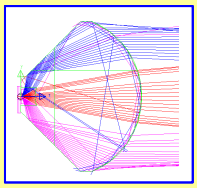

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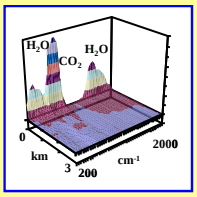

The 'Equilibrium' Climate Modeling Fraud

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Key Points

- Climate modeling based on radiative forcings, feedbacks and climate sensitivity in an equilibrium average climate is pseudoscientific nonsense.
- This scientific fraud was established between 1967 and 1981 by four key papers, two by Manabe and Wetherald (MW67 and MW75) and two by Hansen et al (H76 and H81).
- There are nine fundamental scientific errors in H81.
- The basic 'equilibrium' climate modeling approach is that a time series of contrived radiative forcings can be used to simulate a 'global mean temperature record' (H81, fig.5).
- Later, starting with the IPCC Third Assessment Report in 2001, these forcings were divided into 'natural' and 'anthropogenic' forcings. This was then used to create the illusion that the warming found in the global mean temperature record was human caused.
- This 'human caused' warming was then used to make fraudulent claims that there was an increase in the frequency and intensity of 'extreme weather events'.
- This became the foundation of the 'net zero' insanity and the 1.5 or 2 °C limit in the Paris climate Accord.
- In the real world, the warming found in the global mean temperature record is produced by a combination of natural ocean warming, particularly the Atlantic Multi-decadal Oscillation (AMO), urban heat island effects and various other adjustments (homogenization) used to modify the raw weather station data.
- An infrared radiative forcing or decrease in the longwave IR (LWIR) flux emitted at the top of the atmosphere produced by an increase in atmospheric greenhouse gas concentration does not change the energy balance of the earth, nor does it produce a measurable change in the surface temperature.
- Since there is no equilibrium, the radiative transfer analysis used to calculate the LWIR radiative forcing has to be extended to include the rates of cooling.
- The total LWIR cooling rate in the troposphere at low and mid latitudes is -2 to -2.5 °C per day.
- A doubling of the CO_2 concentration from 280 to 560 parts per million (ppm) produces a decrease in this cooling rate or a slight warming of up to +0.08 °C per day.
- At a lapse rate (change in temperature with altitude) of -6.5 °C per kilometer, a change in temperature of +0.08 °C is produced by a decrease in altitude of 12 meters. This is equivalent to riding an elevator down four floors.
- Any slight heating of the troposphere is dissipated by wideband LWIR emission to space.
- Over the oceans, the penetration depth of the LWIR into the surface is less than 100 micron (0.004 inches). Here it is fully coupled to the wind driven evaporation or latent heat flux.
- The small increase downward LWIR flux from the lower troposphere to the surface produced by a greenhouse gas forcing cannot produce a measurable increase in ocean temperature.
- Over land, the small increase downward LWIR flux from the lower troposphere to the surface produced by a greenhouse gas forcing cannot produce a measurable increase in surface temperature. such changes are overwhelmed by the normal diurnal and seasonal temperature variations.
- The scientific fraud has been exploited as a lucrative alternative source of funding by government agencies such as NOAA, NASA and DOE. Congress has failed to control 'mission creep' at these agencies.
- The scientific fraud has also been exploited by environmental and political groups to further their own interests and restrict the use of fossil fueled combustion.
- It is time to dismantle this massive fraud

Summary

Eisenhower's warning about the corruption of science by government funding has come true. Climate science has been thoroughly corrupted by a tidal wave of government largesse. There are three parts to this climate fraud. First, climate energy transfer was oversimplified using the equilibrium climate assumption. This created global warming as a mathematical artifact when the CO_2 concentration was increased in the early 'steady state air column' climate models. Later, the coupled GCM atmosphere-ocean models were simply 'tuned' to match a global mean temperature record. Second, there was 'mission creep'. As funding was reduced for NASA space exploration and US Department of Energy (DOE) nuclear programs, climate modeling became an alternative source of revenue. The simplified climate models were accepted without question. Third, there was a deliberate decision by various outside interests, including environmentalists and politicians to exploit the fictional climate apocalypse to further their own causes. The climate models used to perpetuate the climate fraud are no longer based on science. They are political models based on the pseudoscience of radiative forcings, feedbacks and climate sensitivity that are 'tuned' to meet political goals. The climate modelers are paid to provide the climate lies and propaganda needed to justify public policy that restricts the use of fossil fuels. Climate science has degenerated beyond dogma into the Imperial Cult of the Global Warming Apocalypse.

Starting in the nineteenth century, the energy transfer processes that determine the surface temperature were oversimplified using the equilibrium climate assumption. The time dependence of the energy transfer processes that determine the surface temperature was eliminated and it was assumed that changes in the atmospheric concentration of carbon dioxide could cycle the earth through an Ice Age. The first climate model was the equilibrium or steady state air column described by Arrhenius in 1896. This was just a uniform volume of air illuminated by a 24 hour average solar flux with a partially reflective blackbody surface that had zero heat capacity. When the CO_2 concentration was increased, such a model created global warming as a mathematical artifact produced by the oversimplified modeling assumptions. Over time, the original speculation by Tyndall in the early 1860s that changes in the atmospheric concentration of CO_2 could cycle the earth through an Ice Age was transformed into concerns that fossil fuel combustion could cause global warming. This became scientific dogma.

The climate modeling fraud was established between 1967 and 1981 by four key papers, two by Manabe and Wetherald (M&W) at NOAA in 1967 (MW67) and 1975 (MW75) and two by Hansen's group at NASA Goddard in 1976 (H76) and 1981 (H81). When M&W developed the first generally accepted computer climate model in 1967, they used a modified equilibrium air column. A 9 or 18 layer radiative transfer model with a fixed relative humidity distribution was added to the Arrhenius model. This created a 'water vapor feedback' that amplified the original CO_2 induced warming artifact. This type of model is known as a one dimensional radiative convective (1-D RC) model. M&W then spent the next 8 years building their 1967 model artifacts into each unit cell of a 'highly simplified' global circulation model (MW75). Physical reality was abandoned in favor of mathematical simplicity. M&W built an equilibrium climate fantasy land and remained there.

Mission creep now started as resources were reduced for NASA space programs and later DOE nuclear programs. (The Atomic Energy Commission was merged into DOE in 1977). The climate modelers at NASA started out by studying radiative transfer in planetary atmospheres, mainly Mars and Venus. On both planets, the atmospheric composition is approximately 95% CO_2. The modelers then began to expand their work and analyze the earth's climate [Hansen, 2000]. They failed to conduct any model validation or 'due diligence' and blindly accepted the 1-D RC equilibrium air column model and the CO_2 warming dogma. They just wanted funding to continue their work on atmospheric energy transfer. They entered the equilibrium climate fantasy land created by M&W and never left. In 1976, a group from NASA Goddard that included Hansen extended the MW67 model to include additional 'minor species' including N_2O, CH_4, NH_3, HNO_3, C_2H_4, SO_2, CCl_2F_2, CCl_3F, CH_3Cl and CCl_4 (H76). The foundation of the climate modeling fraud was completed with the publication of H81. This added a slab ocean model, the CO_2 doubling ritual and the calculation of the global temperature record using a contrived set of 'radiative forcings' to the 1-D RC model. H81 created the prototype political climate model. The complexities of the earth's climate were reduced to the single time series of numbers in the global average temperature record and the climate model used a contrived set of pseudoscientific radiative forcings to match these numbers. There are 9 fundamental scientific errors or groups of errors in H81. Later, starting with the Third IPCC Climate Assessment Report (TAR, 2001), the 'anthropogenic' forcings were separated from the 'natural' forcings and used as a political tool to control the energy supply by claiming an anthropogenic cause for 'extreme weather events'. This provided the foundation for the net zero insanity that we have today. The two key papers that established the anthropogenic forcings were Stott et al, 2001 and Tett et al, 2000. Most of the work was performed at the UK Hadley Center.

When the atmospheric concentration of CO_2 is increased, radiative transfer calculations show that there is a small decrease in the long wave IR (LWIR) emitted to space at the top of the atmosphere (TOA) within the spectral region of the CO_2 bands. However, the atmospheric LWIR flux at TOA is a cumulative cooling flux that is emitted from many different levels in the atmosphere at different temperatures. The upward emission from each level is modified by the absorption and emission of the levels above. The upward and downward LWIR fluxes are not equivalent because of molecular line broadening. In order to understand the atmospheric heating effects, the radiative transfer calculation has to be extended to include the change in the rate of cooling at each level in the model. At low and mid latitudes, the rate of cooling for the total LWIR flux in the troposphere is -2.0 to -2.5 °C per day. A doubling of the CO_2 concentration produces a decrease in this cooling rate or a slight warming of up to +0.08 C per day. For a tropospheric lapse rate (decrease in temperature with altitude) of -6.5 °C per kilometer, a change in temperature of +0.08 °C is produced by a decrease in altitude of 12 meters. This is equivalent to riding an elevator down four floors. The small amount of heat released into the troposphere by a CO_2 doubling is simply reradiated to space by wideband LWIR emission. There is no change to the energy balance of the earth and no measurable increase in surface temperature.

In addition to the small decrease in LWIR flux at TOA produced by a CO_2 doubling, there is also a similar small increase in the downward LWIR flux emitted to the surface from the lower troposphere. Over the oceans, the penetration depth of the LWIR flux into the surface is less than 100 micron (0.004 inches). Here it is fully coupled to the much larger and more variable wind driven evaporation or latent heat flux. Any change in ocean temperature produced by the LWIR flux from a CO_2 doubling is too small to measure. Over land, all of the flux terms are absorbed by a thin surface layer. Almost all of the absorbed solar flux is dissipated by a combination of net LWIR emission and moist convection within the same diurnal cycle that it is absorbed. The surface temperature is reset each day by the local weather system passing through. Any temperature increase produced by the additional LWIR flux from an increase in CO_2 concentration is too small to measure in the normal daily and seasonal surface temperature variations.

Instead of conducting any thermal engineering analysis of the effect of small CO_2 induced changes in the atmospheric LWIR flux on the surface temperature, the climate modelers chose to remain in the equilibrium climate fantasy land created by the early climate models. It was assumed that the initial decrease in LWIR flux at TOA produced by an increase in atmospheric greenhouse gas concentration changed the energy balance of the earth. The surface temperature then adjusted by warming to a new equilibrium temperature that restored the LWIR flux at TOA. A change in flux at TOA was called a radiative forcing. The climate models were 'tuned' using a contrived set of forcing agents that also included aerosols of different kinds so that the model output appeared to match a 'global mean temperature record'. Various 'feedbacks' were used to alter the temperature response produced by the forcings. The climate models were compared to each other by calculating the temperature rise produced by a hypothetical doubling of the atmospheric CO_2 concentration. This was called the climate sensitivity. The whole construct of forcings, feedbacks and climate sensitivity is pseudoscientific nonsense.

When the global mean temperature record is examined, the dominant signal is the Atlantic Multi-decadal Oscillation (AMO) superimposed on a linear temperature rise related to the recovery from the Little Ice Age or Maunder Minimum. Later warming also includes urban heat island effects, changes to the urban/rural mix of the weather stations used to calculate the global average and a wide range of adjustments called 'homogenization'. There can be no CO_2 signal in the global mean temperature record. During the 1970s, there was a global cooling scare related to the cooling phase of the AMO. This changed to the current warming scare in the mid 1980s when the next warming phase of the AMO could be detected in the temperature record.

The United Nations Intergovernmental Panel on Climate Change (UN IPCC) was established in 1988 and the US Global Change Research Program (USGCRP) was established by Congress in 1990. In the UK, Margaret Thatcher used climate change to enhance her political career and the Hadley Climate Center was established in 1990 to provide the climate propaganda that she needed. In the US, Al Gore became a leading proponent of the climate fraud. This led to increased government funding for climate modeling and climate science degenerated past dogma into the Imperial Cult of the Global Warming Apocalypse. Irrational belief in the warming created by the climate models became a prerequisite for research funding.

Starting in 2000, in time for the Third IPCC Climate Assessment, the contrived set of radiative forcings used to create the global mean temperature record was divided into 'natural' and 'anthropogenic' forcings. The climate models were rerun with the separate sets of forcings to create the illusion that the warming in the global mean temperature record was 'human caused'. This allowed every imaginable form of 'extreme weather event' to be 'attributed' to 'anthropogenic warming'. Instead of King Canute trying to stop the rising tide, the natural baseline created by the pseudoscientific radiative forcing argument may compared to using the climate models to try and stop the ocean waves and create a flat ocean without the gyre circulation.

The extreme weather attribution trick has conveniently ignored a major heat source in the lower troposphere - air compression. Downslope winds and the air circulation inside high pressure domes produce local air heating over several days or less. As the winds dry out the vegetation, any ignition source can start a brush fire. In addition, the maximum surface temperature in the equatorial ocean warm pools stays near 30 ℃. If surface temperatures start to increase above this, strong local thunderstorms form that remove the excess heat. The temperature changes produced for example by the El Niño Southern Oscillation (ENSO) are changes to the location and extent of the warm pool, not an increase in the maximum ocean temperature.

The use of a set of pseudoscientific radiative forcings to create the illusion that the 'equilibrium' climate models can simulate the global mean temperature record has been used to establish the fictional 1.5 to 2.0 ℃ temperature limit incorporated into the Paris Climate Accord. It has also provided the foundation for the insane Net Zero energy policy. It is time to shut down the climate models, dismantle this massive climate fraud and begin the 'clawback' process to recover the taxpayer funds that have been wasted - for over 30 years.

Roy Clark is coauthor of the book 'Finding Simplicity in a Complex World – the Role of the Diurnal Temperature Cycle in Climate Energy Transfer and Climate Change'. This provides a more detailed description of the climate energy transfer processes that determine the surface temperature. Further information about the book is available at:

https://clarkrorschpublication.com/index.html

More detailed discussions of various aspects of the climate fraud may be downloaded using the links:

https://venturaphotonics.com/files/VPCP_017.1_Hansen81.pdf
https://venturaphotonics.com/files/VPCP_024.1_FollowtheYellowBrickRoad.pdf
https://venturaphotonics.com/files/VPCP_025.1_GreenhouseGasForcings.pdf
https://venturaphotonics.com/files/VPCP_026.1_TheCorruptionofClimateScience.pdf

Technical Background

The climate models in use today are still based on the assumption of an equilibrium climate that can be perturbed by a 'radiative forcing' or change in flux emitted to space at the top of the atmosphere (TOA) [IPCC, AR6, WG1 Chap. 7, 2021, Knutti and Hegerl, 2008]. This hypothetical climate is then supposed to 'adjust' to a new 'climate state' with a different surface temperature that restores the energy balance at TOA. Radiative forcing is based on an incorrect application of the First Law of Thermodynamics, conservation of energy. There is no 'magic thermostat' at the top of the atmosphere that controls the surface temperature.

The earth is an isolated planet that is heated by shortwave electromagnetic radiation from the sun and cooled by the emission of longwave IR (LWIR) radiation back to space. It is also a rotating water planet with an axis tilted near 23° to the orbital plane and an atmosphere that has an IR radiation field. The earth's climate has been sufficiently stable over several billion years to allow the evolution of life on earth to reach its present state. The basic requirement for stability comes from the Second Law of Thermodynamics, not the First. There has to be a thermal and/or humidity gradient at the air-surface interface so that the surface dissipates the absorbed solar flux and maintains the surface temperature within the relatively narrow bounds needed to sustain life.

The surface is heated by the absorbed solar flux and cooled by a combination of net LWIR emission, and moist convection (evapotranspiration). Over the oceans, heat may be redistributed over long distances by ocean currents. The convection is coupled to both the gravitational field and the rotation (angular momentum) of the earth. As the warm air rises through the troposphere, it cools as it expands and internal energy is converted to gravitational potential energy. For dry air, the lapse rate, or change in temperature with altitude, is -9.8 K km^{-1}. As moist air rises above the saturation level, water condenses to form clouds with the release of latent heat. This reduces the lapse rate. The US standard atmosphere uses an average lapse rate of -6.5 K km^{-1}. The coupling of the convection to the rotation leads to the formation of the Hadley, Ferrel and polar cell convective structure, the trade winds, the mid latitude cyclones/anticyclones and the ocean gyre circulation [Clark and Rörsch, 2023] (CR23).

A change in surface temperature is produced by a change in the heat content or enthalpy of the surface reservoir or thin layer of ocean or land at the surface-air interface. There are four main, time dependent, interactive flux terms that are coupled to this reservoir. These are the absorbed solar flux, the net LWIR emission, the moist convection and the subsurface transport. The downward LWIR from the lower troposphere interacts with the upward LWIR flux from the surface to produce a partial LWIR exchange energy. The net LWIR cooling flux that can be emitted by the surface is simply the difference between the upward and downward LWIR fluxes. In order to dissipate the absorbed solar flux, the surface warms up until the excess heat is removed by evapotranspiration. The energy transfer processes are different at the land-air and ocean-air interfaces and have to be considered separately.

Over land, all of the flux terms are absorbed by a thin surface layer. The surface temperature increases as the solar flux is absorbed. This establishes a thermal gradient with both the cooler air above and the subsurface ground layers below. The surface-air gradient drives the evapotranspiration and the subsurface gradient conducts heat below the surface during the first part of the day after sunrise. Later in the day, as the surface cools, the subsurface gradient reverses and the stored heat is returned to the surface. As the land and air temperatures equalize in the evening, the convection stops and the surface cools more slowly by net LWIR emission. This convection transition temperature is reset each day by the local weather system passing through. Almost all of the absorbed solar heat is dissipated within the same diurnal cycle.

The surface or skin temperature is the temperature at the surface-air interface. The weather station temperature or meteorological surface air temperature (MSAT) is the temperature measured by a thermometer installed in a ventilated enclosure located for convenience near eye level, 1.5 to 2 m above the ground [Oke, 2016]. Historically in the US, the daily minimum and maximum MSATs were recorded using Six's thermometer mounted in a white painted wooden enclosure (Stevenson screen or cotton region shelter). It is now recorded electronically using a smaller 'beehive' enclosure. The min and max MSATs are produced by different physical processes. The minimum MSAT is usually a measure of the surface air temperature of the local weather system passing through. The change in temperature or ΔT from min to max is determined by the mixing of the warm air rising from the solar heated surface with the cooler air at the level of the MSAT thermometer. The min and max readings are often averaged to give an 'average daily temperature'. This has little physical meaning.

Over the oceans, the surface is almost transparent to the solar flux. The diurnal temperature rise is small and the bulk ocean temperature increases until the water vapor pressure at the surface is sufficient for the excess absorbed solar heat to be removed by wind driven evaporation. Outside of the tropics there is a seasonal time delay or phase shift between the peak solar flux at solstice and the surface temperature response that may reach 6 to 8 weeks. In addition, there is no requirement for an exact flux balance between the solar heating and the surface cooling terms. This leads to natural variations or quasi-periodic oscillations in ocean surface temperatures. The temperature changes related to both the seasonal phase shifts and the ocean oscillations are coupled to the land surface temperatures through the changes in the diurnal transition temperature determined by weather systems that form over the oceans and then move over land.

The troposphere functions as an open cycle heat engine that transports part of the absorbed solar heat from the surface to the middle and upper troposphere by moist convection. From here it is radiated back to space, mainly by LWIR emission from the water bands. This emission is determined mainly by the local air temperature with a broad peak centered near 260 K (-13 °C). If the surface temperature increases, the water band emission shifts to a higher altitude and more heat is stored as gravitational potential energy. This heat engine has some unusual properties. The heat source is the solar flux that is changing on both a daily and a seasonal time scale. The solar heat is stored by the surface layer over land and especially by the oceans. It is released over a wide range of time scales. There are characteristic diurnal and seasonal time delays or phase shifts between

the peak solar flux and the temperature response. The heat engine operates at low temperatures and pressures. This means that the LWIR flux has to be calculated using high resolution radiative transfer techniques. A simple blackbody description is inadequate. Convection is also a mass transport process that is coupled to both the gravitational field and the rotation (angular momentum) of the earth. The energy transfer processes associated with the surface energy transfer and the tropospheric heat engine are shown schematically in Figure T1 (CR23).

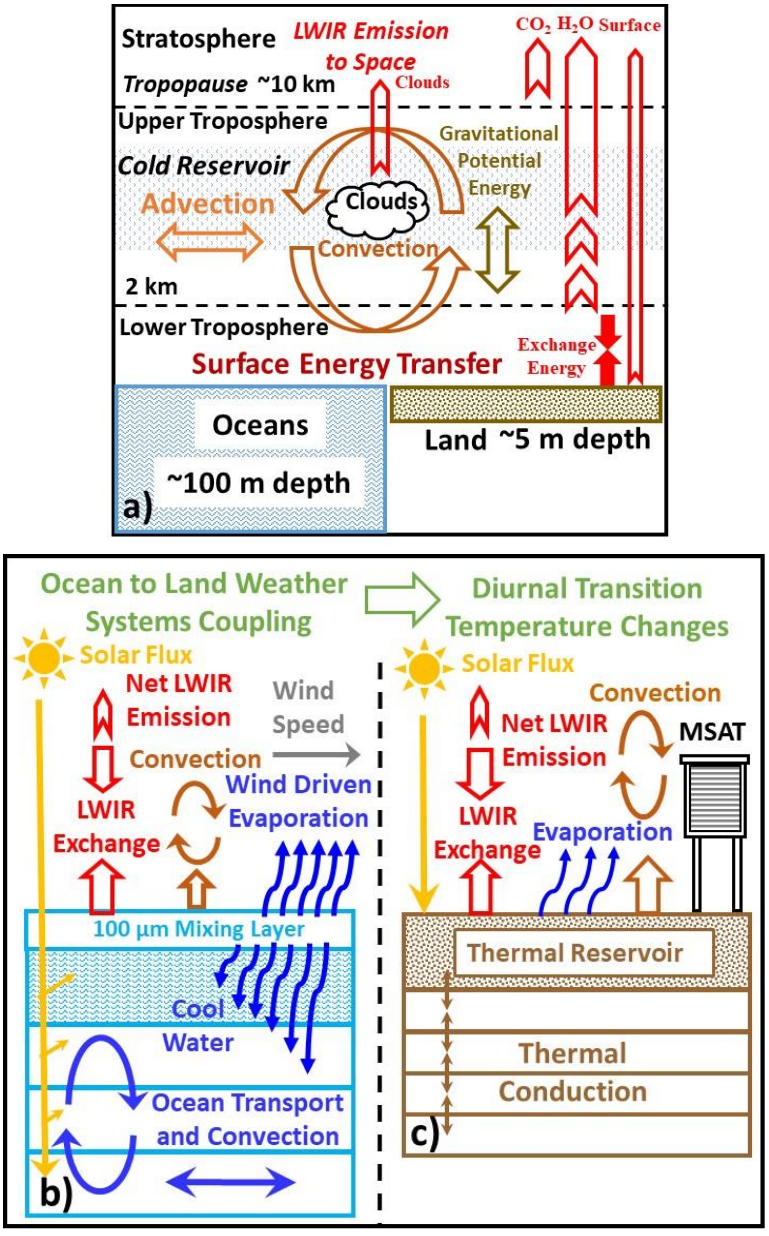


Figure T1: Basic climate energy transfer processes for the earth, a) atmospheric energy transfer showing the tropospheric heat engine, b) ocean energy transfer and c) land energy transfer (schematic).

The Equilibrium Average Climate and the Steady State Air Column Model

The energy transfer processes that determine the surface temperature were oversimplified starting in the nineteenth century. The equilibrium climate assumption was first introduced by Pouillet [1836]. Speculation that changes in the atmospheric concentration of CO_2 could cycle the earth through an Ice Age started with Tyndall [1861, 1863]. The first equilibrium air column model was introduced by Arrhenius [1896]. This had a fixed average solar flux, a partially reflective blackbody surface with zero heat capacity and single air volume at a uniform temperature. Other energy transfer processes such as advection were assumed to be constant. When the CO_2 concentration was increased, there was an initial decrease in the LWIR flux emitted at the top of the model atmosphere (TOMA). The equilibrium constraint then requires that the surface temperature increase until the flux balance is restored at TOMA. This temperature increase is a mathematical artifact of the simplifications used in the model (see Section 2.0 below).

Starting in the early 1960s, it was decided that the rather primitive global circulation models (GCMs) used for weather forecasting at that time could be modified using the equilibrium climate assumption and radiative transfer calculations to predict 'climate'. The first step was the development of a one dimensional model that could calculate a temperature profile of the atmosphere for incorporation into a GCM. The early work is described in two papers, Manabe and Moller [1961] and Manabe and Strickler [1964]. The first generally accepted climate model was the one dimensional radiative convective (1-D RC) model developed by Manabe and Wetherald (M&W) [1967], (MW67). They added a 9 or 18 layer radiative transfer model to the Arrhenius air column. They also added a fixed relative humidity distribution. This created a 'water vapor feedback' that amplified the initial warming artifact produced when the CO_2 concentration was increased. At the time, such a warming was expected from the equilibrium assumption and this result was accepted without question (see Section 3.0 below). M&W went on to spend the next seven years building a 'highly simplified' global circulation climate model in which the mathematical artifacts created by the MW67 model were incorporated into each unit cell of the larger GCM (see Section 4.0 below).

