Follow the Yellow Brick Road

Roy Clark PhD
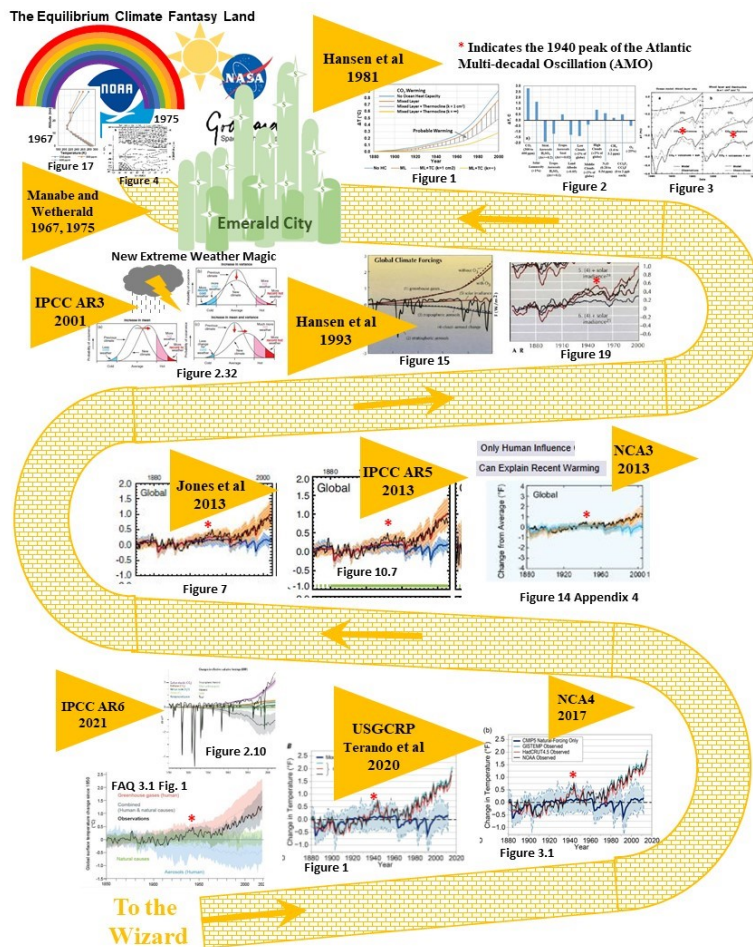
Follow the Yellow Brick Road

Table of Contents

Summary

The climate energy transfer processes related to climate change are reviewed. The observed increase in the atmospheric concentration of CO_2 of approximately 140 parts per million (ppm), from 280 to 420 ppm since the start of the Industrial Revolution has had no measureable effect on the earth's climate. The concept of radiative forcings, feedbacks and climate sensitivity as described in Chapter 7 of the UN IPCC AR6 Working Group 1 Report is pseudoscientific nonsense. A contrived set of radiative forcings is used to 'tune' the climate models so that they appear to match an equally contrived 'global mean temperature record'. The radiative forcings are then divided into 'human' and 'natural' forcings and the 'human' caused warming produced in the climate models is used to attribute fossil fuel combustion to an increase in the frequency and severity of 'extreme weather events'. In reality, an infrared radiative forcing produced by an increase in atmospheric 'greenhouse gas' concentration cannot change the energy balance of the earth, nor can it produce a measurable change in surface temperature. We then follow the Yellow Brick Road back from AR6 to the Emerald City and the climate wizard Hansen. In 1981, he created the magic spell that allowed the change in long wave IR (LWIR) radiation from an increase in CO_2 concentration to heat the oceans. He also made the ocean oscillations disappear and stopped the wind and the waves from changing the climate. This has been hidden behind a curtain of pseudoscientific radiative forcings for over 40 years. We then continue back to the foundation of the modern Equilibrium Climate Fantasy Land by Manabe and Wetherald in 1967. They added a 9 or 18 layer radiative transfer calculation to the original equilibrium air column used by Arrhenius in 1896. When the CO_2 concentration was increased, the calculations created global warming as a mathematical artifact of the simplifying assumptions used to build the model. They also incorporated a fixed relative humidity distribution that produced a water vapor feedback that amplified the warming. The early climate modelers chose to believe that their simplistic one dimensional radiative convective model could simulate the earth's climate. Mainstream climate 'science' has degenerated past dogma into the Imperial Cult of the Global Warming Apocalypse. The computer programmers and mathematicians involved in climate modeling became Born Again Morons, trapped in a web of lies of their own making. They became prophets of the Imperial Cult of the Global Warming Apocalypse. Instead of the Divine Right of Kings we now have the Divine Right of Born Again Morons to amend the basic Laws of Physics and save the world from a non-existent problem. Eisenhower's warning about the corruption of science by government funding has come true. It is time to dismantle this pseudoscientific climate fraud.

Key Words

Introduction

Since the start of the Industrial Revolution about 200 years ago, 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 1a [Keeling, 2023]. Radiative transfer calculations show that this has produced a decrease near 2 W m^{-2} in the longwave IR (LWIR) flux emitted to space at the top of the atmosphere (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. For a 'CO$_2$ doubling' from 280 to 560 ppm, the decrease in outgoing longwave radiation (OLR) is estimated to be 3.7 W m^{-2}, with a similar increase in downward LWIR flux to the surface. At present, the average annual increase in CO_2 concentration is near 2.4 ppm yr^{-1}. This produces an increase in the downward LWIR flux to the surface of approximately 0.034 W m^{-2} per year. The change in both the outgoing longwave radiation (OLR) emitted to space and the downward LWIR flux to the surface LWIR flux as the CO_2 concentration increases is shown in Figure 1b [Harde, 2017]. The fundamental climate issue that has to be addressed is therefore: how do these changes in LWIR flux alter the surface temperature of the earth?
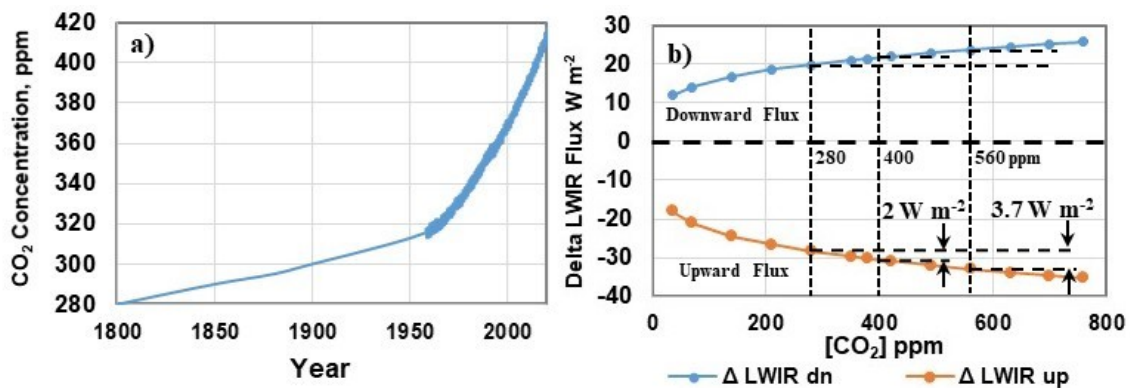
Figure 1: a) the measured increase in atmospheric CO₂ concentration from 1800 (Keeling curve) and b) calculated changes in atmospheric LWIR flux produced by an increase in atmospheric CO₂ concentration from 0 to 760 ppm.

The short answer is that thermal engineering calculations of the change in surface temperature using the time dependent flux terms coupled to the surface thermal reservoirs show that any CO_2 induced change in surface temperature is 'too small to measure'. This has been discussed in detail by Clark and Rorsch [2023] (CR23). The whole concept of radiative forcings, feedbacks and climate sensitivity as described in Chapter 7 of the AR6 Working Group 1 Report is pseudoscientific nonsense [IPCC, 2021].

The thermal engineering analysis and the pseudoscience of radiative forcing will now be considered in more detail.

Thermal Engineering Analysis

There are five parts to the engineering analysis.

1) The radiative transfer calculation of the change in LWIR flux at the top of the atmosphere (TOA) is incomplete. It has to be extended to include the change in the rate of cooling of the troposphere. When this is done, the total LWIR cooling rate for the troposphere is in the 2 to 2.5 K day^{-1} range [Feldman et al, 2008]. The maximum change for a 'CO$_2$ doubling' is a decrease in the rate of cooling, or a slight warming of +0.08 K per day [Iacono et al, 2008]. This is illustrated in Figure 2. At a lapse rate of -6.5 K km^{-1} an increase in temperature of +0.08 K is produced by a decrease in altitude of about 12 meters. This is equivalent to riding an elevator down four floors.
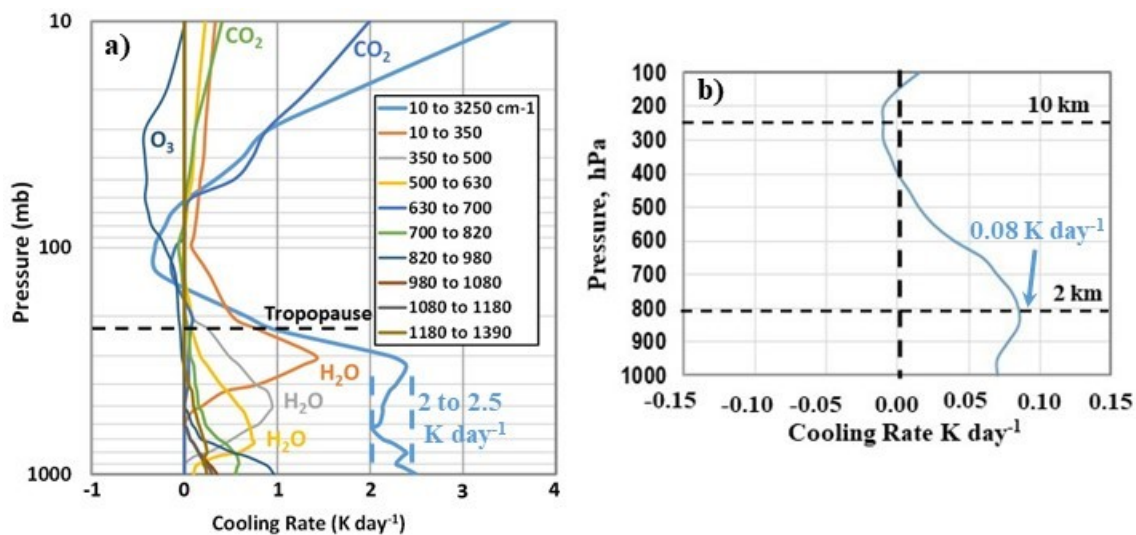
Figure 2: a) Total (10 to 3250 cm^{-1}) and band-averaged IR cooling rate profiles for the tropical model atmosphere on a log-pressure scale. b) Tropospheric heating rates produced by a CO$_2$ 'doubling' from 287 to 574 ppm at mid latitude.

