

The Physical Flaws of the Global Warming Theory *and* Deep Ocean Circulation Changes as the Primary Climate Driver

by

William M. Gray
Professor Emeritus
Department of Atmospheric Science
Colorado State University
Fort Collins, CO 80523

Prepared for the Heartland Institute's 7th International Conference on Climate Change (ICCC-7) to be held in Chicago, IL during May 21-23, 2012

Paper also available at (<http://tropical.atmos.colostate.edu>)

THE MAIN MISCONCEPTION OF THE GLOBAL WARMERS IS TO ASSUME THAT ALL THE MANY LARGE ENERGY TERMS OF THE CLIMATE SYSTEM REMAIN CONSTANT OVER LONG PERIODS AND THAT THE ONLY CHANGES THAT MATTER FOR CLIMATE ALTERATION ARE THE VERY SMALL MAGNITUDE VARIATIONS OF HUMAN-INDUCED CO₂.

HOW COULD THE WARMERS BE SO NAÏVE AS TO BELIEVE THAT CHANGES IN CO₂ ARE THE DOMINANT CLIMATE FORCING MECHANISM?

Abstract

Increases in CO₂ and other greenhouse gases will not be able to bring about significant climate disruption in the next 75-100 years. The main problem with the Anthropogenic Global Warming (AGW) theory is the false treatment of the global hydrologic cycle which is not adequately understood by any of the AGW advocates. The water vapor, cloud, and condensation-evaporation assumptions within the conventional AGW theory and the (GCM) simulations are incorrectly designed to block too much infrared (IR) radiation to space. They also do not reflect-scatter enough short wave (albedo) energy to space. These two misrepresentations result in a large artificial warming that is not realistic. A realistic treatment of the hydrologic cycle would show that the influence of a doubling of CO₂ should lead to a global surface warming of only about 0.3°C – not the 3°C warming as indicated by the climate simulations.

The global surface warming of about 0.7°C that has been experienced over the last 150 years and the multi-decadal up-and-down global temperature changes of 0.3-0.4°C that have been observed over this period are hypothesized to be driven by a combination of multi-century and multi-decadal ocean circulation changes. These ocean changes are due to naturally occurring upper ocean salinity variations. Changes in CO₂ play little role in these salinity driven ocean climate forcings.

1. The Earth's Energy Budget

Although rises in CO_2 act to block the normal long wave infrared (IR) radiation to space, this blockage is very small compared to the globe's basic energy budget system. About 3.7 Wm^{-2} of IR energy is intercepted for a doubling of CO_2 (Figure 1). Since the mid-19th century, CO_2 's influence on IR blockage has increased by $\sim 1.4 \text{ Wm}^{-2}$ or 0.6 of 1 percent of the continuous average IR flux to space of 235 Wm^{-2} . The continuous balancing of global average in-and-out net radiation flux is, by contrast, about 342 Wm^{-2} , almost 100 times larger than the amount of radiation blockage expected from a CO_2 doubling over 1.5 centuries. A doubling of CO_2 requires a warming of the globe of $\sim 1^\circ\text{C}$ to enhance outward IR flux by 3.7 Wm^{-2} to just be enough to balance the blockage of IR flux to space if all other factors are held constant.

But this pure IR energy blocking by CO_2 versus compensating temperature rise for radiation equilibrium is unrealistic for the long-period and slow CO_2 rises that are occurring. Only half of the blockage of 3.7 Wm^{-2} at the surface should be expected to go into temperature rise. The other half ($\sim 1.85 \text{ Wm}^{-2}$) of the blocked IR energy to space will be compensated by surface energy loss to support enhanced evaporation. This occurs in a similar way as the earth's surface energy budget compensates for half its solar gain of 171 Wm^{-2} by surface to air upward water vapor flux due to evaporation.

Note in Figures 1 and 2 that the globe's annual surface solar absorption of 171 Wm^{-2} is balanced by about half going to evaporation (85 Wm^{-2}) with the other half (86 Wm^{-2}) going to surface to atmosphere upward IR (59 Wm^{-2}) flux and surface to air upward flux by sensible heat transfer (27 Wm^{-2}). Assuming that the imposed extra CO_2 doubling IR blockage of 3.7 Wm^{-2} is taken-up and balanced by the earth's surface as the solar absorption is taken-up and balanced, we should expect a direct warming of only $\sim 0.5^\circ\text{C}$ for a doubling of the CO_2 . The 1°C expected warming that is commonly accepted assumes that all the absorbed IR goes to balancing outward radiation (through $E = \sigma T^4$) with no energy going to evaporation. This is not realistic. These two figures show how equally the surface solar energy absorption (171 Wm^{-2}) is balanced by a near equal division between temperature rise (enhancing IR and sensible heat loss) and energy loss from surface evaporation. We should assume that the imposed downward IR energy gain for a doubling of CO_2 at the surface will likely be similarly divided. Such a division will cause an enhancement of the strength of the hydrologic cycle by about 2 percent (or 1.85 Wm^{-2} of extra global average evaporation over the $\sim 85 \text{ Wm}^{-2}$ energy equivalent of current evaporation).

This analysis shows that the influence of doubling atmospheric CO_2 by itself (without any assumed positive feedback) leads to only very small amounts of global warming.

The diagram illustrates the Earth's energy balance and the impact of CO₂ doubling. It shows the flow of energy between the Top of Atmosphere (TOA) and the Surface (Sfc.).

Current Conditions (2012):

- Top of Atmosphere (TOA):**
 - Solar:** 342 Wm⁻² (incoming)
 - Ab. Solar:** 64 Wm⁻² (reflected by clouds and aerosols)
 - Sfc. Solar Absorption:** 171 Wm⁻² (reaching the surface)
 - Net Alb:** 107 Wm⁻² (reflected by the surface)
 - OLR + Alb:** 342 Wm⁻² (outgoing)
 - Net OLR:** 235 Wm⁻² (outgoing)
- Surface (Sfc.):**
 - Net IR:** 59 Wm⁻² (incoming)
 - Sen. Heat:** 27 Wm⁻² (incoming)
 - Rain:** 85 Wm⁻² (incoming)
 - Net IR:** 59 Wm⁻² (outgoing)
 - Sen. Heat:** 27 Wm⁻² (outgoing)
 - Rain:** 85 Wm⁻² (outgoing)

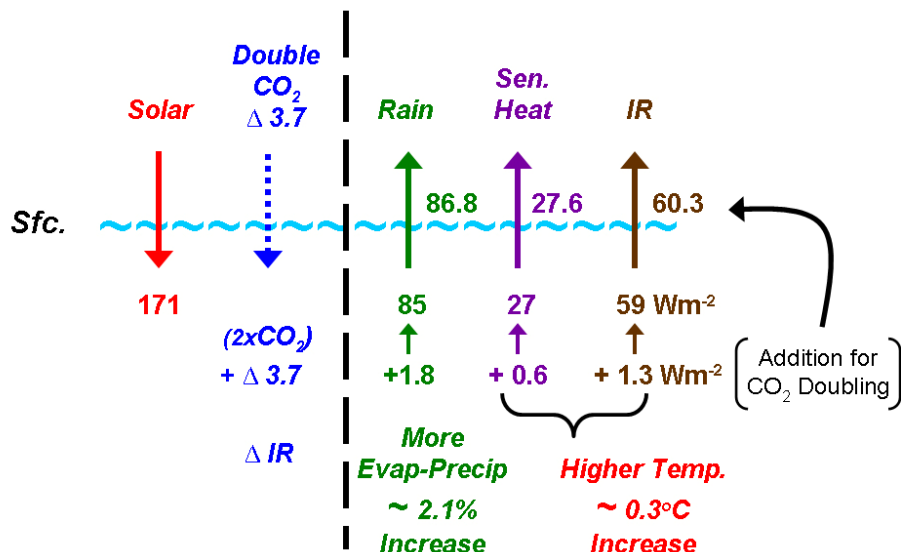
CO₂ Doubling (2100):