Funding was significantly reduced at NASA as the Apollo (moon landing) program ended in 1972. Researchers studying planetary atmosphere began to switch to earth studies [Hansen, 2000]. The atmospheric composition of Venus and Mars is approximately 95% CO_2 with clouds and dust, so their experience was limited to atmospheric radiative transfer and aerosol scattering. To get started with their 'earth studies' they copied the MW67 model and added more species to the model (see Section 5 below) [Wang et al, 1976 (H76)]. The melodramatic 'greenhouse warmings' that they calculated were mathematical artifacts created by the 1-D RC model that they used. The authors were mathematicians and computer programmers in search of continued funding. They were not scientists and they never investigated the validity of the assumptions used in their model. A paycheck was more important. There are two fundamental errors in the 1-D RC approach. First, the equilibrium assumption is incorrect. Second, the surface is just the lower mathematical boundary to the radiative transfer model. The surface energy transfer is ignored. These errors will now be considered in more detail.

Radiative Transfer in a Non-Equilibrium Atmosphere

Once the temperature and species concentration profiles are specified for a radiative transfer calculation, the properties of the IR radiation field can be determined quite accurately. However, this only provides a 'snapshot' of the IR flux for the conditions specified in the calculation. In the 1-D RC modeling approach, the radiative transfer calculation is incorporated into a step integration or 'time marching' procedure. In MW67, the rates of heating and cooling by CO_2, H_2O and ozone (O_3) were calculated for a 9 or 18 air layer model. These cooling rates were then applied to each layer for the duration of the time step in the model. This is not specified in MW67, but in an earlier model [Manabe and Strickler, 1964], it was 8 hours. At the end of the time step, a new set of cooling rates is calculated. In addition, the absolute water vapor concentration is adjusted to match the relative humidity at the new temperature. In the MW67 model this creates a 'water vapor feedback' that amplifies the initial temperature rise produced by an increase in CO_2 concentration. In addition, if the magnitude of the lapse rate exceeds 6.5 K, a convective adjustment is made to lower the temperature change. This process is repeated until a steady state condition is reached. The MW67 model may take over a year of incremental model steps (step time multiplied by the number of steps) to reach a steady state. M&W never explained how these steady state temperatures are related to a non-equilibrium atmosphere with both a daily and a seasonal temperature cycle. In particular, for a doubling of the CO_2 concentration from approximately 300 to 600 ppm, at low to mid latitudes, the maximum daily change in tropospheric temperature is +0.08 C [Iacono et al, 2008; Ackerman, 1979]. This is dissipated each day in the diurnal temperature cycle and cannot accumulate over time. As discussed below, molecular line broadening means that almost all of the downward LWIR flux from the lower troposphere to the surface is emitted from within the lowest 2 km layer of the troposphere and half is emitted from within the first 100 m layer (see Figure T4). In addition, there is no reason to expect a fixed relative humidity distribution near the surface over the diurnal temperature cycle. There are also significant short term temperature variations related to boundary layer turbulence (see Figure T7). The 'time marching' procedure used by M&W is illustrated in Figure T2. Physical reality has been abandoned in favor of mathematical simplicity. There is no equilibrium climate that can be perturbed by CO_2 or other greenhouse gases.

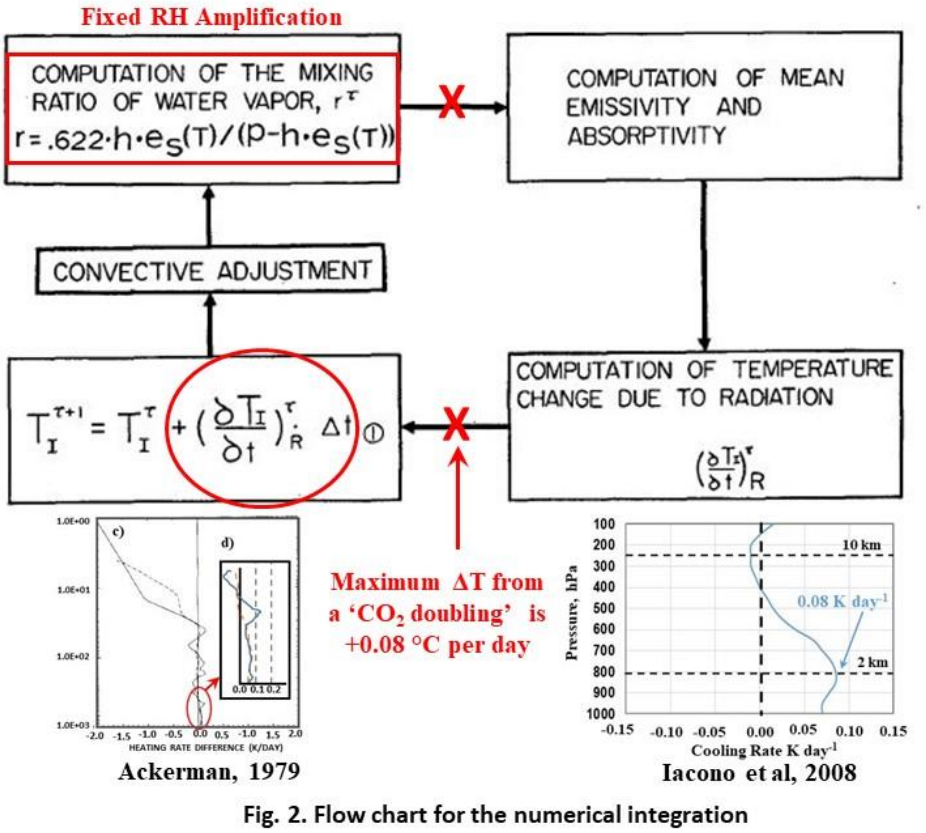


Fig. 2. Flow chart for the numerical integration

Figure T2: The 'time marching' computation used by Manabe and Wetherald (adapted from MW67, Figure 2). The temperature change for a 'CO_2 doubling' produced in the time step is too small to detect in the normal daily and seasonal temperature variations. M&W allowed these small step by step temperature changes to accumulate and be amplified by the imposed fixed relative humidity distribution.

In order to understand the atmospheric heating effects of a 'CO_2 doubling' or other increase in greenhouse concentration, the LWIR flux has to be interpreted as a cooling flux. At each level in the radiative transfer model, the net LWIR flux has to be divided by the local heat capacity to give the rate of cooling (CR23). In addition, the LWIR flux consists of a very large number of overlapping lines. Each line is produced by a transition between two rotation-vibration states of an IR active molecule. The line positions and line strengths for H_2O, CO_2, O_3, N_2O and CH_4 are illustrated in Figure T3 [Wijngaarden and Happer, 2022]. The CO_2 bands of interest are circled in red. These lines are broadened by molecular collisions and are wider at lower altitudes. This decouples the upward and downward flux, so the decrease in LWIR flux at TOA does not reach the surface. Almost all of the downward LWIR flux reaching the surface originates from within the first 2 km layer of the troposphere and approximately half of this is from the first 100 m layer above the surface. This is illustrated in Figure T4 CR23 [Clark, 2013]. In addition to the small decrease in LWIR flux at TOA, an increase in greenhouse gas concentration produces a similar increase in LWIR flux from the lower troposphere to the surface. Here it is fully coupled to the turbulent convective boundary layer and any changes in temperature produced are too small to measure.

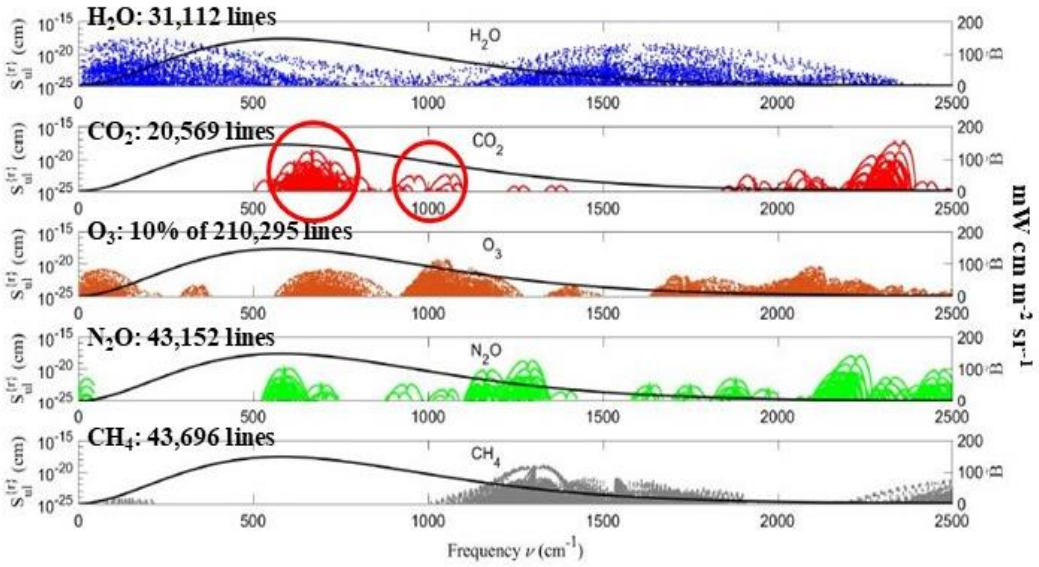


Figure T3: HITRAN linestrengths at 296 K for H_2O, CO_2, O_3, N_2O and O_3 plotted vs. wavenumber from 0 to 2500 cm^{-1}. The smooth black line is the blackbody emission at 296 K. The number of lines plotted are indicated for each species. Because of the large number of lines, only 10% of the O_3 lines, selected randomly, are plotted. The main atmospheric absorption bands of interest for CO_2 are circled in red.

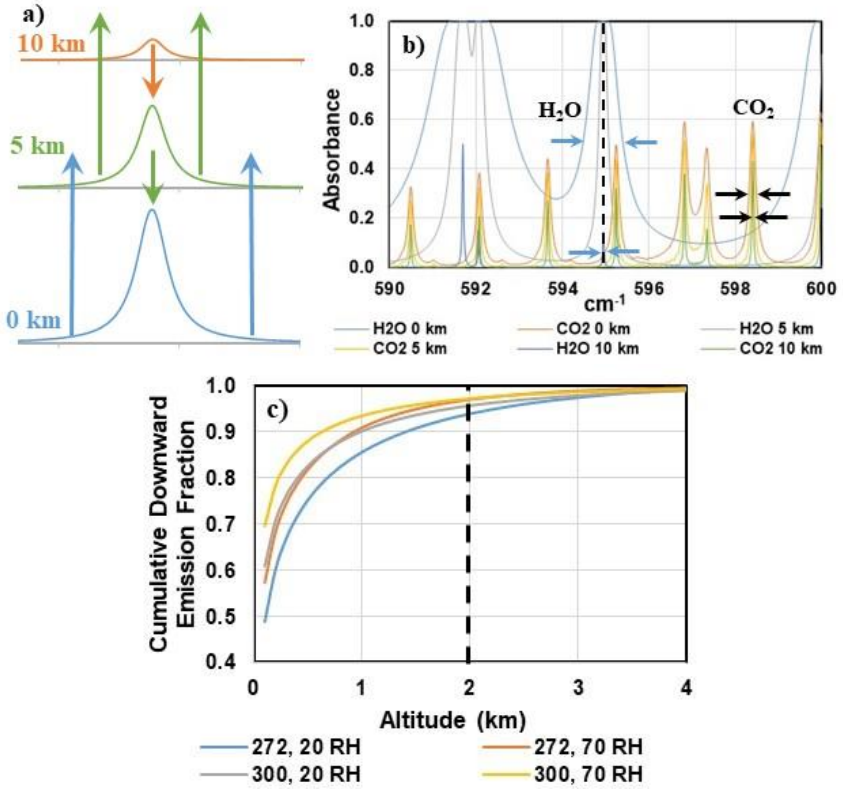


Figure T4: a) Transition from absorption-emission to free photon flux as the linewidth decreases with altitude. Single H_2O line near 231 cm^{-1}. b) Linewidths for H_2O and CO_2 lines in the 590 to 600 cm^{-1} spectral region for altitudes of 0, 5 and 10 km. c) Cumulative fraction of the downward flux at the surface vs. altitude for surface temperatures of 272 and 300 K, each with 20 and 70% relative humidity (RH). Almost all of the downward flux reaching the surface originates from within the first 2 km layer. This is the location of the lower tropospheric reservoir.

Since 1800, the atmospheric concentration of CO_2 has increased by approximately 140 parts per million (ppm), from 280 to 420 ppm. This is illustrated in Figure T5a [Keeling, 2023]. This has produced a decrease near 2 W m^{-2} in the longwave IR (LWIR) flux emitted to space at TOA within the spectral range of the CO_2 emission bands. There has also been a similar increase in the downward LWIR flux from the lower troposphere to the surface. The changes in both the upward flux at TOA and the downward LWIR flux to the surface as the CO_2 concentration is increased are shown in Figure T5b [Harde, 2017]. For a hypothetical 'CO_2 doubling' from 280 to 560 ppm, the decrease in outgoing longwave radiation (OLR) is estimated to be 3.7 W m^{-2} [IPCC, 2013], with a similar increase in downward LWIR flux from the lower troposphere to the surface. At present, the average annual increase in CO_2 concentration is near 2.4 ppm per year. This produces an increase in the downward LWIR flux to the surface of approximately 0.034 W m^{-2} per year.

Figure T6a shows the spectrally resolved LWIR emission to space for 0, 400 and 800 ppm CO_2 concentrations. The CO_2 emission band is shown on an enlarged scale in Figure T6b. The difference between the 800 and 400 ppm emission is shown in Figure T6c [Wijngaarden and Happer, 2022]. This illustrates the 'instantaneous' radiative forcing for a CO_2 doubling [IPCC, 2021, Chapter 7]. The IPCC uses a doubling from 280 to 560 ppm. Figure T6d shows the total and band-averaged IR cooling rate profiles for the tropical model atmosphere on a log-pressure scale [Feldman et al, 2008]. The total LWIR cooling rate is in the -2 to -2.5 °C per day range. Figure T6e shows the change in the rate of tropospheric cooling produced by a CO_2 doubling from 287 to 574 ppm [Iacono et al, 2008]. The maximum change is +0.08 °C per day at an altitude near 2 km. At a lapse rate of -6.5 K km^{-1}, an increase in temperature of +0.08 °C is produced by a decrease in altitude of 12 meters. This is equivalent to riding an elevator down four floors. At higher altitudes in the stratosphere, near 50 km, this increase in CO_2 concentration produces an increase in the cooling rate of approximately 3 °C per day as shown in Figure T6f. However, the air density here is low, 1 mb or 0.001 atm., so the change LWIR flux is small, near -40 μW m^{-2}. In addition, these changes in flux do not couple downwards into the lower troposphere because of line broadening effects at lower altitudes.

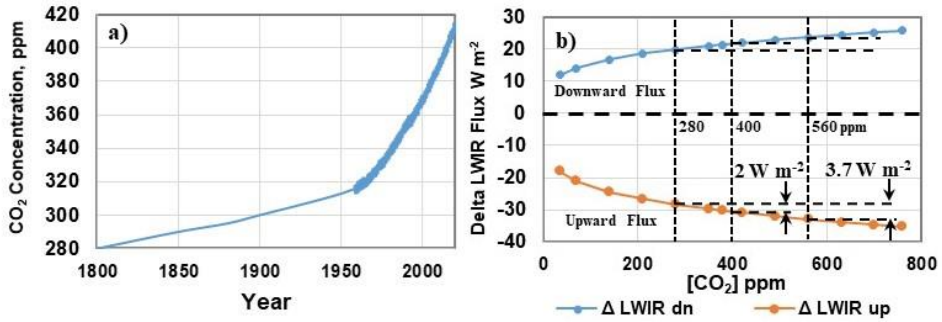


Figure T5: a) the measured increase in atmospheric CO_2 concentration from 1800 (Keeling curve) and b) calculated changes in atmospheric LWIR flux produced by an increase in atmospheric CO_2 concentration from 0 to 760 ppm.

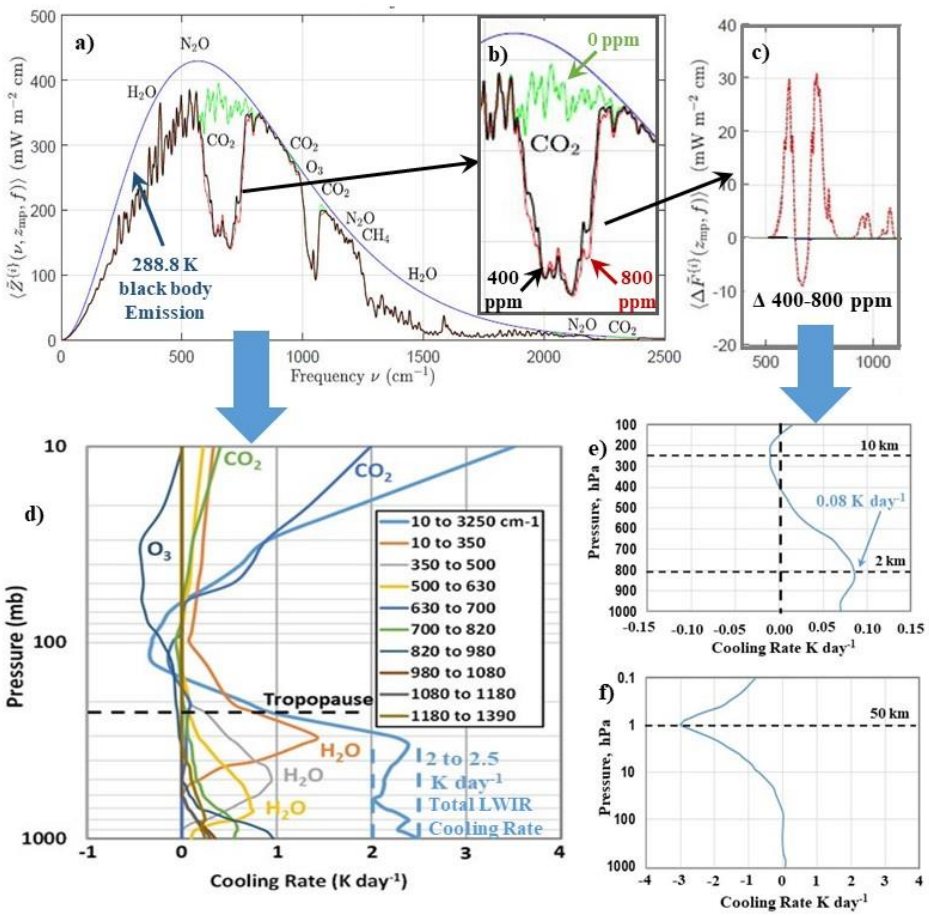


Figure T6: a) the spectrally resolved LWIR emission to space for 0, 400 and 800 ppm CO_2 concentrations, b) the CO_2 emission band on an enlarged scale, c) the difference between the 800 and 400 ppm CO_2 emission, e) the total and band resolved cooling rates vs. altitude for a), e) the changes in the rate of cooling in the troposphere for a CO_2 doubling from 287 to 574 ppm and f) the corresponding changes in the rate of cooling for the stratosphere.

Figure T7 shows the vertical velocity profile up to 2 km altitude in the turbulent surface boundary layer. This is from Doppler heterodyne LIDAR measurements recorded over 10 hours at the École Polytechnique, south of Paris, July 10th 2005 [Gibert et al, 2007]. The change in vertical velocity is ±2 m s^{-1}. This is sufficient to overwhelm any changes in the rate of cooling from a 'CO_2 doubling' as shown in Figure T6e. The LWIR radiative forcings produced by the increase in atmospheric concentration of 'greenhouse gases' cannot change the energy balance of the earth. Any slight heating of the troposphere is dissipated by wideband LWIR emission to space. Any change in surface temperature is too small to measure.

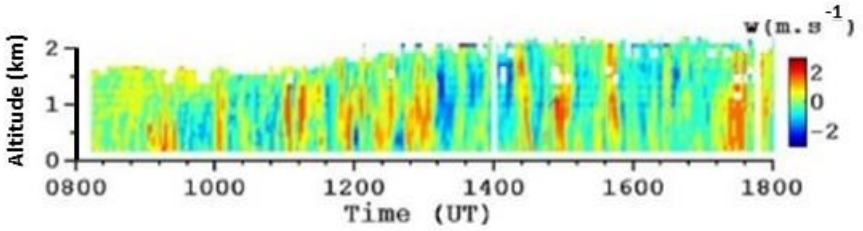


Figure T7: Vertical velocity profile in the turbulent boundary layer recorded over 10 hours at the École Polytechnique, south of Paris, July 10th 2005 using Doppler heterodyne LIDAR.

Surface Energy Transfer

The downward LWIR flux from the lower troposphere to the surface establishes an exchange energy with the upward LWIR flux emitted by the surface. When the surface and surface air temperatures are similar, photons are exchanged within the main spectral absorption-emission regions without any significant transfer of heat. The net LWIR cooling flux (upward minus downward LWIR flux) at the surface is limited to the emission into the LWIR atmospheric transmission window mainly between 800 and 1200 cm^{-1}. This LWIR flux is insufficient to dissipate the absorbed solar insolation. The surface warms up so that the excess solar heat is removed by moist convection. This drives the tropospheric heat engine. The net cooling flux changes with temperature, humidity and cloud cover. In particular, clouds are close to blackbody emitters. The downward LWIR flux from the cloud base 'fills in' the atmospheric LWIR transmission window. This is illustrated in Figure T8. When the surface is warmer than the air layer above, the excess upward LWIR flux emitted by the surface outside of the LWIR transmission window is absorbed in the lower troposphere and can increase the convection. The ocean-air and the land-air interfaces have different energy transfer properties and have to be analyzed separately.

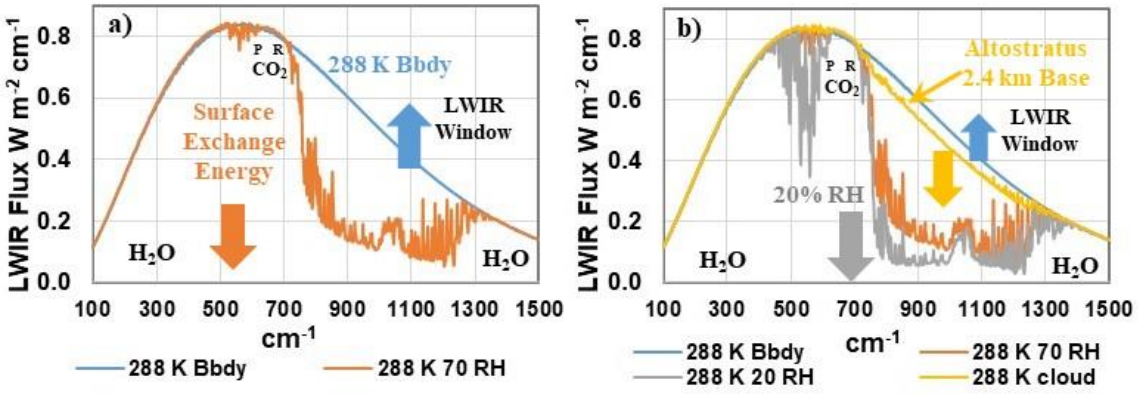


Figure T8: The surface exchange energy for surface and air temperatures of 288 K. a) Blackbody surface emission and downward LWIR flux for a relative humidity of 70% and CO_2 concentration of 400 ppm. The H_2O and CO_2 bands are indicated. b) Same as a) with the downward emission for 20% RH and for altostratus cloud cover with a 2.5 km cloud base added. MODTRAN calculations, 100 to 1500 cm^{-1} spectral range, 2 cm^{-1} spectral resolution [MODTRAN, 2021].

In addition to the equilibrium climate assumption, another basic error in the early climate models was the neglect of the ocean energy transfer. The ocean surface is almost transparent to the solar flux. Approximately 90% of the solar flux is absorbed within the first 10 m layer of the ocean. The diurnal temperature rise is small and the bulk ocean temperature increases until the water vapor pressure at the surface is sufficient for the wind driven evaporation to remove the excess solar heat. The cooler water produced at the surface then sinks and produces a Rayleigh-Bénard type of convection with plumes of warm and cold water moving in opposite directions. This allows the convection to continue overnight. At the surface, the penetration depth of the LWIR flux into the surface layer is less than 100 micron (0.004 inches). Here it is fully coupled to the wind driven evaporation. Figure T9 shows the spectrally resolved penetration depth for water in the LWIR region [Hale and Querry, 1973]. Within the ±30° latitude bands that include approximately half of the earth's ocean surface area, the average rate of evaporation per unit wind speed is at least 15 W m^{-2}/m s^{-1}. This is shown in Figure T10 using long term (1958-2006) zonal average data from Yu et al [2008]. The entire increase of 2 W m^{-2} in LWIR flux from the 140 ppm increase in atmospheric CO_2 concentration is dissipated by an increase in wind speed of approximately 13 cm s^{-1}. A typical range for the wind speed is 0 to 13 m s^{-1} (0 to 30 mph) with higher short term wind gusts, not including local storms. This means that the magnitude and variation in the wind driven evaporation are so large that it is impossible for small changes in the LWIR flux from CO_2 to penetrate below the surface and warm the bulk ocean underneath.

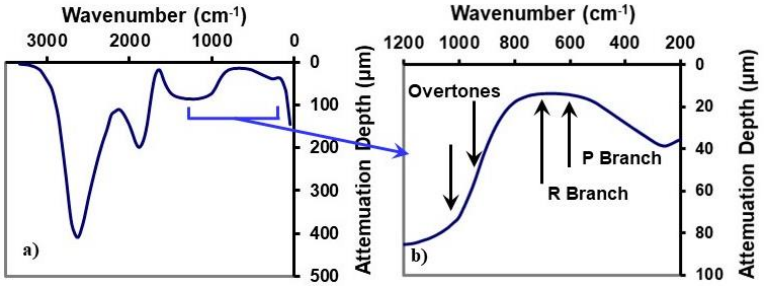


Figure T9: Penetration depth (micron) of LWIR radiation into the ocean surface for 99% attenuation, a) 50 to 3300 cm^{-1} and b) 1200 to 200 cm^{-1}. The approximate locations of the CO_2 P and R branches and the overtone bands are indicated [Hale and Querry, 1973].

