Climate Veritas
The Story of the Sun and the Climate

The Greenhouse Gas Theory vs. the Proven Laws of Physics Regarding Climate Change

"It doesn't matter how beautiful your theory is, it doesn't matter how smart you are. If it doesn't agree with experiment, it's wrong." ~ Professor Richard P. Feynman, Professor CalTech University, Nobel Prize in Physics 1965

This paper will describe how the unproven theory of greenhouse gas caused climate change has been unable to show neither past significant climate events nor predict future climate change as implemented in the UN IPCC (Intergovernmental Panel on Climate Change) climate models. The IPCC climate models are very complex and can only be used with high-powered computer simulations. The models presented in this paper are based on gas law physics and the Stefan-Boltzman law of radiation and are backed up by experimental data, unlike the IPCC computer models.

We will describe a new model based on well-known gas law physics and the Stefan-Boltzman law of blackbody radiation that has been developed by Dr. Ned Nikolov and Dr. Karl Zeller (NZ). This work has been empirically verified by satellite data. The NZ model is a closed form formula that can be used to simply calculate global temperatures of rocky planets with atmospheres based on measured variables such as solar irradiance, surface atmospheric pressure, surface geothermal flux, planetary albedo and the deviation from baseline albedo.[1]

The History of the Greenhouse Gas Warming Model

Irish scientist John Tyndall was the first scientist to discover in about 1860 that gases in the atmosphere such as carbon dioxide, water vapor, etc were able to absorb radiant heat in his laboratory research. Wikipedia editors claim that Tyndall proved the greenhouse effect because he measured the absorption of radiant heat in the laboratory by so-called greenhouse gases. This is not true because the measurement of heat absorption by a gas in the laboratory does not translate to heating of the open atmosphere because the laws of thermodynamics prohibit it. It is not possible to trap heat in an open system. Furthermore, these theories were formulated before the development of quantum mechanics. We now know that all atoms and molecules absorb and emit radiation not just the CO_2 molecule.

Swedish physicist and chemist Svante Arrhenius proposed in 1896 that anthropogenic CO_2 could cause the Earth's temperature to increase. He studied this concept for many years proposing that the Earth would be about 20° Celsius cooler without CO_2 in the atmosphere and be an additional 10° Celsius cooler because the cooler atmosphere would contain less water vapor. Thus the 30° Celsius warming of the Earth due to its atmosphere came into being. But this theory has never been proven with planetary experiments.

Carl Sagan proposed in 1962 that the temperature on Venus would be very hot due to the greenhouse effect of its atmosphere which is 96% CO_2. The Mariner satellite measured the temperature of Venus to be about 300° Celsius and the atmospheric pressure to be 20 times that of the earth. This was supposedly

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[1]Albedo – The fraction of solar radiation that is reflected by the global cloud cover.

confirmation of the greenhouse effect but the scientists did not take into consideration the physics of the Universal Gas Law that states that higher pressure will RAISE the temperature of any gas.

The United Nations IPCC Climate Models

The UN Intergovernmental Panel on Climate Change has been releasing updated projections of the impact of human caused (anthropogenic) climate change since 1990. These reports have become more complicated over the years despite the fact that the IPCC models are INCAPABLE of either reproducing climate records from the past or forecasting the change for the near future.

The IPCC released its Sixth Synthesis Report on climate change on March 20, 2023. It had approximately 90 authors from all over the world. Nobody knows what the scientific expertise of these 90 authors is but they released a report that is basically an accumulation of platitudes about climate change that is not grounded in true science as Professor Steve Konin has shown in his book "Unsettled".

For example: "*This report recognizes the interdependence of climate, ecosystems and biodiversity, and human societies (Figure SPM.1) and integrates knowledge more strongly across the natural, ecological, social and economic sciences than earlier IPCC assessments. The assessment of climate change impacts and risks as well as adaptation is set against concurrently unfolding non-climatic global trends e.g., biodiversity loss, overall unsustainable consumption of natural resources, land and ecosystem degradation, rapid urbanisation, human demographic shifts, social and economic inequalities and a pandemic.*"[2]

What does this mean? How can this be quantified in scientific terms such as projected temperature increases due to CO_2 emissions? We show later in this paper that the IPCC temperature models can't reproduce past temperature changes nor project future temperatures with any reliability. In other words, the IPCC statements are based on inaccurate models.