2) The upward and downward LWIR flux terms are decoupled by molecular line broadening. Almost all of the downward LWIR flux to the surface originates from within the first 2 km layer of the troposphere. Approximately half of this flux originates from the first 100 meter layer above the surface. This is illustrated in Figure 3 [Clark, 2013]. Within the troposphere, any change in temperature related to LWIR cooling is fully coupled to the temperature changes produced by turbulent convection. This means that the small amount of tropospheric heating produced by a 'greenhouse gas forcing' is simply re-radiated to space as wideband LWIR emission (there may also be a change in altitude and therefore gravitational potential). THERE IS NO CHANGE TO THE ENERGY BALANCE OF THE EARTH. This is illustrated in Figure 4 [CR23 Chaps. 2 and 8, Gibert et al, 2007]. (The changes in cooling rates in the stratosphere require very small changes in flux because of the low air density).
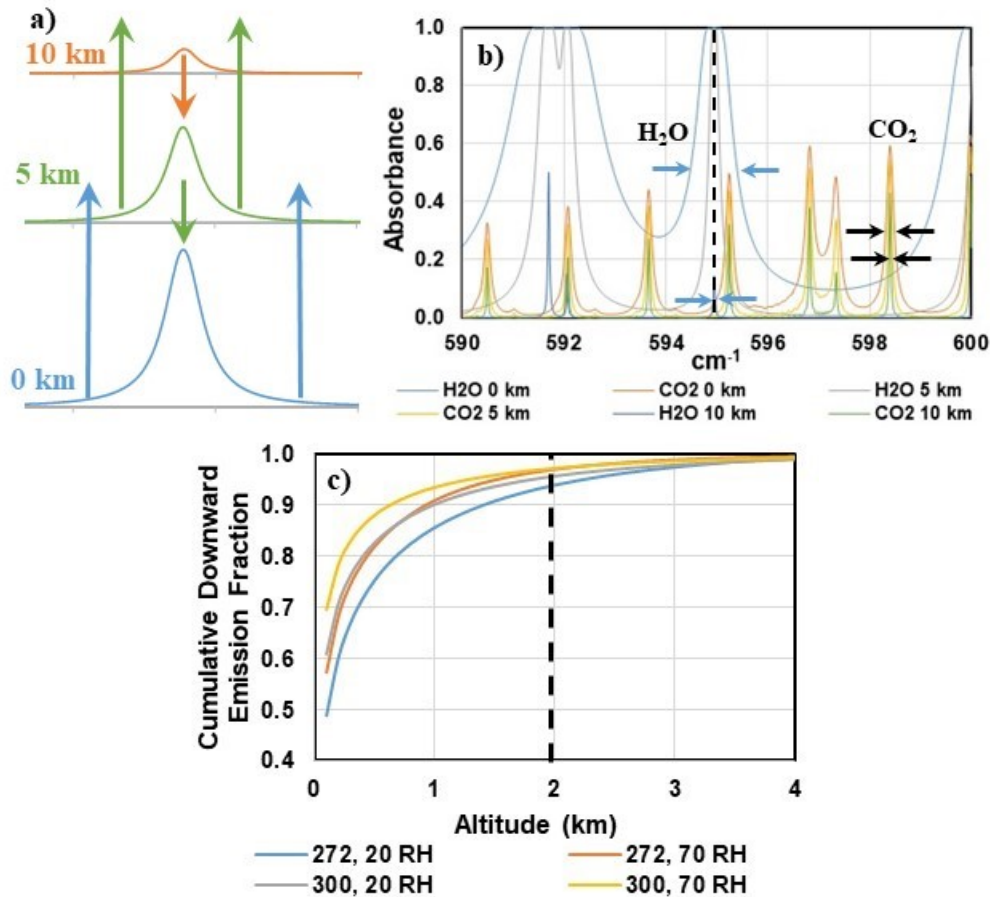
Figure 3: The transition from absorption-emission to free photon flux as the linewidth decreases with altitude. a) Single H_2O line near 231 cm^{-1}. b) Linewidths for H_2O and CO_2 lines in the 590 to 600 cm^{-1} spectral region for altitudes of 0, 5 and 10 km. c) Cumulative fraction of the downward 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.
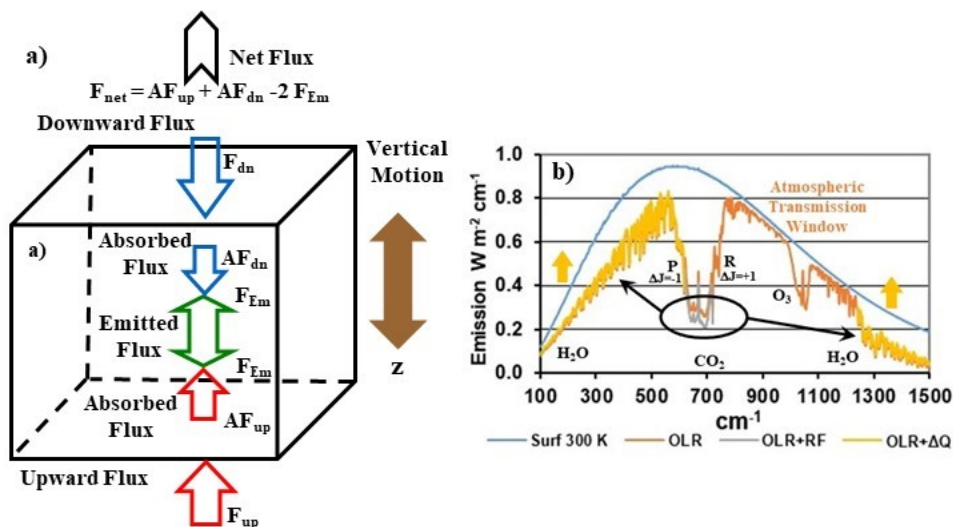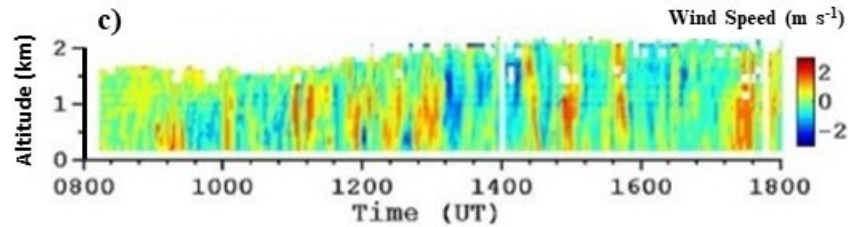
Figure 4: a) The energy transfer processes for a local tropospheric air parcel (in a plane-parallel atmosphere). b) The dissipation of the absorbed heat from a 'CO₂ doubling' by the normal tropospheric energy transfer processes (schematic). The wavelength specific increase in absorption in the CO₂ P and R bands is dissipated as small changes in broadband LWIR emission and gravitational potential energy. c) The 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.

3) At the surface, the penetration depth of the LWIR flux into the oceans is less than 100 micron (0.004 inches) [Hale and Querry, 1973]. Here it is fully coupled to the much larger and more variable wind driven evaporation (latent heat flux). Using long term zonal averages, the sensitivity of the latent heat flux to the wind speed within the ±30° latitude bands is at least 15 W m^{-2}/m s^{-1}. This is illustrated in Figure 5 [Yu et al, 2008]. The 2 W m^{-2} increase in downward LWIR flux to the surface from 140 ppm CO_2 is dissipated by an increase in wind speed of 13 centimeters per second. The annual increase of 0.034 W m^{-2} from 2.4 ppm CO_2 is dissipated by an increase in wind speed of 2 mm s^{-1}. Any CO_2 induced ocean temperature changes are too small to measure. In addition, outside of the tropics there are significant time delays or phase shifts between the peak solar flux at summer solstice and the ocean temperature response that may easily reach 6 to 8 weeks. Such phase shifts are solid evidence of a non-equilibrium thermal response. This is not new science. Subsurface seasonal phase shifts over land were described by Fourier in 1824 [CR23, Chaps. 6 and 7, Fourier, 1824]. Ocean phase shifts are illustrated in Figure 6.
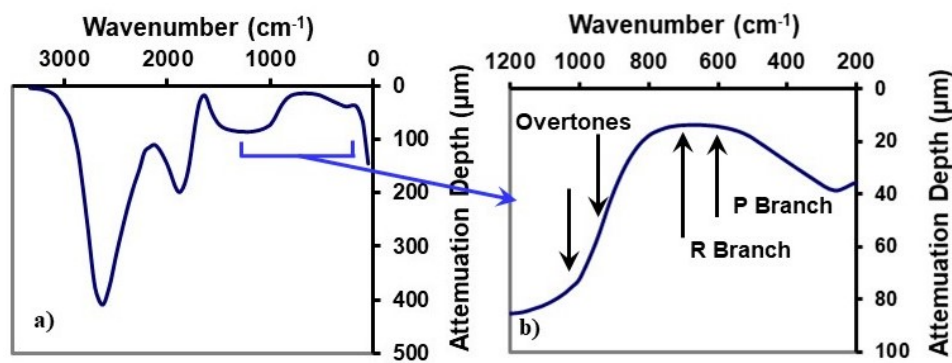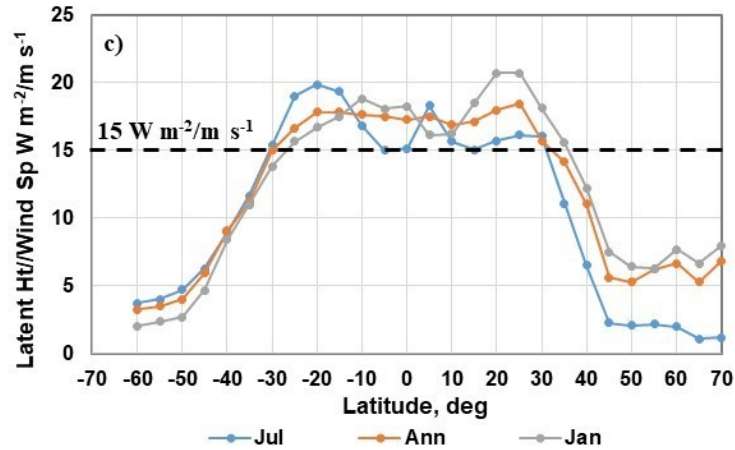
Figure 5: the penetration depth (99% absorption) of the LWIR flux into water a) below 3300 cm^{-1} and b) 1200 to 200 cm^{-1}. The locations of the main CO_2 absorption bands and the overtones are indicated. c) The sensitivity of the ocean latent heat flux to the wind speed.
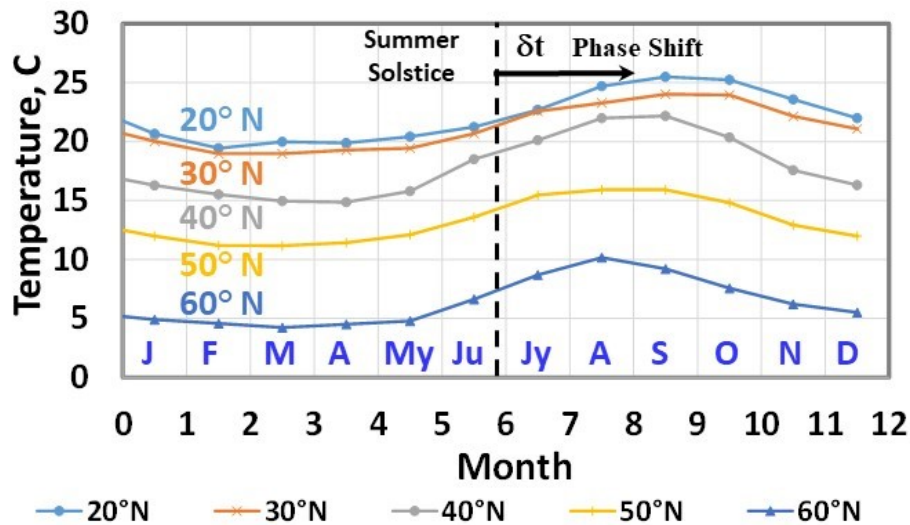
Figure 6: Monthly ocean surface temperatures at 2.5 m depth at selected latitudes for 2018 along the 20 W transect in the N. Atlantic Ocean showing the seasonal phase shift.

4) Over land, all of the flux terms are absorbed by a thin surface layer. The surface temperature initially increases after sunrise 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 day to day changes in convection transition temperature are much larger than any temperature change produced by CO_2. See CR23 Chap. 8 for further discussion.

5) When the global climate anomaly record, such as the HadCRUT4 data set is evaluated, the dominant term is found to be the Atlantic Multi-decadal Oscillation (AMO) [CR23, Chap. 7, HadCRUT4, 2022, Morice et al, 2012, AMO, 2022]. The additional part of the recent warming may be explained as a combination of three factors. First there are urban heat islands related to population growth that were not part of the earlier record. Second, the mix of urban and rural weather stations use to create the global record has changed. Third, there are so called 'homogenization' adjustments that have been made to the raw temperature data. These include the 'infilling' of missing data and adjustments to correct for 'bias' related to changes in weather station location and instrumentation. 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]. This is illustrated below in Figure 8g.

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 not 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 their 1981 paper Hansen et al chose to ignore the 1940 AMO peak in their analysis of the effects of CO_2 on the weather station record [Hansen, 1981]. Similarly, Jones et al conveniently overlooked the 1940 AMO peak when they started to ramp up the modern global warming scare in 1986 [Jones et al, 1986]. The IPCC also ignored the AMO peak in its first assessment report in 1990 [IPCC 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 7. The AMO and the periods of record used are shown in Figure 7a. 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 7b through 7g. The Keeling curve showing the increase in atmospheric CO_2 concentration is also shown in Figures 7d through 7g [Keeling, 2023].

The latest warming phase of the AMO started to influence the global mean temperature record in about 1985. This enabled the climate modelers to ramp up the climate modeling fraud. In their analysis of the temperature record Wigley et al [1985] at the Climatic Research Unit (CRU), University of East Anglia (UEA) concluded that "*unequivocal, statistically rigorous detection of the effects of changing CO_2 levels on atmospheric temperatures is not yet possible*". However, no quantitative thermal engineering analysis of the changes in surface temperature was presented. By 1988 Jones, Wigley, Hansen and others claimed "*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*" [Jones et al, 1988]. The UN IPCC was established in 1988.
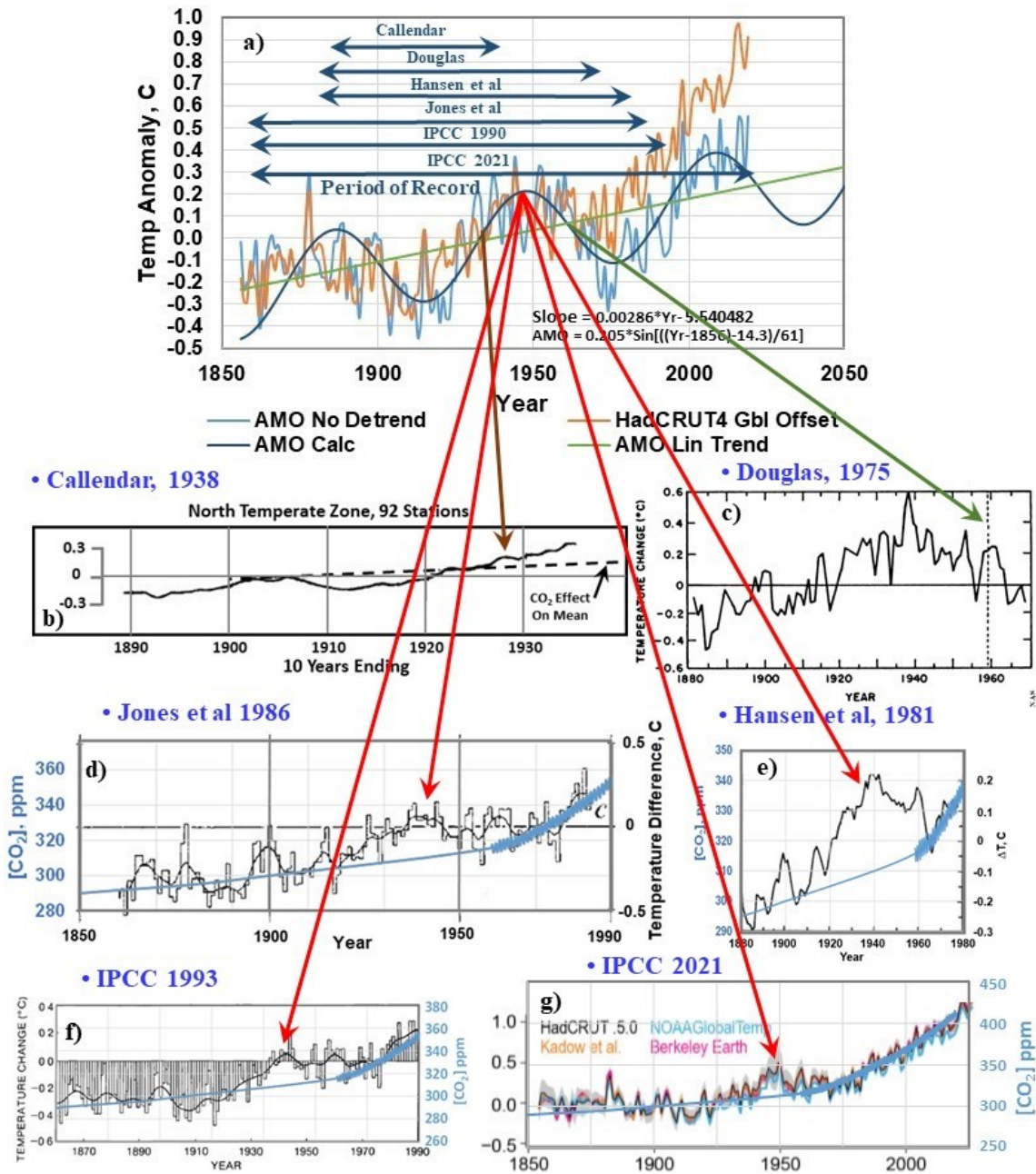
Figure 7: a) AMO anomaly and HadCRUT4 global temperature anomaly, aligned from 1860 to 1970, **b)** temperature anomaly for N. temperate stations from Callendar [1938], **c)** global cooling from Douglas [1975], **d)** global temperature anomaly from Jones et al, [1986] **e)** global temperature anomaly 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.

