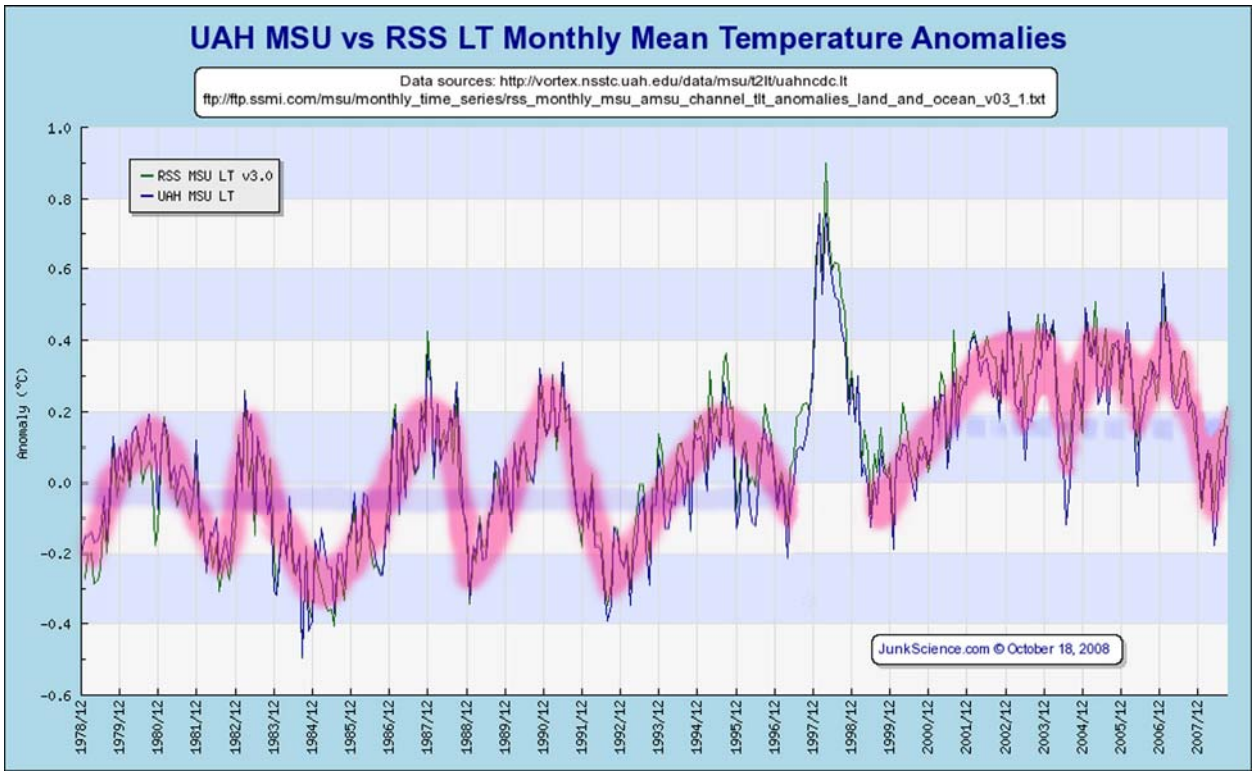


**Figure 7. Major climate oscillations. The exceptional peak from 1997 to 1999 does not belong to this set. Width of the light red band corresponds to the scale of the local weather events.**

small oscillations, as in Figure 7. More than likely the small oscillations are a reflection of fluctuating cloud cover that locally can modulate the ground area being warmed by the sun and thereby influence the temperature. Eventually it might be possible to correlate them with known local weather events. And the larger, “named” variations that so attracted the attention of climatologists are more than just a random collection of ups and downs: they emerge as a coordinated set of climate oscillations. The precision of satellite measurements guarantees that they are absolutely real and must be explained. First thing that is obvious about them is that they have nothing to do with carbon dioxide which requires a monotonic increase of temperature with time. Volcanoes like