Another example: "*This report recognizes the value of diverse forms of knowledge such as scientific, as well as Indigenous knowledge and local knowledge in understanding and evaluating climate adaptation processes and actions to reduce risks from human-induced climate change. AR6 highlights adaptation solutions which are effective, feasible, and conform to principles of justice. The term climate justice, while used in different ways in different contexts by different communities, generally includes three principles: distributive justice which refers to the allocation of burdens and benefits among individuals, nations and generations; procedural justice which refers to who decides and participates in decision-making; and recognition which entails basic respect and robust engagement with and fair consideration of diverse cultures and perspectives.*"

This paragraph from the scientific report is pure politics. We should base our scientific assessment of climate change on *Indigenous knowledge* and *local knowledge*? Were native societies better at forecasting the weather, not climate, than we are with constellations of satellites and powerful computer models? The concept of climate justice is pure nonsense since how the environment is treated around the world varies primarily by national wealth. Wealthier nations with good energy resources treat the environment better.

The IPCC Computer Models are based on the false assumption that greenhouse gases can trap heat in the atmosphere and reradiate it down to the earth's surface thereby warming the planet. The IPCC figure 2.11 is the model for this process.

Figure 2.11 from IPCC AR5 WG1 (2013)
All energy fluxes are in W m⁻²

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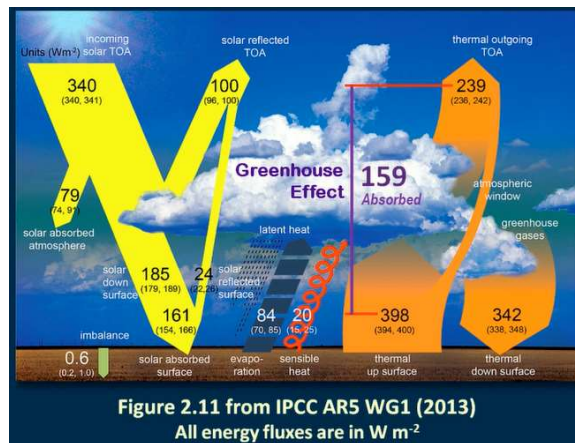
[2]IPCC released its Sixth Synthesis Report – "Summary for Policymakers" page 5 March 20, 2023

The figure shows the inflow of 340 watts/m^2 of radiative energy from the sun. Due to various losses and reflections a net 161 watts/m^2 is absorbed at the earth's surface. The earth re-radiates 398 watts/m^2 upward in long wave infrared radiation that is mainly caused by the adiabatic heating of the earth by its atmosphere. 239 watts/m^2 escapes through the TOA to space. That leaves 159 watts/m^2 absorbed in the atmosphere. The Greenhouse Gas Effect (GHE) postulates that the greenhouse gases re-radiate that 159 watts/m^2 of stored energy back to earth in the amount 342 watts/m^2 which raises the earth's temperature.

The question is how does 159 watts/m^2 become amplified to 342 watts/m^2 of re-radiated energy?

This violates the 1st law of thermodynamics. The 1st law says that energy can be neither created nor destroyed, but can only change form. A particular consequence of this is that the total energy of an isolated system does not change. Thus the GHE is in violation of a law that has been well known for nearly 200 years because it claims that radiated energy from the earth's surface actually will raise the temperature when it is reabsorbed by the greenhouse gases and re-radiated due to the GHE.

The GHE theory says that the earth re-radiates long wave radiation into the atmosphere which heats up the atmospheric CO_2 which then re-radiates infrared radiation omni-directionally. Besides the violation of the 1st law of thermodynamics, energy transfers between different media involve losses not gains as postulated in the GHE theory. In other words, the claim is that the CO_2 in the atmosphere is a heat amplifier, which is ridiculous.