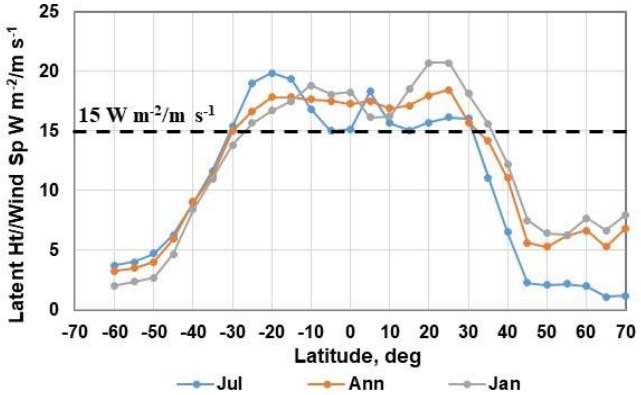


Figure T10: The change in ocean latent heat flux per unit wind speed based on zonal averages from Yu et al [2008].

Outside of the tropics there is a seasonal time delay or phase shift between the peak solar flux at summer solstice and the surface temperature response that may reach 6 to 8 weeks. In addition, there is no requirement for an exact flux balance between the solar heating and the surface cooling terms. This leads to natural variations or quasi-periodic oscillations in ocean surface temperatures within the ocean gyre circulation. There are four main ocean oscillations, the Atlantic Multi-Decadal Oscillation (AMO), the El Niño Southern Oscillation (ENSO), the Indian Ocean Dipole (IOD) and the Pacific Decadal Oscillation (PDO) [AMO, 2022; ENSO. 2022; IOD, 2022; PDO, 2022]. These oscillations provide a natural 'noise floor' for the ocean surface temperatures (CR23). The ocean gyre circulation and the ocean oscillations are illustrated in Figure T11.

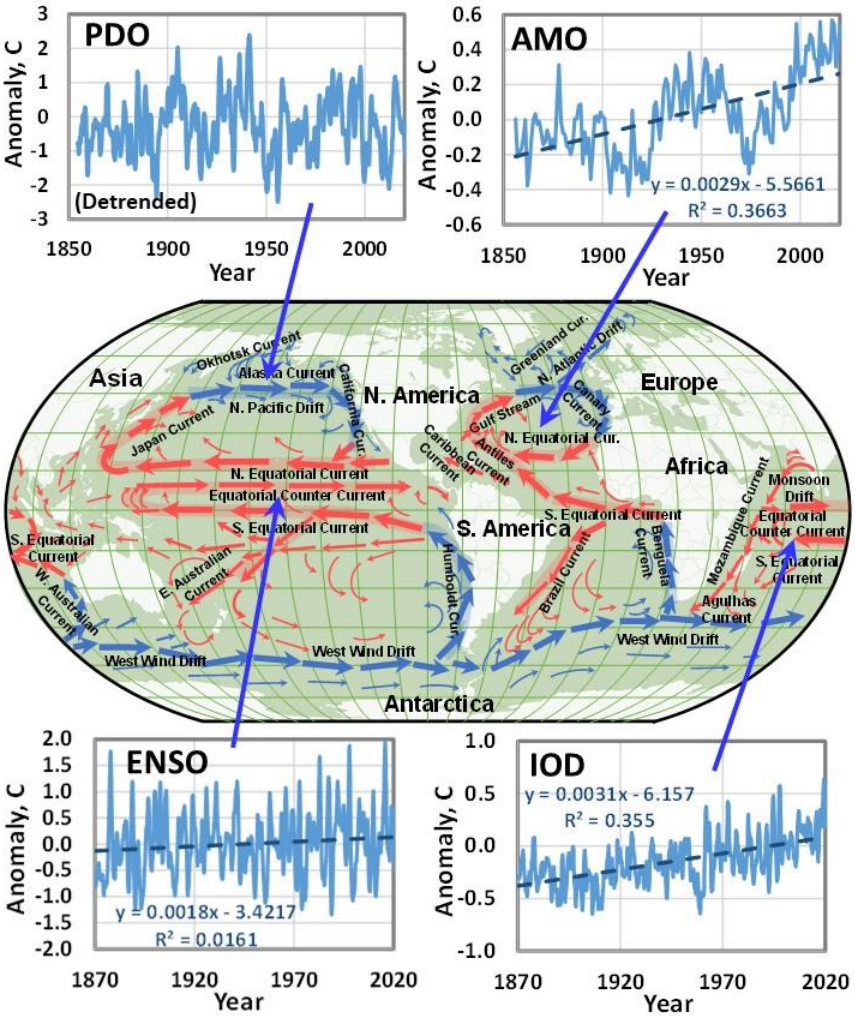


Figure T11: The ocean gyre circulation and the four main ocean oscillations (schematic)

As discussed above, over land, almost all of the absorbed solar heat is dissipated within the same diurnal cycle. The convective transition temperature is reset each day by the local weather system passing through. In many parts of the world, the prevailing weather systems are formed over the oceans and then move over land. This explains the observed coupling of the ocean surface temperatures to the weather station record including both the seasonal phase shift and the ocean

oscillations. In particular, the 1940 AMO peak has conveniently been ignored in the global mean temperature record.

When the small increase in downward LWIR flux produced by a greenhouse gas forcing is added to the interactive flux terms at the surface, any temperature change is too small to measure. This is discussed in more detail in CR23.

The Evidence for the Climate Modeling Fraud

The climate fraud has developed over many years from an oversimplified climate model into a massive multi-trillion dollar fraud. There is no single event that established the fraud. It may be described as a confluence of special interest bandwagons. Here we follow the technical evolution of the climate fraud from its start in the nineteenth century to the 49 computer modeling groups that contributed to the compendium of pseudoscience in AR6, the Sixth Assessment Report published by the UN Intergovernmental Panel on Climate Change (IPCC) in 2021. We focus specifically on the four publications that established the modern computer climate modeling fraud between 1967 and 1981. This created the pseudoscience of radiative forcing, feedbacks and climate sensitivity that is still used by the climate modelers today. We also explain the later practice of dividing the contrived set of radiative forcings into 'natural' and 'anthropogenic' contributions. This enabled the fraudulent claim that the 'human caused' or 'anthropogenic' forcings have led to an increase in the intensity and frequency of 'extreme weather events'. This in turn provided the pseudoscientific justification for the insane policy of net zero, the elimination of fossil fuel combustion.

1) There is no equilibrium average climate that can be perturbed by 'radiative forcings'

The earth is not in thermal equilibrium on any time or spatial scale [Essex et al, 2006]. A change in temperature is produced by a change in the heat content or enthalpy of a local thermal reservoir divided by the heat capacity. The change in enthalpy has to be determined by integrating all of the interactive time dependent flux terms coupled to the reservoir over a given time period [Clark, 2013]. There are also well known diurnal and seasonal time delays or phase shifts between the peak solar flux and the peak temperature response. This is clear evidence of a non-equilibrium thermal process. Such phase shifts not a new discovery. The seasonal phase shift in the subsurface ground temperature response was described by Fourier [1824, 1827]. He successfully explained the observations using his theory of heat [Fourier, 1822].

> At a moderate depth, as three or four meters, the temperature observed does not vary during each day, but the change is very perceptible in the course of a year, it varies and falls alternately. The extent of these variations, that is, the difference between the maximum and minimum of temperature, is not the same at all depths, it is inversely as the distance from the surface. The different points of the same vertical line do not arrive at the same time at the extreme temperatures.
> .....
> The results observed are in accordance with those furnished by the theory, no phenomenon is more completely explained.

Fourier (1824, p. 144)

The diurnal phase shift over land was recorded in 1953 as part of the Great Plains Turbulence Field Program conducted in O'Neill, Nebraska [Letteau and Davidson, 1957]. The temperature data recorded for August 13 1953 are shown in Figure 1a. The seasonal phase shift for the oceans is illustrated in Figure 1b. This shows the monthly surface temperatures (2.5 m depth) at selected latitudes from the equator to 60° N along the 20° W longitude transect in the N. Atlantic Ocean. These data are from Argo buoy measurements recorded in 2018. The temperatures are monthly averages for a 5° x 1° (latitude x longitude) strip downloaded from the Argo Ocean Atlas [Argo, 2020]. Peak temperature occur 6 to 8 weeks after summer solstice. Phase shifts are discussed in more detail in CR23 and in the on line article VPCP 28 Time dependent climate energy transfer: The forgotten legacy of Joseph Fourier [VPCP28.Fourier].

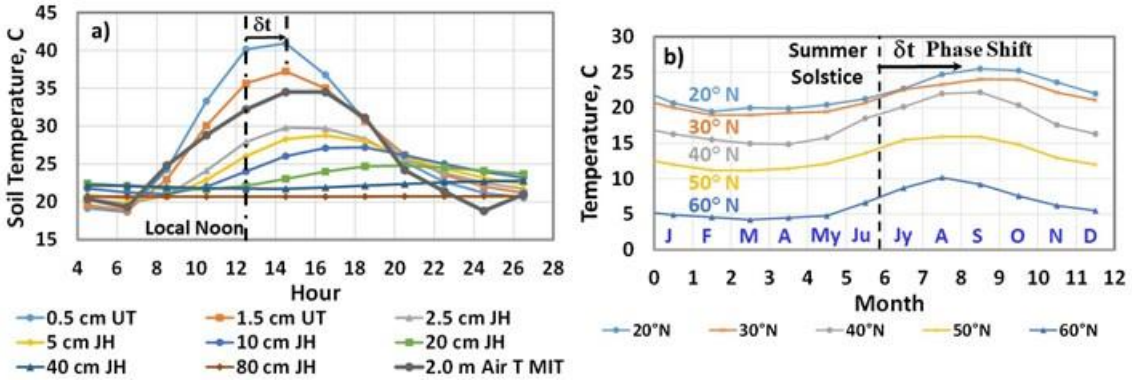


Figure 1: a) Subsurface temperatures from 0.5 to 80 cm depth recorded at O'Neill, Nebraska, August 13 1953. The 2 m air temperature is also shown. The diurnal phase shifts relative to local noon are indicated. b) The monthly temperatures at 2.5 m depth at selected latitudes for 2018 along the 20° W transect in the N Atlantic Ocean. The seasonal phase shifts are indicated.

The climate models start from the invalid concept of an equilibrium average climate. In the original 1-D RC models, there was an exact flux balance between a 24 hour average solar flux and the LWIR flux emitted back to space at the top of the model atmosphere (TOMA). In the later GCMs it is assumed that there is an exact, long term planetary energy balance between the average absorbed solar flux and the average outgoing LWIR radiation (OLR) returned to space. An increase in the atmospheric CO_2 concentration produces a slight reduction in the LWIR flux emitted at TOA. This is considered to be a perturbation to the equilibrium state and the climate is then presumed to 'adjust' so that there is an increase in 'equilibrium surface temperature' that restores the flux balance at TOA [Knutti, and Hegerl, 2008]. The change in flux at TOA is called a radiative forcing. This also includes other 'forcing agents' such as aerosols that change the solar flux reflected to space at TOA. It is further assumed that there is a linear relationship between the 'radiative forcing' and the surface temperature response ΔT.

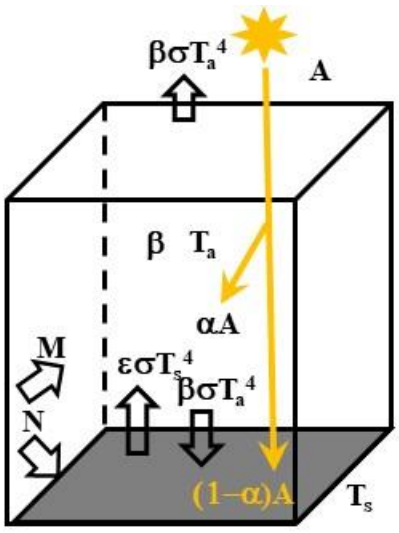
$$\Delta T = \lambda RF \qquad \text{(Eq. 1)}$$

Where λ is a 'climate sensitivity constant' and RF is the radiative forcing or change in LWIR flux [Harde, 2017, 2013, IPCC, 2013 Chap. 8]. Climate sensitivity is defined in terms of the temperature change produced by doubling of the CO_2 concentration from a 'preindustrial' level of 280 ppm to 560 ppm. It is assumed *a-priori* that all of the recent changes in the temperature record must be attributable to the increase in 'radiative forcing'.

A radiative forcing is a change in flux with units of W m^{-2}. In a non-equilibrium system, this produces a change in the rate of cooling (or heating) of a thermal reservoir. In order to determine a change in temperature, the forcing has to be integrated over time and divided by the heat capacity of the reservoir.

2) The 1896 Arrhenius Equilibrium Air Column Climate Model

The first climate model was the equilibrium air column described by Arrhenius in 1896. His motivation for developing the model was the speculation by Tyndall in the 1860s that changes in atmospheric CO_2 concentration could cycle the earth through an Ice Age [Tyndall, 1861, 1863]. His model is illustrated in Figure 1. It was just an air volume illuminated by an equilibrium average solar flux with a partially reflective blackbody surface. There was no surface heat capacity. Convection, evaporation and subsurface transport were neglected. When the CO_2 concentration was increased, the surface temperature had to increase until the energy balance at the top of the model atmosphere was restored. Such temperature increases were a mathematical artifact of the simplified energy transfer processes used in the model. Arrhenius repeated his calculations in 1906 and obtained lower temperature changes [Arrhenius, 2014]



T_s is the surface temperature,
T_a is the air temperature,
A is the solar flux at the top of the atmosphere
α is the absorbance of the solar flux by the air column
β is the LWIR absorbance of the air column
M is the external heat flow into the air column (advection)
N is external heat flow into the surface
σ is Stefan's constant
ε is the surface emissivity

σ, A, ε, M, N, α are assumed to be constant
β is the independent variable
T_s, T_a are dependent variables

$$T_s^4 = K/[(1+\varepsilon(1-\beta)]$$

where K is a constant

Figure 2: The 1896 Arrhenius equilibrium air column model

3) The 1967 Manabe and Wetherald Equilibrium Air Column Climate Model

In 1967 Manabe and Wetherald added a 9 or 18 air layer radiative transfer model to the Arrhenius equilibrium air column (MW67). Like Arrhenius they chose to ignore the effects of convection, evaporation and subsurface transport. Instead, they imposed a tropospheric lapse rate that could not exceed -6.5 °C per km. In addition, they added a new requirement for a fixed relative humidity (RH) distribution. This provided a 'water vapor feedback' that amplified the initial surface warming produced by an increase in the CO_2 concentration. When the air temperature increases at fixed RH, the absolute water vapor concentration increases, by definition. This produces an increase in downward LWIR flux to the surface that in turn amplifies the initial CO_2 warming artifact. The radiative transfer calculation was correct for each species and temperature distribution used in the model, but the equilibrium average air column with water vapor feedback amplified the surface temperature warming artifacts when the CO_2 concentration was increased. In addition, the model took a year to reach equilibrium as measured by the iteration step time multiplied by the number of iterations. The 1967 M&W model is illustrated in Figure 3. The time step integration procedure is illustrated above in Figure T2. This type of model is known as a one dimensional radiative convective (1-D RC) model. M&W never explained how small changes in 'equilibrium' LWIR flux and temperature have any effect on the real diurnal and seasonal flux and temperature changes observed on planet earth. The temperature increase that they calculated at each 'time marching step' in their calculation was too small to detect in the normal diurnal and seasonal temperature changes in a turbulent troposphere. They created their own equilibrium climate fantasy land and never left.

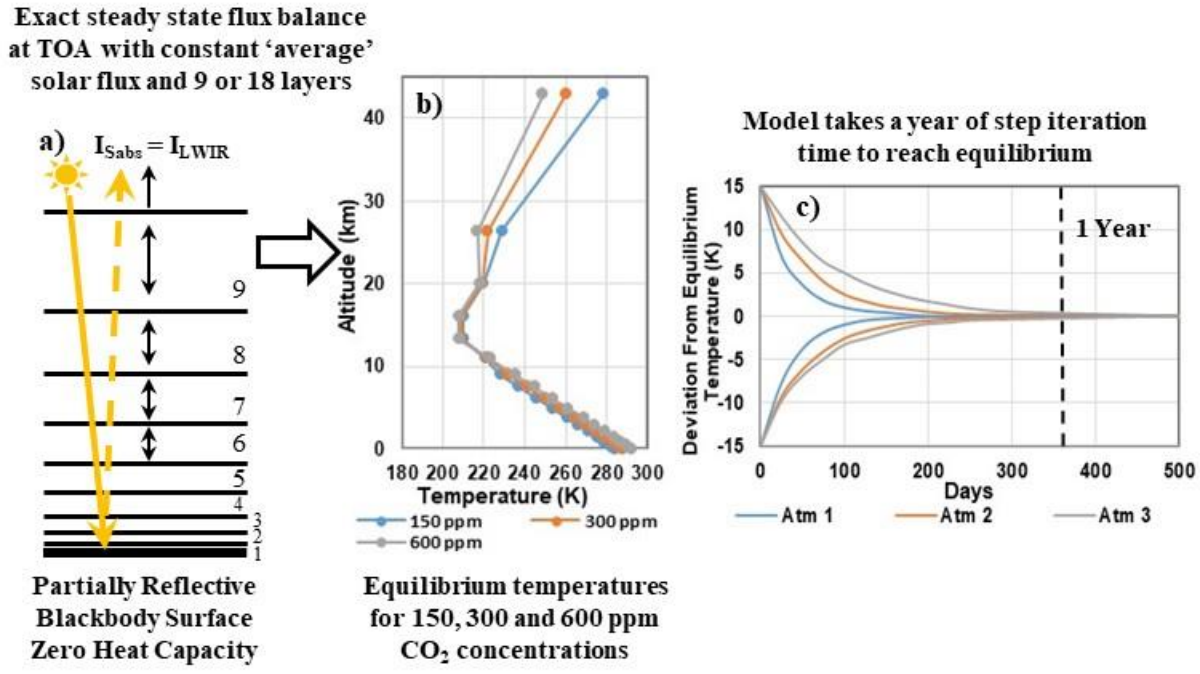


Figure 3: a) the 1967 M&W climate model for 9 air layers, b) equilibrium temperatures calculated for 3 different CO2 concentrations and c) time for the model to reach equilibrium.

4) The 1975 M&W Global Circulation Model

M&W chose to ignore the errors that they introduced in the MW67 1-D RC model and went on to incorporate the 1967 mathematical warming artifacts into every unit of a 'highly simplified' global circulation model [M&W, 1975] (MW75). The 1967 model was now described as a 'global average climate model'. Although the MW75 GCM did not contain any real climate effects such as ocean transport and the cloud cover was fixed, claims of global warming from a 'CO_2 doubling' were still made, even though the source was the invalid 1967 assumptions. The 1975 model also created a 'hot spot' in the upper troposphere at low and middle latitudes. This is also an artifact of the model assumptions related to the relative humidity assumption. The temperature increases produced by a 'CO_2 doubling' and the 'hot spot' are shown in Figure 4.

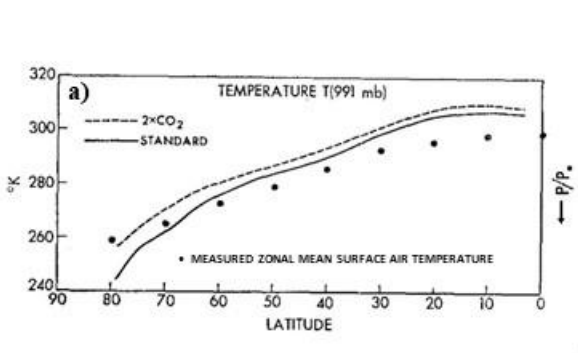


FIG. 5. Zonal mean temperature at the lowest prognostic level (i.e., ~991 mb). Dots indicate the observed distribution of zonal mean surface air temperature (Oort and Rasmusson, 1971).

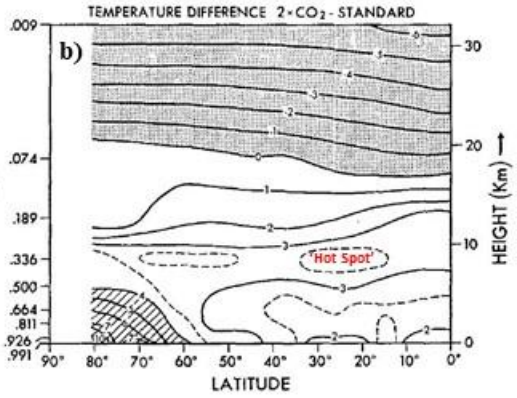


FIG. 4. Latitude-height distribution of the zonal mean temperature (K) for the standard case (a) and of the increase in zonal mean temperature (K) resulting from the doubling of CO_2 concentration (b). Stippling indicates a decrease in temperature.

Figure 4: The effect of a CO_2 doubling in the 1975 M&W GCM, a) The increase in surface air temperature and b) the tropospheric 'hot spot' near 10 km altitude at low and mid latitudes.

M&W also ignored the instabilities introduced into a global circulation model by the large number of coupled non-linear equations that had to be solved. Lorenz [1963, 1973] found that such solutions were unstable, even for a simple convection model with 3 equations. A practical limit for weather forecasting was 12 days ahead. This work should have made it clear that such GCMs had no predictive capabilities over the time scales associated with climate change.

In their conclusions, M&W stated:

> In evaluating these results, one should recall that the current study is based upon a model with fixed cloudiness. The results may be altered significantly if we use a model with the capability to predict cloudiness. Other major characteristics of the model which can affect the sensitivities of the model climate are idealized geography, swamp ocean and no seasonal variation. Because of the various simplifications of the model, it is advisable not to take too seriously the quantitative aspect of the results obtained in this study.

The MW75 paper set a benchmark for climate warming by CO_2. The equilibrium air column was now hidden inside the unit cell of the GCM. Funding for additional GCM development work by M&W or others required similar warming effects. The climate model bandwagon was rolling and there was no turning back. M&W were already trapped in a web of lies of their own making.

5) The Start of Radiative Forcing

The NASA Apollo or moon landing program ended in 1972. As funding was reduced, NASA researchers studying planetary atmospheres began to diversify into climate studies even though they had no understanding of climate energy transfer on a rotating water planet. This was described by Hansen et al [2000]

> When I came to GISS as a postdoctoral candidate in the late 1960s my primary interest was in planetary atmospheres, especially the clouds of Venus, and I focused on radiative transfer theory as a tool to study the Venus clouds. But at about that time the director of GISS, Robert Jastrow, concluded that the days of generous NASA support for planetary studies were numbered, and he thus began to direct institutional resources toward Earth applications.

Melodramatic claims about climate change related to 'runaway' greenhouse effects or 'air pollution' were used to justify the extension of their atmospheric radiative transfer studies of Mars and Venus to the earth's atmosphere. During the 1970s there was a global cooling scare related to the cooling phase of the Atlantic Multi-decadal Oscillation (AMO). Since ocean cooling was not part of the climate change narrative, Rasool and Schneider [1971] (RS71) claimed that an increase in aerosol concentration could over-ride any CO_2 induced warming and produce atmospheric cooling. If this continued then it could trigger an Ice Age. At the time, both authors were with NASA Goddard.

> We will report here on the first results of a calculation in which separate estimates were made of the effects on global temperature of large increases in the amount of CO_2 and dust in the atmosphere. It is found that even an increase by a factor of 8 in the amount of CO_2, which is highly unlikely in the next several thousand years, will produce an increase in the surface temperature of less than 2 K. However, the effect on surface temperature of an increase in aerosol content of the atmosphere is found to be quite significant. An increase by a factor of 4 in the equilibrium dust concentration of the atmosphere, which cannot be ruled out as a possibility within the next century, could decrease the mean surface temperature by as much as 3.5 K. If sustained over a period of several years, such a temperature decrease could be sufficient to trigger an Ice Age.

They used a 1-D equilibrium model with 60 layers, 0.5 km thick and performed calculations for both clear sky and 'cloudy' conditions. Their model had a lower sensitivity to a CO_2 doubling than MW67, 0.8 °C compared to 2.9 °C. The real value should be 'too small to measure'.

In 1975, Ramanathan at NASA Langley claimed that an increase in the atmospheric concentration of chlorofluorocarbons (CFCs) could produce an increase in surface temperature. This was later recognized as the first use of radiative forcing, although the term 'radiative forcing' was not introduced until later [Ramaswamy et al, 2019]. Ramanathan simply used the available spectral

data to calculate the decrease in average LWIR flux at TOA for an increase in CF_2Cl_2 and $CFCl_3$ concentrations. He then did a bait and switch trick. He took a sensitivity of the surface temperature to the solar flux of 1.425 W m^{-2} K^{-1} derived from the work of Budyko [1969] and applied it to the change in LWIR flux produced by the CFCs. His calculated warming is shown in Figure 5 [Ramanathan, 1975].

> The implications of Eq. 3 for the global climate can be examined by invoking the global energy balance condition which stated that on a global average the net incoming solar radiation should be in balance with F [the LWIR flux emitted to space]. Since the net incoming solar radiation would not change with the addition of CFCs, the energy balance condition implies that F has to be the same for both the perturbed and the unperturbed atmosphere. Recall that the ΔF given by Eq. 3 was calculated by fixing the atmospheric and surface temperature. The decrease in F can be related to an equivalent change in T through the relation $\Delta T_s = \Delta F/(dF/dT_s)$ where dF/DTs is obtained by differentiating Budyko's empirical formulation for F with respect to T_s which yields $dF/dT_s = 1.425$ W m^{-2} K^{-1}.