- Top of Atmosphere (TOA):**
 - Net OLR:** 235 Wm⁻² (outgoing)
 - CO₂ OLR Blockage:** 3.7 Wm⁻² (reducing outgoing radiation)
- Surface (Sfc.):**
 - Net IR:** 59 Wm⁻² (incoming)
 - Sen. Heat:** 27 Wm⁻² (incoming)
 - Rain:** 85 Wm⁻² (incoming)
 - Net IR:** 59 Wm⁻² (outgoing)
 - Sen. Heat:** 27 Wm⁻² (outgoing)
 - Rain:** 85 Wm⁻² (outgoing)

Summary:

- Net IR:** ~50% (~1.9 Wm⁻²)
- Sen. Heat:** ~50% (~1.8 Wm⁻²)
- Rain:** ~50% (~1.8 Wm⁻²)
- CO₂ OLR Blockage:** 3.7 Wm⁻²
- CO₂ OLR Blockage:** 3.7 Wm⁻²
- CO₂ OLR Blockage:** 3.7 Wm⁻²

SURFACE EQUILIBRIUM WITH DOUBLE CO₂ (units Wm²)



4

2. Variations of Radiation is only a part of the Climate Change Physics

Internal mechanisms of the global energy budget such as evaporation-condensation and deep global ocean current variations also play an independent role from radiation as a major climate change mechanism (Figure 3). The whole AGW theory and dialog over the years has been based on radiation changes. This is far too narrow and naïve. Other important physical processes are important. Figure 1 shows that half the balancing of the earth's surface absorption of solar radiation was accomplished by surface evaporation. And evaporation on the shorted time scales is determined primarily by the Bulk Formula as illustrated in Figure 4. Evaporation is dependent primarily on surface wind speed, sea minus air temperature difference, and surface air relative humidity. Evaporation rates are not well related to surface solar absorption on shorted time and space scales. Variations of radiation have been given far too much thought and credit and have carried far too much influence on the conceptual views of the causes of climate change.

CLIMATE FORCING

Δ RADIATION
(NOT THE WHOLE STORY)

THERE ARE IMPORTANT INTERNAL
FORCINGS OFTEN NEGLECTED
(VARIATION IN GLOBAL NET
EVAPORATION-PRECIPITATION AND
DEEP OCEAN CIRCULATION CHANGES)

Figure 3. Pointing out that climate variation is influenced by other processes besides variations in radiation. Evaporation-precipitation and deep ocean circulation changes also play a basic role.

BULK FORMULA

$$\frac{\text{EVAP.}}{\text{cm}^2 \text{ d}} = \rho \quad C_E \quad |V| \quad (g_s - g) \quad \Delta t$$

$$(1.1 \times 10^{-3}) \quad (2 \times 10^{-3}) \quad (5 \text{ m/s}) \quad (3 \times 10^{-3} \text{ g/kg}) \quad .864 \times 10^5$$

$$= \sim 0.29 \text{ cm/cm}^2\text{d} \approx 85 \text{ Wm}^{-2}$$

Can vary up to $\pm 5 \text{ Wm}^{-2}$

$$3.7 \text{ Wm}^{-2} = 4.2\% \text{ Evaporation Change}$$

Figure 4. Illustration of the breakdown of terms in the Bulk Formula (that determines evaporation rate) and their typical global average necessary to give a net average evaporation rate of a little under 0.3 gm/cm² per day. A doubling of CO₂ would bring about a blockage of 3.7 Wm⁻² which is equivalent to variation of average global evaporation of about 4.2 percent if all this energy went into evaporation. In this case we could have a double of CO₂ and no global warming at all.

3. Nature of Cumulus Convection

The AGW theory and the many AGW global model simulations assume that tropospheric relative humidity (RH) will remain quasi-constant as CO₂ induced blockage of infrared (IR) radiation brings about temperature rises. Surface evaporation and rainfall must also increase under these conditions. The temperature and moisture from the CO₂ gas increases are programmed in the GCM models to artificially increase the globe's upper-tropospheric moisture with increased global temperature and rainfall. The resulting extra increased upper tropospheric moisture is assumed to block large amounts of additional outgoing infrared (IR) radiation to space beyond the blockage of CO₂ by itself. This consequently leads to significant amounts of extra global temperature increase which is two to three times larger than what the CO₂ doubling temperature increase can accomplish alone. Our observational analysis shows that these additional feedback warming assumptions are unrealistic. These incorrect views of convectively induced global warming originated with the National Academy of Science (NAS) report of 1979.

The NAS or Charney Report of 1979. The basic error of the global GCMs has been the model builder's general belief in the National Academy of Science (NAS) 1979 study – often referred to as The Charney Report - which hypothesized that a doubling of atmospheric CO₂ would bring about a general warming of the globe's mean temperature between 1.5 – 4.5°C (or an average of ~ 3.0°C) (Figure 5). This was based on the report's assumption that the relative humidity (RH) of the atmosphere would remain quasi-constant as the globe's temperature increased from CO₂'s influence to block IR energy loss to space. The Clausius-Clapeyron equation specifies that as the temperature of the air rises the ability of the air to hold more water vapor rises exponentially. If relative humidity (RH) of the air were to remain constant as atmospheric temperature rose then the water vapor (q) amount in the atmosphere would accordingly rise. The water vapor content of the atmosphere rises by about 50 percent if atmospheric temperatures were to increase by 5°C and relative humidity remained constant. Rising water vapor content, particularly in the upper troposphere greatly reduce the amount of outgoing longwave radiation (OLR) which can escape to space.

FAMOUS NATIONAL ACADEMY OF SCIENCE (1979) STUDY (The Charney Report)

☛ Doubling CO₂ will lead to global
ΔT of 1.5-4.5°C (~3°C)

☛ Due to positive water vapor feedback
ΔT → Δ moisture → reduced OLR
↑ ↑
ΔCO₂ RH const.

Figure 5. The very influential NAS report of 1979 which deduced that any warming of the globe from CO₂ increases would occur with constant relative humidity (RH). This would, in general, lead to an additional increase in atmospheric water vapor (q) and decrease outgoing longwave radiation (OLR). But this NAS report did not specifically deal with the water vapor content in the upper troposphere during periods of deep convection.

My colleague, Barry Schwartz and I have performed (Gray and Schwartz, 2010 and 2011) observational research using the NOAA-NCEP reanalysis data from 1950. We have also processed the International Satellite Cloud Climatology Project (ISCCP) data for the period 1984-2004 for infrared (IR) and albedo energy flux to space and used this information in conjunction with the reanalysis data. Figure 6 shows the data sets we have used and Figure 7 shows the areas and locations over which we have combined our data sets with monthly and some daily rainfall information to observe how measured IR and albedo vary with different rainfall amounts. The NAS 1979 Charney Report and the numerical GCM simulations do not stand up to what we have found. Processing this data over the last few years has shown us that:

1. Upper tropospheric water vapor does not increase with increasing amounts of rainfall and temperature near the critical upper level IR emission level (Table 1).
2. Any extra blockage of infrared (IR) radiation to space due to increased CO₂, rainfall or cloudiness is usually compensated by increase in albedo from the cloud tops (Figure 8). Increases in global rainfall lead to more net radiation (IR + albedo) flux to space and, all other factors held constant, to a weak global cooling. This is diametrically opposite to the AGW theory and what the GCMs climate simulations indicate.

GLOBAL DATA SETS

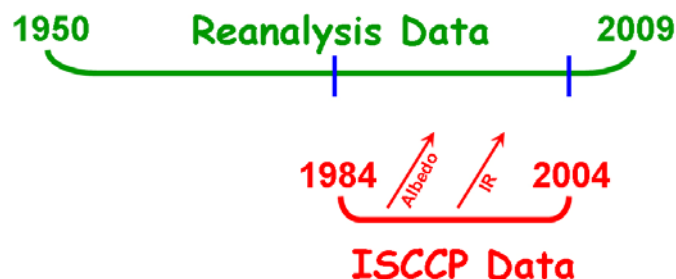


Figure 6. Data sets used along with the data periods used for analysis. Both reanalysis and International ISCCP observations were analyzed.