What is even more relevant is that the IPCC models have a very poor record in reproducing the recent past and the future projections vary wildly between the different models as shown in this figure:


Global mean temperature near−term projections relative to 1986−2005
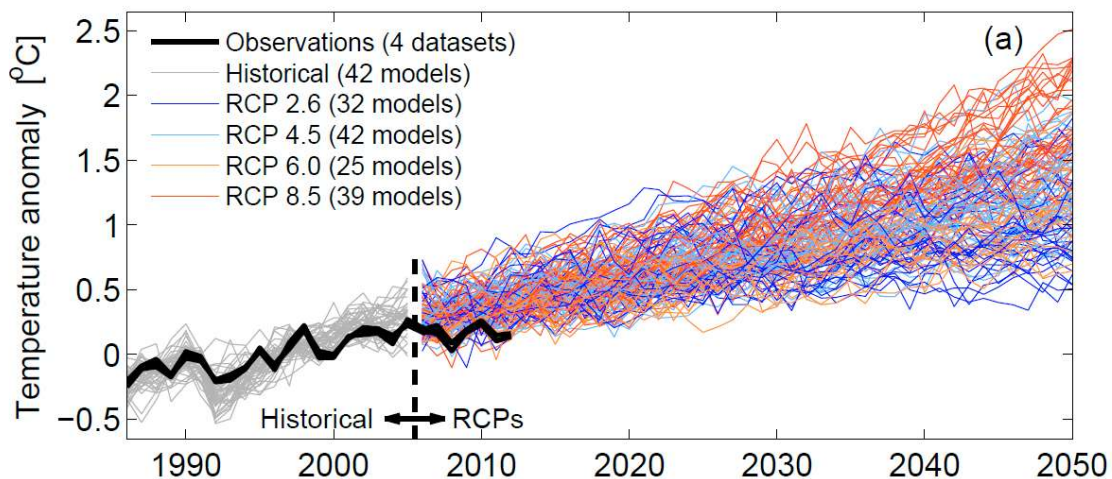
Note that the projections of temperature increases out to 2050 vary by a factor of five from the worst case scenario to the best case yet the IPCC chooses to make the median projection of the 181 models the curve used to estimate climate warming even though the models are not even close to the observations of the temperature based on four different temperature datasets. The models converge on the observations in the historical past but that is because they are adjusted to get some degree of agreement.

The following graph shows the relationship between CO_2 and temperature in past millennia based on various proxies.

Evolution of Atmospheric CO$_2$ and Global Surface Temperature for the Past 105 My
Temp. Data from: Westerhold et al. (2020); Kaufman et al. (2020); O'Brien et al. (2017); Snyder (2016); Linnert et al. (2014)
CO$_2$ Data from: Foster et al. (2017)
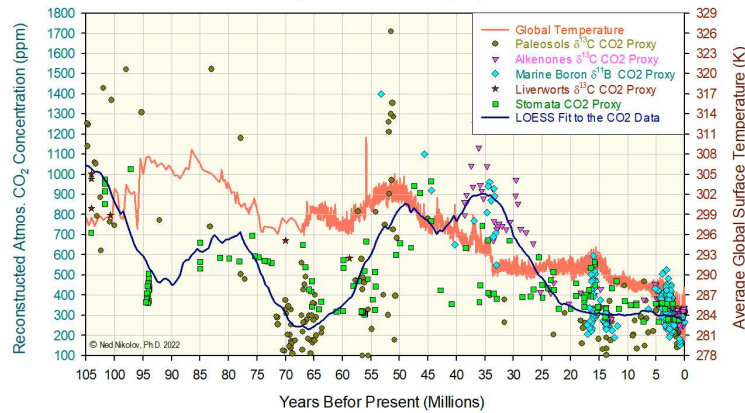
Note that about 35 million years ago the CO2 was higher relative to the temperature and 15 million years ago it was lower. So, contrary to modern greenhouse gas theory, higher concentrations of CO2 did not correspond to higher temperatures. The effect is even more pronounced 50-100 million years ago when CO2 levels were much lower but temperatures were much higher.