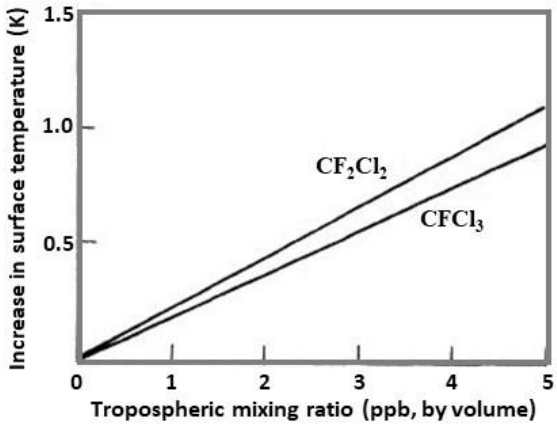


Fig. 1. Increase in global surface temperature is a function of the tropospheric concentrations of CF_2CL_2 and $CFCL_3$. Results are for globally averaged conditions with 50 cloud cover.

Figure 5: Increase in 'equilibrium surface temperature' claimed by Ramanathan for an increase in the atmospheric concentration of chlorofluorocarbons

In 1976, a group at NASA Goddard, including Hansen, extended the 1967 M&W 1-D RC model to include another 8 minor species, N_2O, CH_4, NH_3, HNO_3, C_2H_4, SO_2, CH_3Cl and CCl_4, in addition to the CFCs analyzed by Ramanathan [1975] and the original molecules, CO_2, H_2O and O_3 included in MW67. The changes in surface temperature for the changes in concentration indicated are shown in Figure 6, from Table 3 of H76.

The authors failed to understand that their calculated temperature changes were nothing more than mathematical artifacts of the 1-D RC climate model that they were using.

> A first step toward achieving a realistic climate model can be taken by modeling specific aspects of the full climate system. In particular, for evaluating the effect of a perturbation of atmospheric

radiative constituents, a one dimensional radiative-convective model of the atmospheric thermal structure is a useful tool. H76 pp. 686-687

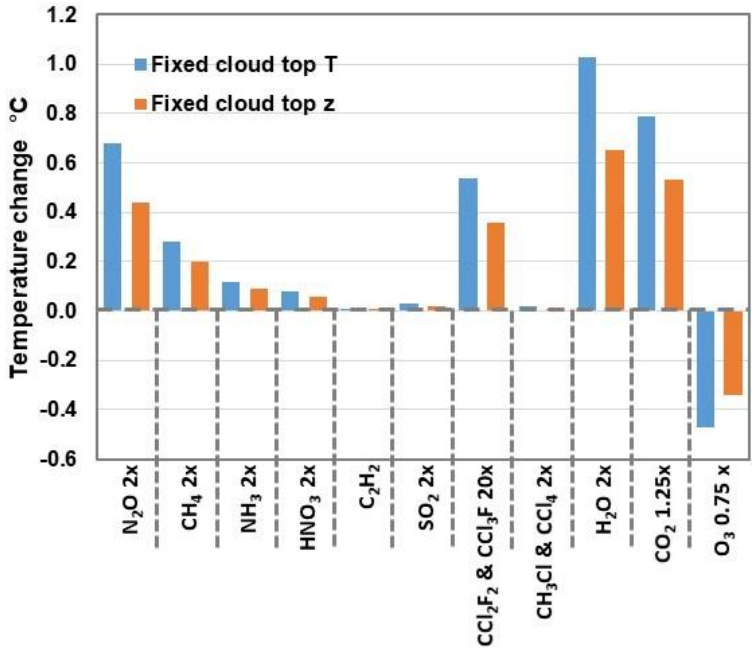


Figure 6: Changes in 'equilibrium surface temperature' produced as mathematical artifacts in a 1-D RC model by changes in species concentration as indicated.

6) The 1981 Hansen Model

The 1981 paper by Hansen et al (H81) provided the pseudoscientific foundation of radiative forcings, feedbacks and climate sensitivity still used by the climate modelers today. With the publication of H76, the Goddard group had already entered the equilibrium climate fantasy land created by M&W. With H81 they added a 2 layer slab ocean and the step doubling CO_2 ritual. Then they used a contrived set of radiative forcings to simulate the global temperature record.

6.1 The Greenhouse Effect

H81 started with a discussion of the 'greenhouse effect' that claimed that an increase in CO_2 concentration would cause a warming of the surface and lower troposphere.

> Carbon dioxide absorbs in the atmospheric 'window' from 7 to 14 micron which transmits thermal radiation emitted by the earth's surface and lower atmosphere. Increased atmospheric CO_2 tends to close this window and cause outgoing radiation to emerge from higher colder levels, thus warming the surface and lower atmosphere by the so called greenhouse mechanism. The most sophisticated models suggest a mean warming of 2 to 3.5 °C for doubling of the CO_2 concentration from 300 to 600 ppm. H81 p.957

This is only the case in the equilibrium climate fantasy land when the time marching' calculation shown in in Figure T2 is used. In the real world, any temperature changes from a 'CO_2 doubling' are too small to measure [Ackerman, 1979, Iacono et al, 2008].

6.2 The Effective Emission Temperature

Then the authors introduced a pseudoscientific 'effective emission temperature' of 255 K for the earth based on a planetary radiation balance argument [Möller, 1964, Taylor 2006]. However, they failed to recognize that the LWIR flux emitted to space was just a cumulative cooling flux that was emitted from many different levels of the atmosphere at different temperatures. The LIWR emission from each level is then modified by the absorption and emission of the layers above. The spectral distribution of the LWIR flux emitted at the top of the atmosphere is not that of a blackbody radiator near 255 K. The flux at TOA should not be converted to a temperature using the Stefan Boltzmann Law. Nor should this temperature be combined with a 288 K average surface temperature to give a 'greenhouse effect temperature' of 33 K. As shown in Figure 7, spectra of the LWIR flux at TOA have been available since 1970 from the IRIS-D Michelson interferometer (Fourier transform IR spectrometer) on the Nimbus 4 satellite. [Hanel et al, 1971]. There can be no 'greenhouse effect temperature' of 33 K.

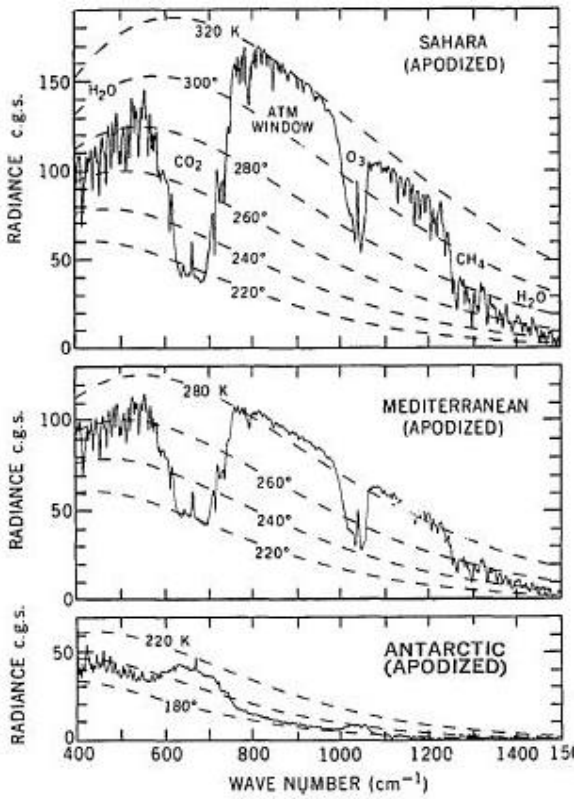


Figure 7: The spectral distribution of LWIR emission to space recorded by the IRIS-D Michelson interferometer on the Nimbus 4 satellite [Hanel et al, 1971].

6.3 The Tropospheric Heat Engine

The authors then introduced a 'mean emission level' above the surface but failed to explain that the troposphere functions as an open cycle heat engine. The surface must be warmer than the cold reservoir of the heat engine. They also failed to mention that the emission level for water vapor is set by the local air temperature and increases in altitude when the surface temperature increases. In addition, the emission level for CO_2 is at a higher altitude than that of water vapor.

6.4 The Climate Sensitivity

The H81 climate model can be 'tuned' by adjusting the feedbacks used in the model. These are evaluated by calculating the climate sensitivity or increase in equilibrium surface temperature for a doubling of the CO_2 concentration from 300 to 600 ppm. The effect of various feedbacks is given in H81 Table 1, shown here as Figure 7. For H81, model 4 with a feedback factor, f of 1.4 and a climate sensitivity of 2.8 °C was used.

Table 1. Equilibrium surface temperature increase due to doubled CO_2 (from 300 to 600 ppm) in 1-D RC models. Model 1 has no feedbacks affecting the atmosphere's radiative properties. Feedback factor f specifies the effect of each added process on model sensitivity to doubled CO_2; F is the equilibrium thermal flux into the ground if T_s is held fixed (infinite heat capacity) when CO_2 is doubled. Abbreviations: FRH, fixed relative humidity; FAH, fixed absolute humidity; 6.5LR, 6.5°C km^{-1} limiting lapse rate; MALR, moist adiabatic limiting lapse rate; FCA, fixed cloud altitude, FCT, fixed cloud temperature; SAF, snow/ice albedo feedback; and VAF, vegetation albedo feedback. Models 5 and 6 are based on f values from Wang and Stone (*19*) and Cess (*20*), respectively, and ΔT_s of model 2.

Model	Description	ΔT_s (°C)	f	F (W m^{-2})
1	FAH, 6.5LR, FCA	1.22	1	4.0
2	FRH, 6.5LR, FCA	1.94	1.6	3.9
3	Same as 2, except MALR replaces 6.5LR	1.37	0.7	4.0
4	Same as 2, except FCT replaces FCA	2.78	1.4	3.9
5	Same as 2, except SAF included	2.5–2.8	1.3–1.4	
6	Same as 2, except VAF included	~3.5	~1.8	

Figure 8: The H81 1-D RC model can be 'tuned' by adjusting the feedbacks used in the model.

In the real world, any climate sensitivity to CO_2 is 'too small to measure'.

6.5 The Slab Ocean Model

The authors then introduced a 'slab' ocean model with a mixed ocean layer 100 m thick and a thermocline layer below this. They ignored the surface energy transfer and only considered the time delays related to the increase in heat capacity. The penetration depth of the LWIR flux into the oceans is less than 100 micron as shown in Figure 9a [Hale and Querry, 1972]. Here it is fully coupled to the wind driven evaporation or latent heat flux. Using long term zonal averages from Yu et al, [2008], the sensitivity of the latent heat flux to the wind speed is at least 15 W m^{-2}/m s^{-1} over the ±30° latitude bands. This is shown in Figure 9b. The entire 'CO_2 doubling' flux of 4 W m^{-2} is dissipated by an increase in wind speed of 27 cm s^{-1} or approximately 1 km per hour. The normal (1σ) variation of the wind speed in the ±30° latitude bands is ±2 m s^{-1} (~±7 km hr^{-1}) at an

average wind speed of approximately 6 m s^{-1} (~21 km hr^{-1}) with larger wind gust fluctuations. At present, the annual average increase in CO_2 concentration is near 2.4 ppm. This corresponds to an increase in downward LWIR flux to the surface of 0.034 W m^{-2} per year which is dissipated by an increase in wind speed of approximately 2 mm per year (CR23). Based on this discussion, it is impossible for the increase in downward LWIR flux from the lower troposphere to the surface produced by a 'CO_2 doubling' to cause any measurable change in ocean surface temperature. The authors chose to ignore physical reality and simply assumed that the increase in LWIR flux had to cause the expected climate warming in their oversimplified equilibrium air column model. This is shown in Figure 9c. Hansen et al were not the only ones to consider a 'slab' ocean model. Manabe and Stouffer [1980] created 4xCO_2 induced warming in a single 'mixed layer' ocean. A two layer slab ocean model was described by Cess and Goldenberg [1981] and ocean-atmosphere coupling was discussed by Dickinson [1981]. The ocean warming from a quadrupling of the CO_2 concentration calculated by Manabe and Stouffer is shown in Figure 9d. In 2022, Manabe was one of the recipients of the Nobel Prize for physics. This is probably the first time that this prize has been awarded for fraudulent pseudoscience.

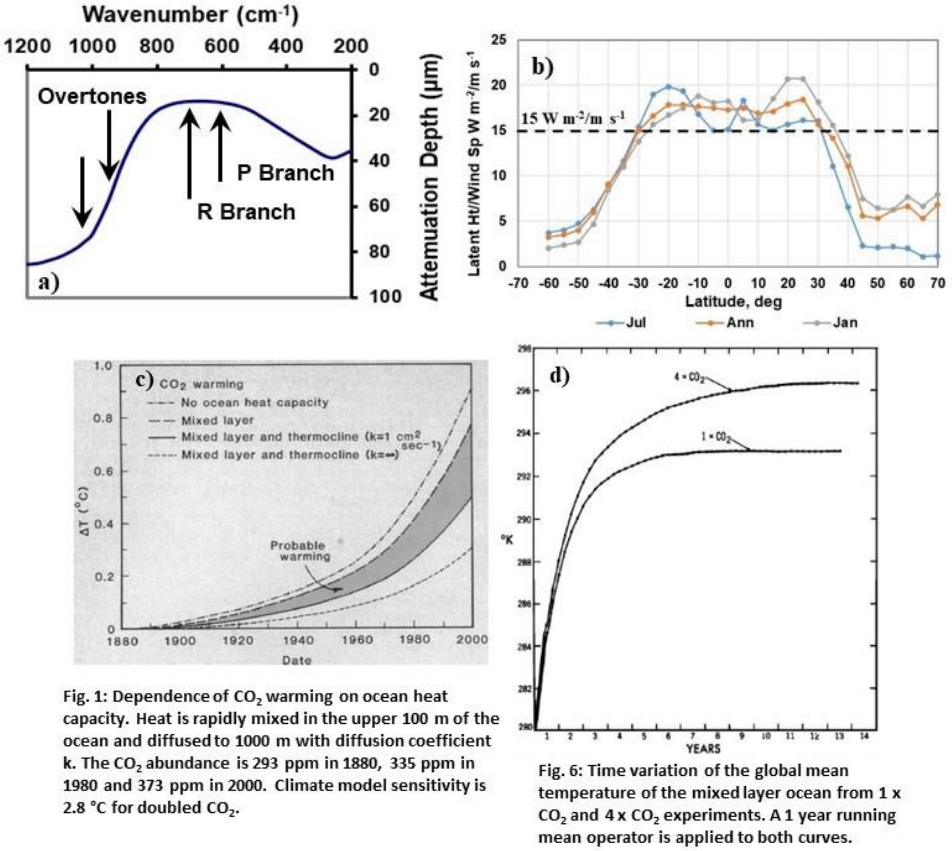


Fig. 1: Dependence of CO_2 warming on ocean heat capacity. Heat is rapidly mixed in the upper 100 m of the ocean and diffused to 1000 m with diffusion coefficient k. The CO_2 abundance is 293 ppm in 1880, 335 ppm in 1980 and 373 ppm in 2000. Climate model sensitivity is 2.8 °C for doubled CO_2.

Fig. 6: Time variation of the global mean temperature of the mixed layer ocean from 1 x CO_2 and 4 x CO_2 experiments. A 1 year running mean operator is applied to both curves.

Figure 9: a) The penetration depth (99% attenuation) of IR radiation into water, 200 to 1200 cm^{-1}. The approximate position of the CO_2 absorption bands is indicated. b) The sensitivity of the latent heat flux to the wind speed using long term zonal averages from Yu et al [2008]. c) Hansen et al 1981, figure 1, ocean warming produced by a CO_2 radiative forcing. d) Manabe and Stouffer, 1980 figure 6, ocean warming produced by a 4x increase in CO_2 concentration. In reality any small increase in downward CO_2 LWIR flux to the surface is fully coupled to the wind driven evaporation (latent heat flux) and cannot heat the oceans.

6.6 Radiative Perturbations

The authors then proceed to consider 'radiative climate perturbations' in their model. Figure 10 (H81, figure 2) shows the estimated changes in surface temperature produced by a variety of 'radiative perturbations', now known as 'radiative forcings' [Ramaswamy et al, 2019]. These temperature changes are mathematical artifacts in the model calculation created by the simplifying assumptions used. They are an extension of the earlier work described in H76. This in turn was based on the time step integration procedure introduced in MW67 (see Figure T2 above). As shown in Figure 8, the model can be 'tuned' to give different results by changing the feedback inside the model. Here a CO_2 doubling from 300 to 600 ppm gives a temperature increase of 2.8 °C.

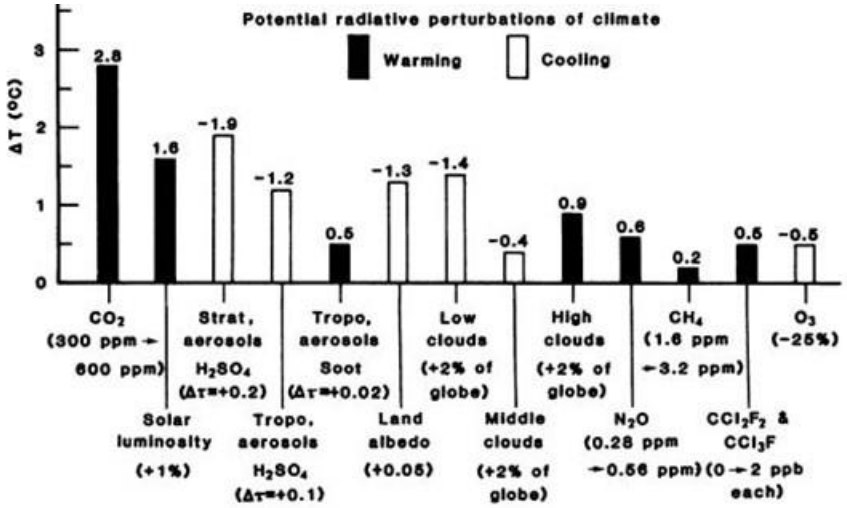


Figure 10: (Hansen, 1981 figure 2) Effects of various 'radiative perturbations' on surface temperature calculated using a 1D RC climate model. The changes in 'surface temperature' are mathematical artifacts produced by the simplifying assumptions used in the model.

6.7 The Global Mean Temperature

Next the authors describe long term surface air temperature averages derived from weather station data. Figure 11 (H81, figure 3,) shows the five year average temperature from 1880 to 1980 for northern, southern and tropical latitudes and the global average. This includes the well-defined Atlantic Multi-decadal Oscillation (AMO) peak near 1940 [AMO, 2022] that was conveniently ignored. The change in CO_2 concentration (Keeling curve [2022]) is also shown.

The role of the AMO in setting the surface air temperature has been misunderstood or ignored for a long time. The first person to claim a measurable warming from an increase in CO_2 concentration was Callendar in 1938. [Callendar, 1938]. The warming that he observed was from the 1910 to 1940 warming phase of the AMO and not from CO_2. During the 1970s there was a 'global cooling' scare that was based on the cooling phase of the AMO from 1940 to 1970 [McFarlane, 2018, Peterson et al, 2008, Douglas, 1975, Bryson and Dittberner, 1976]. In H81, Hansen et al chose to ignore the 1940 AMO peak in their analysis of the effects of CO_2 on the weather station record.

Similarly, Jones et al conveniently overlooked the 1940 AMO peak when they started to ramp up the modern global warming scare in 1986 and 1988 [Jones et al, 1986, 1988]. The IPCC also ignored the AMO peak in its first assessment report in 1990 [IPCC 1990, FAR WG1 fig. 11 SPM p. 29] and it has continued to ignore it as shown in AR6 WG1 TS CS Box 1 fig. 1c p. 61 [2021]. This is illustrated in Figure 12. The AMO and the periods of record used are shown in Figure 12a. The AMO consists of a long period oscillation near 60 years superimposed on a linear temperature recovery from the Little Ice Age (LIA) [Akasofu, 2010]. The temperature records used by Callendar, Douglas, Jones et al, Hansen et al and IPCC 1990 and 2021are shown in Figures 12b through 12g. The Keeling curve showing the increase in atmospheric CO_2 concentration is also shown in Figures 12d through 12g [Keeling, 2023].

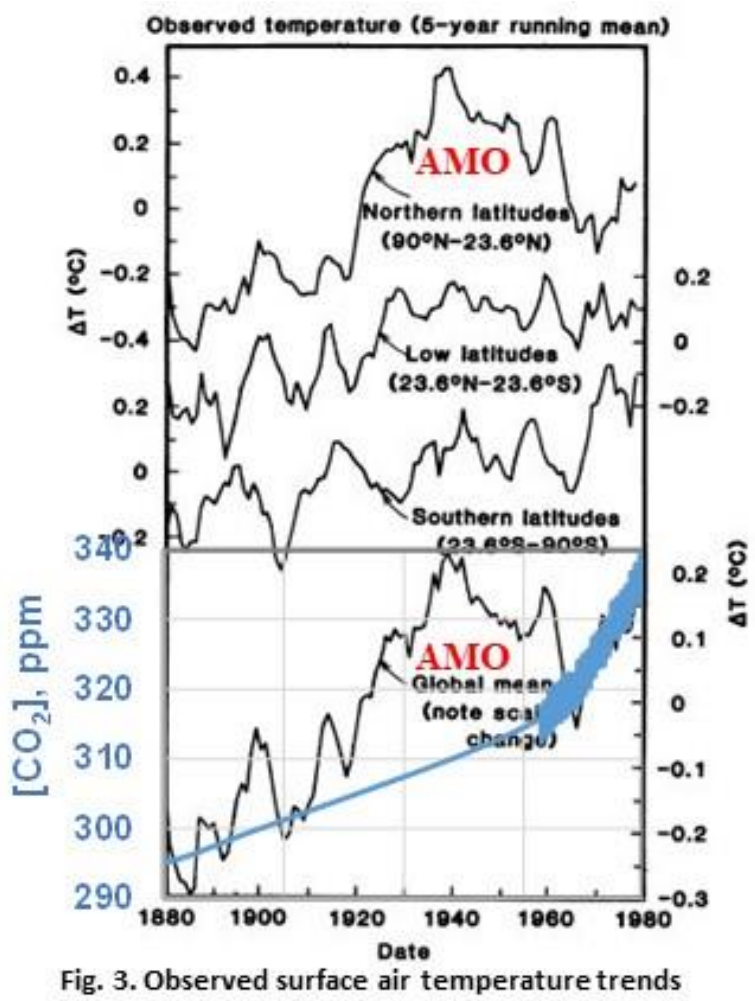


Figure 11: (H81, figure 3) the long term five year average temperatures from 1880 to 1980 for northern, southern and tropical latitudes and the global average, with the Keeling curve (CO_2 concentration) overlaid. The broad peak centered near 1940 is the AMO.

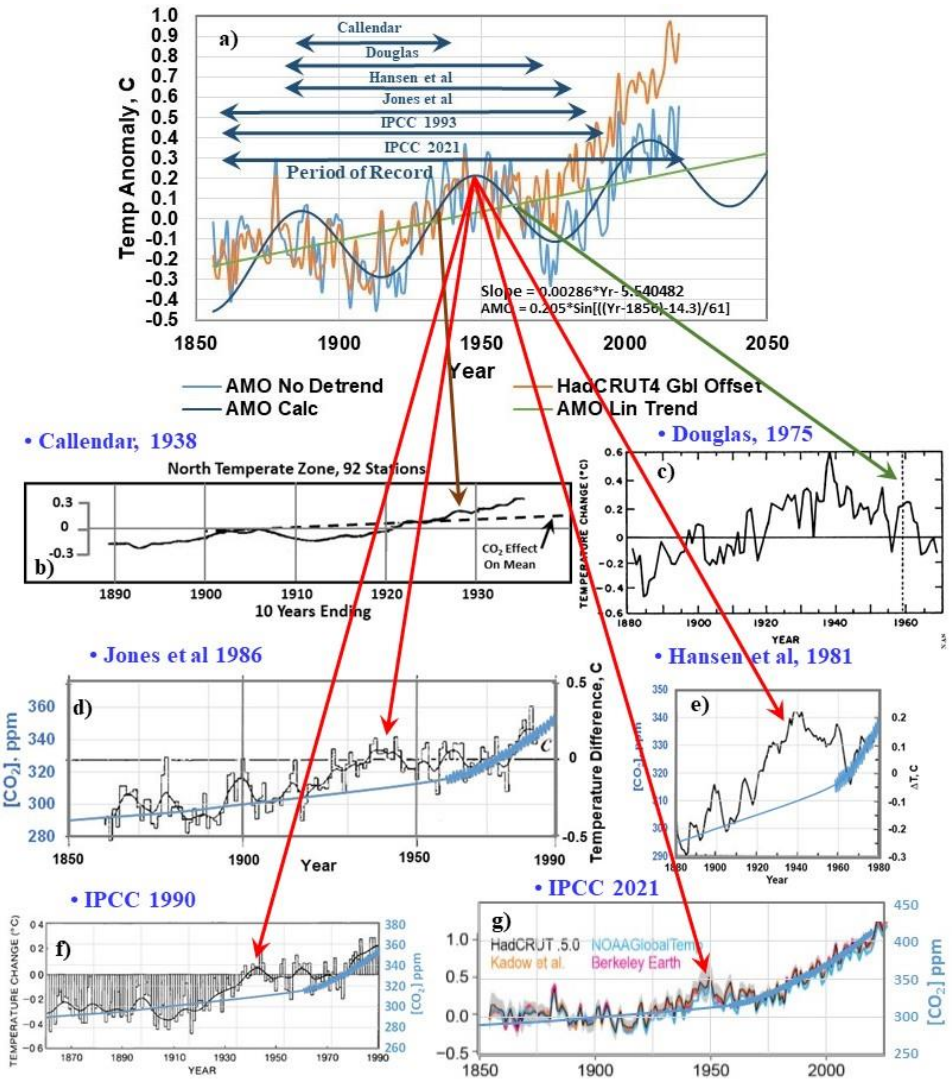


Figure 12: a) AMO anomaly and HadCRUT4 global temperature anomaly, aligned from 1860 to 1970, b) temperature anomaly for N. temperate stations from Callendar [1938], c) global cooling from Douglas [1975], d) global temperature anomaly from Jones et al, [1986] e) global temperature anomaly from Hansen et al, [1981], f) and g) global temperature anomaly from IPCC 1990 and IPCC 2021. The changes in CO_2 concentration (Keeling curve) are also shown in d) through g). The periods of record for the weather station data are also indicated.