AREAS

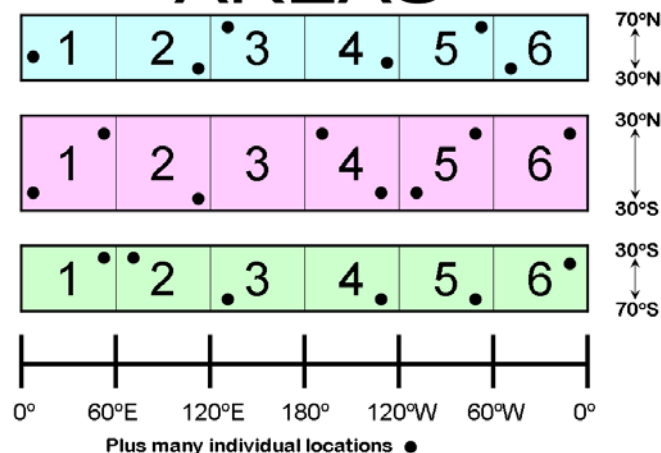


Figure 7. Areas and specific locations where we have analyzed outgoing IR and albedo radiation to space vs. rainfall amounts.

Table 1. Changes in 300 mb temperature, specific humidity (q), and relative humidity (RH) in tropical areas between two rainfall difference data sets for the tropics. Rain differences average 3.9 percent for the 10 highest minus 10 lowest monthly differences (top) and 1.9 percent for the [(95-04) – (84-94)] data set differences (bottom). Negative values are in red. All 300 mb moisture parameters showed decreases with enhanced rainfall.

TROPICS (30°N-30°S; 0-360°)

Monthly (High – Low) Precipitation Values

Δ Rain (3.9%)							
(10 High) - (10 Low)							
Avg. of each of 12 months	0	1	2	3	4	5	6
	0-360	0-60E	60-120E	120E-180	180-120W	120-60W	60W-0
300 mb Temp. (°C)	0.02	0.13	0.27	0.23	(0.34)	(0.21)	0.02
Specific Humidity (q)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Relative Humidity (RH)	(1.66)	(1.34)	(2.33)	(1.73)	(0.41)	(1.20)	(2.69)

Δ Rain (2.0%)							
(95-04) - (84-94)							
Avg. of each of 12 months	0	1	2	3	4	5	6
	0-360	0-60E	60-120E	120E-180	180-120W	120-60W	60W-0
300 mb Temp. (°C)	0.16	0.26	0.24	0.11	(0.05)	0.13	0.25
Specific Humidity (q)	(0.03)	(0.02)	(0.03)	(0.05)	(0.04)	(0.02)	(0.04)
Relative Humidity (RH)	(3.92)	(2.84)	(3.53)	(4.84)	(3.83)	(3.24)	(5.23)

The typical enhancement of rainfall and updraft motion in deep cumulus and cumulonimbus clouds within heavy raining meso-scale disturbance areas acts to increase the return flow mass subsidence in the surrounding broader clear and partly cloudy regions (Figure 8). Global rainfall increases typically cause an overall reduction of specific humidity (q) and relative humidity (RH) in the upper tropospheric levels of the broader scale surrounding convection subsidence regions. This leads to a net enhancement of radiation energy to space over the rainy areas and over broad areas of the globe. Albedo is typically decreased to space as much (or slightly more) than IR is increased to space in the broad scale clear and partly cloudy areas. But over the rain and cloudy areas albedo energy to space is increased slightly more than infrared (IR) radiation is reduced to space. The albedo enhancement over the cloud-rain areas tends to increase the net (IR + albedo) radiation energy to space more than the weak suppression of (IR + albedo) in the clear areas. Near neutral conditions occur in the partly cloudy areas (Figure 9).

Our observational studies (Gray and Schwartz, 2010 and 2011) of the variations of outward radiation (IR + albedo) energy flux to space (ISCCP data) vs. tropical and global precipitation increase (from NCEP reanalysis data) indicates that there is not a reduction of global net radiation (IR + Albedo) to space which is associated with increased global or tropical-regional rainfall. There is, in fact, a weak tendency to go the opposite way.

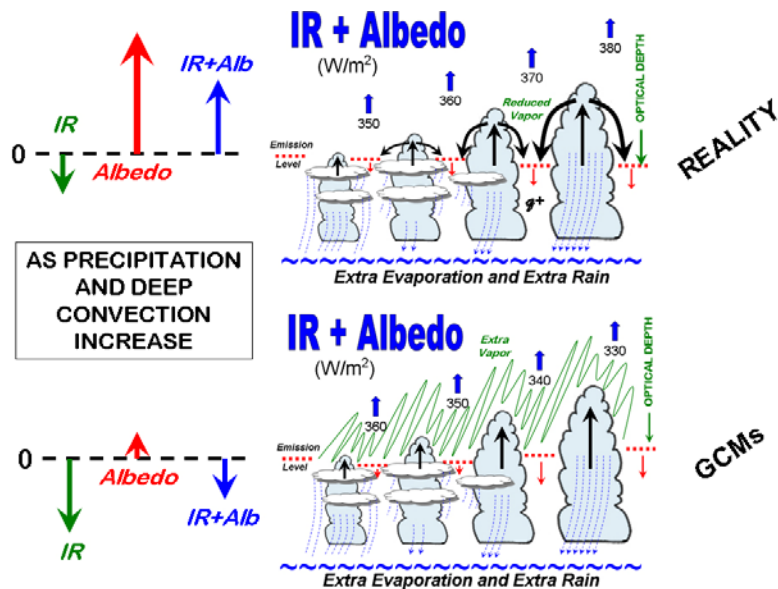


Figure 8. Two contrasting views of the effects of how the continuous intensification of deep cumulus convection would act to alter radiation flux to space. The top diagram emphasizes the increasing extra mass flow return subsidence associated with an ever increasing depth and intensity of cumulus convection. Radiation flux to space increases with enhanced deep convection and rainfall due to a lowering of the upper-level emission level and an increase in albedo. By contrast, the bottom diagram interprets the increase of deep convection (like the GCMs have done) as acting to add moisture to the upper tropospheric levels and cause a decrease of radiation to space. The bottom diagram is not realistic and is the primary reason why the GCMs exaggerate CO₂'s influence on global warming.

TYPICAL RADIATION CHANGES WITH INCREASING GLOBAL PRECIPITATION

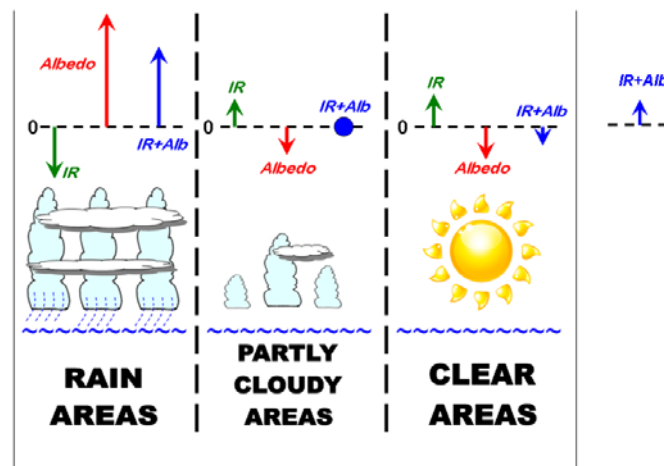


Figure 9. Typical variations of IR, albedo and (IR + albedo) associated with three different areas of rain and cloud for periods of increased precipitation.

SUMMARY. Our data indicates that, in general, the positive water vapor feedback assumptions of the GCM global climate simulations for CO₂ doubling are not valid. We should put no credence in their projections of large amounts of global warming (~ 3°C) for a doubling of CO₂.