Radiative Forcing Pseudoscience

When the atmospheric concentration of a 'greenhouse gas' such as CO_2 is increased, radiative transfer calculations show that there is a decrease in the LWIR flux emitted to space within the spectral range of the specific greenhouse gas LWIR emission [Wijngaarden, and Happer, 2022].

This is illustrated for CO_2 in Figure 4b. The concept of radiative forcing assumes that this decrease in LWIR flux at TOA changes the energy balance of the earth. The climate is then assumed to adjust to a new equilibrium state with a warmer surface temperature that restores the LWR flux at TOA to its initial equilibrium value. Changes in other 'forcing agents' such as aerosols may have a cooling effect by increasing the amount of sunlight reflected back to space. It is also assumed that there is a linear relationship between the radiative forcing ΔF and the surface temperature response ΔT [IPCC, 2021, 2013, Ramaswamy et al, 2019]. The change flux at TOA, ΔN is given by:

$$\Delta N = \Delta F + \alpha \Delta T \qquad \text{(Eqn. 1)}$$

Here α is a 'net feedback parameter'. The initial 'forcing', ΔF is reduced by the surface temperature response.

The surface temperature response may also be modified by various feedback effects. In particular, when a fixed relative humidity distribution is used in the radiative forcing analysis, the water vapor concentration increases with temperature. This amplifies the initial temperature response. The climate models are based on an invalid correlation between a contrived set of radiative forcings and an equally contrived 'global average temperature'. Once the radiative forcing argument is accepted one enters the Equilibrium Climate Fantasy Land where physical reality has been abandoned in favor of mathematical simplicity.

In addition to creating climate warming as a mathematical artifact of the simplified modeling assumptions, large scale climate models have no predictive capabilities over the time scales required for climate change because of Lorenz instabilities. The solutions to the large number of coupled non-linear equations are unstable and the errors increase over time [Lorenz, 1963, 1973]. The models are simply 'tuned' to match the global average temperature record. Simple inspection of such records reveals the 1940 AMO peak. The IPCC climate fraud then continues by separating the contrived radiative forcings into 'human' and 'natural' factors. The models are then rerun with just the natural factors and this is used to 'attribute' climate change to 'human' or 'anthropogenic' causes. This is illustrated in Figure 8 using illustrations and data from IPCC AR6 WG1 [IPCC, 2021.
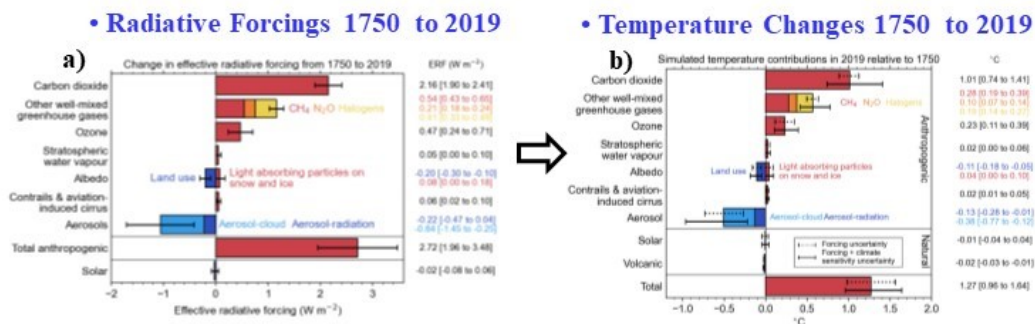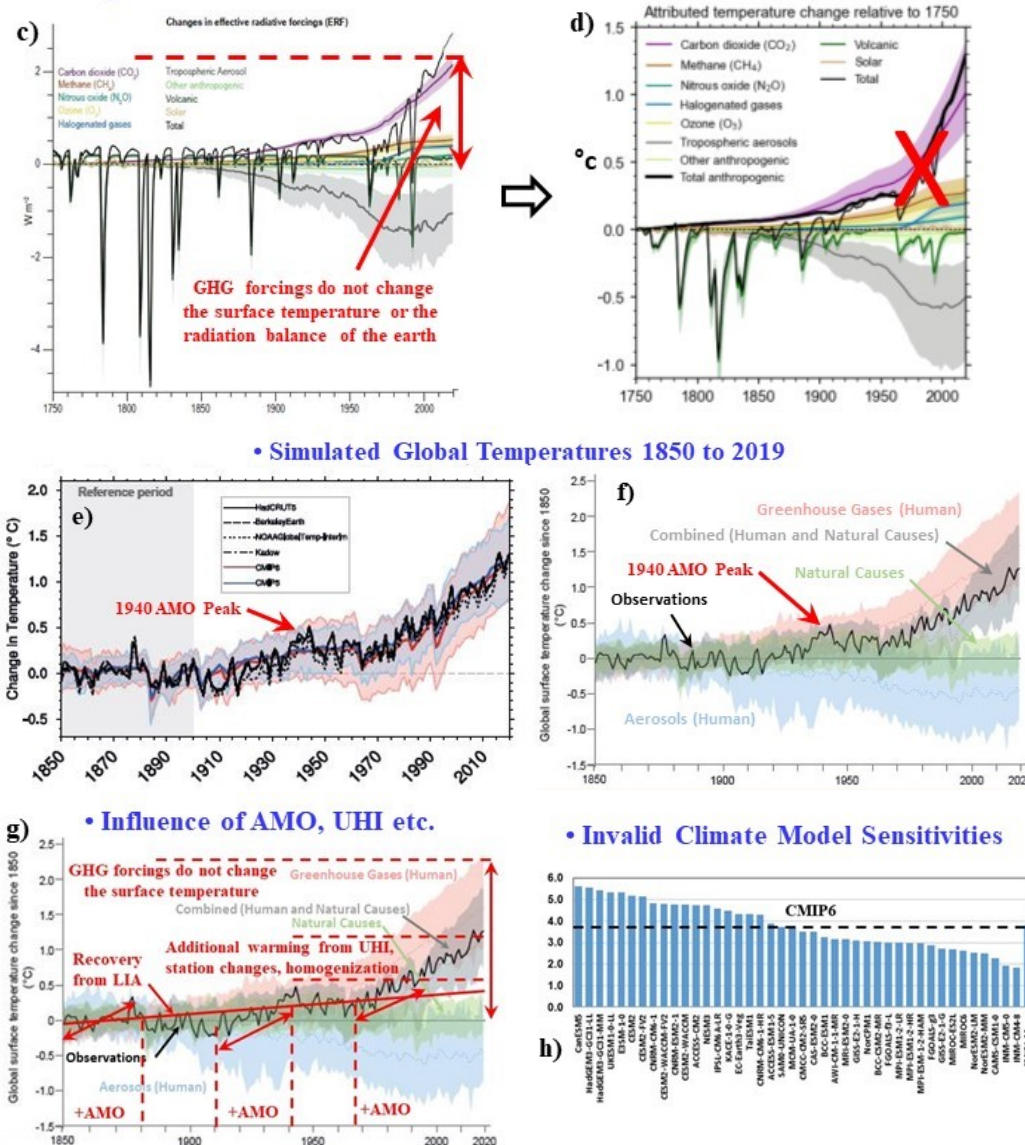
Figure 8: Understanding the IPCC climate fraud: a) Changes in radiative forcings since 1750, b) simulated temperature increases from 1750 to 2019, based on a), c) time dependence of the radiative forcings and d) time dependence of the temperature changes derived from c), e) 'tuned' temperature record using a contrived set of radiative forcings that appear to simulate the global mean temperature record, f) the separation of the contrived forcings to create fraudulent 'human' and 'natural' temperature records, g) the contributions of the AMO, UHI etc. to the global mean climate record, h) the [pseudoscientific] equilibrium climate sensitivity (ECS) estimated from the CMIP6 models (IPCC AR6, WG1, figures 7.6, 7.7, 2.10, 7.8, 3.4b and FAQ 3.1 Fig. 1, ECS data from Table 7.SM.5).

Follow the Yellow Brick Road

The concepts of radiative forcing, feedbacks and climate sensitivity to CO$_2$ are not unique to the CMIP6 models used in the AR6 report. They have been part of the underlying foundation of the climate models since they were first developed [Ramaswamy et al, 2019]. We will now 'Follow the Yellow Brick Road' and trace these concepts back through earlier IPCC reports and related

documents to the climate magic published by Hansen, 'The Wizard of Goddard' in 1976 and 1981 and then back further to the creation of the modern Equilibrium Climate Fantasy Land by Manabe and Wetherald in 1967 and 1975. This is illustrated in Figure 9.
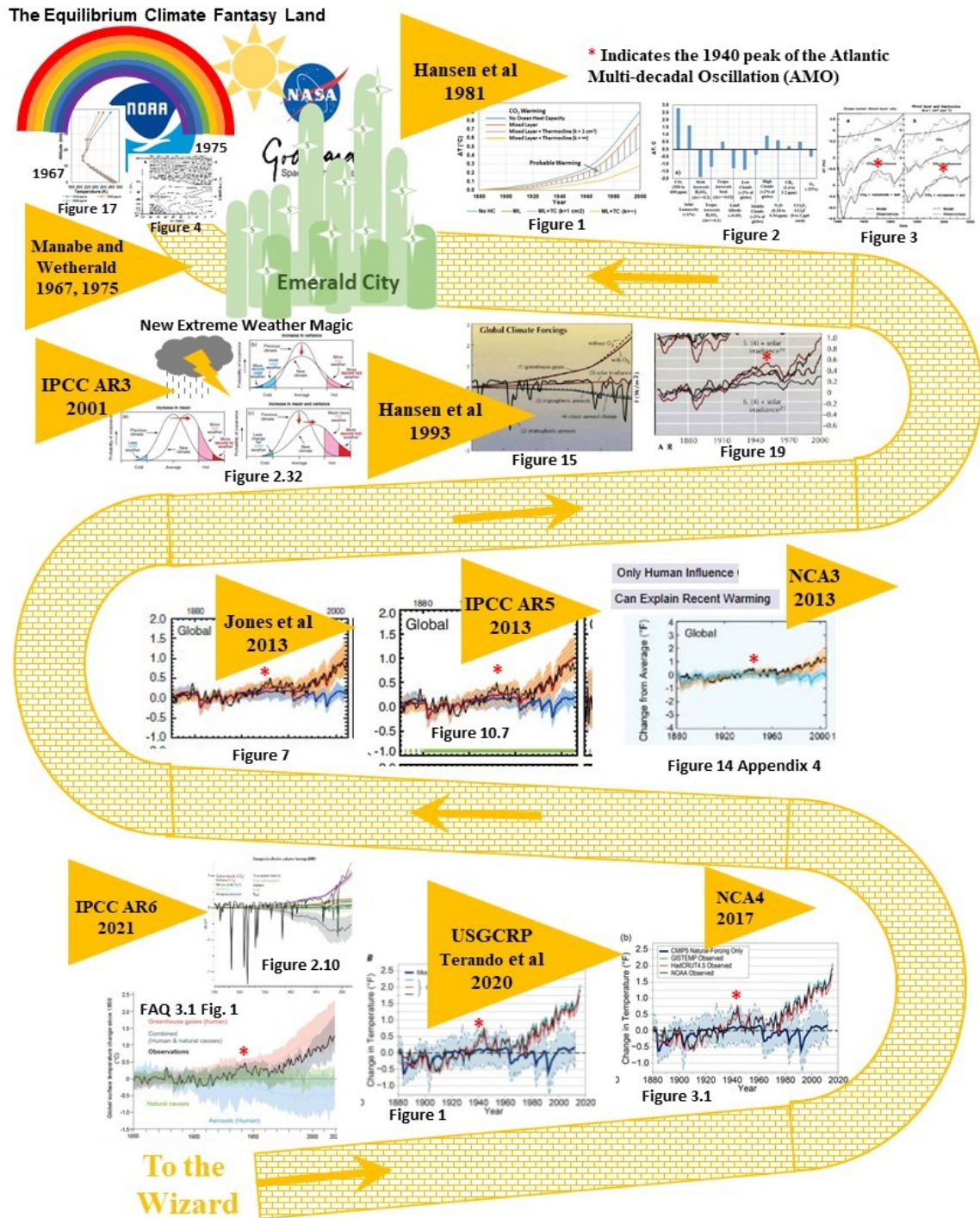

Figure 9: 'Follow the Yellow Brick Road' – the history of radiative forcing from IPCC AR6 back to Hansen et al [1981, 1976] and Manabe and Wetherald [1967, 1975].

We join the yellow brick road at AR6 WG1 in 2021 with figures 2.10 and FAQ 3.1 fig. 1 that show the time series of the radiative forcings, the simulation of the global average temperature record and the 'attribution' to human factors (see Figures 8c and 8f). (In all of the global average temperature plots, the 1940 AMO peak is indicated by the red asterisk). Next we go to the 2020 US Geological Survey Report, '*Using information from global climate models to inform policymaking-The role of the U.S. Geological Survey*' [Terando et al, 2020]. Figure 1 from this report is an earlier version of the attribution used in AR6 only this is based on the CMIP5 model ensemble results used for AR5 (The temperature scale here is °F not °C). We find almost the same figure in the Fourth Climate Assessment Report, NCA4 published by the US Global Change Research Program (USGCRP) in 2017 [Knutson et al, 2017]. An earlier version was published by the USGCRP in NCA3, figure 14, Appendix 4. [Melillo et al, 2013]. A similar figure to this was published in IPCC AR5, figure 10.7 and the original is found as figure 7 in a paper by Jones et al [2013]. This shows that little has changed since 2013. The USGCRP has blindly copied the IPCC AR5 report and Terrando et al have blindly copied USGCRP NCA4. There has been no attempt at independent model validation using thermal engineering calculations.