6.8 The CO_2 Doubling Ritual

The authors then go on to discuss the presumed effects of the volcanic eruption of Mount Agung in 1963. However, this discussion is based on the mathematical artifacts created by their 1-D RC model. There is no reason to expect that the model results for aerosols to be any better than those for CO_2. The authors then describe the changes in flux produced in their 1-D RC model when the CO_2 concentration is doubled from 300 to 600 ppm and their model responds by 'adjusting' to a new 'equilibrium state' with a higher surface temperature. This is shown in Figure 13 (H81, figure 4). Again, the temperature changes are just mathematical artifacts of the 1-D RC model. The authors of H81 copied MW67 and H76 and conveniently forgot to explain how these small changes

in LWIR flux can have any effect on the earth's climate when coupled to the normal diurnal and seasonal flux changes.

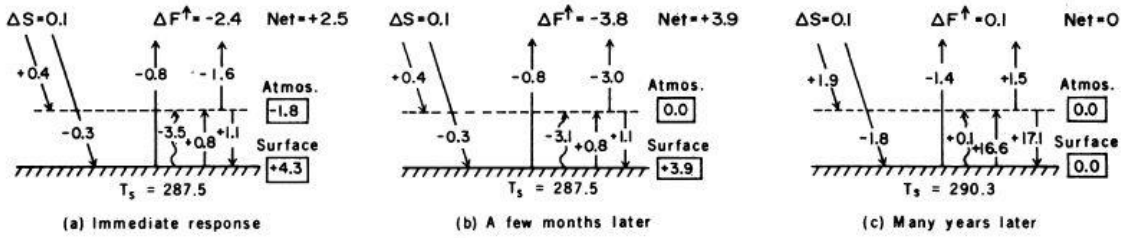


Fig. 4. Change of fluxes (watts per square meter) in the 1-D RC model when atmospheric CO_2 is doubled (from 300 to 600 ppm). Symbols: ΔS, change in solar radiation absorbed by the atmosphere and surface; $\Delta F\uparrow$, change in outward thermal radiation at top of the atmosphere. The wavy line represents convective flux; other fluxes are radiative.

Figure 13: (H81, Figure 4), the effects of a hypothetical 'CO_2 doubling' from 300 to 600 ppm on an equilibrium average climate.

Unfortunately, the pseudoscientific concept of radiative forcing has become accepted as part of the Imperial Cult of the Global Warming Apocalypse. A very similar argument to Figure 12 was used in Chapter 8 of the Fifth IPCC Climate Assessment WG1 Report [IPCC, 2013] over 30 years later. Figure 14 shows the equilibrium climate 'adjustment' to a radiative forcing from figure 8.1 of the IPCC report. This figure was adapted from figure 2 of Hansen et al [2005] '*Efficacy of Climate Forcings*' that added additional 'fudge factors' to the pseudoscience of radiative forcing. One of the other authors of this paper was Gavin Schmidt. He took over Hansen's position as director of NASA GISS in 2014 and also served as acting climate advisor to President Biden. He has continued to promote the NASA Goddard climate modeling fraud created by Hansen in 1981.

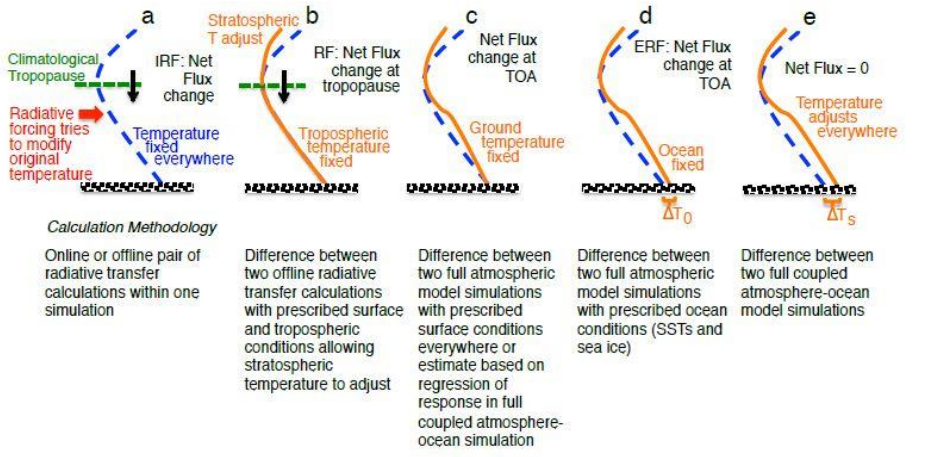


Figure 8.1 | Cartoon comparing (a) instantaneous RF, (b) RF, which allows stratospheric temperature to adjust, (c) flux change when the surface temperature is fixed over the whole Earth (a method of calculating ERF), (d) the ERF calculated allowing atmospheric and land temperature to adjust while ocean conditions are fixed and (e) the equilibrium response to the climate forcing agent. The methodology for calculation of each type of forcing is also outlined. ΔT_o represents the land temperature response, while ΔT_s is the full surface temperature response. (Updated from Hansen et al., 2005.)

Figure 14: (Figure 8.1 AR5, WGp 1 [2013]). Cartoon comparing (a) instantaneous RF, (b) RF, which allows stratospheric temperature to adjust, (c) flux change when the surface temperature is fixed over the whole Earth (a method of calculating ERF), (d) the ERF calculated allowing atmospheric and land temperature to adjust while ocean conditions are fixed and (e) the equilibrium response to the climate forcing agent. The methodology for calculation of each type of forcing is also outlined. ΔT_o represents the land temperature response, while ΔT_s is the full surface temperature response. (Updated from Hansen et al., 2005.)

The authors of H81 ignored four important aspects of the atmospheric radiative transfer.

1) The LWIR flux emitted to space by the atmosphere is a cooling flux. A change in this flux has to be analyzed as a change in the rate of cooling at different levels in the atmosphere.
2) The upward and downward LWIR fluxes are decoupled by molecular line broadening effects.
3) In addition to the decrease in LWIR flux to space, an increase in greenhouse gas concentration produces a slight increase in the downward LWIR flux to the surface. Almost all of this downward flux originates from within the first 2 km layer above the surface and approximately half originates from within the first 100 m layer above the surface.
4) The LWIR flux in the lower troposphere is fully coupled to the turbulent boundary layer near the surface.
This is discussed in detail above in relation to Figures T3 to T7.

6.9 The Simulation of the global mean Temperature Record

The authors then use a contrived mix of increasing CO_2 concentration, volcanic aerosols and variations in solar flux to create an approximate fit to the weather station record with their 1-D RC model. This is shown in Figure 15 from H81, figure 5. In reality, they are simply 'tuning' their model to match a temperature record dominated by the AMO (see Figure 12).

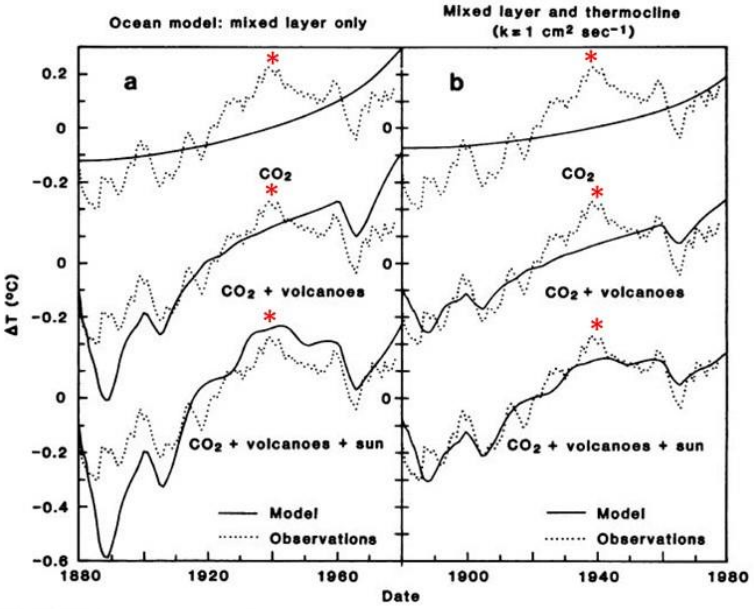


Fig. 5. Global temperature trend obtained from climate model with sensitivity 2.8°C for doubled CO_2. The results in (a) are based on a 100-m mixed-layer ocean for heat capacity; those in (b) include diffusion of heat into the thermocline to 1000 m. The forcings by CO_2, volcanoes, and the sun are based on Broecker (*25*), Lamb (*27*), and Hoyt (*48*). Mean ΔT is zero for observations and model.

Figure 15: (H81 figure 5), the climate model fit to the global mean temperature using a combination of pseudoscientific forcings from CO_2, volcanoes and sun for two different ocean model configurations. The 1940 AMO peak is indicated by the red asterisk.

7) The Growth of the Climate Modeling Fraud

The H81 paper is one of the earliest examples of the use of a contrived set of 'radiative forcings' to fraudulently 'tune' an equilibrium climate model to match the global average temperature record. This was the prototype political climate model that was 'tuned' to meet political goals. The climate modelers are paid to provide the climate lies and propaganda needed to justify public policy that restricts the use of fossil fuels. This process was adopted by the IPCC and copied by the US Global Climate Research program (USGCRP) [Ramaswamy et al, 2019, Melillo, 2014, Wuebbles et al, 2017]. In 1979 there were only two modeling groups that provided GCM data for the Charney report [Charney, 1979]. By 1995, 18 coupled climate models were available from seven different countries [Meehl et al, 1997]. The modeling effort for the IPCC is now coordinated through the Coupled Model Intercomparison Project (CMIP). In 2019 there were 49 modeling groups with approximately 100 different models involved in CMIP6 generating the fraudulent data to be incorporated into the next IPCC climate assessment (AR6) [Hausfather, 2019]. All of these models used the same basic approach established by M&W and H81. The climate sensitivities created by these models are clear evidence of the climate modeling fraud (see Figures 18 and 20f below). All 49 groups of climate modelers have abandoned physical reality and entered the equilibrium climate fantasy land.

The radiative forcings, the climate model simulation of the global mean temperature record and the equilibrium climate sensitivities (ECS) published in each of the IPCC Climate Assessment Reports are shown in Figures 16, 17 and 18 [IPCC, 1990, 1995, 2001, 2007, 2013, 2021]. The simulation from H81 (figure 5) is also shown in Figure 17a. There can be no 'CO_2 signal' in the global mean temperature record. The 1940 AMO peak in the global mean temperature record is indicated by a red asterisk. The ECSs vary from approximately 2 to 5 ℃ and are indicators of the differences in the model parameters such as feedbacks that are used to 'tune' the models to match the global mean temperature record. The real climate sensitivity should be 'too small to measure'. A greenhouse gas forcing does not change the energy balance of the earth, nor does it produce a measurable change in surface temperature. The IPCC used FAR, SAR and TAR to denote the First, Second and Third Assessment Reports, then changed to AR4, AR5 and AR6 for the later reports. AR1, AR2 and AR3 labels are also included on Figures 16, 17 and 18. The ocean oscillations such as the AMO are produced by a natural imbalance between the solar heating and the wind driven cooling of the ocean gyre circulation. Instead of King Canute trying to stop the rising tide, the natural baseline created by the pseudoscientific radiative forcing argument may compared to using the climate models to try and stop the ocean waves and create a flat ocean without the gyre circulation.

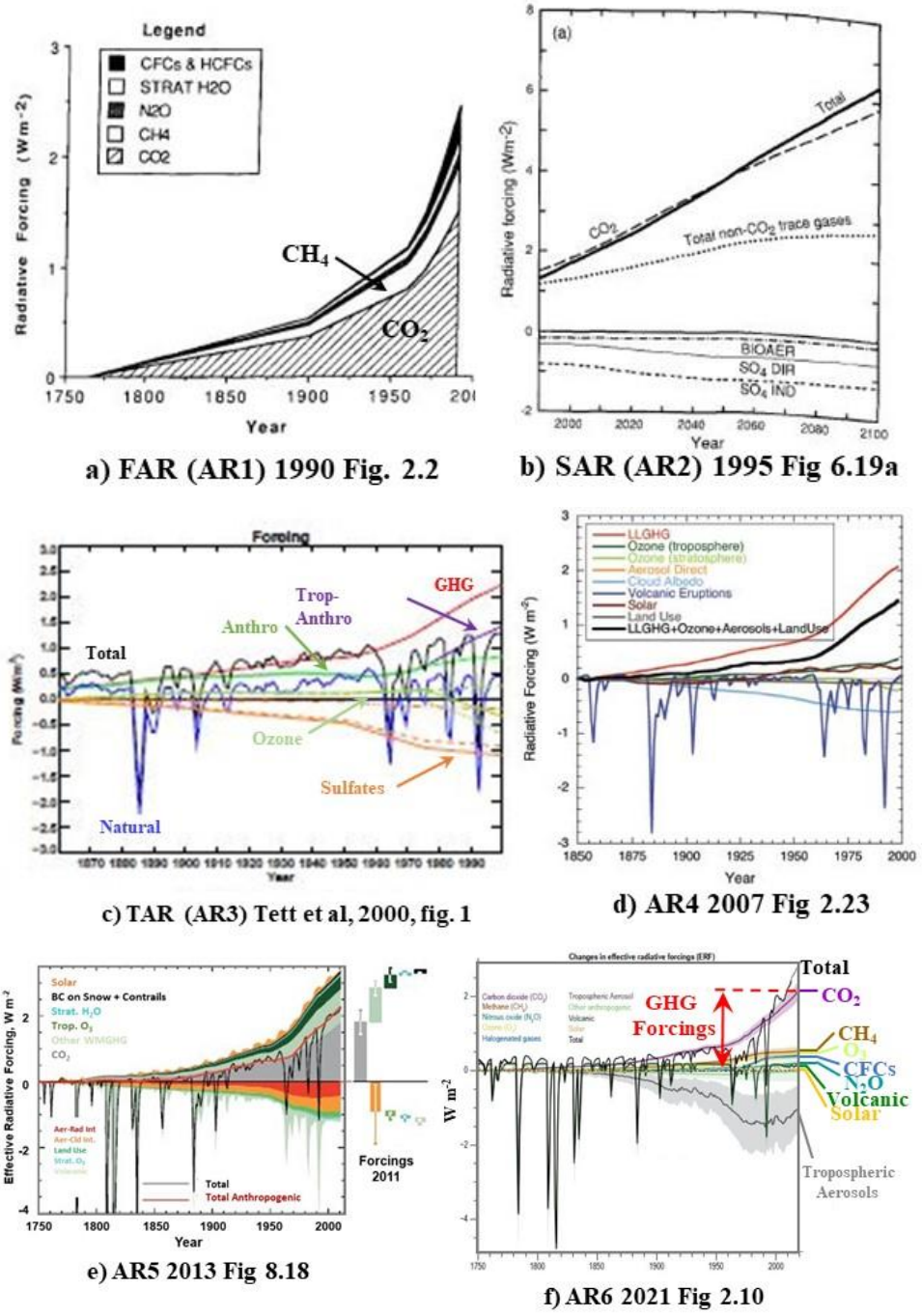


Figure 16: The time series of the radiative forcings used in six IPCC climate assessment reports. For the Third AR, the source is Tett et al, 2000. This is given as one of the sources of Figure 12.7.

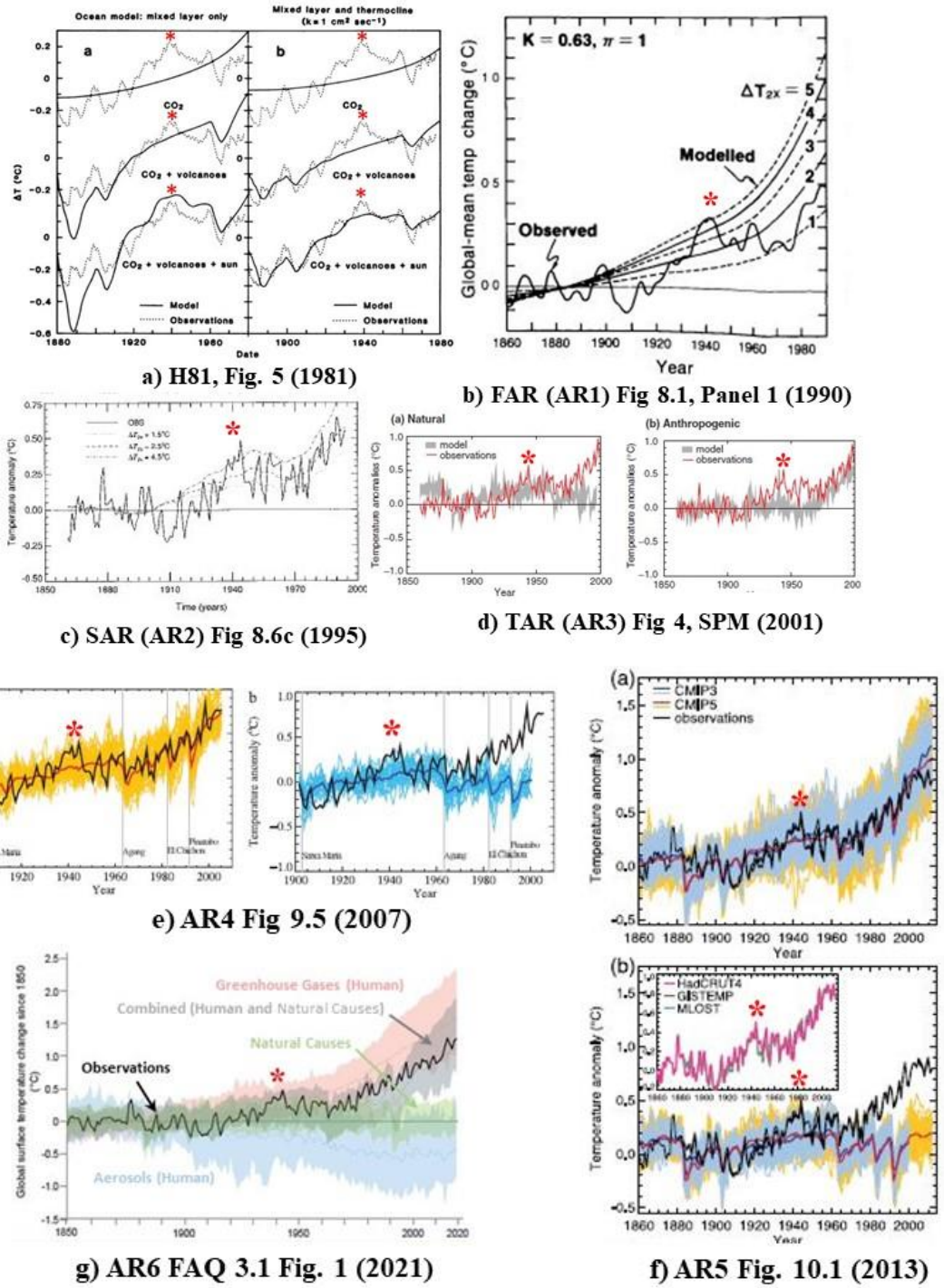


Figure 17: Climate model simulations of the global mean temperature record from H81 to AR6.

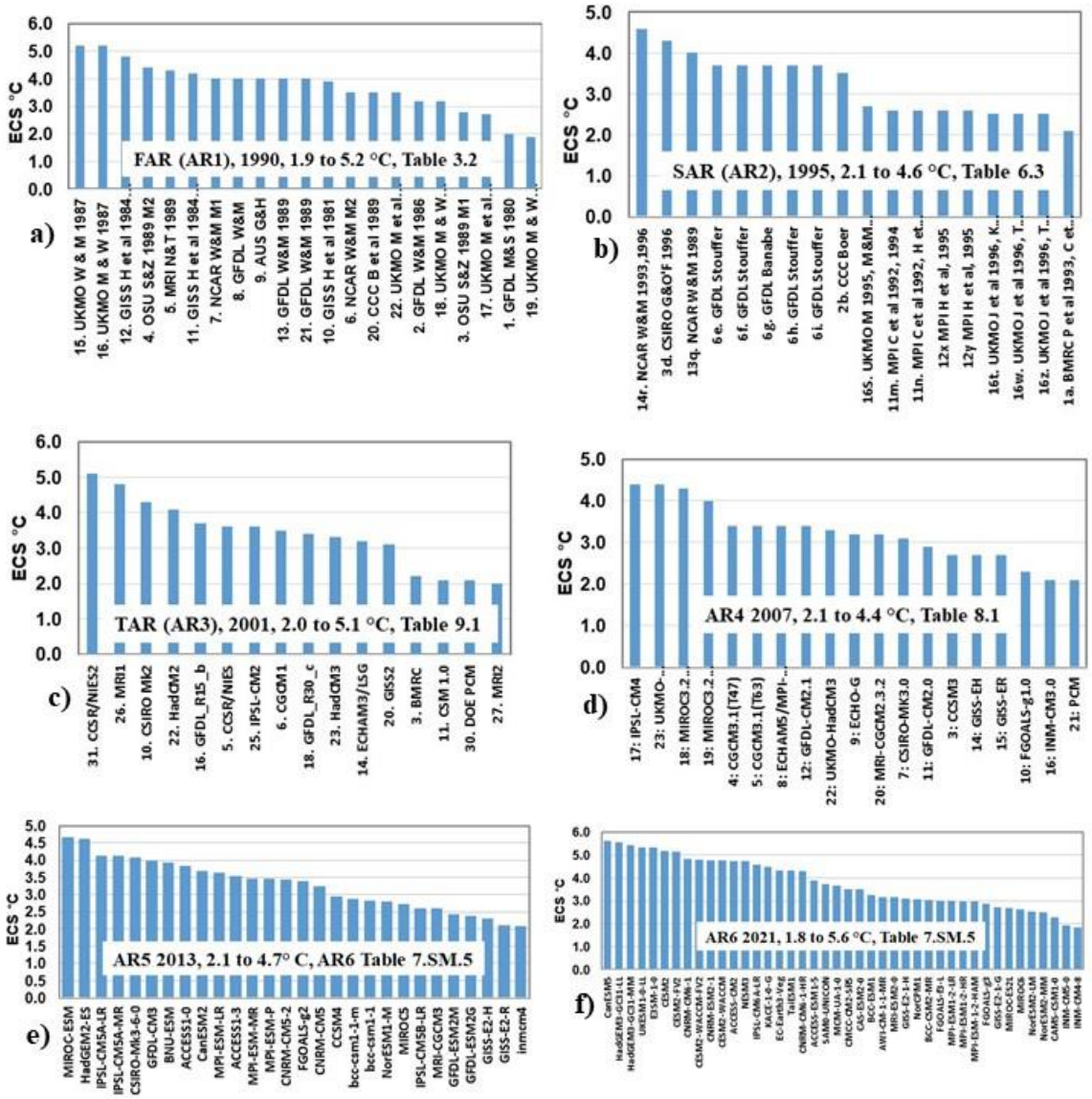


Figure 18: The equilibrium climate sensitivities (ECS) for various climate models from the six IPCC reports. The sources are indicated on the figures. The correct value of the ECS should be 'too small to measure'.

7.1 Connecting 'Natural' and 'Anthropogenic' Forcings and 'Extreme Weather'

Starting with the Third IPCC Climate Assessment Report (TAR) [2001], a new level of political fraud was added to the climate models. The contrived time series of radiative forcings used to create the illusion of a fit to the global mean temperature record was split into 'natural' and 'anthropogenic' forcings. The climate models were then rerun to create a separate 'natural baseline' and an 'anthropogenic contribution'. A vague statistical argument using changes to the normal distribution ('bell' or Gaussian curve) of temperature was then used to claim that the increase in temperature caused by 'anthropogenic' forcings would cause an increase in the frequency and intensity of 'extreme weather events'. This is illustrated in Figure 19. The calculated global mean temperature record using a contrived set of natural, anthropogenic and combined

forcings is shown in Figures 19a through 19c. The forcing components are shown in Figure 19d and 19e and the 'attribution' argument based on changes to a normal statistical distribution of temperature is shown in Figure 19f. (Figures 19a through 19d and 19f are from WG1 AR3, SPM4, SPM 3 and fig. 2.32. Figure 19e is from Tett et al, 2000, fig. 1). The climate model results are from Stott et al [2000] using the Hadley HadCM3 model. Little has changed in 20 years. This provided the pseudoscientific justification for the political control of fossil fuel combustion that led to the disastrous net zero policy of today.