4. The Ocean as the Primary Driver for Global Climate Change

This paper hypothesizes that it is variations in the global ocean's Meridional Overturning Circulation (MOC) that are the primary driver of climate change over the last few thousand years. These changes are manifested in alterations of the deep water formation of the Atlantic Thermohaline Circulation (THC) and the Surrounding Antarctica Subsidence (SAS) regions (Figure 10). Figure 11 shows how the MOC is a combination of the high latitude deep water formation of the Atlantic THC and the Antarctic SAS region. These deep water formation changes are driven by upper ocean salinity variations on various multi-decadal to multi-century time scales. Figure 12 shows typical Atlantic Ocean current differences when the Atlantic THC is strong (and more sinking is occurring) and when it is weak (and less sinking is occurring).

A slowing down of the global ocean's Meridional Overturning Circulation (MOC = THC + SAS) is the likely cause of most of the global warming that has been observed since the latter part of the 19th century. Shorter multi-decadal changes in the MOC are hypothesized to be responsible for the more recent global warming periods between 1910-1940 and 1975-1998 and the weak multi-decadal cooling periods between 1945-1975 and 2000 to the present. This current weak cooling is projected to go on for the next couple of decades. Figure 13 shows the typical parameter circulation features which accompanies periods when the MOC (or THC) is stronger than normal and when it is weaker than normal. Note the typical changes in North Atlantic blocking action, El Nino activity, middle-latitude zonal winds, etc for strong vs. weak phases of the MOC (or THC).

When the MOC (or THC) is stronger than average there is more upwelling of cold water in the South Pacific and Indian Oceans, and an increase in global rainfall of a few percent occurs. This causes the global surface temperatures to cool. The opposite occurs when the MOC (or THC) is weaker than normal. There is less upwelling of cold water, global rainfall is reduced a few percent and the global surface temperature warms.

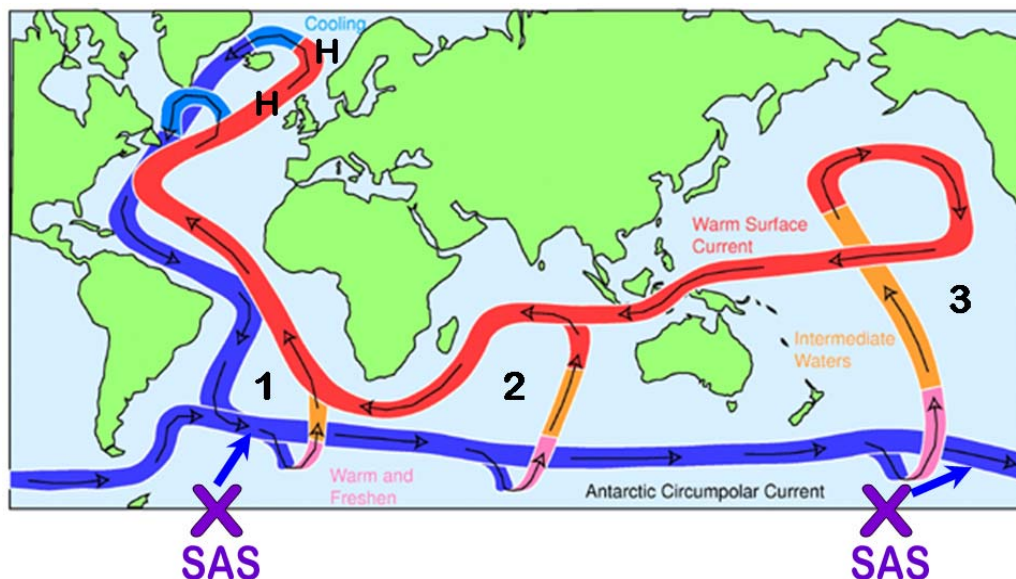


Figure 10. Idealized representation of the globe's salinity driven ocean Meridional Overturning Circulation (MOC) which is composed of deep ocean sinking by the North Atlantic Thermohaline Circulation (THC), areas H, and in the Surrounding Antarctic Subsidence (SAS), purple areas X. Figure adapted from John Marshall.

The MOC (or THC) average strength over the last 150 years has likely been below the multi-millennium average and that is the primary reason we have seen this long global warming since the late 19th century. The globe appears to be rebounding from the conditions of the Little Ice Age to more Holocene average or above-average conditions which were typical of the earlier 'Medieval' and 'Roman' warm periods.

Global Oceans

$$\text{MOC} = \text{THC} + \text{SAS}$$

<u>M</u> eridional	<u>A</u> tlantic	<u>S</u> urrounding
<u>O</u> verturning	<u>T</u> hermohaline	<u>A</u> ntarctic
<u>C</u> irculation	<u>C</u> irculation	<u>S</u> ubsidence

Figure 11. Illustration of how the global ocean Meridional Overturning Circulation (MOC) is defined as a combination of the high north latitude Atlantic Thermohaline Circulation (THC) upper ocean subsidence and the high latitude Southern Hemisphere Surrounding Antarctic Subsidence (SAS) upper ocean subsidence.

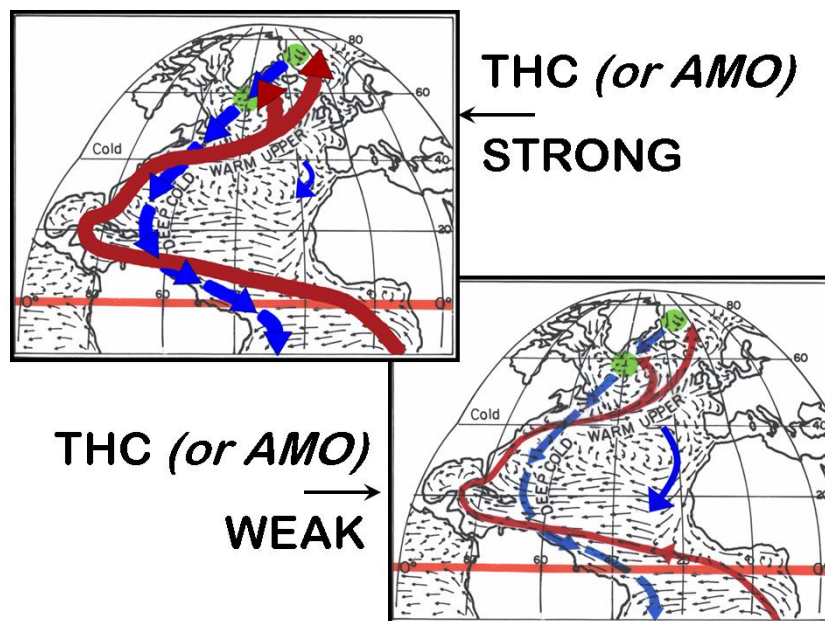


Figure 12. Idealized portrayal of the primary Atlantic Ocean upper ocean currents during strong vs. weak phases of the thermohaline circulation (THC).