Mt. Pinatubo or El Chichon, thought to have been sources of cooling, could only have produced random changes in the pattern but this is not a random pattern. The peaks before 1997 have a spacing from three to five years and a peak-to-peak amplitude of 0.4 to 0.5 degrees Celsius. Since the peak height is almost constant and the cycles repeat we must regard the center line of the oscillations as the effective world temperature. This center line is horizontal for twenty years, indicating that the "late twentieth century warming" simply did not happen. In particular, Hansen's 1988 warming did not happen either and carbon dioxide did not change its behavior to please Hansen. But this oscillatory period is then terminated by a sharp warming peak from 1997 to 1999, attributed to the "super El Nino" of 1998. It is twice as high and distinctly different from all other peaks that preceded it. And it sharply divides the climate record into two distinct periods that have characteristics of their own and which must be separately analyzed. The world temperature to the right of that peak is dominated by a unique elevated temperature plateau – the "twenty first century high" – that starts like an El Nino and ends like a La Nina but maintains an almost constant, El Nino – like, warmth for six years. All of these features must have a physical reason of course. For example, ocean water sloshing back and forth from one side of the ocean to the other is a possible agent that could produce the observed multi-year repeats. And it turns out that something like this is already known: it is the El Nino – Southern Oscillation or ENSO system. The fact that these oscillations show up as global temperature changes indicates a massive, periodic transfer of heat from the oceans to the atmosphere and back again which was previously unsuspected. General Circulation Models (GCMs) used by IPCC computer models exclude this major ocean – atmosphere heat exchange. They also use the non-existent late twentieth century warming as input to their computers. They need it because without a warming to extrapolate the models will grind to a halt. There are about two dozen such models today, running on supercomputers at a not inconsiderable expense to the public and outputting nothing but GIGO. But Uncle Sam has deep pockets, [9] with over a billion dollars to spend on climate research each year, and a few missteps like this in a good cause would hardly be noticed. Pilkey and Pilkey-Jarvis, however, have surveyed numerous attempts to use computer models for simulating natural systems and have come to the conclusion that none of them can be trusted to give quantitative results [10]. They regard such modeling efforts simply as "useless arithmetic."

## Pinatubo Cooling

For warming enthusiasts Mount Pinatubo temporarily interrupted that global warming they believe in. What really happened is that a La Nina phase of ENSO started just at the time the volcano erupted. But much nonsense has been written about this that needs to be disposed of before we go on. Thus, Hansen et al. [11] come out with a GISS climate model just as the Soviet Union is collapsing and state that "We estimate the predicted global cooling on such practical matters as the severity of the coming Soviet winter and the dates of cherry blossoming next spring…" A great contribution to the *Collective Farmers' Almanac* indeed! McCormick et al. [12] claim that Mount Pinatubo "…put an end to several years of globally warm surface temperature." How scientific! I guess they know all this because they have two satellites at their disposal (SAGE I and II) and a third one (CALIPSO) going up shortly. The same article also warns us about a greenhouse warming of two to five degrees Celsius by the middle of the twenty first century. It is Richard Monastersky, a science writer [13], who finally gives us specifics. It turns out that the initial aerosol cloud that reached the stratosphere warmed it but this was followed by stratospheric cooling of a little more than a degree that was still in progress by 1994. And the cooling happened at altitudes between 17 and 22 kilometers according to John Christy of the University of Alabama in Huntsville. What, if anything, happened to the troposphere is not mentioned. Self et al. [13] also report warming in the lower stratosphere (16 to 22 km height) when Pinatubo's sulfur dioxide aerosols were first released, followed by cooling within a year. But they then jump from the stratosphere to the troposphere and with no evidence whatsoever they assign the 1991/92 La Nina cooling to Pinatubo. This simply cannot be done. We know the stratosphere cooled but they claim a tropospheric cooling of 0.5 to 0.7 degrees for the volcano effect. Even if the stratosphere, where the actual cooling took place, were to mix with the troposphere the temperature of the lower troposphere would hardly change because the mass and heat capacity of stratospheric gases at that height is negligible compared to that of the troposphere. Observations from the middle of 1991 when the eruption started to the middle of 1992 when the cooling ended show that the ENSO oscillation is clearly unperturbed. And there is little to distinguish the 1991/92 La Nina from the two previous ones – they all involve a drop of global temperature by about 0.5 degrees and look pretty much the same. As for El Chichon in 1982, it erupted when the La Nina phase was at its minimum and all sorts of excuses had to be made to explain a failure to detect cooling.