The history of radiative forcing was reviewed by Ramaswamy et al [2019]. This provides a convenient source for the earlier history of climate modeling and the radiative forcing fraud. The concept of radiative forcing has been used in the climate models reported by the IPCC since it was established in 1988.

> Assessment of RF has been firmly embedded in IPCC assessments from its FAR [First Assessment Report] onward. FAR (Shine et al. 1990) took as its starting point the fact that the climate impact of a range of different climate forcing agents could be compared using RF, in watts per square meter, even though this was only starting to be done routinely in the wider literature at the time.
>
> Ramaswamy et al, 2019 p. 14.11

The first use of the concept of radiative forcing is attributed to Ramanathan in 1975 in a paper on the 'greenhouse effect' produced by cholorfluorocarbons [Ramanathan, 1975]. Here, he used a sensitivity of 1.425 W m^{-2} K^{-1} for the change in weather station temperature due to variations in the solar flux derived by Budyko [1969]. He assumed an equilibrium climate and applied the same solar sensitivity to the change in LWIR flux. Molecular line broadening effects were not considered.

As we continue down the Yellow Brick Road, we find that a major change occurred with Third Climate Assessment. New extreme weather magic was added to the radiative forcings. The magicians at the UK Hadley Center invoked the statistical demons hiding in the normal distribution of the temperature. The radiative forcings were split into 'natural' and 'anthropogenic' contributions. The climate models were run with just the 'natural' forcings to create a baseline global mean temperature series that was not 'human caused'. The model magic was used to suppress the ocean oscillations and the gyre circulation and create a flat ocean. The pseudoscientific greenhouse gas forcings then created the warming in the global mean temperature record. Aerosols and other forcings still provided the 'tuning knobs'. This changed the variance

and the mean in the normal distribution of the temperature and added more extreme weather [IPCC AR3, WG1 Figures SPM 3 and 4 and Figure 2.32, Stott et al, 2000, Tett et al, 2000, figure 1].

Further down the Yellow Brick Road, an even earlier version of Terando et al figure 1 can be found as figure 19 in a review paper by Hansen et al [1993]. The radiative forcings used here are shown in figure 15. This is an earlier version of the forcings shown in AR6 WG1 figure 2.10. Little has changed in almost 30 years. As we continue on down the Yellow Brick Road we come to the Emerald City and find the magical climate model creation of Hansen, The Wizard of Goddard [Hansen et al, 1981] (H81). Now we must enter the Emerald City and explore the Equilibrium Climate Fantasy Land created by the Wizard Hansen and the earlier magicians, Manabe and Wetherald (M&W). We find the keys to this Fantasy Land in the 1981 paper.

The Equilibrium Climate Fantasy Land

We now examine the work of the Wizard Hansen and the magic that provides the foundation of the climate models in use today.

Greenhouse Effect Magic

H81 starts by invoking the magic of the greenhouse effect. The IR active 'greenhouse' species in an atmospheric air parcel absorb part of the LWIR flux from above and below and emit IR radiation at the local air temperature. This is illustrated above in Figure 4a. When the greenhouse gas concentration is increased, the air parcel absorption and emission increase. However, we are now in the 1-D RC equilibrium climate fantasy land. The sun shines 24 hours a day at a fixed average intensity and the air layers are in equilibrium. In the original M&W Fantasy Land, the surface had zero heat capacity. When the CO_2 concentration was increased, it took a year for the surface and air column to warm up and reach the new surface temperature that restored the flux balance at TOA. In addition, there was a magical feedback from water vapor that amplified the surface warming.

In the real world, the downward LWIR flux from the lower troposphere to the surface 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 (moist convection). The four main energy transfer terms, the absorbed solar flux, the net LWIR emission, the evapotranspiration and the subsurface energy transport are fully interactive and should not be separated. The energy transfer processes are different at the land-air and ocean-air interfaces and have to be considered separately [CR23, Chap. 2].

At present the average annual increase in atmospheric CO_2 concentration is near 2.4 ppm per year. The corresponding increase in downward LWIR flux to the surface is approximately 0.034 W m^{-2}

per year. How can this have any measurable effect on the surface temperature over a year of daily and seasonal temperature cycles?

Could the Wizard be wrong?

H81 continues:

> The major difficulty in accepting this [greenhouse] theory has been the absence of observed warming coincident with historic CO_2 increase. In fact, the temperature of the N. Hemisphere decreased by about 0.5 °C between 1940 and 1970, a time of rapid CO_2 build up. In addition, recent claims that climate models overestimate the impact of radiative perturbations by an order of magnitude have raised the issue of whether the greenhouse effect is well understood.

As shown above in Figure 7, the coupling of the AMO to the temperature record was ignored. References 10 and 11 in H81, Newell and Doplick [1979] and Idso [1980], both point out that measured climate sensitivities give much smaller temperature increases than those determined by M&W and Hansen et al. This was later discussed in more detail by Idso [1998]. These issues are ignored in H81.

More Greenhouse Effect Magic

Next, the Wizard waves his magic wand and makes a greenhouse effect temperature appear by rearranging the photon energy distribution at TOA. Conservation of energy requires an approximate long term energy balance between the solar flux absorbed by the earth and the LWIR flux returned to space. Simple energy transfer arguments based on a rotating sphere illuminated by a collimated beam of light, give an average planetary LWIR flux emitted at TOA near 240 W m^{-2}. Using the Stefan Boltzmann law, this average flux is converted to an 'effective emission temperature' near 255 K. Assuming an average surface temperature of 288 K, the temperature difference of 33 K is often called a 'greenhouse effect temperature' and it is argued that the earth's surface is 33 K warmer than it would be without 'greenhouse gases' in the atmosphere [Taylor, 2006]. This is pseudoscientific nonsense. The LWIR flux emitted to space is simply a cumulative cooling flux emitted by 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 spectral distribution is not that of a blackbody radiator at 255 K [CR23, Chap. 2]. A global average surface temperature is also a mathematical construct with no physical meaning.

The Tropospheric Heat Engine

H81 continues with a discussion of the moist lapse rate and explains the greenhouse effect temperature as LWIR emission from a 'mean radiating level' of 5 km. There is no discussion of the tropospheric heat engine [CR23 Chap. 2]. The difference in emission level between H_2O and CO_2 is not considered. The decoupling of the upward and downward LWIR fluxes by molecular line broadening effects is ignored. It is assumed that the increase in atmospheric IR absorption

changes the energy balance of the earth and that the surface and atmospheric temperatures will warm until the energy balance at TOA is restored. The coupling of the LWIR flux to the turbulent moist convection near the surface is also ignored (See Figure 4).

The Climate Model Sensitivity

The climate model used for H81 was a one dimensional radiative convective (1-D RC) model based on earlier work by Wang, Hansen et al [1976] and by Manabe and Wetherald [1967]. The solar flux has been averaged so that it shines 24 hours a day at a fixed intensity. The LWIR flux returned to space must exactly balance the average absorbed solar flux. When the concentration of CO_2 or other greenhouse gases is increased, there is an initial decrease in the LWIR flux at the top of the model atmosphere (TOMA). The model is configured to adjust to a new equilibrium state so that the surface temperature increases until the LWIR flux is restored to its original value. The model can be 'tuned' using various presumed feedback effects that modify the temperature response to CO_2. For the 1981 paper, the model was 'tuned' to produce a 2.8 °C temperature increase for a doubling of the CO_2 concentration. Without feedbacks, the model 'doubling' response was 1.2 °C. The correct response is of course 'too small to measure' [CR23, Chap. 8]. The climate model sensitivity for various feedback parameters is shown in Figure 10.

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 10: Climate model sensitivity to various feedback parameters, table 1 from H81.

Ocean Heating

The original 1967 1-D RC model developed by M&W had a partially reflective blackbody surface with zero heat capacity. H81 then proceeds to discuss the effects of a 'slab' ocean model introduced as an addition to the M&W surface. This ocean model has two layers, a 'mixed layer' 100 m deep and a 1000 m 'diffuse layer' below this. The penetration depth of the LWIR flux from CO_2 into the water surface is less than 100 micron (0.004 inches) [Hale and Querry, 1973]. The wind driven evaporation was ignored (see Figure 5). The wizard Hansen simply waved his magic wand and the waves and the ocean oscillations disappeared. The 'slab' ocean just added time delays to the climate model that became part of the CO_2 doubling ritual. The ocean warming created in the model by the increase in CO_2 concentration is shown in Figure 11.
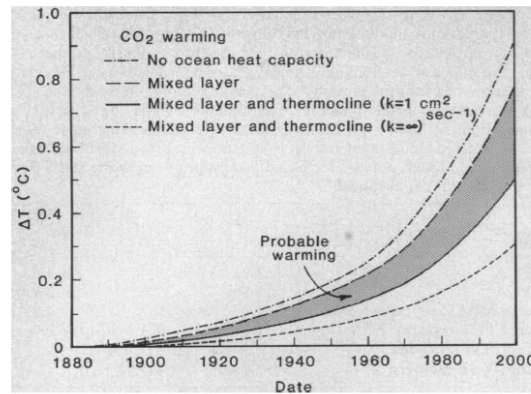
Figure 11: CO$_2$ induced ocean warming, fig. 1 from H81.

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 fraudulent ocean warming from a quadrupling of the CO$_2$ concentration calculated by Manabe and Stouffer is shown in Figure 12.
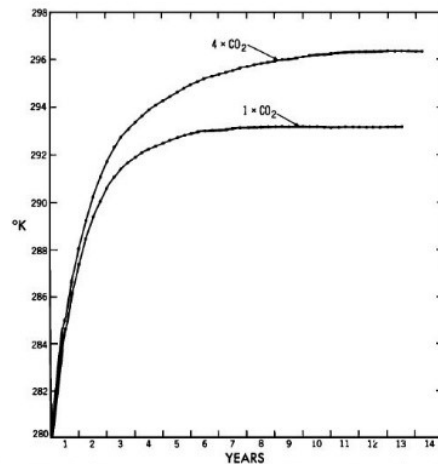

Figure 12: Ocean warming produced by a quadrupling of the CO$_2$ concentration, fig. 6 from Manabe and Stouffer, 1980.

Radiative Forcing

Hansen et al then proceed to use their 'tuned' 1-D RC model to calculate the change in 'equilibrium surface temperature' produced by a variety of 'radiative perturbations' that later came to be known as 'radiative forcings'. For 'greenhouse gases' in this model, the change in LWR flux at TOA can propagate down to the surface through the pressure broadened lines in the lower troposphere. The magical water vapor feedback mechanism in the model will amplify any increase in temperature produced by an increase in LWIR flux to the surface. These 'radiative perturbations' provided the

foundation for the contrived set of 'radiative forcings' that have been used to create the illusion that the climate models can simulate the global mean temperature record (see Figure 8). The contrived forcings are then divided into 'anthropogenic' or 'human caused' forcings and 'natural' forcings. The climate models are rerun with just the 'natural' forcings' to create a 'natural' baseline. 'Extreme weather events' can then be blamed on the 'human factors' in the radiative forcings.
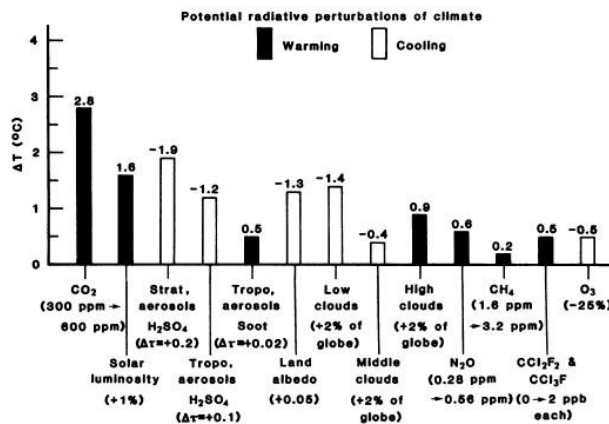

Fig. 2. Surface temperature effect of various global radiative perturbations, based on the 1-D RC model 4 (Table 1). Aerosols have the physical properties specified by (17). Dependence of ΔT on aerosol size, composition, altitude, and optical thickness is illustrated by (26). The $\Delta \tau$ for stratospheric aerosols is representative of a very large volcanic eruption.

Figure 13: Equilibrium temperature changes produced by various 'radiative perturbations' (forcings), fig. 2 from H81.

The Global Mean Temperature Record and the AMO

Next, Hansen et al used weather station data to construct mean temperature records for northern, tropical and southern latitudes and a combined global record. They chose to ignore the obvious 1940 peak related to the AMO (See Figure 7) and blamed the warming that started in about 1970 on CO_2. This is shown in Figure 14. For reference, measured increase in CO_2 concentration (Keeling curve) has been superimposed on the global mean temperature record. The 1940 AMO peak is also indicated.
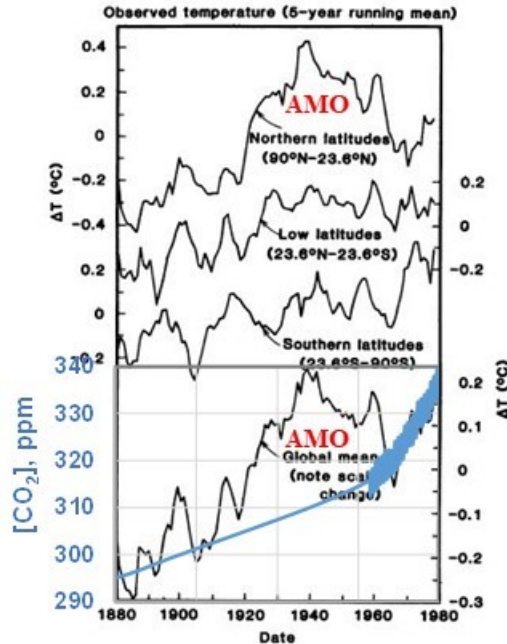
Fig. 3. Observed surface air temperature trends

Figure 14: The weather station temperature record, fig.3 from H81.