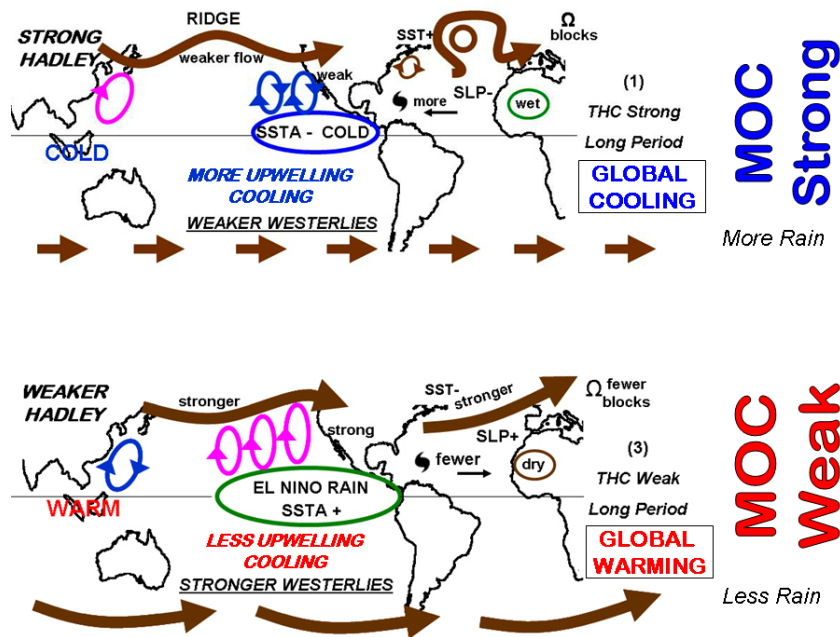


Figure 13. Portrayal of typical circulation differences that occur with a strong or above average global MOC (or THC) – top, and a below average or weak MOC (or THC) – bottom. Note the many global circulation differences, especially for the North Atlantic blocking action, global rainfall, El Nino activity, etc.

GCMs do not yet accurately model the globe's deep-water ocean circulation. Accurately modeling the global ocean's deep circulation is fundamental to any realistic understanding of global temperature change. The multi-decadal global warming periods between 1910-1940 and 1975-1998 and the multi-decadal cooling between 1880-1910, 1945-1975 and 2000-present are hypothesized to be due to Atlantic upper ocean salinity variations (Figures 14 and 15). The longer multi-century warming of the last 150 years is hypothesized to be largely due to the longer period multi-century full global slow-down in the strength of global ocean deep water formation. Both the Atlantic THC and the Antarctic SAS play a role in this multi-century MOC weakening. This long-period combined weakening of the MOC is viewed as being driven by a global upper ocean salinity decrease. CO₂ changes play little role in these global-scale ocean changes. Figure 15 shows the long global warming curve of the last 130 years with the superimposed multi-decadal periods of up-and-down global temperature change which are superimposed on this longer upward warming cycle.

There is no way we can blame most of the last century's global warming of 0.7°C on rises in CO₂. Most of this long-period temperature rise has been caused by natural climate changes of which humans have played no significant role. This long-period warming of ~ 0.7°C is hypothesized to be a result of the long period slow down of the global ocean's **Meridional Overturning Circulation** (MOC) which is driven by natural multi-century variations of upper ocean salinity. The shorter period multi-decadal up-and-down global temperature changes we have experienced during the last 100-150 years are a result of stronger and weaker multi-decadal THC periods driven primarily by Atlantic multi-decadal variations of salinity (Figures 14 and 15).

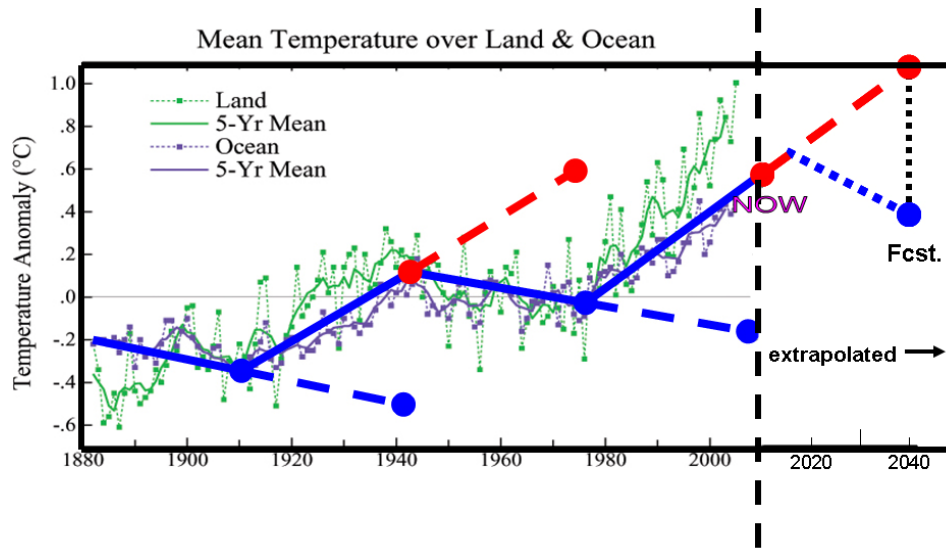


Figure 14. The global surface temperature change is given by the solid blue line; the dotted blue and dotted red lines illustrate how much error one would have made by extrapolating a multi-decadal cooling or warming trend beyond a typical 25-35 year period of warming or cooling. Note the recent 1975-2000 warming trend has not continued, and we are currently in a weak global cooling period that should continue, I believe, until about 2025-2030.

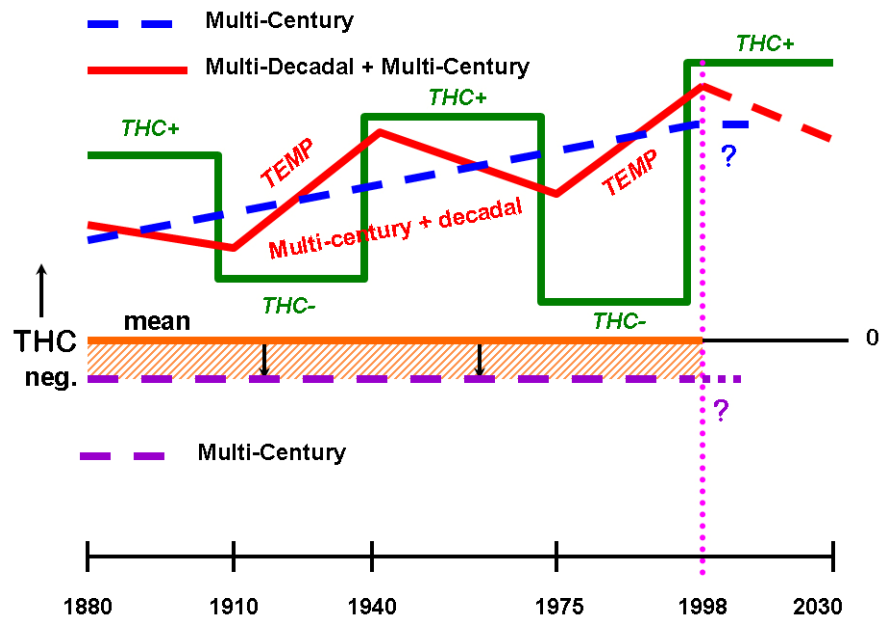


Figure 15. Idealized portrayal of the negative long-term multi-century THC (or MOC) that we have had since the mid-19th century (purple dotted line) due to the last 150 year weakening of the THC due to global multi-century upper-ocean salinity changes. This has caused the last century-and-a-half mean warming of 0.7°C. Superimposed on this salinity driven long-term ocean circulation warming are the multi-decadal warming and cooling periods shown by the up-and-down red line that is influenced by the multi-decadal variation in the salinity-induced strength of the Atlantic Ocean THC (green line). When the Atlantic THC is weak the globe typically undergoes multi-decadal weak warming periods. When the THC is strong the globe typically experiences weak cooling periods.