## What is ENSO?

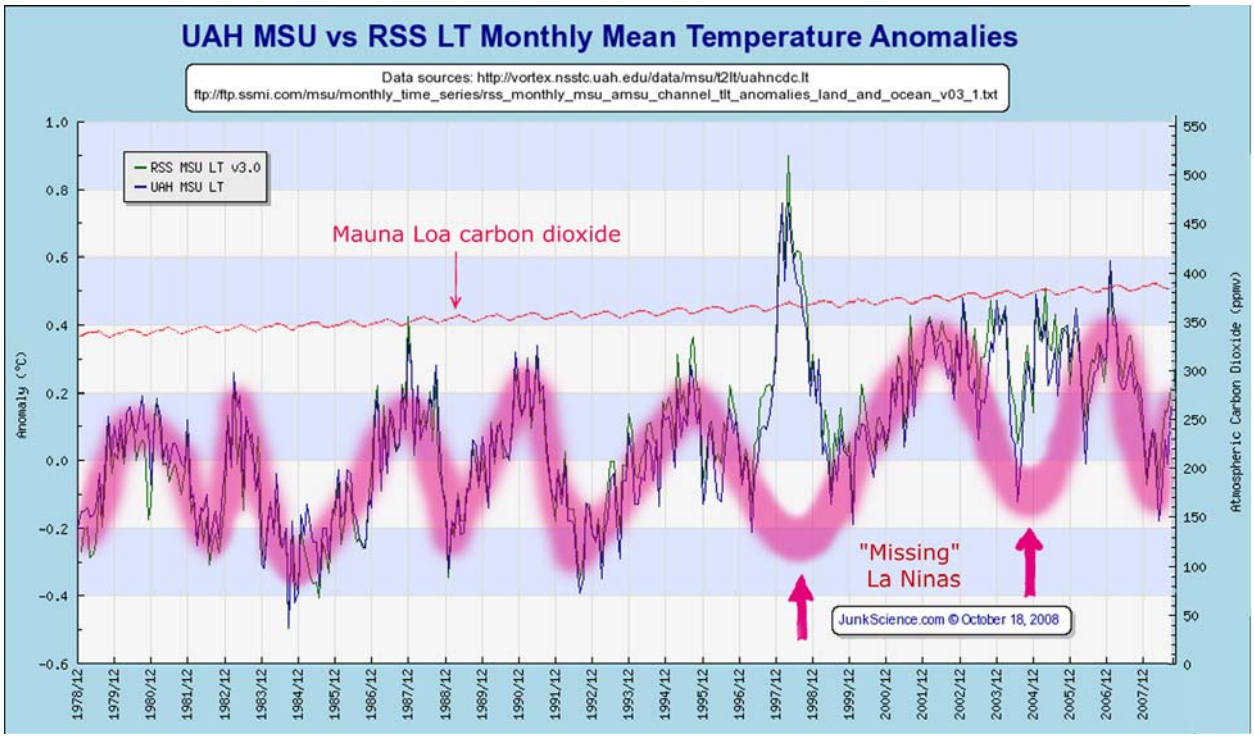


**Figure 8. Thirty years of ENSO. La Ninas that were over-ridden by the 1998 peak and by the twenty-first century high have been reconstructed.**

If ENSO is truly a physical oscillation then the entire temperature record should be a wave train. But there are some irregularities in it, starting with the 1998 “super El Nino.” Figure 8 shows how wavelike behavior in these deviant regions can be reconstructed and how this reconstruction will fit in seamlessly with the rest of the pattern. Existence of such a wave train implies physical existence of low frequency, extremely long waves in the ocean. ENSO could then be visualized as a wave bouncing back and forth from the sides of a very large bowl we call the Pacific Ocean. And its basic wave frequency would then be determined by the dimensions of the ocean itself. To confirm that this is so we would need to observe the rise and fall of the ocean surface in the affected regions. Fortunately there is now a way to do that: it is radar altimetry from satellites. High resolution radar altimetry of sea surface elevation anomalies can now be viewed by anyone by means of *Satellite Eye* [14] and *Google Earth* software. Figure 9 is a view of such sea surface elevation anomalies in the Western Pacific. It shows how the ocean water has piled up east of the Philippines and New Guinea. These Islands block the flow