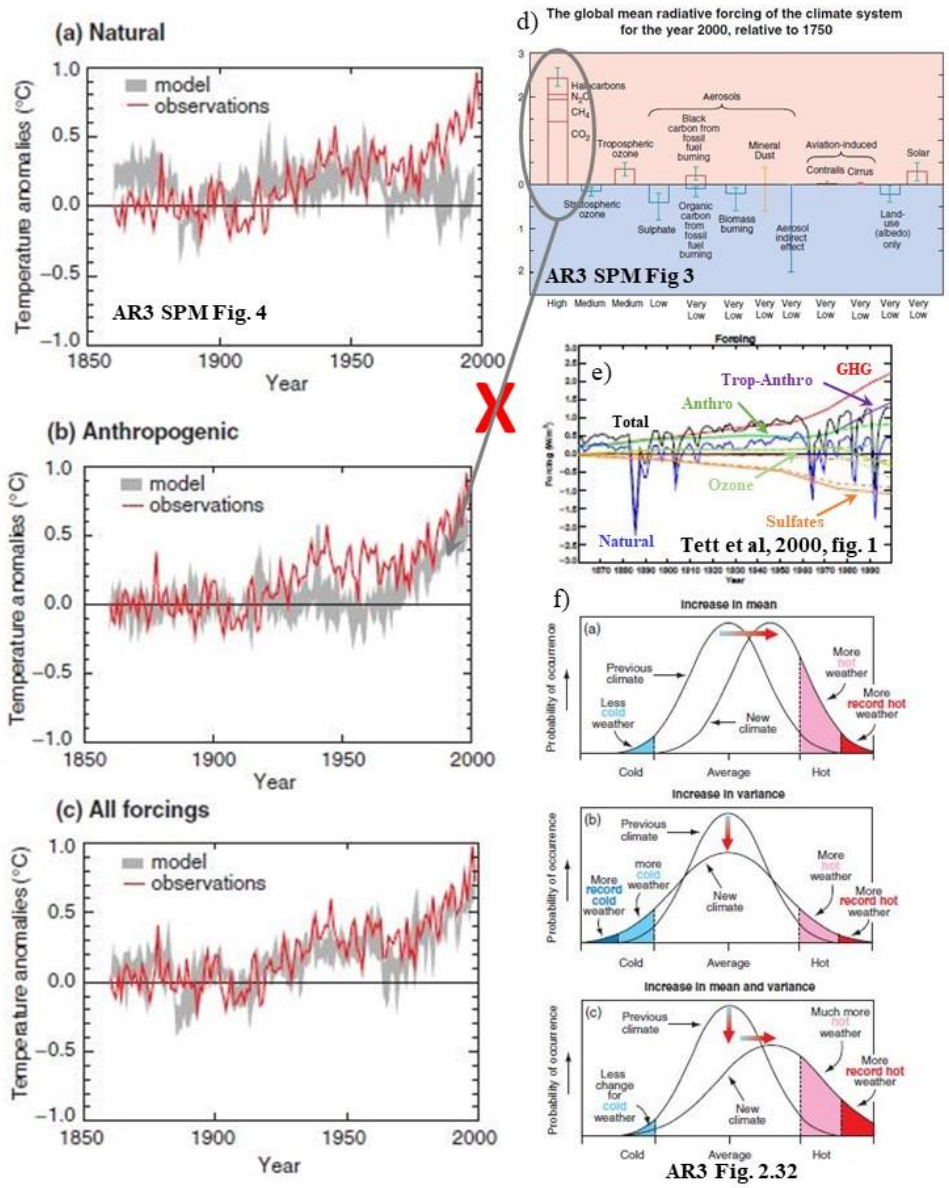
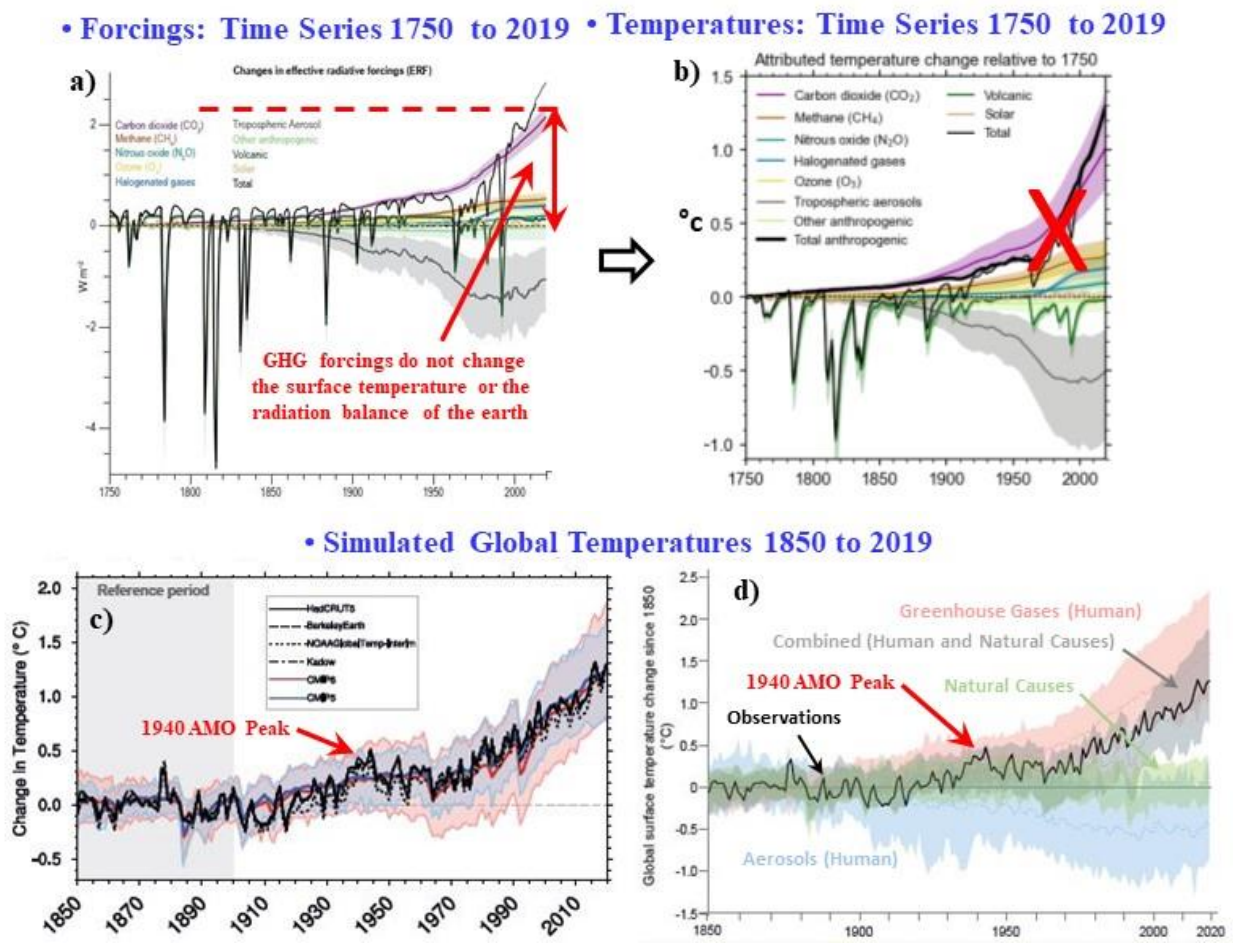


Figure 19: The 'attribution' of warming in the global mean temperature record to 'anthropogenic' causes. The contrived set of pseudoscientific forcings used by the climate models to simulate the global mean temperature record are separated into natural and anthropogenic sources. The climate models are rerun using the natural forcings to create a fraudulent 'natural' baseline and the anthropogenic forcings to show the 'human caused' warming. A vague statistical argument is used to claim that the anthropogenic warming caused an increase in the frequency and intensity of 'extreme weather events'.

As computer technology has improved, the climate models have become more complex, but the underlying assumptions have not changed significantly. 'Effective' radiative forcings were introduced by Hansen et al in 2005. These were used to provide additional 'tuning' in the climate models [Hansen et al, 2005]. The time series of the radiative forcings used in the CMIP6 models and the related temperature changes are shown in Figures 20a and 20b. The comparison to the global temperature record is shown in Figure 20c. The fraudulent attribution to human causes by dividing the radiative forcings into 'natural' and 'human caused' is shown in Figure 20d. The real causes of the observed temperature changes are shown in Figure 20e. They are a combination of ocean temperature changes, urban heat island effects, changes to the rural/urban mix in the weather station averages and various 'adjustments' used to 'homogenize' the temperature data (see Figure 12). It has been estimated that half of the warming in the 'global record' has been created by such adjustments [Andrews 2017a, 2017b and 2017c, D'Aleo and Watts 2010, Berger and Sherrington, 2022, O'Neill et al, 2022]. The dominant terms in the ocean temperature contribution are the AMO and a linear temperature recovery from the Little Ice Age (LIA) [AMO 2022, Akasofu, 2010]. The climate models are simply 'tuned' to match the global temperature record. The 'tuned' models are then used to simulate the increase in global average temperature produced by a doubling of the CO_2 concentration. This gives the climate sensitivities shown in Figure 20f.



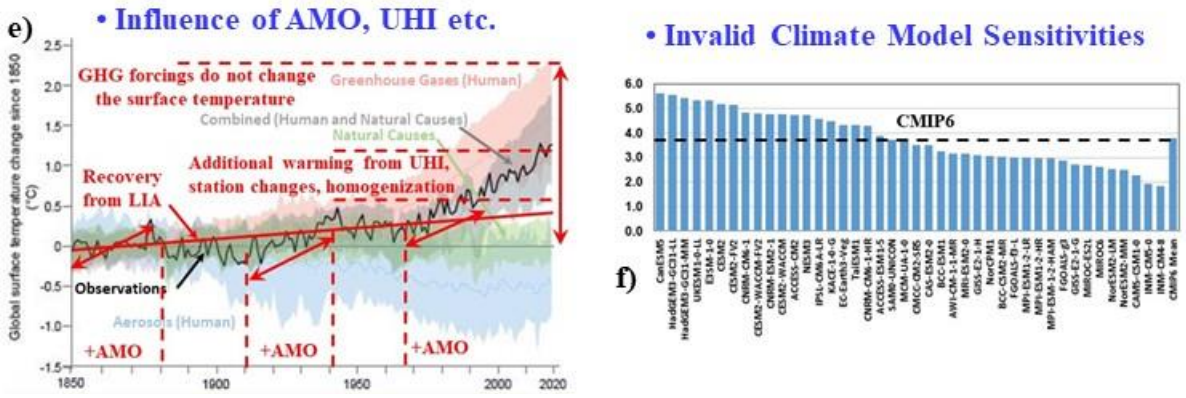


Figure 20: The attribution fraud from the CMIP6 model ensemble used in AR6. a) time dependence of the radiative forcings and b) time dependence of the temperature changes derived from a), c) 'tuned' temperature record using a contrived set of radiative forcings that appear to simulate the global mean temperature record, d) the separation of the contrived forcings to create fraudulent 'human' and 'natural' temperature records, e) the contributions of the AMO, UHI etc. to the global mean climate record, f) the [pseudoscientific] equilibrium climate sensitivity (ECS) estimated from the CMIP6 models (IPCC AR6, WG1, figures 2.10, 7.8, 3.4b and FAQ 3.1 Fig. 1, ECS data from Table 7.SM.5)

8) Evidence Ignored: 1) The Linewidths and Cooling Rates Derived from the Radiative Transfer Calculations

The climate modelers also ignored the details of their own radiative transfer calculations. They were trapped in the equilibrium climate 'box'. The LWIR flux emitted to space is decoupled from the downward LWIR flux to the surface by molecular line broadening (CR23), [Clark, 2013]. Manabe's group was certainly aware of molecular line broadening effects, but they relied on low resolution absorption measurements for their radiative transfer analysis.

> Owing to the pressure broadening of the line shape the mean absorptivity is also a function of pressure of the layer with which we are concerned. Therefore, it is necessary to take into consideration this effect. Manabe and Moller, 1961

Later, high resolution molecular line data was available, for example from McClatchey et al [1973] and was used to generate simplified k distribution spectral models needed for faster computational speed in the climate models [Lacis and Oinas, 1991, Lacis et al, 1979]. However, there was no analysis of molecular line broadening. Furthermore, the contribution of different atmospheric levels to the intensity of the LWIR flux emitted at TOA or to the surface was not considered. A high resolution (0.01 cm^{-1}) transmittance calculation of the 2060 to 2120 cm^{-1} spectral region from McClatchey [1973] is shown in Figure 21. The strong lines are from CO_2 overtone bands including the [11^10:00^00] Q branch [Herzberg, 1991].

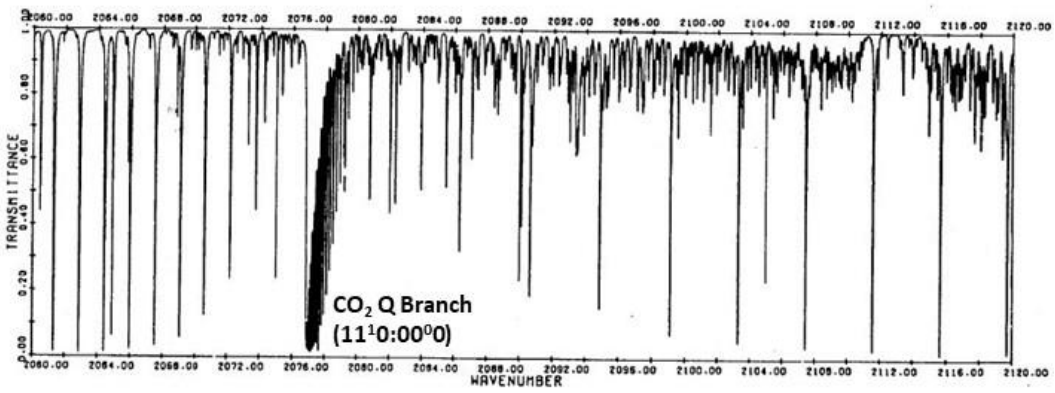


Figure B1: Synthetic spectrum using the Data Compilation. Conditions are as follows: pressure = 188 mb, T = 219 K, $W_{H_2O} = 2.00 \times 10^{20}$, $W_{CO_2} = 2.05 \times 10^{21}$, $W_{O_3} = 3.23 \times 10^{18}$, $W_{CO} = 4.67 \times 10^{17}$. Lines belonging to other molecular species contained on tape are not present in this spectral region. Spectral resolution is 0.01 cm^{-1}.

Figure 21: High resolution LWIR spectrum from McClatchey et al [1973] 2060 to 2120 cm^{-1}, 0.01 cm^{-1} resolution.

The climate models had to calculate the LWIR cooling rates as part of the iteration process used to reach equilibrium and set the LWIR flux at the top of the model atmosphere to match the absorbed solar flux. The atmospheric cooling rate for CO_2 was discussed by Plass [1956, figure 8]. Both heating and cooling rates for CO_2, H_2O and ozone were considered by Manabe and Strickler [1964, figure 8c]. This is shown in Figures 22a and 22b. Stone and Manabe [1968] discussed the LWIR cooling rate profiles produced by different radiative transfer models (Figure 22c) but they did not consider the effects of changing the CO_2 concentration. Ackerman [1979] determined both the cooling rate profiles and the change in the cooling rate produced by a doubling of the CO_2 concentration (Figures 22d through 22f). Unfortunately, neither Manabe's group nor Ackerman extended their analysis beyond the accepted equilibrium air column model. The seasonal and diurnal temperature cycles and ocean surface energy transfer were not considered. The information on molecular linewidths and cooling rates was available in 1979 to show that a 'radiative forcing' produced by an increase in CO_2 concentration did not change the energy balance of the earth or the surface temperature. It was ignored in H81.

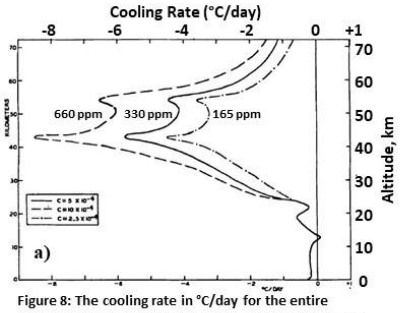


Figure 8: The cooling rate in °C/day for the entire frequency interval from 12μ-18 μ. Curves are given for the following CO_2 concentrations: $c = 5 \times 10^{-4}$ (0.033% by volume); $c = 10 \times 10^{-4}$ (0.066% by volume); $c = 2.5 \times 10^{-4}$ (0.0165% by volume). There is no difference in the cooling rates below 24 km.

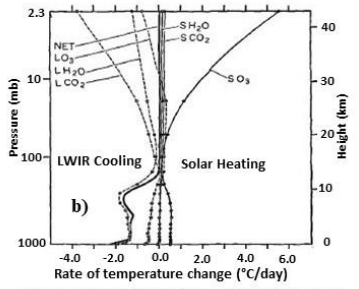


Figure 8c: Vertical distribution of the radiative heat balance components for the thermal equilibrium of a clear atmosphere

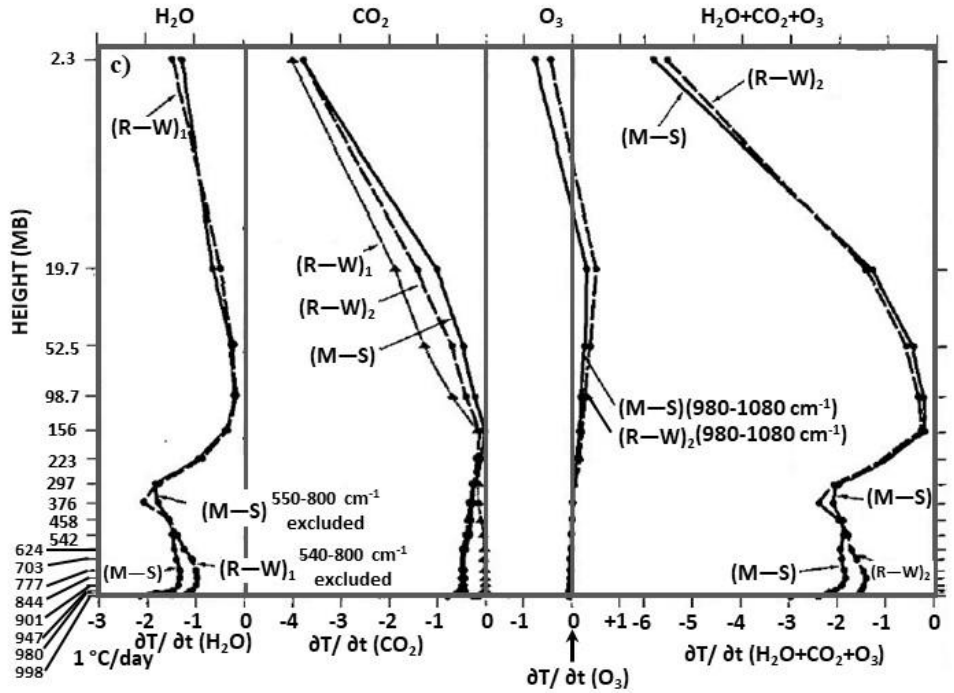


Figure 4: Comparison of heating rated computed by the (M-S) and (R-W) models

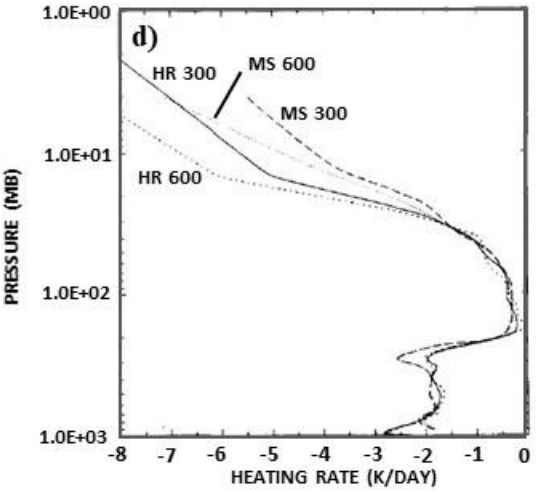


Fig. 3(a) Heating rate profiles computed with HR code for CO_2 concentrations of 300 ppm (solid curve) and 600 ppm (short dash) and profiled computed with MS code for CO_2 concentrations of 300 ppm (long dash) and 600 ppm (dotted) using mid latitude summer profiles.

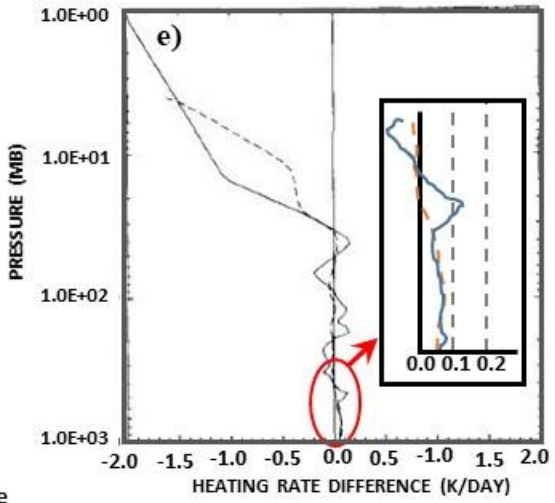


Fig. 3(b) Difference between heating rate profiles for computed CO_2 concentration of 300 ppm and 600 ppm for HR code (solid curve) and MS code (long dash)

Figure 22: The calculation of atmospheric LWIR cooling rates by a) Plass (for CO_2 only), b) Manabe and Strickler, c) Stone and Manabe and d) by Ackerman. e) The difference in cooling rates produced by a doubling of the CO_2 concentration and f) the response of the lower troposphere from e) on an enlarged scale, also from Ackerman.

9) Evidence Ignored: 2) The Charney Report

The climate model results were officially 'sanctified' by the Charney report published in 1979 [Charney, 1979]. It concluded in part:

> When it is assumed that the CO_2 content of the atmosphere is doubled and statistical thermal equilibrium is achieved, the more realistic of the modeling efforts predict a global surface warming between 2 C and 3.5 °C with greater increases at higher latitudes.
> The primary effect of an increase of CO_2 is to cause more absorption in the troposphere and thus to increase the air temperature in the troposphere. A strong positive feedback mechanism is the accompanying increase of moisture which is an even more powerful absorber of terrestrial radiation.

This report was very narrow in scope and ignored the large body of evidence that was available by 1979 to show that the climate equilibrium assumption was invalid and that an increase in the atmospheric CO_2 concentration could not change the surface temperature of the earth. There was no quantitative discussion of the surface energy transfer processes that determine the surface temperature. For example, as illustrated in Figure 1a, above, detailed flux and temperature measurements were available from the Great Plains Turbulence Field Program conducted in 1953 [Letteau and Davidson, 1957, CR23]. Ocean surface energy transfer was discussed by Bunker [1976]. Natural wind driven ocean oscillations including the Southern Oscillation Index and the North Atlantic Oscillation were also ignored [Julian and Chervin, 1978, Lamb, 1972]. Stephenson et al, [2003] provides a historical review and earlier references. The spectral properties of water were published by Hale and Querry [1973]. This showed that the penetration depth of the LWIR flux into the water surface was less than 100 micron. An LWIR radiative forcing by a greenhouse gas could not heat the oceans.

There are also issues related to conflict of interest that need to be considered. Charney served as consultant to NASA GISS and recommended that NASA import the Mintz and Arakawa two layer atmospheric model from UCLA. Arakawa provided support to NASA for this model [Hansen, 2000]. Charney and Arakawa were both reviewers for the Charney report.

The causes of an Ice Age were finally explained in 1976 by Hays et al. Subtle changes in the distribution of the solar flux over the earth's surface related to Milankovitch cycles - orbital eccentricity, axial tilt and precession were sufficient to change the balance between the rates of heating and cooling of the earth. Changes in the atmospheric concentration of CO_2 followed the ocean temperature changes [Hays et al, 1976, Imbrie and Imbrie, 1979]. The mathematical warming artifacts created by the equilibrium air column had been revealed to anyone who cared to look. Physical reality had been abandoned in favor of mathematical simplicity. The climate modelers were blinded by the equilibrium assumption. They continued to play computer games in their equilibrium climate fantasy land. They wanted to keep their jobs.

10) Evidence Ignored: 2) The Ocean Oscillations

Starting in about 1982, a major CO_2 research program was initiated by the US Department of Energy (DOE) with an extensive report published in 1985 [MacCracken and Luther, 1985a, 1985b, Riches and Koomanoff, 1985]. The climate model results were accepted without question. The issue was how to detect the CO_2 signal in the surface temperature record. In their analysis of the temperature record Wigley et al [1985] concluded that "*unequivocal, statistically rigorous detection of the effects of changing CO_2 levels on atmospheric temperatures is not yet possible*". No quantitative thermal engineering analysis of the changes in surface temperature was presented. In the following year, using the same data set, the Climate Research Unit (CRU) at the University of E. Anglia started to ramp up the warming claims: "*the data show a long timescale warming trend, with the three warmest years being 1980, 1981 and 1983 and five of the nine warmest years in the entire 134 year record occurring after 1978*" [Jones et al. 1986]. In a slightly later paper, Jones et al [1988] concluded "*Nevertheless, the persistent surface and tropospheric warmth of the 1980s which, together with the ENSO, gave the exceptional warmth of 1987 could indicate the consequences of increased concentrations of CO_2 and other radiatively active gases in the atmosphere*". Again, there was no attempt to perform any thermal engineering analysis of the surface temperature. The temperature record from Jones et al [1988] is shown in Figure 26. The increase in CO_2 concentration [Keeling, 2023] has been added and the positive phases of the AMO are indicated. Based on Figure 23, there is no reason to expect that the increase in CO_2 concentration has had any effect on the temperature record. The full list of authors is P. D. Jones and T. M. L. Wigley, *Climatic Research Unit, University of E. Anglia*, C. K. Folland and D. E. Parker, *Meteorological Office. Bracknell, UK*, J. K. Angell, *Air Resources Laboratory, NOAA Environmental Research Labs, Silver Spring, MD, USA*, S. Lebedeff and J. E. Hansen, *NASA Goddard Space Flight Center, New York, USA*.