Furthermore, the GHE theory totally ignores the adiabatic compression of the atmosphere due to gravitational force. This raises the temperature of the earth, as we all know when we go from the bottom of the mountain to the top and find out that we need a jacket because it's colder. The effect is the well-known atmospheric lapse rate, which is about 7º Celsius per kilometer of altitude. The heating of the earth by the atmosphere is from the heat generated due to the adiabatic compression of the atmosphere. The Universal Gas Law states: PV=nRT where:

P= the pressure of the gas

V= volume of the gas

n= the number of moles of the gas (one mole is equal to 6×10^{23} units of a substance that can be atoms, molecules or ions)

R= the universal gas constant (8.314 joules/°K/mole)

T= the temperature of the gas in °K

Professor Robert Holmes showed that the temperature of Earth and Venus could be calculated with an accuracy of 0.04% by simply knowing the near surface atmospheric pressure, the molar mass of the atmosphere and the near surface density of the atmosphere from satellite measurements.[3] There is no greenhouse gas assumptions in this calculation because all gases obey the universal gas law. This is an interesting exercise because it shows that the atmosphere obeys the well-known physics gas laws. However, it does not give us insight into what is driving climate change, which we discuss below.

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[3]"Thermal Enhancement on Planetary Bodies and the Relevance of the Molar Mass Version of the Ideal Gas Law to the Null Hypothesis of Climate Change", Robert Holmes, Earth Sciences Publishing, April 13, 2018

How Does the Earth's Atmosphere Heat the Planet?

The Earth's atmosphere has weight due to gravity consequently it compresses adiabatically causing the temperature to rise at the surface. "Current climate science does not recognize direct thermodynamic effects of atmospheric pressure on the global surface temperature. The "Greenhouse" theory only acknowledges the influence of pressure on temperature through the pressure broadening of gaseous infrared absorption lines."[4] This is a major flaw in the UN IPCC's climate models because as we will show the adiabatic heating due to atmospheric pressure is the PRIMARY heating mechanism for the Earth's climate not re-radiated heat by greenhouse gases.

The first thing to note is that most researchers assume that re-radiation of absorbed upwelling infrared radiation from the Earth's surface warms the Earth's temperature by 33° Celsius due to the heat trapping of greenhouse gases such CO_2.[5] They ignore the adiabatic heating due to the pressure of the Earth's atmosphere.
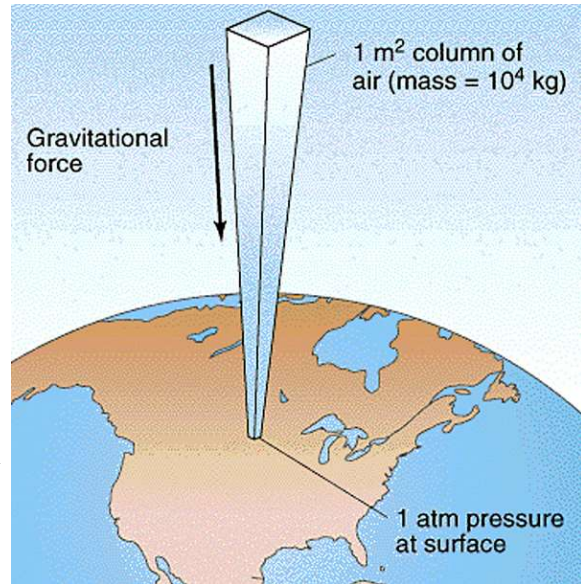
An obvious example of atmospheric heating of our climate is Mount Kilimanjaro near the equator in Africa as shown in the picture below. It has snow and ice on the top all year long even though it is located in the tropics.
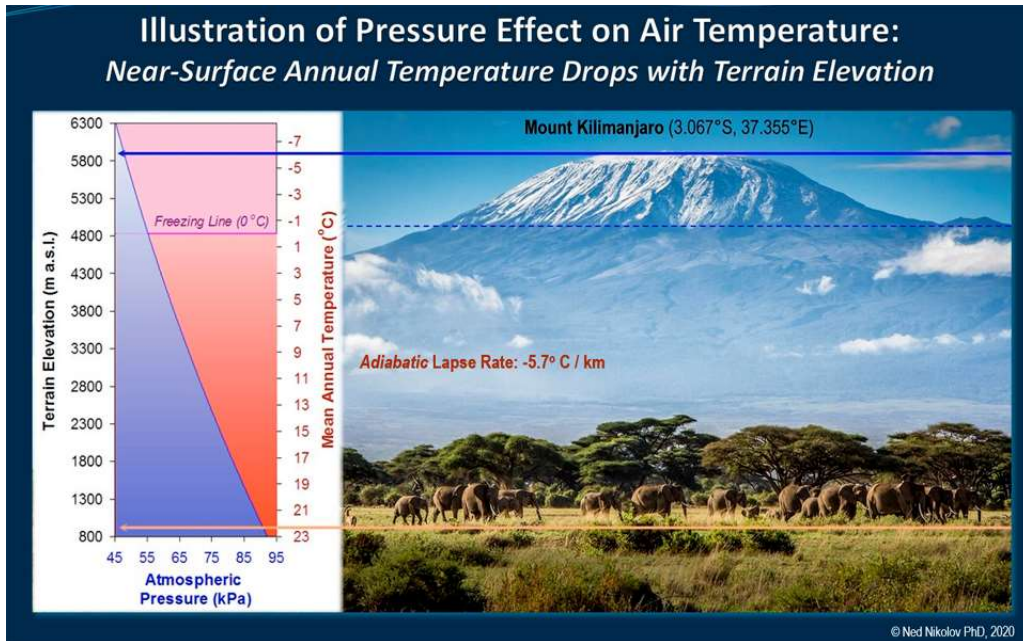
Nikolov and Zeller (NZ) have reassessed how solar heating of an airless spherical planet has been traditionally calculated. The calculation has been based on a flat disk geometry for the planet. This gives a