The CO₂ Doubling Ritual

Next, the Wizard Hansen waved his magic wand and created the CO_2 Doubling Ritual for use in the Equilibrium Climate Fantasy Land. He doubled the CO_2 concentration in his 1-D RC model with a slab ocean and let the model respond using his magical equilibrium average accounting tricks. The effects of the flux changes during the diurnal and seasonal cycles were ignored. His k distribution method removed the influence of molecular line broadening. There was no convective turbulence in the troposphere of the Fantasy Land, nor was there any wind driven evaporation over the oceans. The gyre circulation and the ocean oscillations were banished. The surface was initially heated by an increase in flux of 4.3 W m^{-2}. After a few months, this was reduced to 3.9 W m^{-2}. Then the radiative forcing magic invoked the water vapor feedback spells and the surface slowly warmed, including the slab ocean until the new, warmer equilibrium temperature was reached in the Fantasy Land. This was the 2.8 C temperature rise that had been 'tuned' into the model. The calculated flux changes are shown in Figure 15.

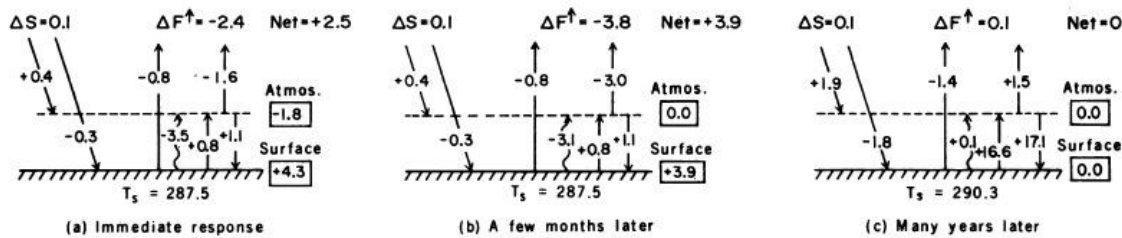Fig. 4. Change of fluxes (watts per square meter) in the 1-D RC model when atmospheric CO₂ is doubled (from 300 to 600 ppm). Symbols: ΔS, change in solar radiation absorbed by the atmosphere and surface; ΔF↑, change in outward thermal radiation at top of the atmosphere. The wavy line represents convective flux; other fluxes are radiative.

Figure 15: The changes in flux calculated for the CO₂ Doubling Ritual, fig. 4 from H81.

The CO_2 Doubling Ritual is still used to estimate the climate sensitivity in the climate models. The main change was the switch to 'effective' radiative forcings (ERF) by Hansen et al in 2005. The radiative forcing magic was not working properly and more 'tuning' was needed to make the models match the data [Hansen et al, 2005]. The temperature adjustment after a CO_2 doubling is illustrated in Figure 16a from Box 7.1 fig 1 in AR6 WG1 and the various steps in the temperature recovery from a CO_2 doubling are illustrated in Figure 16b from fig. 8.1 in AR5 WG1. Little has changed in the Equilibrium Climate Fantasy Land in the last 40 years.
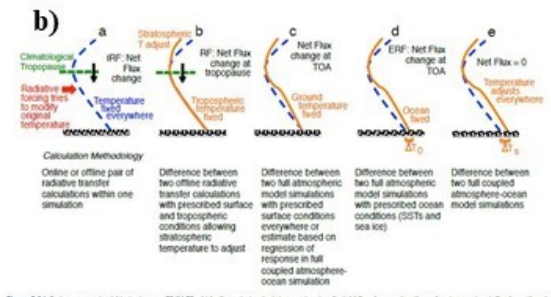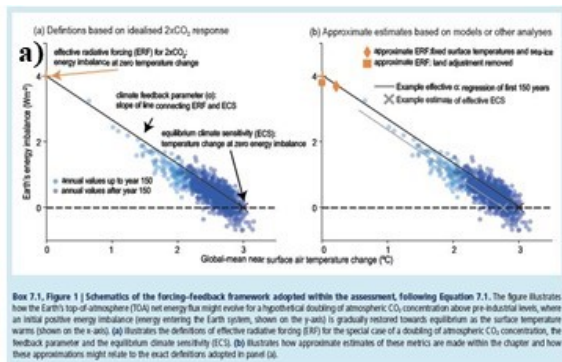

Figure 16: The CO₂ Doubling Ritual, a) the linear temperature adjustment after a CO₂ doubling from Box 7.1, fig.1 in AR6 WG1 and the various steps in the temperature recovery from fig. 8.1 AR5 WG1.

Matching the Temperature Record

The Wizard Hansen then put his magic to work and created the forcings needed to make the 1-D RC model appear to match the temperature record. He used a mix of increased CO_2 concentration, volcanic aerosols and solar flux variation to 'tune' his 1-D RC model with a 'slab' ocean. This is shown in Figure 17. The 1940 AMO peak is indicated by the red asterisks. This approach has now evolved into the contrived set of forcings used in AR6 (see Figure 8c). As illustrated in Figure 8g, an LWIR 'greenhouse gas forcing' cannot change the surface temperature of the earth. The global mean temperature record can be explained as a combination of the AMO, the recovery from the LIA, urban heat island effects, changes to the urban/rural station ratio in the raw temperature data and 'homogenization' adjustments.
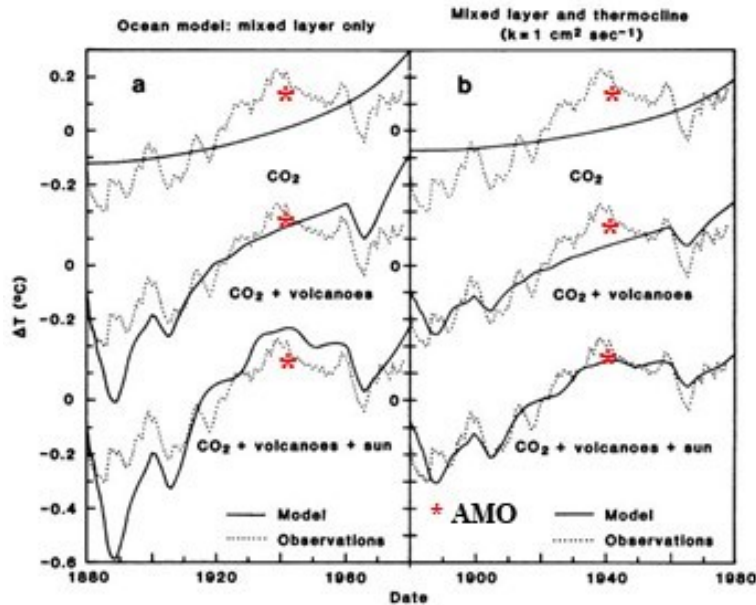
Fig. 5. Global temperature trend obtained from climate model with sensitivity 2.8°C for doubled CO_2. The results in (a) are based on a 100-m mixed-layer ocean for heat capacity; those in (b) include diffusion of heat into the thermocline to 1000 m. The forcings by CO_2, volcanoes, and the sun are based on Broecker (25), Lamb (27), and Hoyt (48). Mean ΔT is zero for observations and model.

Figure 17: A contrived set of 'radiative forcings' from CO_2, volcanic aerosols and solar intensity with a 'slab' ocean was used to create the observed global temperature record, fig. 5 from H81.

The Foundation of the Equilibrium Climate Fantasy Land

The 1-D RC climate model used in H81 was adapted from the one published by Manabe and Wetherald in 1967. M&W in turn copied the basic equilibrium air column from Arrhenius [1896] and added a 9 or 18 layer radiative transfer model. This provided reasonable values for the calculated LWIR flux based on the conditions specified in the model. They also added a fixed relative humidity distribution that provided the water vapor feedback. Their model took a year (number of steps multiplied by the step time) to reach equilibrium. They used a band model to simplify the radiative transfer calculations and ignored the molecular line broadening effects that decouple the upward and downward LWIR fluxes (see Figure 3). The assumptions used by M&W are shown in Figure 18.

1) At the top of the atmosphere, the net incoming solar radiation should be equal to the net outgoing long-wave radiation.
2) No temperature discontinuity should exist.
3) Free and forced convection, and mixing by the large-scale eddies, prevent the lapse rate from exceeding a critical lapse rate equal to 6.5C km^{-1}.
4) Whenever the lapse rate is subcritical, the condition of local radiative equilibrium is satisfied.
5) The heat capacity of the earth's surface is zero.
6) The atmosphere maintains the given vertical distribution of relative humidity (new requirement).

Figure 18: The modeling assumptions used by M&W in their 1967 paper.

Stone and Manabe [1968] considered the calculation of the LWIR cooling rates in M&W 1967 and compared their results to that of Rodgers and Walshaw [1966]. The tropospheric cooling rates were similar to those in Figure 2a. However, they did not consider the change in cooling rate produced by a change in the CO_2 concentration. An analysis by Ackerman [1979] did consider the changes in CO_2 cooling rate for a CO_2 doubling and found similar values to Iacono et al [2008]. However, changes in surface temperature were then analyzed using a 1-D RC model and the coupling to the tropospheric turbulence was ignored.

M&W then went on to incorporate their 1967 model into every unit cell of a 'highly simplified' global circulation model (GCM) [M&W 1975]. The 1967 model was now described as a 'global average climate model'. Although the M&W 1975 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. M&W failed to understand that the simplifications introduced in their 1967 model created the mathematical warming artifacts that they interpreted as a CO_2 induced warming. The increase in temperature produced by this 'CO_2 doubling' is shown in Figure 19.
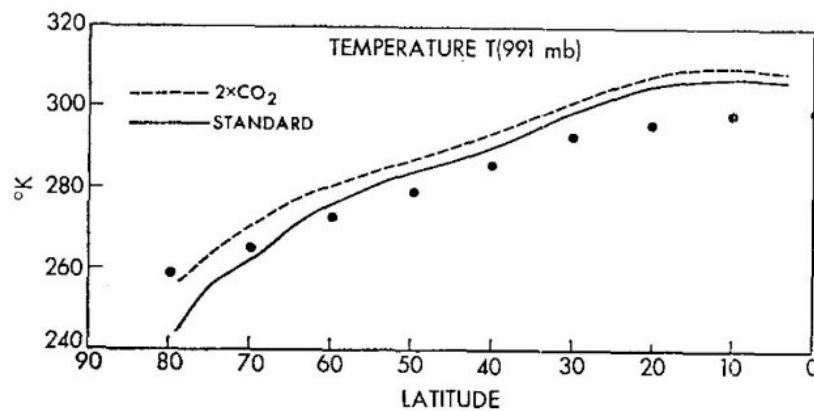

FIG. 5. Zonal mean temperature at the lowest prognostic level (i.e., ~991 mb). Dots indicate the observed distribution of zonal mean surface air temperature (Oort and Rasmusson, 1971).

Figure 19: The zonal temperature increases produced by a 'CO_2 doubling' in the 1975 M&W model.

The Growth of the Climate Fraud

The foundation of the massive climate fraud we have today was established between 1967 and 1981 by a small group of climate modelers associated with the NOAA Geophysical Fluid Dynamics Laboratory and the NASA Centers at Goddard and Langley. The initial fraud may be found in 4 papers, two by Manabe and Wetherald in 1967 and 1975 and two by the Hansen group in 1976 and 1981 [M&W 1967, M&W 1975, H81 and H76].

There are three parts to the growth of this fraud. First, starting in the nineteenth century, climate energy transfer was oversimplified using the equilibrium climate assumption. Physical reality was

abandoned in favor of mathematical simplicity. Global warming was created as a mathematical artifact in these simplistic climate models. The climate fraud started to grow as junior researchers trained at NOAA and NASA moved on to other positions, taking their fraudulent models with them. Second, as funding was reduced for NASA space exploration and DOE nuclear programs there was 'mission creep' and climate modeling became an alternative source of revenue. Eisenhower's warning about the corruption of science by government funding has come true. 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 [Hecht, 2007]. The World Meteorological Organization (WMO) and the United Nations Environmental Program (UNEP) were used to promote the global warming scare. The UN Intergovernmental Panel on Climate Change (UN IPCC) was established in 1988 and the US Global Change Research Program (USGCRP) was established by Presidential initiative in 1989 and mandated by Congress in 1990. The IPCC has used the fraudulent climate models to create the illusion that a dangerous climate warming is being produced by the increase in CO_2 concentration. The USGCRP has blindly copied the IPCC reports. In the UK, Margaret Thatcher used climate change to enhance her political career and the Hadley Center was established in 1990 to provide the climate propaganda that she needed [Courtney, 2012, Folland et al, 2004]. In the US, Al Gore became a leading proponent of the climate fraud.

The development of climate models enabled NOAA (and the earlier ESSA and Weather Bureau) to 'double dip' the funding. Weather forecasting and climate modeling could share the same resources. The equilibrium climate assumption was accepted without question and the pseudoscientific 1-D RC model was never challenged. As funding for NASA was reduced after the end of the Apollo (moon landing) program, the planetary atmosphere groups at NASA Goddard and Langley jumped on the climate bandwagon. The atmospheres of Mars and Venus are approximately 95% CO_2. The 1976 'greenhouse warming' paper by Wang, Hansen et al expanded the radiative transfer analysis to 10 minor IR species as well as H_2O and O_3 [Wang, Hansen et al, 1976]. The NASA groups had no prior experience in climate studies and simply accepted the M&W 1-D RC model as gospel. They used it to create melodramatic claims of global warming that would provide further funds for their work. They could also use NASA computers to develop global circulation models that also relied on the equilibrium assumption. They soon became trapped in a web of lies of their own making. They had to maintain the illusion of melodramatic global warming to keep the research money flowing.