5. Failure of the Global Climate Models

AGW theory fails because the basic physics behind it is flawed. Its primary scientific justification has come from global climate model simulations which have serious embedded physical assumption errors. These model assumption errors cause their 75-100 year climate forecast simulations to give unrealistically too high global warming results by a factor as much as 10. These GCMs indicate that when CO₂ doubles near the end of this century that the global average surface temperature should increase by about 3°C. All of the 19 global numerical models calculations that were discussed in the latest IPCC-AR4 (2007) report show about the same 3°C global warming for a doubling of CO₂ (Figures 16 and 17). If this magnitude of warming were realistic it would bring about a major disruption in our global climate system and severely impact all life on earth. But it is not physically possible for this magnitude of 3°C global warming to occur as a consequence of the doubling of CO₂ and a resulting blockage of but 3.7 Wm⁻². All the global circulation models have the same major physical flaw which is known as the 'positive water-vapor feedback loop'. The argument goes like this:

1. Models assume that as CO₂ increases to doubling that this causes the atmosphere to warm 1°C in order to send more IR energy to space in order to come into a radiative equilibrium. However, as discussed in section 3, the real warming for a doubling of CO₂ should be only half this amount (~ 0.5°C). These GCM models then incorrectly assume that as the atmospheric temperatures increase approaches 1°C, that the relative humidity (RH) of the atmosphere remains constant. Any warming with constant RH causes the water vapor content of the atmosphere to rise. This extra assumed water vapor increase resulting from this warming then is assumed (incorrectly) to cause a large additional blockage of IR energy to space. This additional IR blockage due to the extra moisture increase is 2-3 times as large as the original IR blockage from the original CO₂ doubling. This is known as the positive water-vapor feedback loop or the needed additional moisture-temperature rise that must occur to keep RH constant while achieving a new radiational equilibrium after CO₂ doubles. This extra water vapor gain is needed to maintain constant RH while CO₂ doubles. This makes it necessary that IR energy flux to space be further decreased by about twice (~ 7.4 Wm⁻²) the amount of the original IR blockage from CO₂ doubling alone. To accomplish all these changes and maintain their numerical climate model in radiation equilibrium they must increase their global temperatures by an additional 2°C beyond the original 1°C warming needed to balance 3.7 Wm⁻².

This strong additional water vapor gain and resulting 2°C temperature increase to obtain radiation equilibrium are not realistic. In fact, our project's observational analysis (Gray and Schwartz, 2010 and 2011) show that in the critical upper tropospheric RH does not go up as temperature rises and rainfall increases. By contrast, we find that upper level water vapor slightly decreases (Table 1) with additional rainfall and temperature rise. This is a result of the mass balancing upper-level subsidence drying from the return flow of the deep penetrating cumulonimbus (Cb) convective updrafts (Figure 8).

This strong positive water vapor feedback loop which the GCMs rely so heavily on for the largest part of their global warming simulations is not strongly positive as they have assumed all these years, but slightly negative. There cannot be an extra global warming which is twice as large as the original amount of warming coming from the doubling of CO₂ by itself (if 1°C) or four times as large a warming if the modelers had used the correct 0.5°C warming – as discussed above. This is the huge conceptual error of the GCM numerical simulations and the primary reason why they have so grossly exaggerated the

global warming that would result from a doubling of CO₂. A number of us have for years been pointing out this massive conceptual error in the GCM simulations. But the modelers take no notice and proceed on with their erroneous GCM simulations and dire future warming predictions.

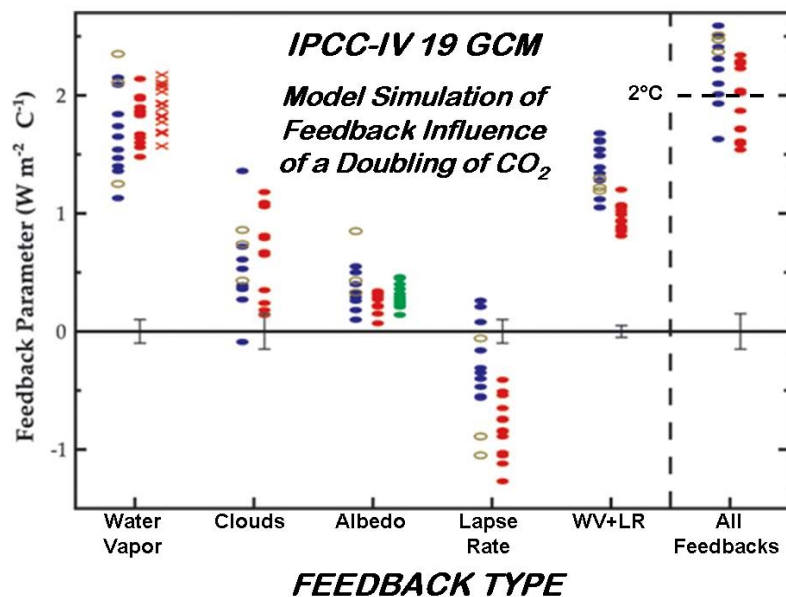


Figure 16. Scatter plot of the extra global feedback energy increases resulting from water vapor, albedo, cloud, and lapse-rate changes due to a doubling of CO₂ from 19 GCMs of the 2007 IPCC-AR4 report. All models give strong positive energy feedbacks equivalent to about 2°C warming.

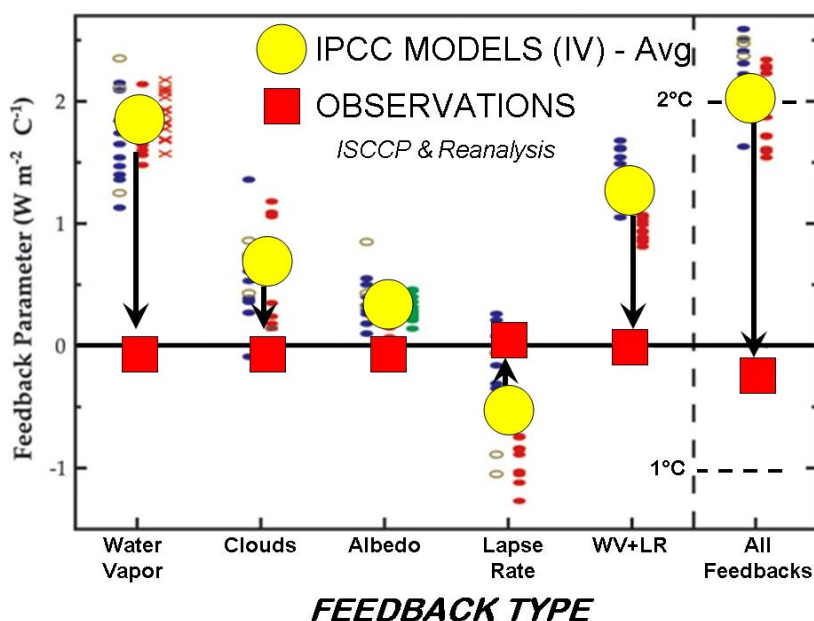


Figure 17. Comparison of the mean GCM feedback magnitudes (yellow circles) vs. what our observations (Gray and Schwartz, 2010 and 2011) imply as to the magnitude of the various feedback processes (red squares).

We envisage the expected 0.5°C warming from a doubling of CO₂ that occurs with enhanced global rainfall to cause a small negative (not positive) feedback of about – 0.2°C, certainly not the positive feedback of 2.0°C that the GCMs indicate. The estimated global temperature change which my colleague (Barry Schwartz) and I project from a doubling of CO₂ near the end of the 21st century is only about 0.3°C, which is only about one-tenth of the global warming projected by nearly all of the recent GCM climate simulations (Figure 18).

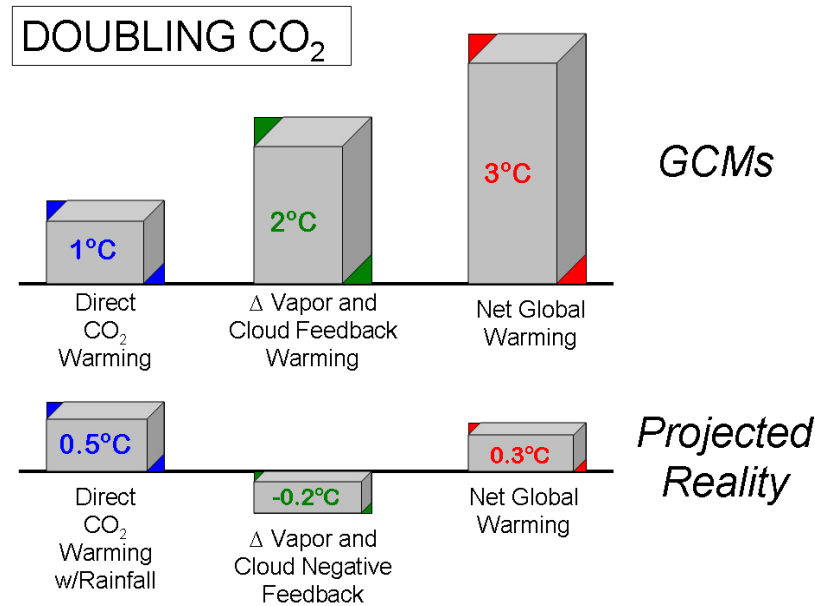


Figure 18. Comparison of the IPCC-AR4 GCMs prediction of global warming vs. the author's estimate of global warming when CO₂ amounts double near the end of the 21st century.