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[4] "Exact Formulas for Estimating the Equilibrium Climate Sensitivity of Rocky Planets & Moons to Total Solar Irradiance, Absorbed Shortwave Radiation, Planetary Albedo and Surface Atmospheric Pressure", Ned Nikolov and Karl Zeller, April 2022, Colorado, USA

[5] Hanson et. al. 1981, Peixto and Oort 1992, Wallace and Hobbs 2006, Lacis et. al. 2010,2013, Schmidt et. al. 2010.

biased measure of the amount of heating from the sun because it ignores the fact that the amount of radiation absorbed by the planet drops dramatically from the equator of the planet to the poles. NZ derived the correct formula for absorbed solar radiation by an airless spherical planet by applying the Stefan-Boltzman (SB) radiation law to a spherical planet. This formula was used to calculate the temperature of the moon. The results were in close agreement with measurements provided by the NASA Diviner Lunar Radiometer Experiment, which confirmed the validity of the model.

This research enabled NZ to calculate the temperature of the Earth with no atmosphere and compare it to the actual temperature with the atmosphere. They defined a new term called Atmospheric Thermal Enhancement (ATE) which can be used for any rocky planet to determine how much the atmosphere raises the planet's temperature. The results for the Earth are:

$ATE = T_s - T_{na} = 287.6° K - 197.1° K = 90.5° K$ T_s is the temperature of the surface. T_{na} is the temperature of the surface with no atmosphere.

This shows that the adiabatic heating due to weight of the Earth's atmosphere is 90.5° K (or Celsius) not 33° as has been assumed. Furthermore, this heating is not due to trapped heat by greenhouse gases as the climate models assume.