Later, as funding was reduced for nuclear programs, the Department of Energy that included the old Atomic Energy Commission also jumped on the climate bandwagon. The national labs had 'supercomputers for hire'. The DOE also supported climate model comparison programs that later evolved into the Climate Model Intercomparison Project (CMIP) [Meehl et al, 1997, Stouffer et al, 2017, Taylor et al, 2012]. This has become the major source of fraudulent climate model results used by the IPCC. As computer technology improved and more groups joined the climate modeling bandwagon, the underlying pseudoscience of radiative forcings, feedbacks and climate sensitivity was accepted without question. One useless climate model could be compared to another and physical reality could be ignored. The models were 'tuned' to match the global mean temperature

record using a set of contrived radiative forcings. These were then manipulated to claim 'human causes' for every imaginable 'extreme weather event' [Herring et al, 2022].

Outside events were ignored. The early climate model results were officially 'sanctified' by the Charney report in 1979. The reviewers concluded that a warming of 3±1.5 °C from a 'doubling' of the atmospheric CO_2 concentration was likely. At the time, preliminary results from just five primitive GCMs were available, 3 from Manabe's group and 2 from Hansen's group [Charney et al, 1979]. The real cause of an Ice Age was planetary perturbations of the earth's orbit known as Milankovitch cycles. This had been established in 1976 from an analysis of deep drilled ocean sediment cores [Hays et al, 1976]. A more detailed description was given in the book '*Ice Ages*' by Imbrie and Imbrie [1979]. If changes in CO_2 concentration did not cause an Ice Age cycle, then there should be no reason to worry about fossil fueled combustion. A large body of other evidence was also ignored including detailed surface energy transfer measurements [Lettau and Davidson, 1957], ocean surface energy transfer [Bunker, 1976], the spectral distribution of the LWIR emission to space [Hanel et al, 1971] and the penetration depth of the LWIR radiation into water [Hale and Querry, 1973].

In 1979 there were only two modeling groups that provided GCM data for the Charney report. 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 is clear evidence of the climate modeling fraud (see Figure 8h). All 49 groups of climate modelers have abandoned physical reality and entered the realm of computational climate fiction.

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 [FM, 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. 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 and Fuller, 2010].

The Radiation Balance of the Earth

In order for the radiative forcing magic to work, an infrared radiative forcing produced by an increase in atmospheric greenhouse gas concentration must change the energy balance of the earth. This established another climate bandwagon. Satellite radiometer measurements of this energy balance had to agree with climate models. 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.

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. The ocean gyre circulation and the four main ocean oscillations are illustrated in Figure 20 [CR23, Chap. 2].

Figure 21 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 $\pm 30°$ 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 22 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 (See figure 3). The detailed

analysis of the energy flows that establish the earth's radiation balance do not support the radiative forcing narrative.
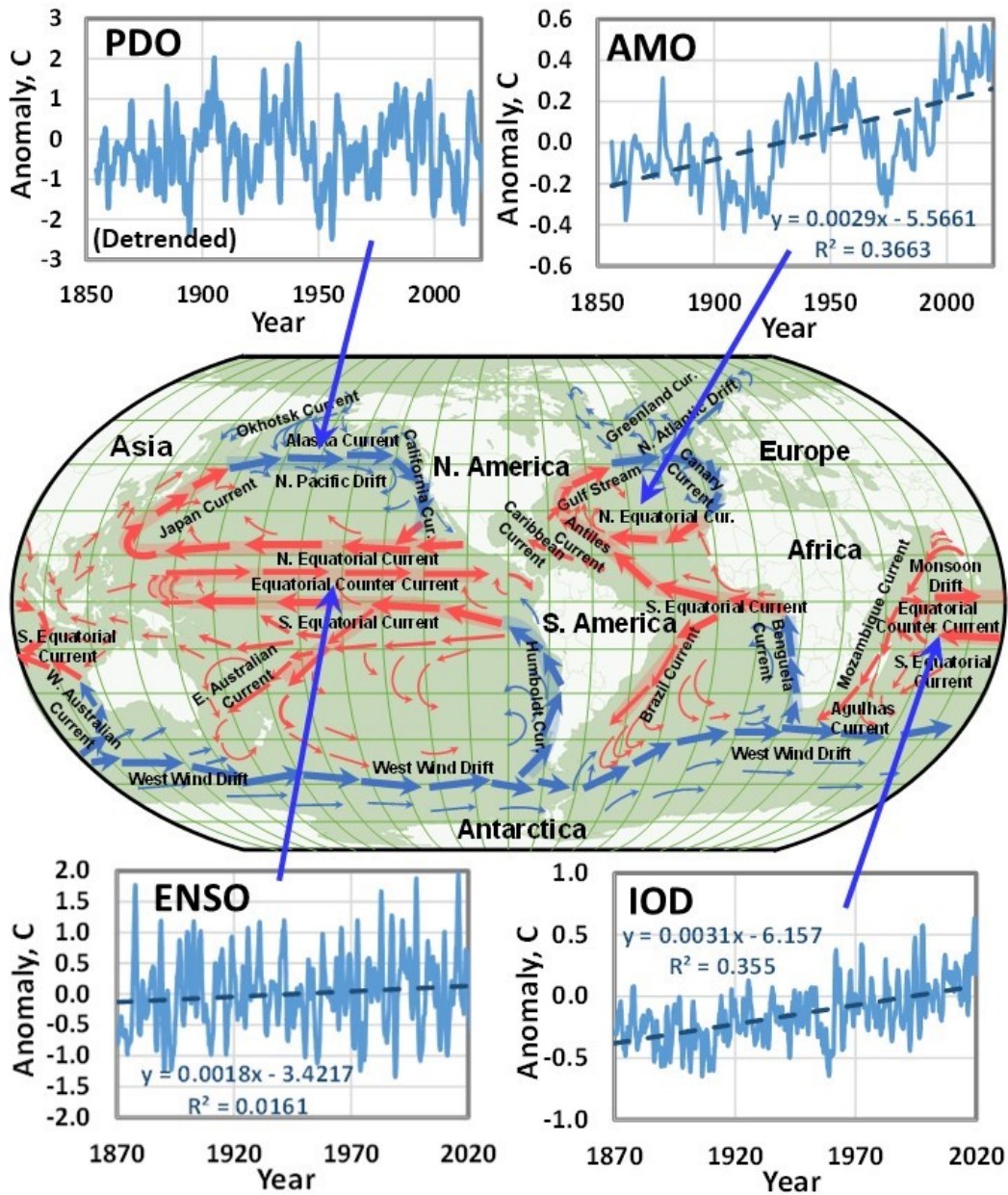

Figure 20: The ocean gyre circulation and the four main ocean oscillations (schematic).
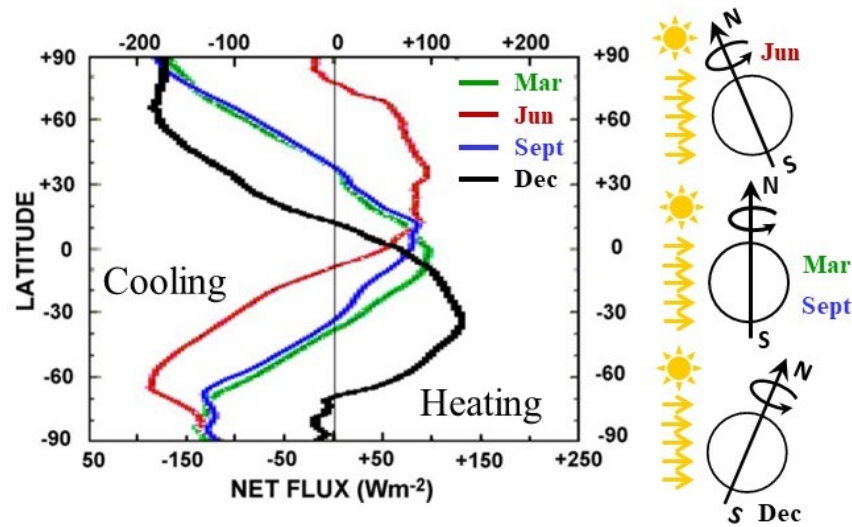
Figure 21: Zonal averages of the net flux (absorbed solar minus emitted LWIR flux), for March, June, September and December, five year average CERES values.
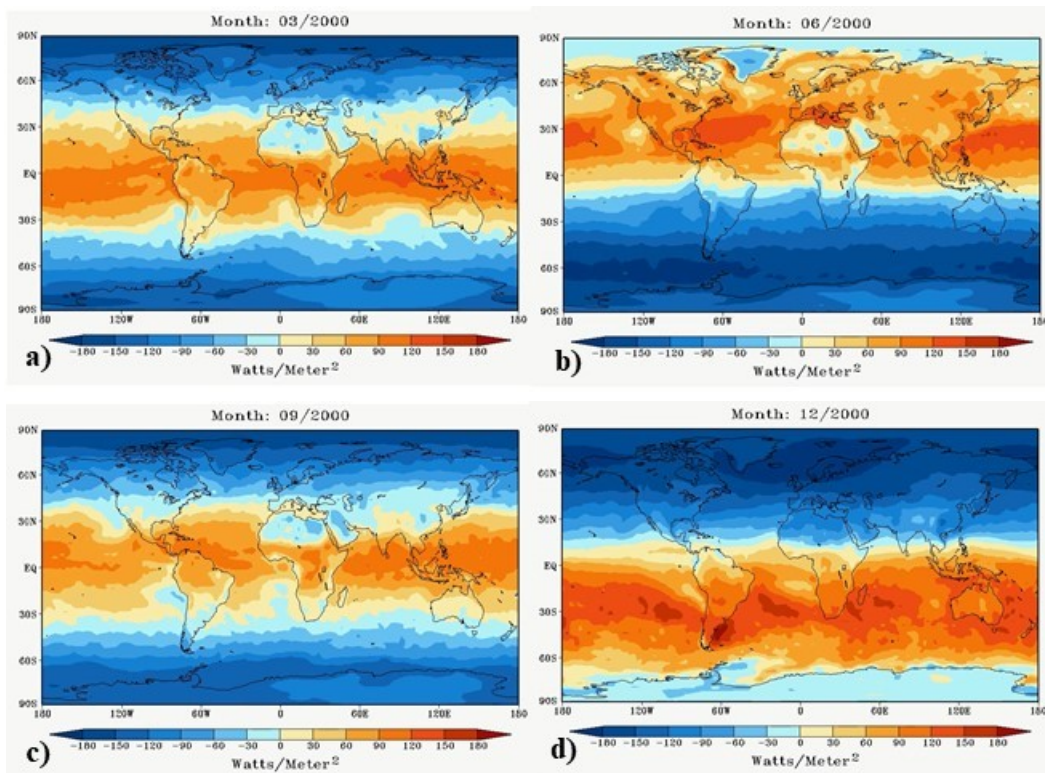

Figure 22: Spatially resolved CERES Terra monthly average net radiation balance at TOA for March, June, September and December 2000.

Forcing the Climate Sensitivity

The climate models are 'tuned' to create the global mean temperature record using a contrived set of radiative forcings. The same set of forcings are also combined with the global mean temperature

record to create a 'measured' climate sensitivity. A good example of this is 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 and the radiative forcings are taken from the CMIP5/RCP4.5 model ensemble. 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 23a and 23b. 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 23b cannot couple below the ocean surface and cause any measurable change in ocean temperature (see Figures 5 and 7). Using the data from Figures 23a and 23b 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 ($\Delta F-\Delta Q$) 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 23c and 23d. 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. All of this is pseudoscientific nonsense.
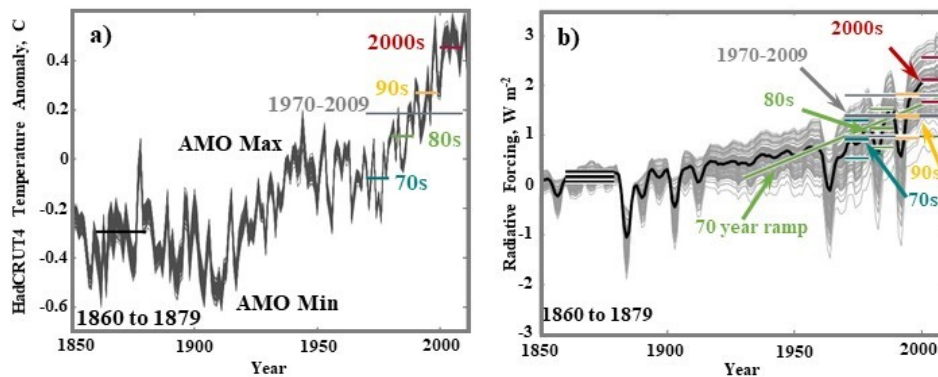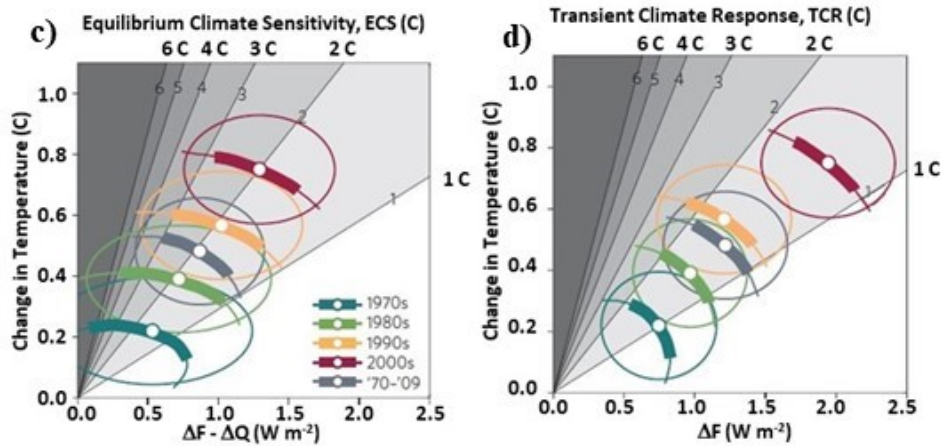
Figure 23: a) Decadal mean temperature estimates derived from the HadCRUT4 global mean temperature series. b) Decadal mean forcing with standard errors from the CMIP5 /RCP4.5 ensemble. c) Estimates of ECS and d) TCR from Otto et al [2013].