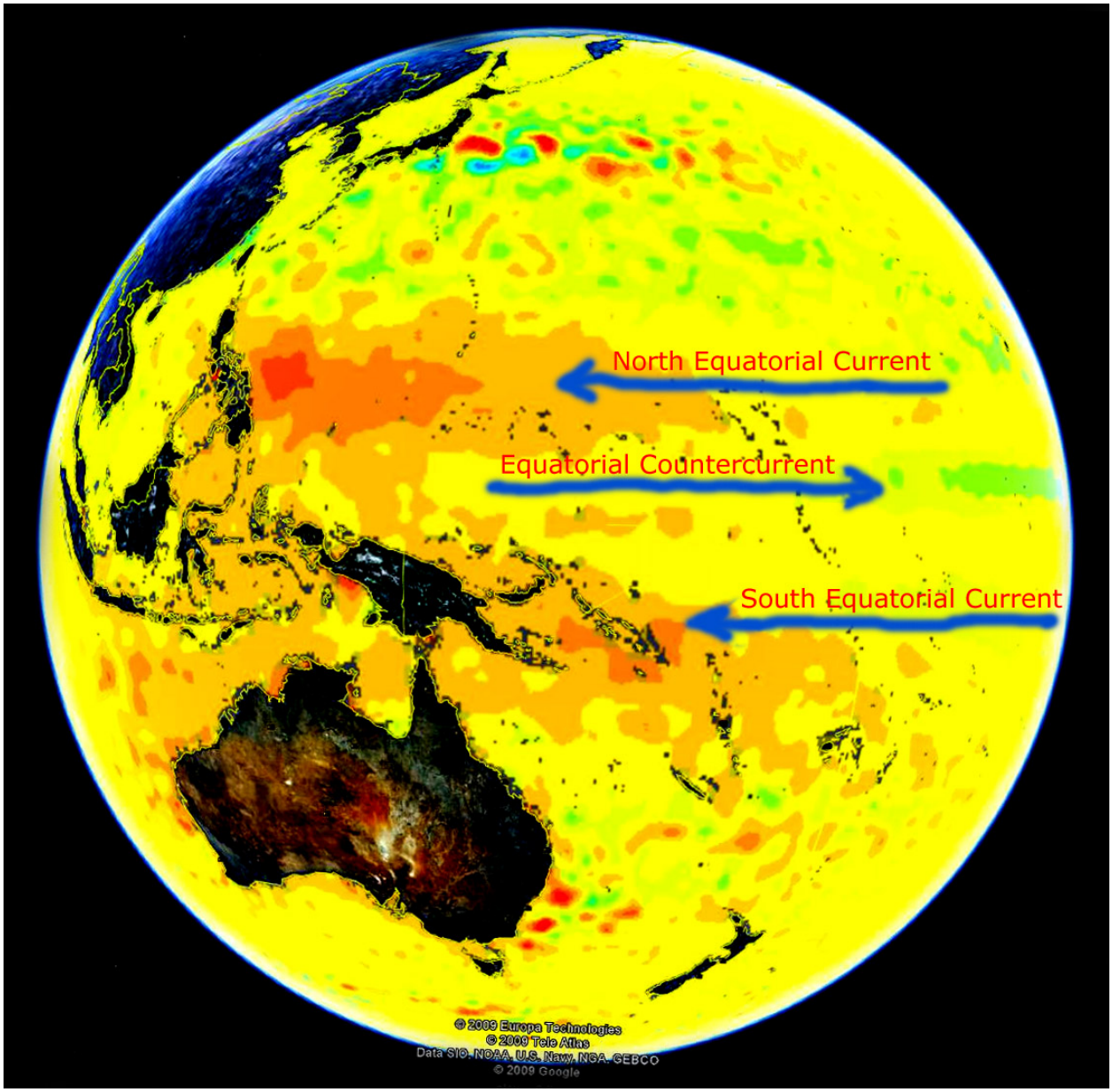


**Figure 9. Western equatorial Pacific showing sea surface elevation anomalies. Two large patches of elevated sea level can be seen that are created by blockage of equatorial currents by the Philippines (north) and by New Guinea (south).**

of equatorial currents into the Indian Ocean and thereby reflect the water mass back towards the east. Return flow of warm water is via the equatorial countercurrent. ENSO is of course a Pacific Ocean phenomenon and a related question might be to ask why the Atlantic Ocean does not have an oscillating climate system. There is nothing like ENSO in the Atlantic Ocean because of the shape of its equatorial shores. Figure 10