This model was applied to our Moon, Triton (satellite moon of Neptune), Mars, Earth, Titan (largest moon of Saturn) and Venus which has a 96% atmosphere of CO_2. The results of calculations and the corresponding satellite measurements are shown in the following figure:
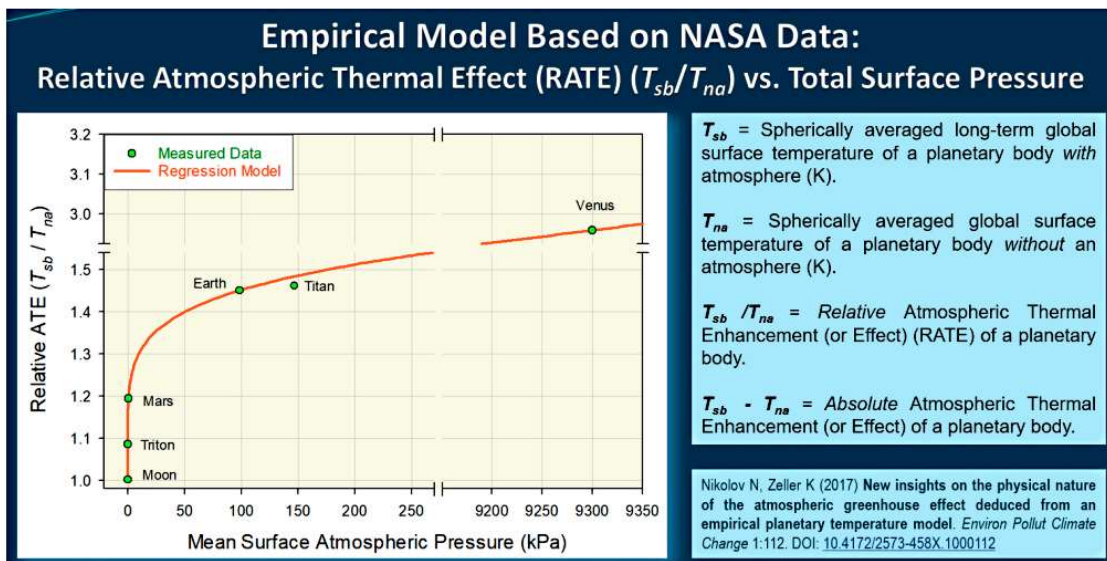
Figure 2. Graphical depiction of the Relative Atmospheric Thermal Effect (RATE), a form of pressure-induced adiabatic heating empirically described by Eq. 3.

This shows the excellent agreement of the model with satellite data on the ATE of the temperature for the various planets including our moon with a factor of 1.0 to Venus with a factor of about 2.7. The heating of the atmospheric planets is due to adiabatic heating (compression of the atmosphere due to gravity). This is a well-known rule of gas law physics.

The atmosphere is very stable over long periods of time so what causes the variation in the climate?

# How Does the Sun Affect the Climate?

We all know that the sun affects our climate but interestingly there is very little discussion about that in the IPCC reports. The reports focus on how the burning of fossil fuels that releases CO_2 into the atmosphere is the primary driver of climate change.

Solar radiation on a summer day is more intense in the direct sunlight than when it is cloudy. The clouds modify the absorption of solar radiation on the Earth's surface due to absorption of the radiation and reflection of the radiation. The amount of radiation reflected by the global cloud cover is called albedo and it determines how the global temperature changes over time. We now explain how the NZ model of climate change is based on ATE, as previously discussed, and solar radiation as described below.

"Contemporary climate science and IPCC Assessment Reports do not discuss global temperature sensitivities to changes in cloud albedo, absorbed solar radiation or total surface atmospheric pressure. Consequently, no equations have been derived/proposed thus far to calculate these sensitivities. Part of the reason is that variations of cloud albedo are typically viewed in modern climate science as internal feedback to a climatic change induced by external forcing such as increasing anthropogenic carbon emissions." [6]

"However, a plethora of studies published during the past 15 years have shown through both satellite and surface observations that the absorption of solar radiation by the Earth-atmosphere system has increased significantly since 1982 due to a decreased cloud cover/albedo, a phenomenon often referred to as "global brightening." [7] The IPCC models use the "assumed" effects of CO_2 caused warming to drive the climate models whereas direct observations have shown that the albedo has been decreasing which will cause warming. NZ have developed a formula based on the spherical integration of the Stefan-Boltzman law of radiation that calculates the warming of a rocky planet due to solar radiation. This work was expanded to develop a formula for predicting the temperature enhancement of a planet due to changes in the albedo.

The model was tested against the CERES satellite measurements of albedo from 2001-2019 as shown in this figure.