The Imperial Cult of the Global Warming Apocalypse

Humans are easily fooled. As children we may believe that there are monsters under the bed. Logic and reason develop later, as we grow into adults. Irrational belief, particularly in religious matters is common. Some people become Born Again Christians and accept a literal interpretation of their religious texts. These beliefs will not be changed by reason or logic. A similar transformation occurred in climate science. Scientific reason was abandoned in favor of an irrational belief in the simplified mathematical equations that are used in the climate models. A radiative forcing by greenhouse gases had to change the energy balance of the earth and heat the oceans. Evidence that contradicted this was ignored. Thermal engineering analysis was replaced by correlation. The atmospheric CO_2 concentration increased and the oceans warmed. Mainstream climate science has degenerated past scientific dogma into a quasi-religious cult. The computer programmers and mathematicians involved in climate modeling became Born Again Morons, trapped in a web of lies of their own making. They became prophets of the Imperial Cult of the Global Warming Apocalypse. Instead of the Divine Right of Kings we now have the Divine Right of Born Again Morons to amend the basic Laws of Physics and save the world from a non-existent problem.

Instead of a flat earth they have chosen to believe in a flat ocean where wind driven oscillations and non-equilibrium phase shifts do not exist. The climate must be controlled by the pseudoscience of radiative forcings and feedbacks. The sacred spaghetti plots generated by the computer models, the immaculate radiation balance of the earth and the holy climate sensitivity form a triangle of fraud that is part of the creed of the Imperial Cult of the Global Warming Apocalypse. The new indulgences require us to give up fossil fuels to save us from a climate apocalypse that is too small to measure. We can ride an elevator down four floors to the new climate hell - with a change in LWIR heating rate of +0.08 K per day.
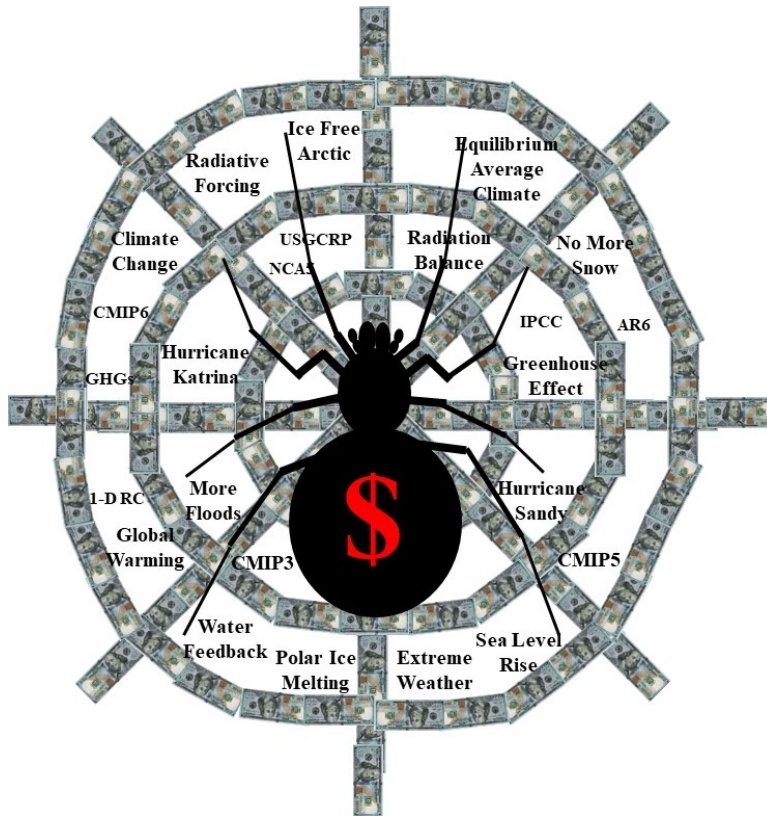
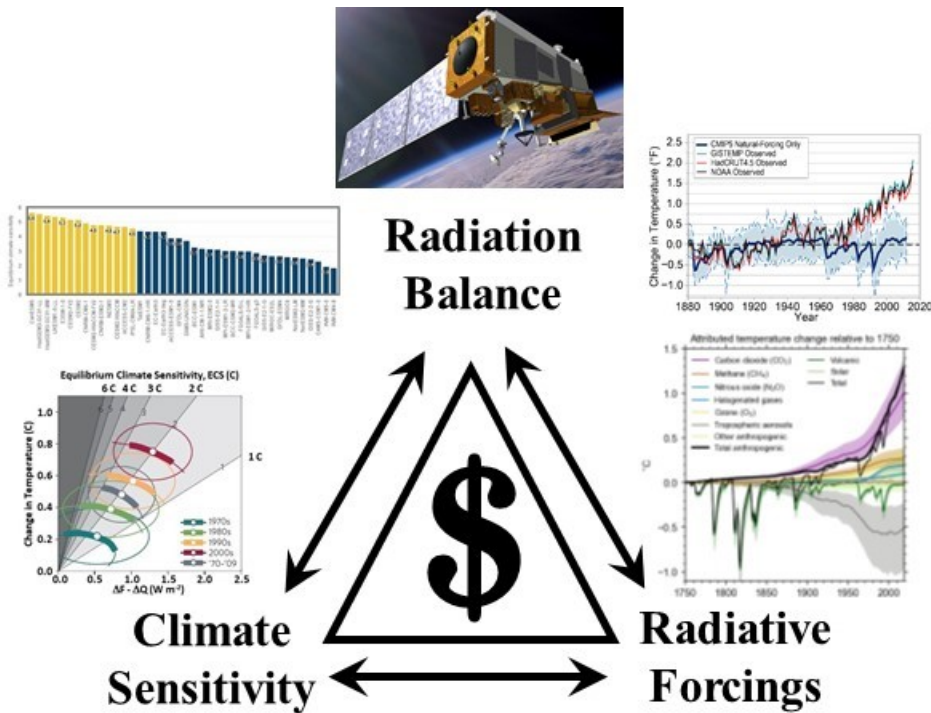**Figure 24: The Climate Web of Lies**

Figure 25: The Triangle of Fraud: the radiation balance, the climate sensitivity and a contrived set of radiative forcings are used to support the climate modeling fraud.

Eisenhower's warning about the corruption of science by government science has come true. The government agencies and university groups involved in climate modeling have become bloated bastions of corruption. The climate modeling fraud has spawned a vast secondary industry of policy analysts, economists, geologists, geographers, ecologists, psychologists, sociologists and other assorted 'experts' that was created and funded to study every aspect of this nonexistent global warming apocalypse problem. All of this is a massive pyramid or Ponzi scheme built on the pseudoscience of radiative forcing, feedbacks and climate sensitivity. The USGCRP has simply copied the IPCC reports for over 30 years. The climate model results produced by the groups at NOAA. NASA, NSF and DOE (including the National Labs) have been accepted without question by the rest of 13 agencies involved in the USGCRG. The fictional warming created by the climate models has been used to drive US energy policy and force the unnecessary adoption of solar and wind based electrical power generation and the use of electric vehicles. It is time to shut down the climate modeling groups and dismantle this massive fraud.

Acknowledgement

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.

Ackerman, T. P. (1979), "On the effect of CO_2 on the atmospheric heating rates" *Tellus* **31** pp 115-123. [https://a.tellusjournals.se/articles/10.3402/tellusa.v31i2.10416]

Akasofu, S.-I. (2010), "On the recovery from the Little Ice Age" *Natural Science* **2**(11) pp. 1211-1224. [http://dx.doi.org/10.4236/ns.2010.211149]

AMO (2022), [https://www.esrl.noaa.gov/psd/data/correlation/amon.us.long.mean.data]

Andrews, R. (2017a), "Adjusting Measurements to Match the Models – Part 3: Lower Troposphere Satellite Temperatures" *Energy Matters* Sept 14. [http://euanmearns.com/adjusting-measurements-to-match-the-models-part-3-lower-troposphere-satellite-temperatures/#more-19464]

Andrews, R. (2017b), "Making the Measurements Match the Models – Part 2: Sea Surface Temperatures" *Energy Matters* Aug 2. [http://euanmearns.com/making-the-measurements-match-the-models-part-2-sea-surface-temperatures/]

Andrews, R. (2017c), "Adjusting Measurements to Match the Models – Part 1: Surface Air Temperatures" Energy Matters July 27. [http://euanmearns.com/adjusting-measurements-to-match-the-models-part-1-surface-air-temperatures/]

Arrhenius, S. (1896), "On the influence of carbonic acid in the air upon the temperature of the ground" *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science* **41** pp. 237-276. [https://doi.org/10.1080/14786449608620846]

Berger, T. and G. Sherrington, (2022), "Uncertainty of Measurement of Routine Temperatures– Part Three" WUWT Oct 14 [https://wattsupwiththat.com/2022/10/14/uncertainty-of-measurement-of-routine-temperatures-part-iii/]

Bryson, R. A. and G. J. Dittberner (1976), "A non-equilibrium model of hemispheric mean surface temperature" *J. Atmos. Sci.* **33**(11) pp. 2094-2106. [https://journals.ametsoc.org/view/journals/atsc/33/11/1520-0469_1976_033_2094_anemoh_2_0_co_2.xml]

Budyko, M. I. (1969) "The effect of solar radiation variations on the climate of the Earth" *Tellus* **21**(5) pp. 611-619. [https://doi.org/10.3402/tellusa.v21i5.10109]

Bunker, A. F. (1976) "Computations of Surface Energy Flux and Annual Air–Sea Interaction Cycles of the North Atlantic Ocean" *Monthly Weather Review* **104**(9) pp. 1122-1140. [https://doi.org/10.1175/1520-0493(1976)104<1122:COSEFA>2.0.CO;2] [https://doi.org/10.1175/1520-0493(1976)104<1122:COSEFA>2.0.COsemicolon2]

Callendar, G. S. (1938), "The artificial production of carbon dioxide and its influence on temperature" *J. Roy. Met. Soc.* **64** pp. 223-240. [https://doi.org/10.1002/qj.49706427503] availabe at: [http://www.met.reading.ac.uk/~ed/callendar_1938.pdf]

CERES Team (2004) Earth Radiation Budget: Seasonal cycles in Net Radiation, 3/2000 to 2/200, CERES/Terra, Release Date: 07/12/2004

[https://ceres.larc.nasa.gov/documents/press_releases/images/mnet.mp4]

Cess, R. D. and S. D. Goldenberg (1981) "The effect of ocean heat capacity upon global warming due to increasing atmospheric carbon dioxide " *J. Geophysical Res.* **86** pp498-502. [https://doi.org/10.1029/JC086iC01p00498]

Charney, J. G., A. Arakawa, D. J. Baker, B. Bolin, R. E. Dickinson, R. M. Goody, C. E. Leith, H. M. Stommel and C. I. Wunsch (1979), *Carbon Dioxide and Climate: A Scientific Assessment*, Report of an ad hoc study group on carbon dioxide and climate, Woods Hole, MA July 23-27. [https://geosci.uchicago.edu/~archer/warming_papers/charney.1979.report.pdf]

Clark, R. (2013), "A dynamic, coupled thermal reservoir approach to atmospheric energy transfer Part I: Concepts" *Energy and Environment* **24**(3, 4) pp. 319-340. [https://doi.org/10.1260/0958-305X.24.3-4.319]

"A dynamic, coupled thermal reservoir approach to atmospheric energy transfer Part II: Applications" *Energy and Environment* **24**(3, 4) pp. 341-359. [https://doi.org/10.1260/0958-305X.24.3-4.341]

Clark, R. and A. Rörsch, (2023) *Finding Simplicity in a Complex World - The Role of the Diurnal Temperature Cycle in Climate Energy Transfer and Climate Change*, Clark Rörsch Publications, Thousand Oaks, CA. Available from Amazon.

[https://www.amazon.com/Finding-Simplicity-Complex-World-Temperature/dp/B0BZBPV32Q]

Courtney, R. (1999) "Global Warming: How it all began"

John.Daly.*Waiting for greenhouse* Post 1999. [http://www.john-daly.com/history.htm]

D'Aleo, J. and A. Watts (Aug. 27, 2010) "Surface temperature records: policy driven deception? [http://scienceandpublicpolicy.org/images/stories/papers/originals/surface_temp.pdf] (Link not working) Available at:

[https://venturaphotonics.com/files/6.0_D'Aaleo.Watts.Surface_temp.SPPC%202010.pdf]

Dickinson, R. E. (1981) "Convergence rate and stability of ocean-atmosphere coupling schemes with a zero-dimensional climate model" *J. Atmos. Sci* **38**(10) pp. 2112-2120. [https://doi.org/10.1175/1520-0469(1981)038<2112:CRASOO>2.0.CO;2]

Douglas, J. H. (March 1, 1975) "Climate change: chilling possibilities" *Science News* **107** pp. 138-140. [https://www.sciencenews.org/wp-content/uploads/2008/10/8983.pdf]

Feldman D.R., K. N. Liou, R. L. Shia and Y. L. Yung (2008), "On the information content of the thermal IR cooling rate profile from satellite instrument measurements" *J. Geophys. Res.* **113** D1118 pp. 1-14. [https://doi.org/10.1029/2007JD009041]

FM (2012) Kummer, L. (2012) "Hidden history about Madrid 1995: a look at the conference that changed the world" [http://fabiusmaximus.com/2012/09/11/ipcc-climate-change-science-warming-42859/#more-42859]

Folland, C. K., D. J. Griggs and J. T. Houghton (2004), "History of the Hadley Centre for Climate Prediction and Research" *Weather* **59**(11) pp. 317-323. [https://doi.org/10.1256/wea.121.04] available at: [https://www.researchgate.net/publication/253556895_History_of_the_Hadley_Centre_for_Climate_Prediction_and_Research]

Fourier, J.-B.-J. (1824), "Remarques générales sur les températures du globe terrestre et des espaces planétaires" *Annales de Chimie et de Physique* **27**, pp. 136–167. [https://gallica.bnf.fr/ark:/12148/bpt6k65708960/f142.image#] English translation: [http://fourier1824.geologist-1011.mobi/]

Gibert, F., J. Cuesta, J.-I. Yano, N. Arnault and P. H. Flamant (2007), "On the Correlation between Convective Plume Updrafts and Downdrafts, Lidar Reflectivity and Depolarization Ratio" *Boundary Layer Meteorology* **5** pp. 553-573. [https://doi.org/10.1007/s10546-007-9205-6]