6. Summary of Basic Climate Change Physics

During the last one-to-two thousand years of the Holocene period when the solar influence of the earth's changing orbital parameters have been small, it is hypothesized that the back-and-forth variations of the globe's deep ocean circulation patterns operating on multi-century and multi-decadal time scales can explain most of our globe's prominent surface temperature variations. Solar variations, sunspots, and cosmic ray changes are energy-wise too small and mostly in the noise level to play a significant role in the large energy changes that occur during these important multi-decadal and multi-century temperature changes as shown in Figures 19 and 20. Figure 21 shows idealized differences of typical strengths of Atlantic THC circulation between the 19th and 20th centuries. It is the weaker 20th century MOC which is hypothesized to have brought about the global warming of about 0.7°C during this century. Figure 22 gives evidence of large differences in ocean deep water formation between the 19th and 20th century.

Volcanic influences are present for only a few years and cannot explain the long-period observed multi-decadal and multi-century temperature changes. And CO₂ changes could not have played any significant role in these long multi-century temperature changes of the past.

It is the earth's internal fluctuations which are the most important cause of climate and temperature change. These internal fluctuations are driven primarily by deep multi-decadal and multi-century ocean circulation changes of which naturally varying upper ocean salinity content is hypothesized to be the primary driving mechanism. Salinity controls ocean density at cold temperatures and high latitudes where the potential deep water formation sites of the THC and SAS are located. North Atlantic upper ocean salinity changes are brought about by both multi-decadal and multi-century induced North Atlantic salinity variability. More detailed explanations will be given in forth-coming papers.

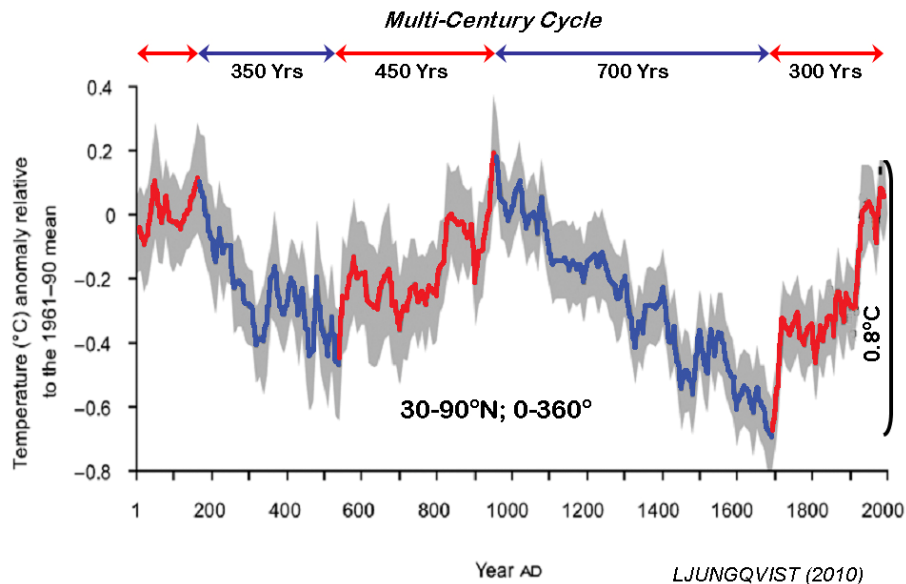


Figure 19. Last two thousand year surface temperatures between 30-90°N constructed from a synthesis of a large variety of observational data sources. Red lines denote long multi-century periods of warming, blue lines denote long multi-century periods of cooling. This figure illustrates the 300 to 700 year-long multi-century temperature changes hypothesized to be caused by the multi-century variation in the full globe ocean's salinity changes on this time scale. The long red warming periods are times when the MOC and global rainfall are weaker than average and the long blue cooling periods are when the MOC and global rainfall are above average.

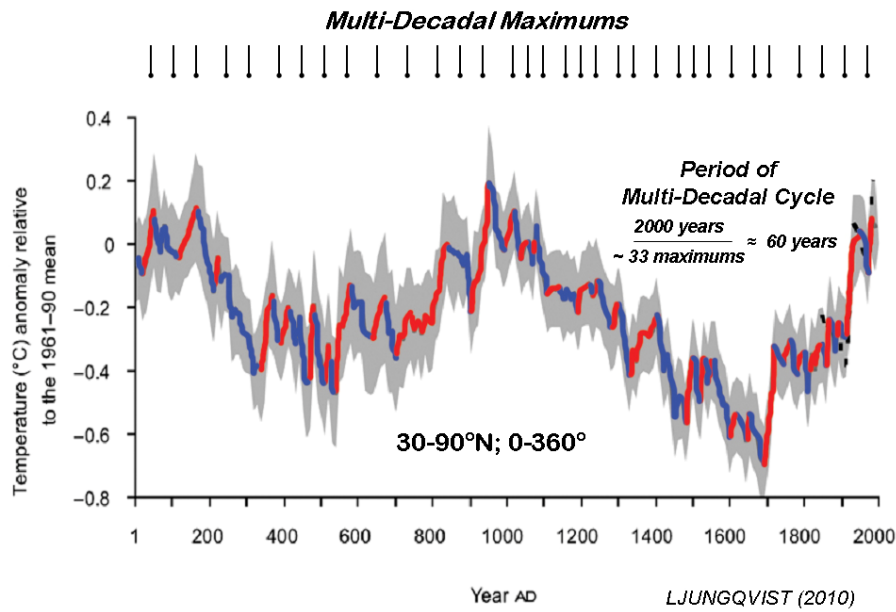


Figure 20. Same as in Figure 19, but emphasizing the multi-decadal variation of surface temperature which have an average period of about 60 years. These multi-decadal changes are hypothesized to be primarily a result of the variations of the Atlantic Thermohaline Circulation (THC) on this time scale. Naturally occurring multi-decadal variations of Atlantic salinity are believed to be the primary cause for these approximate 60-year fluxuations.

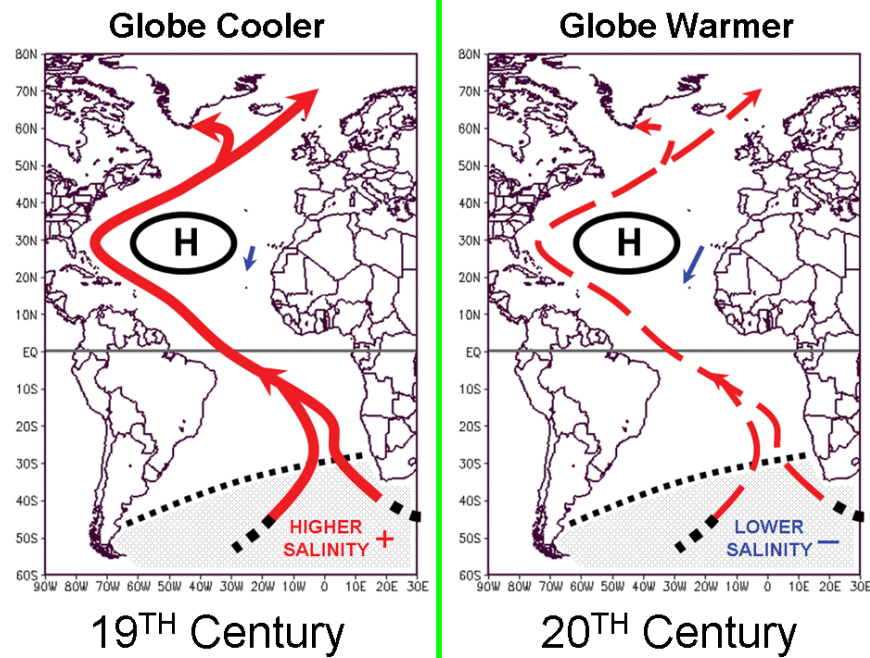


Figure 21. Hypothesized differences in the strength of the Atlantic THC between the 19th and 20th centuries, that has been inferred from various data sources, such as that shown in Figure 22.