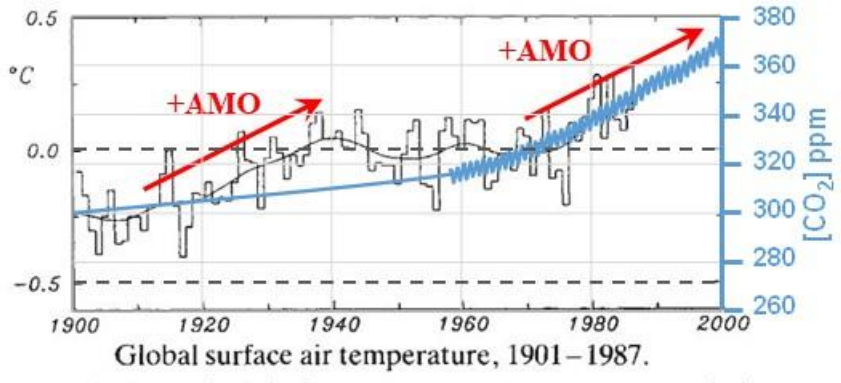


Figure 23: The temperature record from Jones et al [1988] with the Keeling curve and the warming phases of the AMO added.

11) More Mission Creep: The Climate Intercomparison Project

Mission creep continued as the DOE supported climate model comparison programs gradually evolved into the Climate Model Intercomparison Project (CMIP). AMIP, the Atmospheric Model

Intercomparison Project was described by Gates [1992]. This was part of the program for Climate Model Diagnosis and Intercomparison at the Lawrence Livermore National Laboratory (LLNL). The first phase of the Coupled Model Intercomparison Project (CMIP1) started in 1996 [Meehl, 1997].

> The first objective of CMIP1, which began in 1996, is to document systematic simulation errors of global coupled climate models. This is done by comparing the mean model output to observations to determine how well the coupled models simulate current mean climate. Meehl et al, 1997

This may best be described as comparing two meaningless number series. Climate is often defined in terms of the Köppen or similar classification scheme which starts with five basic climate types that are further subdivided into zones based on precipitation and temperature [Kottek et al, 2006]. How is a mean climate related to changes in the 30 different climate zones commonly used in the Köppen classifications? The mean global temperature is an area weighted average of weather station and ocean surface temperatures that can be compared to similar climate model calculations. Such an average is just a number or an index. It is not a temperature. This is discussed in detail by Essex et al [2006]. The models are 'tuned' using a contrived set of radiative forcings and feedbacks so that the average of the calculations appears to match the numerical average of the measured temperatures. The raw station data is extensively processed (homogenized) so that the climate averages may differ significantly from the original data. The model calculations then diverge as errors related to Lorenz instabilities accumulate in climate projections going forward [Lorenz, 1963, 1973].

The second phase, CIMP2 involved a study of the transient climate response.

> The second phase of CMIP, CMIP2, has just begun and will involve an intercomparison of global coupled model experiments with atmospheric CO_2 increasing at a rate of 1 % per year compounded where CO_2 doubles at around year 70 of 80 total years. The goals of CMIP2 are to document the mean response of the dynamically coupled climate system to a transient increase of CO_2 in the models near the time of CO_2 doubling. Meehl et al, 1997

An LWIR greenhouse gas radiative forcing, including a CO_2 doubling does not change the energy balance of the earth, nor can it produce a measurable change in the surface temperature. This CMIP2 study is pseudoscientific nonsense. The climate modelers are still playing computer games in their equilibrium climate fantasy land.

The third phase, CMIP3 involved 12 different experiments [sic] with 24 Air-Ocean GCM models including a separation into natural and anthropogenic forcings and runs with a variety of 'CO_2 forcings' and different emission 'scenarios'. In addition, models were run with both doubling and quadrupling of the CO_2 concentrations and a CO_2 concentration ramp [Meehl et al, 2007]. By now LLNL was heavily involved in collecting and archiving the model data. This was more mission creep away from the original LLNL mission to develop nuclear weapons. The CMIP3 results were used to create 'natural' and 'anthropogenic' forcings for regional and global mean temperature records [IPCC AR4 WG1, 2007 figure SPM4, FAQ 9.2 figure 1].

The CMIP5 and CMIP6 phases have followed CMIP3 with different emission scenarios and a mix of CO_2 ramp and doubling/quadrupling model runs [Taylor et al, 2012, Stauffer et al, 2017]. The number and complexity of the models has increased, but the fundamental assumption that a contrived set of radiative forcings and feedbacks can simulate a global mean climate remains the same (See Figures 16 and 17). The number of denizens in the equilibrium climate fantasy land has also grown. In 2019 there were 49 modeling groups playing computer games for CMIP6 [Hausfather, 2019].

12) Political Exploitation

The political exploitation of the climate modeling fraud started in the 1970s over exaggerated concerns related to population growth. Paul Ehrlich published his book '*The Population Bomb*' in 1968 and Meadows et al published '*Limits to Growth*' in 1972 [Meadows et al, 1972]. An important event was the 1975 conference '*The Atmosphere Endangered and Endangering*' organized by anthropologist Margaret Mead [Hecht, 2007, Mead and Kellogg, 1976]. Her objective was to exploit atmospheric pollution - real or imagined - for population control. Attendees included Stephen Schneider and John Holdren. Both were strongly influenced by Ehrlich. Schneider became a leading advocate of the CO_2 climate scare at Stanford University. Holdren later became science and technology advisor to President Obama.

An important change occurred in the UK in 1979 when Tom Wigley took over from Hubert Lamb as director of the CRU at UEA. Lamb emphasized a historical approach to climate analysis. Wigley promoted climate modeling and chose to believe that the warming artifacts created by the climate models were real. He was an early prophet of the Cult of the Global Warming Apocalypse. He also obtained funding from the US DOE 'CO_2 Program' that promoted climate modeling and the detection of a human 'CO_2 signal' [Wigley et al, 1985].

Efforts also started to exploit global warming within the World Meteorological Organization (WMO) and the United Nations Environmental Program (UNEP). Bert Bolin conducted climate research for both agencies. Maurice Strong was the first head of UNEP in 1972 and from the start it was involved in blatant environmental advocacy [McClean, 2009]. In 1980, a conference in Villach, Austria, was hosted by the WMO, UNEP and the International Council of Scientific Unions (ICSU), with the aim of providing a "carefully prepared scientific assessment of the CO_2 question to provide them with guidance in their future activities and advice to nations". This conference concluded that the scientific uncertainties were so significant that no CO_2 management plan could be proposed. The same three organizations tried again in Villach in1985, using essentially the same data, but this time the 100 attendees participated as individuals rather than representatives of their countries, and they were selected by the three sponsoring agencies because of their support for global warming. This conference included the presentation of several papers, which were both commissioned and peer-reviewed by the conference organizers [Boehmer-Christiansen and Kellow, 2002]. Bert Bolin wrote the report for this conference and created a consensus on the need to take action on global warming. Bolin was also instrumental in preparing

the SCOPE 29 report on '*The greenhouse effect, climate change and ecosystems*' [Bolin et al, 1986]. This created the necessary political pressure for the WMO to establish the IPCC in 1988. Hansen also presented his fraudulent climate warming data to a US Congressional hearing in June 1988 [Hamlin, 2021]. The US Global Change Research Program (USGCRP) was established by Presidential initiative in 1989 and mandated by Congress in 1990.

When the IPCC was created in 1988, Bolin was the first chairman and another global warming believer, John Houghton, Director General of the UK Met Office led Working Group 1 for the technical assessment of global warming. The UK Hadley Center for Climate Prediction was established at the Met. Office in 1990. In conjunction with the Climate Research Center at the University of E. Anglia, the Hadley Center provided major support to the IPCC. The first IPCC assessment report was published in 1990. It was based largely on the SCOPE 29 report. Close ties developed between political leaders and various leading climate researchers. In the UK this included John Houghton (UK Met Office), the Climate Research Unit (CRU) at UEA and Margaret Thatcher (UK Prime Minister) [Courtney, 2012; Folland et al, 2004]. In the US, one of leading political advocates of climate change was Al Gore. He first heard of global warming as a student when he took a course from Roger Revelle. Gore was elected to Congress in 1976 and was US Vice president from 1992 to 2000. He was later responsible for 'An Inconvenient Truth'. This was a largely fraudulent book on global warming that was also made into a film of the same name.

It must be emphasized that the Intergovernmental Panel on Climate Change (IPCC) is a political body, not a scientific one [Crok and May, 2023, McLean, 2010, 2009, Bolin, 2007]. Its mission is to assess "the scientific, technical and socioeconomic information relevant for the understanding of the risk of human-induced climate change." This is based on the *a-priori* assumption that human activities are causing CO_2 induced global warming. There never was an attempt to objectively evaluate the scientific evidence of the cause of climate change. The IPCC was established to exploit global warming as a way of inducing economic disruption based on the population control and sustainability concerns raised by the Club of Rome [Darwall, 2017, Zubrin, 2013, Klaus, 2007, Dewar 1995]. The IPCC has published six major assessment reports: the first, second and third - FAR (1990), SAR (1995), TAR (2001) and AR4 (2007), AR5 (2013) and AR6 (2021). While the reports may contain a useful compendium of scientific references, material that does not conform to the global warming dogma has usually been omitted. Authors and editors were selected based on their willingness to find CO_2 induced global warming whether it existed or not. The primary focus of these reports has been on the use of modeling 'scenarios' to predict future global warming using invalid computer models. These reports should not be cited as scientific references. Any scientific caution about the attribution of temperature increases to global warming was abandoned with the second IPCC Assessment Report in 1995. This was altered at the last minute at the request of the US State Department [Kummer, 2012]. The science had to agree with the 'Summary for Policymakers' written for the politicians. Similarly, the notorious 'Hockey Stick' temperature series based on fraudulent tree ring data was featured prominently in the 2001 Assessment Report [Mann et al, 1998, 1999, Montford, 2010, Steyn, 2015, Wedgman et al, 2010]. This was an attempt to eliminate the Medieval Warm Period and the Maunder Minimum from the climate record. The fraud here was the deliberate manipulation of the measured data to create the desired outcome.

In November of 2009, and again in November 2011, a large archive of e-mails and other files from the Climate Research Unit of the University of East Anglia was released on the Internet. A third round was released in March 2013. This archive has revealed to many people outside of the close knit climate community that there had been an ongoing fraud for many years to promote the global warming agenda and prevent the publication of material that did not support the prevailing global warming dogma. The peer review process in climate science had collapsed and been replaced by blatant cronyism. Climate science had become detached from its foundation in physical science and degenerated into a quasi-religious cult. Belief in global warming was a prerequisite for funding in climate science. The release of this climate archive became known as 'Climategate'. The information provided has been analyzed in detail by several authors [Monckton, 2009, Montford 2010, Mosher & Fuller, 2010].

13) Extreme Weather Events: 1) The Ocean does not boil

As shown above in Figure 9, the small increase in downward LWIR flux from the lower troposphere to the surface produced by an increase in atmospheric greenhouse gas concentration cannot produce any measurable change in ocean surface temperature. The penetration depth of the LWIR flux into the ocean surface is less than 100 micron (0.004 inches). Here it is fully coupled to the wind driven evaporation or latent heat flux. There is no requirement for an exact flux balance between the absorbed solar flux and the ocean surface cooling. Natural variations in the wind speed coupled to the ocean gyre circulation produce quasi-periodic changes in ocean surface temperature. There are four main ocean oscillations, the Atlantic Multi-Decadal Oscillation (AMO), the El Niño Southern Oscillation (ENSO), the Indian Ocean Dipole (IOD) and the Pacific Decadal Oscillation (PDO) [AMO, 2022; ENSO. 2022; IOD, 2022; PDO, 2022]. These oscillations provide a natural 'noise floor' for the ocean surface temperatures (CR23). (See Figure T11 above).

The ENSO index is inversely related to changes in the wind speed as determined by the Southern Oscillation Index (SOI). This is shown in Figure 24. The changes in temperature are not limited to the ocean surface but extend to significant depths. The 2016 ENSO peak was produced by a decrease in wind speed near 2 m s^{-1}. The decrease in latent heat flux (wind driven evaporation) was approximately 30 W m^{-2} and the temperature change was 2.5 C to a depth of at least 75 m. The change in ocean heat content to 75 m depth was approximately 800 MJ m^{-2}. Over the 6 month period of the ENSO peak, the cumulative increase in downward LWIR flux from CO_2 was 0.26 MJ m^{-2}. This is approximately 3000 times less than the change in heat content to 75 m depth produced by the ENSO peak (CR23).

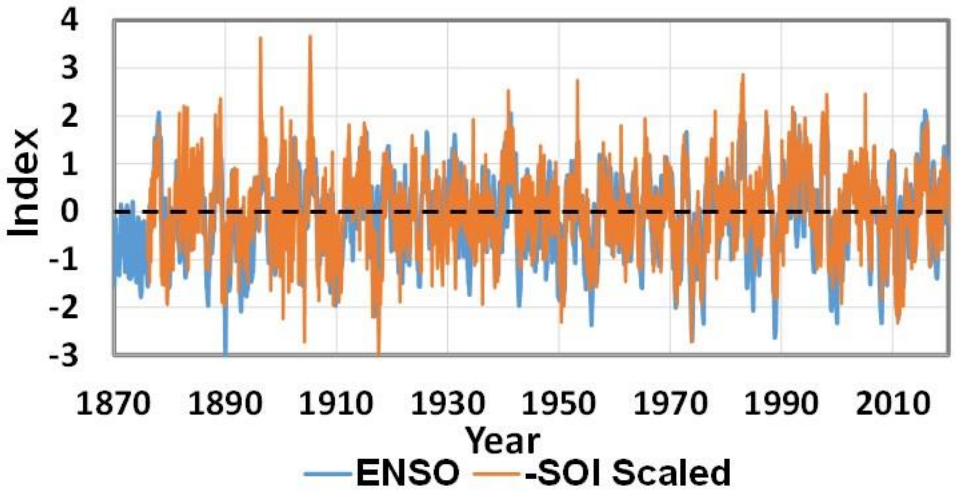


Figure 24: Monthly ENSO data series from 1870 plotted with the scaled SOI index from 1876. The SOI is multiplied by 0.086 and the sign is reversed to match the ENSO response.

In addition, the upper limit to tropical ocean surface temperatures is near 30 °C. When the surface temperature starts to increase above this, strong local thunderstorms are formed that limit the temperature rise [Eschenbach, 2010]. The changes in temperature related to the ENSO are produced by changes in the location and the area of the warm pool. There are also major changes in evaporation and precipitation patterns. The maximum ocean surface temperature does not increase. In addition, as the ENSO index increases, the temperatures in the lower troposphere also increase, with a time delay of a few months. The ENSO related changes in area of the equatorial Pacific Ocean warm pool are shown in Figures 25a and 25c [NRL, 2021]. The monthly ENSO index from 2019 and the UAH global lower tropospheric (tlt) temperature anomalies are shown in Figure 25b [UAH. 2022].

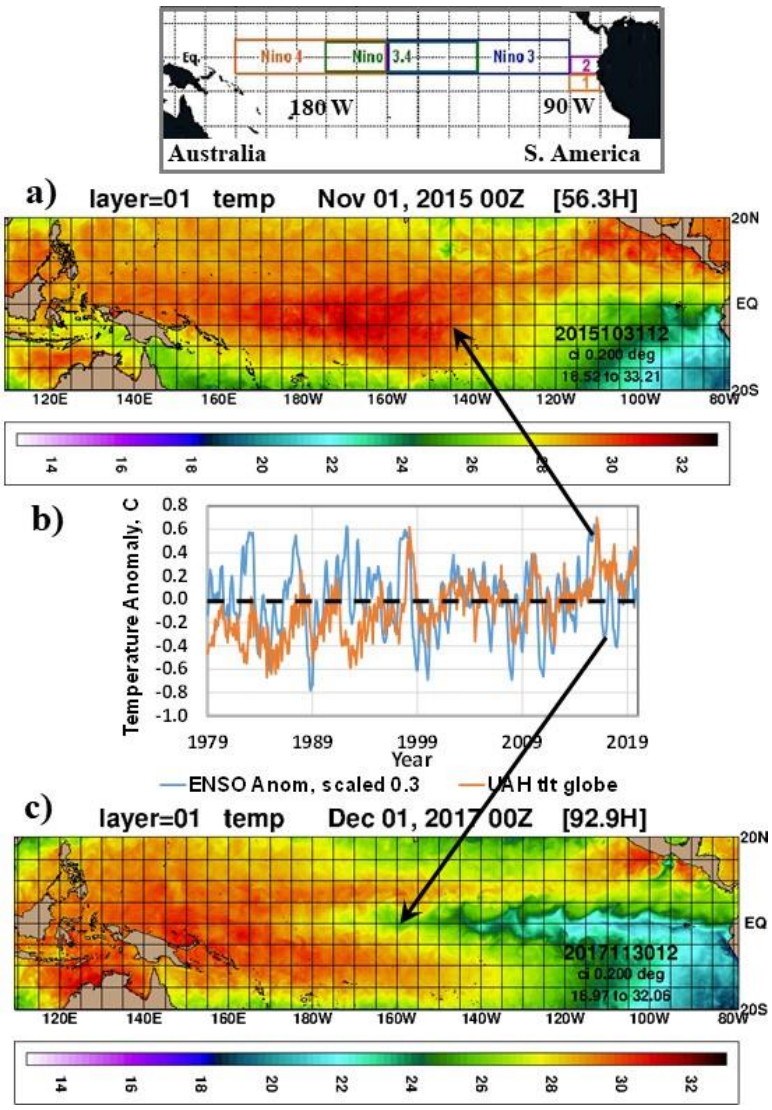


Figure 25: Surface temperatures in the equatorial Pacific Ocean for November 1, 2015 and December 1, 2017 corresponding to a) high and c) low values of the ENSO index. The map inset indicates the Nino 3.4 region used to determine the ENSO index. The monthly ENSO index and the UAH global lower tropospheric temperature anomaly (tlt) from satellite microwave measurements are shown in b).

14) Extreme Weather Events: 2) Downslope Winds and High Pressure Domes

One of the more egregious applications of the equilibrium climate models has been the 'attribution' of 'extreme' natural weather events to the effects of the increased CO_2 levels in the atmosphere. At present, the annual average increase in the atmospheric concentration of CO_2 is near 2.4 ppm per year. The corresponding annual increase in downward LWIR flux from the lower troposphere to the surface is 0.034 W m^{-2}. This can have no effect on such 'extreme' weather events. One of the main climate modeling errors has been the neglect of the heating produced by air compression. As dry air descends to lower altitudes, the lapse rate is +9.8 K km^{-1}. There are two distinct effects. The first is heating by downslope winds and the second is the heating produced by the downward

flow of air within a high pressure 'dome'. These processes can produce temperature changes of 10 C or more over a few days or less.

Downslope winds are well known in many regions or the world and there are many different names for the same effect. In S. California they are Santa Ana Winds. In N. California they are diablo winds. In the Rocky Mountains they are chinook ('snow eating') winds. In the Alps they are föhn winds. A good example of the effect of downslope winds on temperature was recorded at Havre, Montana, December 16 to 18, 1933 [Math, 1934]. At this time the CO_2 concentration was near 310 ppm. The thermograph trace is shown in Figure 26a. The temperature first rose by 27 °F in five minutes and increased by a total of 53 °F in less than 2 days. The temperature then cooled by 41 °F in two hours. There is no connection between these downslope wind events and any increase in atmospheric CO_2 concentration. Once the necessary weather pattern is established, the hot, dry winds will dry out the vegetation very quickly and any ignition source will start the fire. In S. California, a high pressure system over the Great Basin produces an offshore flow that descends from the desert plateau. The winds may be increased by an adjacent low pressure region. This is illustrated in Figure 26b. Figure 26c shows a Terra Satellite image taken 12/5/17 showing the fires in S. California. The smoke is blown out to sea by the offshore winds. The Marshall fire in Boulder Colorado, December 30, 2021 that destroyed about 1000 houses was caused by strong downslope winds and an ignition source related to human activity. The fuel was dry grass and any residual moisture would have been removed very quickly by the dry 100 mph winds [Mass, 2022].

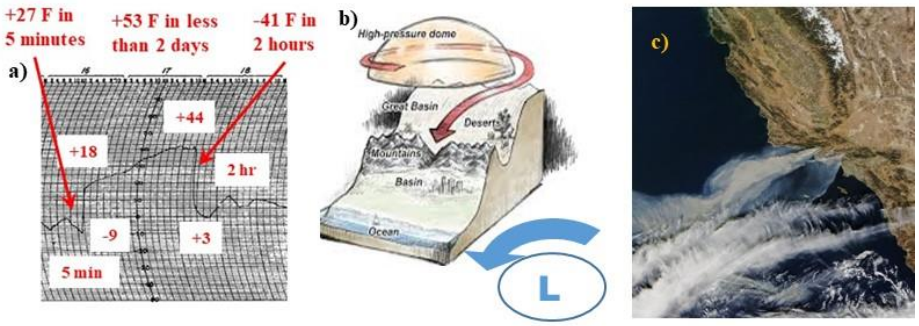


Figure 26: a) Thermograph trace of a downslope wind (Chinook) event, Havre Montana, December 1933, b) The formation of Santa Ana winds in S. California and c) Terra satellite image of the fires in S. California, taken 12/5/17.

The air circulation within a high pressure system produces a downward air flow because of the Coriolis Effect. This provides a natural heat source for these systems. A stationary or blocking high pressure system can result in significant warming over a period of several days. None of this has any relationship to CO_2. A high pressure dome formed over the Pacific Northwest in late June 2021. This produced record high temperatures as shown in Figure 27. As the high pressure system moved east, the temperature in Portland, OR dropped from 116 to 64 °F over the night of June 28 to 29 [Mass, 2021]. Once a 'blocking' high pressure system pattern is established, it can persist for weeks or even months. Since these systems also block rainfall and remove soil moisture, additional heating is produced by the reduced latent heat flux at the surface. For example, there was nothing unusual about the 2003 European heat wave [Black, 2004]. Brush fires produced by

'blocking' high pressure systems are a normal part of the Australian climate [Foley, 1947]. Similarly, a high pressure system regularly forms over the area near Verkhoyansk, Siberia. This produces very high summer temperatures and very low winter temperatures [Autio, 2020; Watts, 2020].

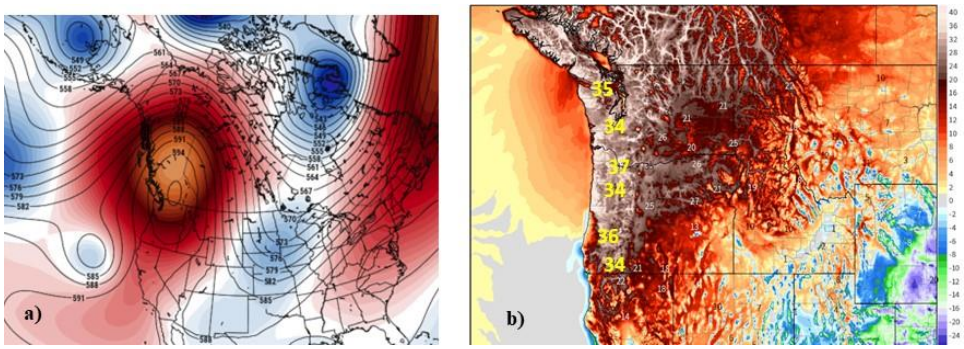


Figure 27: Blocking high pressure system over the Pacific NW, late June 2021. As the high pressure system moved east, the temperature in Portland OR dropped by 29 °C from 4 to 18 C overnight, June 18 to 29.

Much of the early work on the fraudulent link between 'anthropogenic' radiative forcings and extreme weather was conducted at the UK Hadley center [Stott et al, 2006, 2000, Tett et al, 2007, 2000]. Later, this led to one of the more egregious examples of 'extreme weather attribution'- the annual supplement to the Bulletin of the American Meteorological Society 'Explaining Extreme Events of [Year] from a Climate Perspective' [Herring et al, 2022]. The series has been published annually since 2012. The BAMS publication guidelines state:

> 'Each paper will start with a 30 word capsule summary that includes, if possible, how anthropogenic climate change contributed to the magnitude and/or likelihood of the event'.

The climate sensitivities created in CMIP5 and CMIP6 model ensembles and other in climate models are used without question to 'explain' the observed 'extreme weather events' for the year of interest. Natural climate changes related, for example to ocean oscillations and blocking high pressure systems have to be 'enhanced' by the pseudoscience of radiative forcings.