HadCRUT4 (2022), [https://www.metoffice.gov.uk/hadobs/hadcrut4/data/current/time_series/HadCRUT.4.6.0.0.annual_ns_avg.txt]

Hale, G. M. and M. R. Querry (1973), "Optical constants of water in the 200 nm to 200 μm wavelength region" *Applied Optics* **12**(3) pp. 555-563. [https://doi.org/10.1364/AO.12.000555]

Hanel, R. A., B. Schlachman, D. Rogers and D. Vanous (1971) "Nimbus 4 Michelson Interferometer" *Applied Optics* **10**(6) pp. 1376-1382. [https://doi.org/10.1364/AO.10.001376]

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]

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]

Hansen, J., A. Lacis, R. Ruedy M. Sato and H. Wilson (1993), "How sensitive is the world's climate?" *National Geographic Research and Exploration* **9**(2) pp. 142-158. [https://pubs.giss.nasa.gov/docs/1993/1993_Hansen_ha02800o.pdf]

Harde, H. (2017), "Radiation Transfer Calculations and Assessment of Global Warming by CO_2" *Int. J. Atmos. Sci.* 9251034 pp. 1-30. [https://doi.org/10.1155/2017/9251034]

Hausfather, Z. (2019), "CMIP6: The next generation of climate models explained" *Carbon Brief* [https://www.carbonbrief.org/cmip6-the-next-generation-of-climate-models-explained]

Hays, J. D., J. Imbrie, and N. J. Shackleton (1976), "Variations in the Earth's Orbit: Pacemaker of the Ice Ages" *Science* **194** Dec. 10, pp 1121-1132. [https://www.science.org/doi/10.1126/science.194.4270.1121]

Hecht, M. M. (2007), "Where the global warming hoax was born" *21st Century Science and Technology*, pp.64-68, Fall Issue. [http://www.21stcenturysciencetech.com/Articles%202007/GWHoaxBorn.pdf]

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)

Iacono, M. J., J. S. Delamere, E. J. Mlawer, M. W. Shephard, S. A. Clough, and W. D. Collins (2008), "Radiative forcing by long-lived greenhouse gases: Calculations with the AER radiative transfer models" *J. Geophys. Res.* **113**, D13103 pp. 1-8. [https://doi.org/10.1029/2008JD009944]

Idso, S. B. (1998) "CO_2-induced global warming: a skeptic's view of potential climate change", *Climate Research* **10** pp. 69-72 doi:10.3354/cr010069 [https://www.int-res.com/abstracts/cr/v10/n1/p69-82/]

Idso, S. B., (1980) "The Climatological Significance of a Doubling of Earth's Atmospheric Carbon Dioxide Concentration", *Science*, **207**(4438) pp 1462-1463 [https://www.science.org/doi/abs/10.1126/science.207.4438.1462]

Imbrie, J. and K. P. Imbrie (1979), '*Ice Ages: Solving the Mystery*', Harvard University Press, Cambridge, Mass.

IPCC, *Climate Change 2021: The Physical Science Basis*. *Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T.

Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. (2021). In Press. doi:10.1017/9781009157896, [https://www.ipcc.ch/report/ar6/wg1/]

IPCC, *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, (2014)1535 pp. ISBN 9781107661820. [https://www.ipcc.ch/report/ar5/wg1/]

Jones, G. S., P. A. Stott and N. Christidis (2013), "Attribution of observed historical near surface temperature variations to anthropogenic and natural causes using CMIP5 simulations" *J. Geophys. Res. Atmos.* **118**(10) pp. 4001-4024. [https://doi.org/10.1002/jgrd.50239]

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]

IPCC, *Climate Change 2001: The Scientific Basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change* [Houghton, J.T.,Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 881pp. [https://www.ipcc.ch/site/assets/uploads/2018/03/WGI_TAR_full_report.pdf]

Jones, P. D., T. M. Wigley and P. B Wright (1986), "Global temperature variations between 1861 and 1984" *Nature* **323**(31) pp. 430-434. [https://www.nature.com/articles/322430a0]

Kandel, R. and M. Viollier (2010), "Observation of the Earth's radiation budget from space" *Comptes Rendus Geoscience* **342**(4-5) pp. 286-300. [https://doi.org/10.1016/j.crte.2010.01.005]

Keeling (2023), *The Keeling Curve*. [https://scripps.ucsd.edu/programs/keelingcurve/]

Knutson, T., J.P. Kossin, C. Mears, J. Perlwitz and M.F. Wehner (2017), "Detection and attribution of climate change" In: *Climate Science Special Report: Fourth National Climate Assessment, Volume I*, Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.). U.S. Global Change Research Program, Washington, DC, USA, pp. 114-132. [https://doi.org/10.7930/J0J964J6]

Lettau, H.H. and B. Davidson (1957), *Exploring the Atmosphere's First Mile. Proceedings of the Great Plains Turbulence Field Program, 1 August to 8 September 1953 Volume II, Site Description and Data Tabulation*, Oxford, Pergamon Press.
Available at:
[https://books.google.com/books?hl=en&lr=&id=5bcJAQAAIAAJ&oi=fnd&pg=PA377&dq=Lettau,+H.H.+and+B.+Davidson,+Exploring+the+atmosphere%2%80%99s+first+mile.+Oxford:+Pergamon+Press,+1957.&ots=N0vbpjURx3&sig=sSTz9EMWpwi0XysXHTcWcLNxWv0#v=onepage&q&f=false]

Lorenz, E. N. (1973), "On the Existence of Extended Range Predictability" *J. Applied Meteorology and Climatology* **12**(3) pp. 543-546.
[https://journals.ametsoc.org/view/journals/apme/12/3/1520-0450_1973_012_0543_oteoer_2_0_co_2.xml?tab_body=fulltext-display]

Lorenz, E.N. (1963), "Deterministic nonperiodic flow" *Journal of the Atmospheric Sciences* **20**(2) pp. 130-141. [https://journals.ametsoc.org/view/journals/atsc/20/2/1520-0469_1963_020_0130_dnf_2_0_co_2.xml]

Manabe, S. and R. J. Stouffer, (1980), "Sensitivity of a global climate model to an increase of CO_2 concentration in the atmosphere", *J. Geophys Res*. **85**(C10) pp. 5529-5554. [https://doi.org/10.1029/JC085iC10p05529] also available at: [https://www.gfdl.noaa.gov/bibliography/related_files/sm8001.pdf]

Manabe, S. and R. T. Wetherald (1975) "The effects of doubling the CO_2 concentration in the climate of a general circulation model" *J. Atmos. Sci.* **32**(1) pp. 3-15. [https://journals.ametsoc.org/view/journals/atsc/32/1/1520-0469_1975_032_0003_teodtc_2_0_co_2.xml?tab_body=pdf]

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]

Mann M. E., R S. Bradley and M. K. Hughes (1999) "Northern Hemisphere temperatures during the past millennium: Inferences, uncertainties, and limitations" *Geophys Res Lett* **26**:759-762. [http://www.meteo.psu.edu/holocene/public_html/shared/articles/MBH1999.pdf]

Mann, M. E., R. E. Bradley and M. K. Hughes (1998) "Global-scale temperature patterns and climate forcing over the past six centuries" *Nature* **392**, pp. 779-787. [http://www.meteo.psu.edu/holocene/public_html/shared/articles/mbh98.pdf]

McFarlane, F. (2018), "The 1970s Global Cooling Consensus was not a Myth" Watts Up with That, 11.19.2018 [https://wattsupwiththat.com/2018/11/19/the-1970s-global-cooling-consensus-was-not-a-myth/]

Meehl, G. A., G. J. Boer, C. Covey, M. Latif and R. J. Stouffer (1997) "Intercomparison Makes for a Better Climate Model" *Eos* **78**(41) pp. 445-451 October 14. [https://doi.org/10.1029/97EO00276]

Melillo, J. M., T. C. Richmond, and G. W. Yohe, eds., (2014) *Climate Change Impacts in the United States: The Third National Climate Assessment*. U.S. Global Change Research Program, 841 pp.

[https://www.nrc.gov/docs/ML1412/ML14129A233.pdf] on line [https://nca2014.globalchange.gov/]

Monckton, C. (2009), "Climategate: caught green-handed", SPPI [http://scienceandpublicpolicy.org/monckton/climategate.html] (Link not working) Available at: [https://venturaphotonics.com/files/7.0_Monckton_GreenHanded.pdf]

Montford, A. W. (2010), '*The Hockey Stick Illusion'*, Stacey International.

Morice, C. P., J. J. Kennedy,N. A. Rayner and P. D. Jones (2012) "Quantifying uncertainties in global and regional temperature change using an ensemble of observational estimates: The HadCRUT4 data set" *J. Geophysical Res. Atmospheres* 117 D08101 pp. 1-22. [https://doi.org/10.1029/2011JD017187]

Mosher, S. and T. W. Fuller (2010), *Climategate: The Crutape Letters*, Create Space.

Newell, R. E. and T. G. Dopplick (1979), "Questions Concerning the Possible Influence of Anthropogenic CO_2 on Atmospheric Temperature", *J. Applied Meteorology and Climatology* **18**(6) pp. 822-825. [https://doi.org/10.1175/1520-0450(1979)018<0822:QCTPIO>2.0.CO;2]

O'Neill, P., R. Connolly, M. Connolly, Willie Soon, B. Chimani, M. Crok, R. de Vos, H. Harde, P. Kajaba, P. Nojarov, R. Przybylak, D. Rasol, O. Skrynyk, O. SkrynykP. Štěpánek, A. Wypych and P. Zahradníček, (2022), "Evaluation of the Homogenization Adjustments Applied to European Temperature Records in the Global Historical Climatology Network Dataset", *Atmosphere* **13**(2) 285 pp. 1-21. [https://doi.org/10.3390/atmos13020285]

Otto, A., F. E. L. Otto, O. Boucher, J. Church, G. Hegerl, P. M. Forster, N. P. Gillett, J. Gregory, G. C. Johnson, R Knutti, N. Lewis, U. Lohmann, J. Marotzke, G. Myhre, D. Shindell, B. Stevens and M. R. Allen (2013) "Energy budget constraints on climate response" *Nature Geoscience*, **6** (6). pp. 415 - 416. ISSN 1752-0894. [http://eprints.whiterose.ac.uk/76064/7/ngeo1836(1)_with_coversheet.pdf]

Otto, Ibid, Supplementary Material. [https://static-content.springer.com/esm/art%3A10.1038%2Fngeo1836/MediaObjects/41561_2013_BFngeo1836_MOESM299_ESM.pdf]

Peterson, T. C., W. M. Connolley and J. Fleck, (2008) "The myth of the 1970's global cooling consensus" *Bull. Amer. Meteor. Soc.* **86** pp. 1325-1337. [https://doi.org/10.1175/2008BAMS2370.1]

Ramanathan, V. (1975) "Greenhouse effect due to chlorofluorocarbons: Climatic implications" *Science* **190**, pp. 50-52. [https://www.science.org/doi/abs/10.1126/science.190.4209.50]

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]

Rodgers, C. D. and C. D. Walshaw, (1966), "The computation of infra-red cooling rate in planetary atmospheres", *Quarterly Journal of the Royal Met Soc.* **92** pp 67-92. [https://doi.org/10.1002/qj.49709239107]

Stone, H. M. and S. Manabe (1968) "Comparison among various numerical models designed for computing IR cooling" *Monthly Weather Review* 96(10) pp 735-741. [https://doi.org/10.1175/1520-0493(1968)096<0735:CAVNMD>2.0.CO;2]

Stouffer, R. J., V. Eyring, G. A. Meehl, S. Bony, C. Senior, B. Steven, S, and K. E. Taylor (2017) "CMIP5 scientific gaps and recommendations for CMIP6" *Bull. Amer. Met. Soc.* **98**(1) pp. 95-105 [https://journals.ametsoc.org/doi/pdf/10.1175/BAMS-D-15-00013.1]

Stott, P.A., S.F.B. Tett, G.S. Jones, M.R. Allen, J.F.B.Mitchell and G.J. Jenkins (2000), "External control of twentieth century temperature variations by natural and anthropogenic forcings" *Science* **290**, pp. 2133-2137. [https://www.science.org/doi/abs/10.1126/science.290.5499.2133]

Taylor, F. W. (2006), *Elementary Climate Physics,* Oxford University Press, Oxford, Chapter 7.

Taylor, K. E., R. J. Stauffer and G. A. Meehl (2012) "An overview of the CMIP5 and the experimental design" *Bull. Amer. Met. Soc.* **93**(4) pp. 485-498. [https://doi.org/10.1175/BAMS-D-11-00094.1]

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]

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]

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]

Wegman, E. J., D. W. Scott and Y. H. Said, (2010), "Ad hoc committee report on the 'hockey stick' global climate reconstruction".
[http://scienceandpublicpolicy.org/reprint/ad_hoc_report.html] (Link not working) Available at: [https://venturaphotonics.com/files/6.0_Wegman.etal_SPPI.ad_hoc_report_Hockey Stick.pdf]

Wigley, T. M. L., J. K. Angell and P. D. Jones (1985), "Analysis of the temperature record" in *Detecting the climatic effects of increasing carbon dioxide*, M. C. MacCracken and F. M. Luther, Eds. US Department of Energy Report DOE/ER-0235, pp. 55-90.
[https://doi.org/10.2172/6264945]

Wijngaarden, W. A. van and W. Happer (2022), "IR Forcing by Greenhouse Gases" CO_2 Coalition publication 6/10/22, [https://co2coalition.org/wp-content/uploads/2022/03/Infrared-Forcing-by-Greenhouse-Gases-2019-Revised-3-7-2022.pdf]

Yu, L., X. Jin, and R.A. Weller (Jan. 2008), *Multidecade global flux datasets from the objectively analyzed air-sea fluxes (OAFlux) project: latent and sensible heat fluxes, ocean evaporation, and related surface meteorological variables* OAFlux project technical report OA-2008-01. [http://apdrc.soest.hawaii.edu/doc/OAFlux_TechReport_3rd_release.pdf]