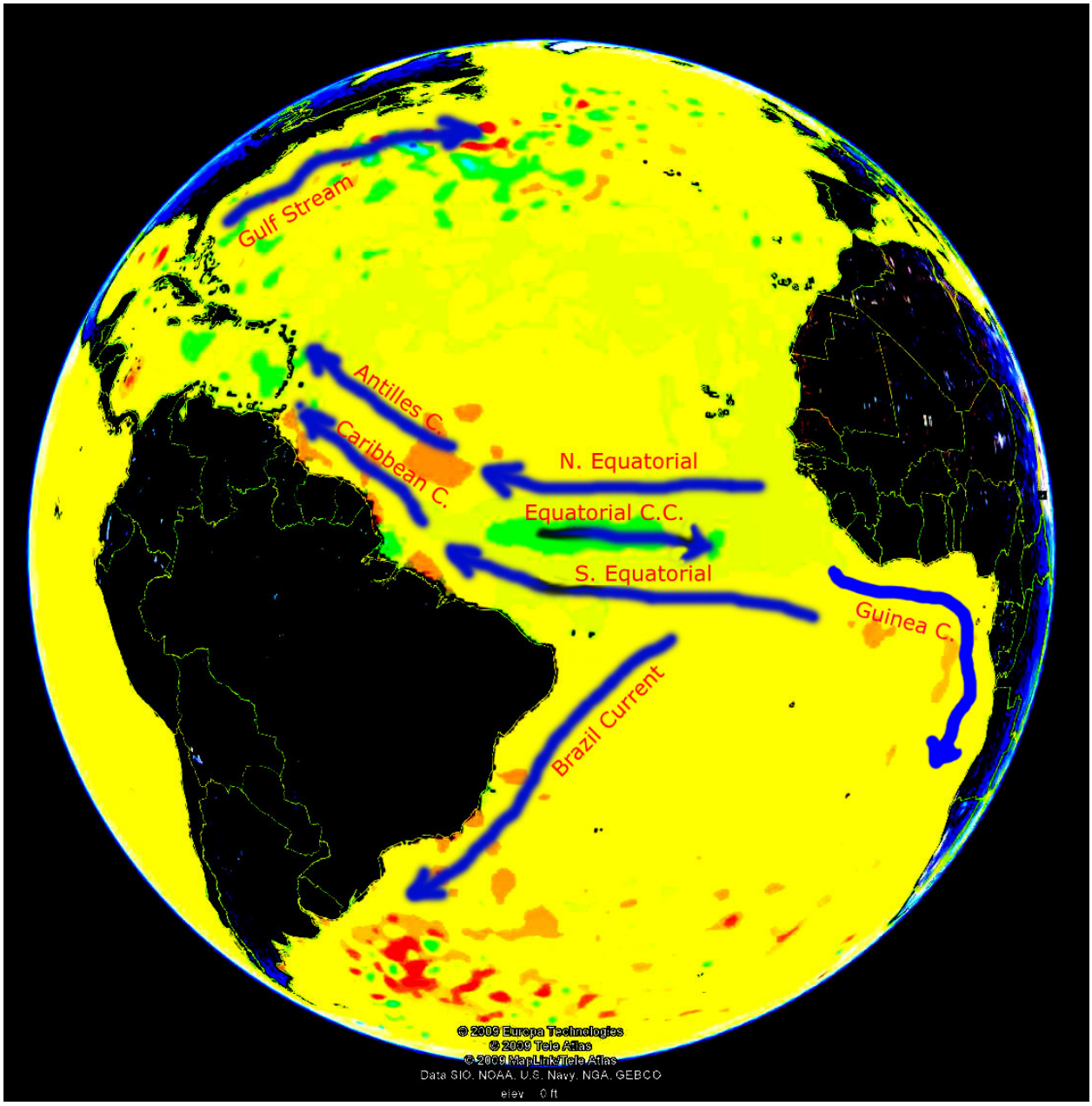


**Figure 10. Sea surface elevation anomalies in the Atlantic Ocean. There is no pileup of water as in the western Pacific and the equatorial countercurrent does not meet with a land barrier.**

shows that the equatorial currents are not blocked and that the eastward bulge of Brazil simply diverts the flow of warm water north and south along the coast until eventually they become the Gulf Stream and the Brazil current, carrying water toward the poles. The equatorial countercurrent likewise does not directly impinge the Africa coast but is diverted south to become the Guinea current which later joins the South Atlantic gyre.