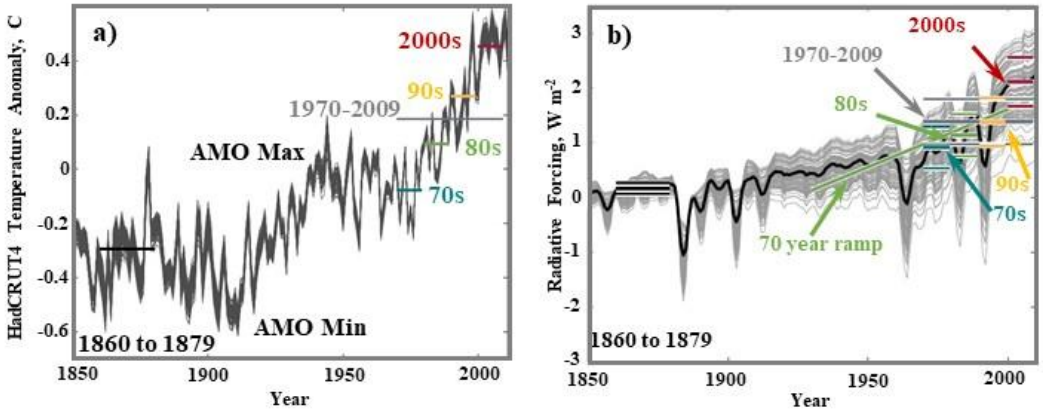
15) Climate Sensitivity

In addition to the calculation of a climate sensitivity to CO_2 by running the climate models with a doubled CO_2 concentration or a 1% per year increase in CO_2 concentration, a similar exercise is applied in reverse to the measured 'global mean temperature record'. This may be illustrated by considering the work of Otto et al [2013]. They defined the climate sensitivities as

$$ECS = F_{2x}\Delta T/(\Delta F - \Delta Q) \qquad \text{(Eqn. 2a)}$$

$$TCR = F_{2x}\Delta T/\Delta F \qquad \text{(Eqn. 2b)}$$

Here, F_{2x} is the radiative forcing produced a doubling of the atmospheric CO_2 concentration, set in this case to 3.44 W m^{-2} for a doubling from 'preindustrial levels', 280 to 560 ppm, ΔF is the change in radiative forcing (W m^{-2}), ΔT (°C) is the change in global mean temperature and ΔQ is the change in the 'earth system heat content', also given in W m^{-2}. The change in temperature is taken from the HadCRUT4 global temperature anomaly [HadCRUT4, 2022] and the radiative forcings are taken from the CMIP5/RCP4.5 model ensemble (see Figure 16e). The change in heat content is dominated by ocean heat uptake. The decadal temperature and forcing estimates from data given by Otto et al are shown in Figures 28a and 28b. The 1910 AMO cycle minimum and the 1940 maximum are indicated. The increase in the downward LWIR flux related to the 'radiative forcing' shown in Figure 30b cannot couple below the ocean surface and cause any measurable change in ocean temperature. Using the data from Figures 28a and 28b combined with estimates of ΔQ from various sources, Otto et al assume that their net radiative forcing estimates are responsible for the observed heating effects and that the temperature response to the change in LWIR flux is linear. Plots of ΔT vs (ΔF-ΔQ) and ΔT vs ΔF are therefore presumed to be linear with a slope that changes with the value of ECS or TCR. The results generated by Otto et al are shown in Figures 28c and 28d. Using the data for 2000 to 2010, they create an ECS of 2.0 °C with a 5-95% confidence interval of 1.2 to 3.9 °C and a TCS of 1.3 °C with a confidence level of 0.9 to 2.0 °C. The correct number is 'too small to measure'. The fundamental error, that the increase in LWIR flux can heat the oceans, can be traced back to H81.



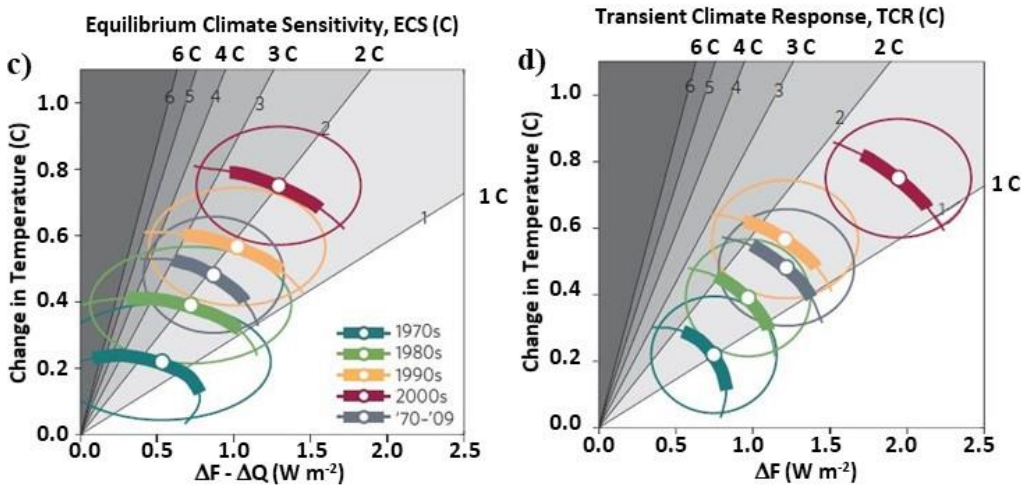


Figure 28: a) Decadal mean temperature estimates derived from the HadCRUT4 global mean temperature series. b) Decadal mean forcing with standard errors from the CMIP5 /RCP4.5 ensemble. c) Estimates of ECS and d) TCR from Otto et al [2013].

16) A Satellite Balancing Act

As computer technology improved, the climate models shifted from the equilibrium air column to the 'energy balance of the earth' as determined by the large scale GCMs. The 1-D RC mathematical warming artefacts were incorporated into each unit cell of the GCM. The climate was now determined by three numbers, the total solar intensity (TSI), the albedo or reflectivity and the average LWIR flux returned to space. This established another climate bandwagon, the use of satellite radiometers to determine the energy balance of the earth.

The earth is an isolated planet that is heated by shortwave (SW) radiation from the sun and cooled by the outgoing longwave radiation (OLR) back to space. Climate stability only requires an approximate long term planetary energy balance between the absorbed solar flux and the OLR. There is no requirement for an exact flux balance at the ocean-air interface between the absorbed solar flux and the surface cooling flux. Natural variations in wind speed produce quasi periodic oscillations in ocean surface temperature. These provide a 'noise floor' for the climate temperatures and for the LWIR flux returned to space. There is no unique solution to the surface flux balance equations that defines a single 'surface temperature'. Any 'radiation imbalance' is accounted for as a change in energy stored in the climate system. Most of this energy is stored as heat by the oceans, but some is stored as gravitational potential energy in the troposphere.

Figure 29 shows an IR image of the earth recorded March 18, 2011 using the CERES instrument on the NASA aqua satellite [CERES, 2011]. The intensity of the LWIR emission varies from 150 to 350 W m^{-2}. The low intensity white areas near the center of the image are the LWIR emission from cloud tops. For the 'radiation balance' all of this information is lost and replaced by a single number.

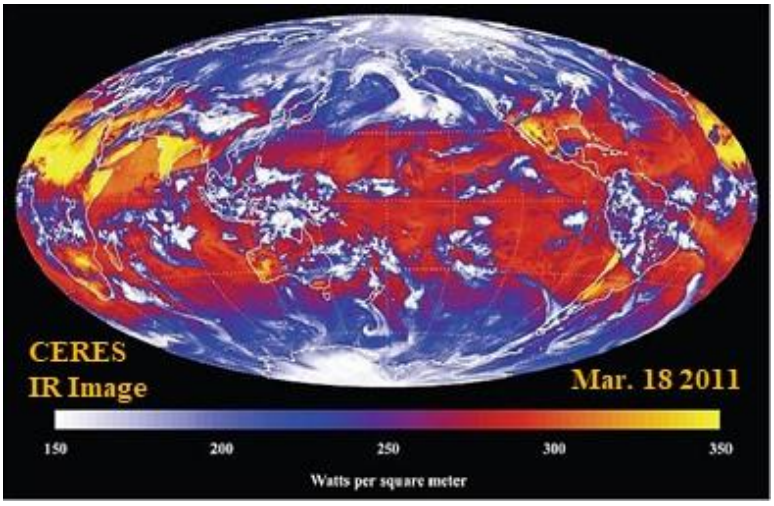


Figure 29: CERES image of the LWIR emission to space from the earth, recorded March 18, 2011.

Figure 30 shows the zonal average of the net flux (absorbed solar flux minus LWIR flux) for March, June, September and December [Kandel and Voilier, 2010]. Near equinox, in March and September, the net flux is positive with a net energy flow of up to 100 W m^{-2} within the ±30° latitude bands. There is net cooling at higher latitudes. In June, near summer solstice in the N. Hemisphere, the heating occurs in the N. Hemisphere and this reverses in December for the S. Hemisphere summer. Figure 31 shows maps of the monthly average of the net flux for March, June, September and December 2000 recorded using the CERES instrument on the NASA Terra satellite. This illustrates the seasonal shift in solar heating (orange/red band) [CERES, 2004]. Any 'radiation balance' requires the accurate determination of small differences in large numbers. The accurate calibration of the radiometers used to measure the radiation balance is a difficult undertaking. The residual imbalance is close to the limits of the measurements. The result may be compared to the description of an average family with 1.9 cars and 2.4 children. It is a mathematical construct with little useful meaning. In addition, the two hemispheres are weakly coupled to each other, so the concept of a single planetary energy balance is a drastic oversimplification of the energy flow. Furthermore, any ocean heating is related to changes in the surface energy balance that have nothing to do with LWIR radiative forcings by 'greenhouse gases'. The decrease in LWIR flux at TOA related to the 'greenhouse gas' forcings is decoupled from the surface by molecular line broadening in the troposphere. The downward LWIR flux to the ocean surface is fully coupled to the wind driven evaporation or latent heat flux at the surface. Any small increase in the downward LWIR flux from CO_2 cannot produce a measurable increase in the ocean surface temperature. The detailed analysis of the energy flows that establish the earth's radiation balance does not support the radiative forcing narrative.

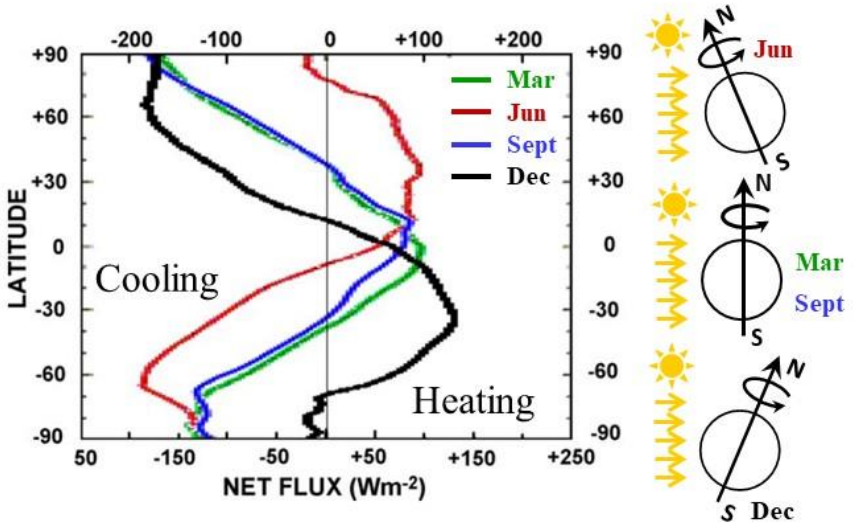


Figure 30: Zonal averages of the net flux (absorbed solar minus emitted LWIR flux), for March, June, September and December, five year average CERES values.

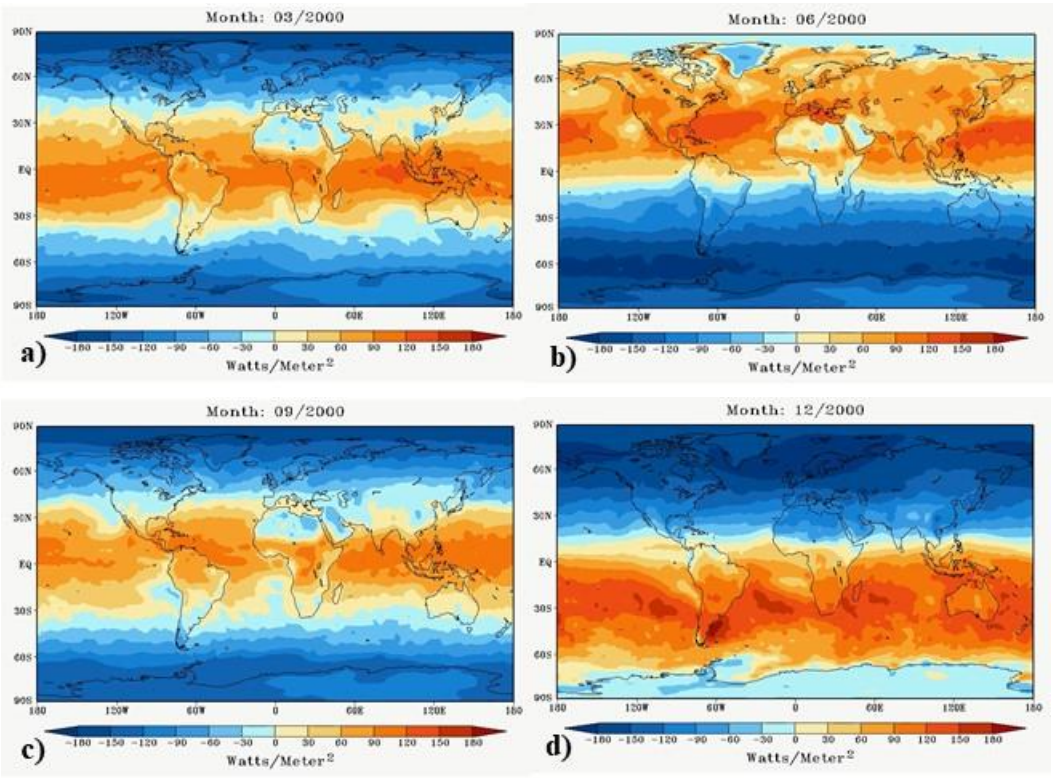


Figure 31: Spatially resolved CERES Terra monthly average net radiation balance at TOA for March, June, September and December 2000.

17) Where was the Oversight?

The peer review process in climate science has collapsed and been replaced by blatant cronyism. In fact, there never was any independent review of climate modeling. As the group of NASA

trained 'equilibrium' climate modelers grew and moved on to other research positions, they formed a group of cronies that reviewed each other's work. Melodramatic predictions of the global warming apocalypse became such a lucrative source of funds that no one wanted to kill the pseudoscientific goose that laid the golden eggs. The climate modelers were soon trapped in a web of lies of their own making.

In addition to the traditional scientific peer review process, there are multiple levels of oversight, all of which have failed. As government agencies, funded by US tax payers, NASA, DOE, NOAA, (Department of Commerce), NSF etc. are subject to Congressional oversight. Each agency has an Inspector General to investigate fraud. In addition, the National Labs are operated by private companies. The operating contracts between these labs and DOE are governed by Federal Acquisition Regulation (FAR). For many years, Lawrence Livermore and Los Alamos National Laboratories were operated by the University of California. Lawrence Livermore is now operated by a consortium that includes Amentum, Battelle, Bechtel, BWXT, Texas A&M University and the University of California. Similarly, the NASA Jet Propulsion Laboratory is operated by the California Institute of Technology. The NOAA Geophysical Fluid Dynamics Laboratory is located on the Princeton University Campus and is government operated but has close associations with the University of Princeton.

Given the multiple layers of oversight, why has the climate modeling fraud persisted for so long?

18) Ending the Climate Fraud

The climate fraud has three parts. First there is the scientific fraud where corruption has prevented the normal iterative process of scientific discovery and hypothesis. Second, there is mission creep that requires action by Congress to reign in various government agencies. The IPCC also needs to be shut down. Third, there are the actions of environmental and political groups that require investigation and legal action as needed.

18.1 No New Climate Pseudoscience Research

A good first step is to stop funding research into climate pseudoscience. This includes both academic and government research and all of the climate modeling activities and related policy analysis that rely on radiative forcings, feedbacks and climate sensitivity.

Anyone who has published papers on climate pseudoscience should be required to retract them before they receive more US funding on any research topic. Major climate pseudoscience research groups should be shut down.

Advanced degrees based on climate pseudoscience should not be recognized.

Publications that should be retracted start with the 'fraudulent four' papers that established the climate fraud, MW67, MW75, H76 and H 81. The later work on 'efficacies of radiative forcings'

by Hansen et al [2005] should also be included. Other publications include the work by Stott et al and Tett et al [2000] that established the 'attribution' process for 'human caused' warming and later work by Jones et al [2013] that provided the 'human forcing' attribution study used in AR5. This was also used in the Fourth US Climate Assessment, NCA4 [Weubbles et al, 2017] and by Terando et al [2020]. The group of papers that started the ramp up of the modern climate fraud from 1985 to 1989 and ignored the AMO in the global mean temperature record also need to be retracted. Another key paper in need of retraction is by Ramaswamy et al [2019] on the history of radiative forcing. Most of the 'extreme weather' papers in the annual Climate Supplements to the Bulletin of the American Meteorological now edited by Herring et al also need to be retracted.

The 'Fraudulent Four'

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MW 67 Manabe, S. and R. T. Wetherald (1967) "Thermal equilibrium of the atmosphere with a given distribution of relative humidity" *J. Atmos. Sci.* **24** pp. 241-249. [http://www.gfdl.noaa.gov/bibliography/related_files/sm6701.pdf]

H81 Hansen, J., D. Johnson, A. Lacis, S. Lebedeff, P. Lee, D. Rind and G. Russell (1981), "Climate impact of increasing carbon dioxide" *Science* **213** pp. 957-956. [https://pubs.giss.nasa.gov/docs/1981/1981_Hansen_ha04600x.pdf]

H76 Wang, W. C., Y. L. Yung, A. A. Lacis, T. Mo and J. E. Hansen (1976), "Greenhouse effects due to man-made perturbations of trace gases" *Science* **194** pp. 685-690. [https://pubs.giss.nasa.gov/docs/1976/1976_Wang_wa07100z.pdf]

'Efficacies'

Hansen, J. et al., (45 authors), (2005), "Efficacy of climate forcings" *J. Geophys Research* **110** D18104 pp.1-45. [https://pubs.giss.nasa.gov/docs/2005/2005_Hansen_ha01110v.pdf]

'Human caused' forcings

Tett, S.F.B., G.S. Jones, P.A. Stott, D.C. Hill, J.F.B. Mitchell, M.R. Allen, W.J. Ingram, T.C. Johns, C.E. Johnson, A. Jones, D.L. Roberts, D.M.H. Sexton and M.J. Woodage (2000), *Estimation of natural and anthropogenic contributions to 20th century temperature change*, Hadley Centre Tech Note 19, pp 52, Hadley Centre for Climate Prediction and Response, Meteorological Office, RG12 2SY, UK., [https://adsabs.harvard.edu/full/2000ESASP.463..201T/0000201.000.html]

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Terando, A. D. Reidmiller, S. W. Hostetler, J. S. Littell, T. D. Beard, Jr., S. R. Weiskopf, J. Belnap, G. S. Plumlee (2020) "Using information from global climate models to inform policymaking—The role of the

U.S. Geological Survey" *U.S. Geological Survey Open-File Report 2020–1058*, 25 pp. [https://doi.org/10.3133/ofr20201058]

Warming in the Temperature Record

Jones, P. D., T. M. L. Wigley, C. K. Foland, D. E. Parker, J. K. Angell, S. Lebedeff and J. E. Hansen (1988) "Evidence for global warming in the past decade" Nature 332, p. 790. [https://doi.org/10.1038/332790b0]

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History of Radiative Forcing

Ramaswamy, V., W. Collins, J. Haywood, J. Lean, N. Mahowald, G. Myhre, V. Naik, K. P. Shine, B. Soden, G. Stenchikov and T. Storelvmo (2019), "Radiative Forcing of Climate: The Historical Evolution of the Radiative Forcing Concept, the Forcing Agents and their Quantification, and Applications" *Meteorological Monographs* Volume **59** Chapter 14. [https://doi.org/10.1175/AMSMONOGRAPHS-D-19-0001.1]

'Extreme Weather'

Herring, S. C., N. Christidis, A. Hoell and P. A. Stott (2022), "Explaining Extreme Events of 2020 from a Climate Perspective" *Bull. Amer. Meteor. Soc.* **101** (1), pp. S1–S128. [https://doi.org/10.1175/BAMS-ExplainingExtremeEvents2020.1] (and prior years in this series)

18.2 Mission Creep

Mission creep started with NOAA (and the earlier agencies, ESSA and the Weather Bureau). Their mission was weather forecasting. Why were resources diverted to climate studies? NOAA should simply archive the weather data for later climate analysis by university or other research groups. Why was the climate fraud not recognized, either at NOAA or NCAR? The phase shift in the solar flux-temperature data was clear evidence of a non-equilibrium thermal response. The limitations to weather forecasting imposed by the Lorenz instabilities were well known. Why does NOAA still practice radiative forcing pseudoscience? Why have Ramaswamy and Herring been allowed to continue their work at NOAA? Why is NOAA still running fraudulent climate models? Why has the University of Princeton not recognized the radiative forcing fraud at the Geophysical Fluid Dynamics Lab?

Mission creep started at NASA in the late 1960s when it became clear that funding would be reduced at NASA Goddard for the study of planetary atmospheres [Hansen et al, 2000]. Why was work on 'earth sciences' even allowed at NASA? This was a perfect recipe for corruption. The NASA climate researchers soon became trapped in a web of lies of their own making. Continued funding required that the climate models had to create the political warming needed to support the melodrama of the Global Warming Apocalypse. NASA has a well-defined process of technology readiness levels (TRLs) for the development of space qualified instrumentation and software. Why has this not been applied to the NASA climate models? TRL1 is 'basic principles observed and

reported'. The 'equilibrium' climate models have not yet reached TRL1. Physical reality has been abandoned in favor of mathematical simplicity. Why have the nine fundamental scientific errors in H81 been ignored? Why was Hansen allowed to continue working at NASA? Why did Gavin Schmidt fail to recognize the nine errors in H81 when he was working on the 2005 'Efficacy' paper?

The Atomic Energy Commission was made part of the newly formed Department of Energy in 1977. As funding for nuclear programs was reduced, the National Labs were not restricted to their nuclear mission. They were allowed to jump on the climate bandwagon and became 'climate modelers for hire - with supercomputers'. Lawrence Livermore Labs became a major center for the Coupled Model Intercomparison Project, CMIP. This allowed one fraudulent climate model to be compared with another. The underlying pseudoscience was accepted without question. This again was again a recipe for corruption. CMIP has now grown to at least 49 modeling groups.

A deeper problem has also emerged in science that has encouraged the climate fraud. Advances in science and technology do not follow a linear path. There are short periods of major discoveries followed by long periods of relative stagnation. Fire and bronze were discovered in antiquity. Iron smelting started about 1200 BC. Gunpowder and printing were introduced into Europe between 1300 and 1450, originally from China. The steam engine was first used in the early eighteenth century and the voltaic pile was demonstrated at the Royal Society in 1800. We are now coming to the end of a major period of discovery. The periodic chart has been filled in. The Higgs boson has been found. We can see back to the 'big bang', the start of the universe. Battery and laser technology have matured. In electronics, Moore's law is coming to an end. Unfortunately, the expectation that this recent pace of technical progress can continue still pervades our expectations for research.

Somehow, we will find the magic battery technology needed to store the electrical power for use when wind and solar generation are not available. Spend money. We can improve our climate models. Spend money. Electrolytic hydrogen can be used as fuel. Spend money. Our universities and government agencies have become bloated bastions of corruption. The delusion that we can change the earth's climate by reducing fossil fuel combustion has become a multi trillion dollar religion. We need a Reformation to remove the Imperial Cult of the Global Warming Apocalypse. It is time for a new Age of Reason.

18.3 Outside Interests

Various political and environmental groups have been very successful at exploiting the climate fraud to further their own interests. This is well documented and will not be considered in detail here [Bolar and Steel, 2014, Bolin, 2007, Darwall, 2017, Dewar, 1995, Hecht, 2007, Klaus, 2007, Mitchell, 2022, Pile, 2023, Singer, 2021, Zubrin, 2013]. Any fraud related issues will require investigation and legal action.

Another agency that has played a major role in spreading the climate fraud in the US is the US Global Research Change Program (USGCRP). This was established by congress in 1990 and includes 13 US agencies. Its mission is 'to coordinate federal research and investments in understanding the forces shaping the global environment, both human and natural, and their impacts on society'. The IPCC was established as part of the UN in 1988. Its mission is to assess "the scientific, technical and socioeconomic information relevant for the understanding of the risk of human-induced climate change." This is based on the *a-priori* assumption that human activities are causing CO_2 induced global warming. There never was an attempt to objectively evaluate the scientific evidence of the cause of climate change.

Here, the USGCRP has failed in its mission to find the 'natural forces' such as ocean oscillations, downslope winds and high pressure domes that are responsible for climate change and extreme weather events such as fires, floods and droughts. The USGCRP has blindly copied the IPCC climate assessment reports and accepted the climate model results as real without any attempt at validation. Few, if any, of the analysts associated with the USGCRP have any expertise in climate energy transfer and many are not scientists at all. The USGCRP should be shut down. There are also major issues of legal liability that will need to be resolved.

Acknowledgement

This work was performed as independent research by the author. It was not supported by any grant awards and none of the work was conducted as a part of employment duties for any employer. The views expressed are those of the author. He hopes that you will agree with them.

Disclaimer

This report addresses the obvious scientific fraud in the climate models. No advice on legal issues related to this fraud is offered or implied.

References

Normally, the references given in an article of this nature would be almost exclusively to the peer reviewed literature, with limited references to websites that provide access to climate data. Unfortunately, climate science has been thoroughly corrupted by the global warming fraud. The peer review process has collapsed and been replaced by blatant cronyism. Many of the publications in 'prestigious' journals such as Nature, Science, PNAS and others that relate to climate modeling predictions of global warming are fraudulent and should never have been published. Consequently, many of the important references given here are to website publications. This should not detract from the integrity of the information provided. Many of these website publications have received a more thorough review than they might have received through the traditional peer review process.

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