A Possible 20th-Century Slowdown of Southern Ocean Deep Water Formation

(Wallace S. Broecker, ¹ Stewart Sutherland, ¹ Tsung-Hung Peng ²)

Chlorofluorocarbon-11 inventories for the deep Southern Ocean appear to confirm physical oceanographic and geochemical studies in the Southern Ocean, which suggest that no more than 5 Sv of ventilated deep water is currently being produced...

...A major reduction in Southern Ocean deep water production during the 20th century (from high rates during the Little Ice Age) is occurring.



**Science 5 November 1999:
Vol. 286. no. 5442, pp. 1132 - 1135**

Figure 22. Summary statement from a paper by Broecker et al. (1999) which indicated a large difference in deep water formation between the 19th and 20th centuries.

7. Negative Consequences of Politics Trumping Climate Science

Until the basic scientific flaws in the AGW theory are recognized and broadly accepted (as they eventually will have to be) it will not be possible for the scientific community and society to put this pernicious and harmful hoax to rest. The wide acceptance of this theory has had a profound negative influence on the US and the world. AGW's basic scientific flaws must be made known as soon as possible so that the public can be made aware as to the fallacy of this hypothesis. This will help reduce the current economic, political, and psychological harm which is occurring around the globe due to AGW's unrealistic warming propaganda and prevent greater harm in future years.

The AGW climate scare of the last 30 years did not come to the forefront from individual scientists beginning to coalesce around the idea that rising levels of CO₂ might pose a serious future climate threat to society. This threat was, by contrast, imposed upon the world from 'above' by the coming together of globally influential politicians, environmentalists, internationalists, etc. who knew little about climate but saw great political opportunities by using the rising CO₂ levels as a scare tactic in order to exercise control over them. People respond best out of fear. But lasting response to fear must have a firm basis in truth. The AGW scare does not.

Had I not spent my whole career (of nearly 60 years) in the meteorology-climate area and knew about AGW only from what I read or heard from the mainstream media, I may have been susceptible to accepting much of the AGW propaganda. This is why so many talented scientists from other fields have been unconsciously sucked into the wide orbit of AGW believers. Very few individuals have the long and broad ranging technical background in meteorology-climate to be able to well understand and attack the basic flaws of the AGW hypothesis. This is why so many of the world's scientific societies and governments have been brainwashed into accepting AGW's erroneous beliefs.

The warnings of President Eisenhower of the capture of overwhelming government support by an elite industrial-military complex are now being realized. But in this more recent version it is our country's global warming – environmental – world government elites who have captured our country's overwhelming government support for AGW funding and society intervention. The just published book by Senator James Inhofe titled "*The Greatest Hoax*" gives much information on the recent political history of the take-over of society by those advocating world government.

I have absolutely no doubt that the AGW hypothesis will become fully discredited within the next decade or so. A doubling of CO₂ near the end of the 21st century should, by itself, only bring about a global warming of about 0.3°C or only about one-tenth of the ~3°C global warming projected by nearly all of the GCM models.

America's economic growth and its confidence in the future will be greatly enhanced when the false dangers of the AGW hypothesis threat have been fully exposed and put behind us. America independence requires that we avoid the controlling tentacles of world government based on an unrealistic fear of human-induced climate degradation. Our Federal Government's current AGW beliefs and its massive funding to promote this agenda should be terminated.

8. References (Partial Listing)

Crichton, M., 2003: *Aliens Cause Global Warming*. California Institute of Technology Lecture. Available on the internet.

Crichton, M., 2004: *State of Fear*. Harper Collins, 579 pp.

Douglass, D.H., Christy, J.R., Pearson, B.D. and Singer, S.F, 2007: A comparison of tropical temperature trends with model predictions. *Int. J. Climatol.*, DOI: 10.1002/joc.1651. DOI: 10.1260/095830509787689277.

Gray, W.M., 2001: Natural versus anthropogenic climate change. Proceedings of the 1st International Conference on Global Warming and The Next Ice Age, Halifax, N.S., Canada (4 pages).

Gray, W. M., 2008: Human-Induced Global Warming: The Great Exaggeration. First Heartland Institute Conference on Climate Change, 73 pp., New York, March 2-4, 2008.

Gray, W. M., 2009: Climate change: Driven by the ocean, not human activity. 2nd Annual Heartland Institute Conference on Climate Change, 22 pp., New York, March 8-10, 2009.

Gray, W. M., 2010: Climate change: Driven by the ocean, not human activity. 4th Annual Heartland Institute Conference on Climate Change, 24 pp., Chicago, May 18-20, 2010.

Gray, W.M., J.D. Sheaffer, and C.W. Landsea, 1997: Climate trends associated with multi-decadal variability of Atlantic hurricane activity, in *Hurricanes. Climate and Socioeconomic Impacts*, edited by H. F. Diaz and R. S. Pulwarty, pp. 15-53, Springer-Verlag, New York.

Gray, W. M. and P. J. Klotzbach, 2011: Have Increases in CO₂ Contributed to the Recent Large Upswing in Atlantic Basin Major Hurricanes since 1995? *Evidence-Based Climate Science*. (pp. 223-249). Elsevier Inc. (ISBN: 9780123859563).

Gray, W. M. and B. Schwartz, 2010: The association of outgoing radiation with variations of precipitation – implications for global warming. Presented at the 29th Conference on Hurricanes and Tropical Meteorology (AMS), Tucson, AZ, May 10-14, 2010.

Gray, W. M. and B. Schwartz, 2011: The association of albedo and OLR radiation with variations of precipitation – implications for AGW. Presented at the 91st meeting of the AMS Conference, Seattle, WA, January 23-27, 2011.

Ljungqvist, F.C., 2010: A new reconstruction of temperature variability in the extra-tropical Northern Hemisphere during the last two millennia. *Geografiska Annaler: Series A*, **92**, 339-351.

Michaels, P.J. and colleagues, 2005: *Shattered Consensus*, Rowman & Littlefield Publishers, Inc., 304 pp.

Michaels, P.J. and R. Balling, Jr., 2000: *The Satanic Gases*, Cato Institute, 224 pp.

Mooney, C., 2007: *Storm World: Hurricanes, Politics, and the Battle Over Global Warming*. Harcourt, 400 pp.

Pilkey, O.H. and L. Pilkey-Jarvis, 2007: *Useless Arithmetic: Why Environmental Scientists Can't Predict the Future*. Columbia University Press, 248 pp.

Schiffer, R.A., and Rossow, W.B., 1985: ISCCP (International Satellite Cloud Climatology Project) Global Radiance Data Set: A New Resource for Climate Research. *Bull. Amer. Meteor. Soc.*, **66**, 1498-1505.

Singer, F., 1997: *Hot Talk Cold Science*. The Independent Institute, Oakland, CA. 207 pp.

Singer, F. and D.T. Avery, 2007: *Unstoppable Global Warming – Every 1500 Years*, Rowman and Littlefield, 264 pp.

Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.), 2007: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. 996 pp.

Weart, S.R., 2003: *The Discovery of Global Warming*, Harvard University Press, 228 pp.