Evidence for Cloud-Albedo Control of Earth's Climate: Annual Data
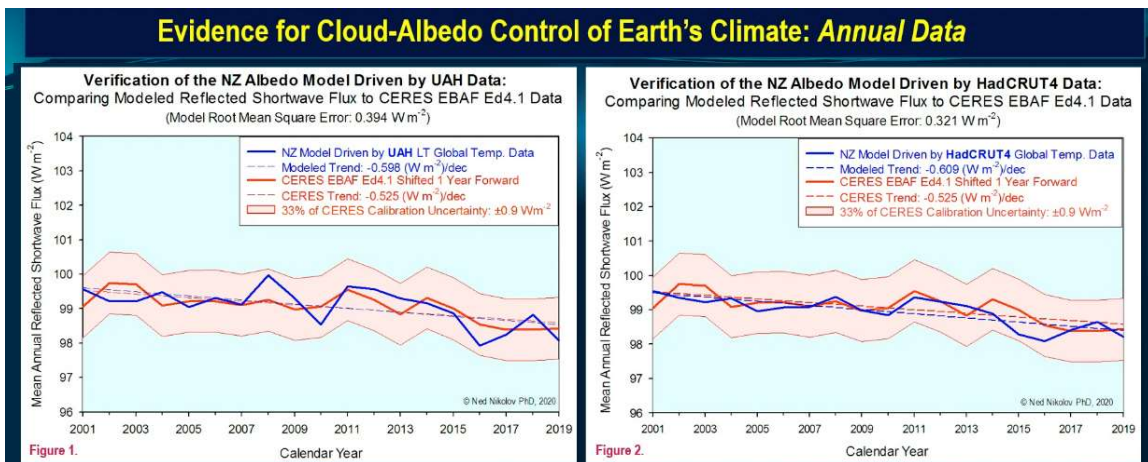
The model predicts departures of the global average surface temperature from a long-term baseline as a function of Earth's albedo variations from a baseline reflectivity. The model was run in reverse estimating monthly changes in Earth's Reflected Solar Flux (RSF) at the top of the atmosphere (TOA) from observed variations of global near surface temperature using UAH (University of Alabama, Huntsville) and

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[6] "Exact Formulas for Estimating the Equilibrium Climate Sensitivity of Rocky Planets & Moons to Total Solar Irradiance, Absorbed Shortwave Radiation, Planetary Albedo and Surface Atmospheric Pressure ', Ned Nikolov, PhD and Karl Zeller, PhD, April 2022, Colorado, USA.

[7] Goode & Pallé 2007; Wild 2009; Herman et al. 2013; Stanhill et al. 2014; Hofer et al. 2017; Pfeifroth et al. 2018; Pokrovsky 2019; Delgado-Bonal et al. 2020; Dübal & Vahrenholt 2021; Yuan et al. 2021

HadCRUT4 (UK Met Office) temperature records. Modeled RSF dynamics were compared to outgoing shortwave fluxes measured from orbit by the Clouds and Radiant Energy System (CERES satellite) between 2001 and 2019.

Figures 1 and 2 show the results from the model-data comparison on an annual basis. Note the 1-year lag of modeled RSR with respect to measured RSR. The high accuracy of the modeled RSR fluxes in terms of both inter-annual variability and decadal trends using two independent global temperature datasets provides a robust support for the hypothesis that **decadal climate dynamics are driven by cloud-albedo variations.**

The following figure shows temperature data back to 1700 in Figure 1. This data was used to calculate the albedo curve in Figure 2 that was then used to produce the absorbed radiation curve in Figure 3.
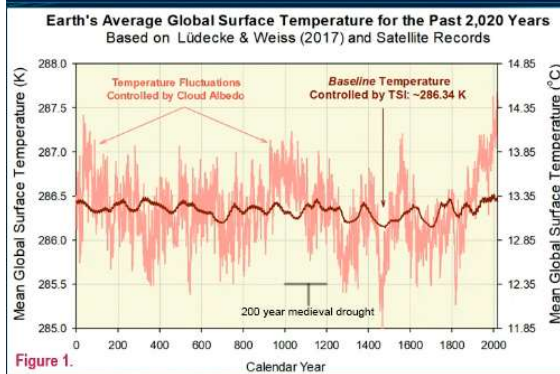

Figure 1.

Figure 2.

Figure 3.
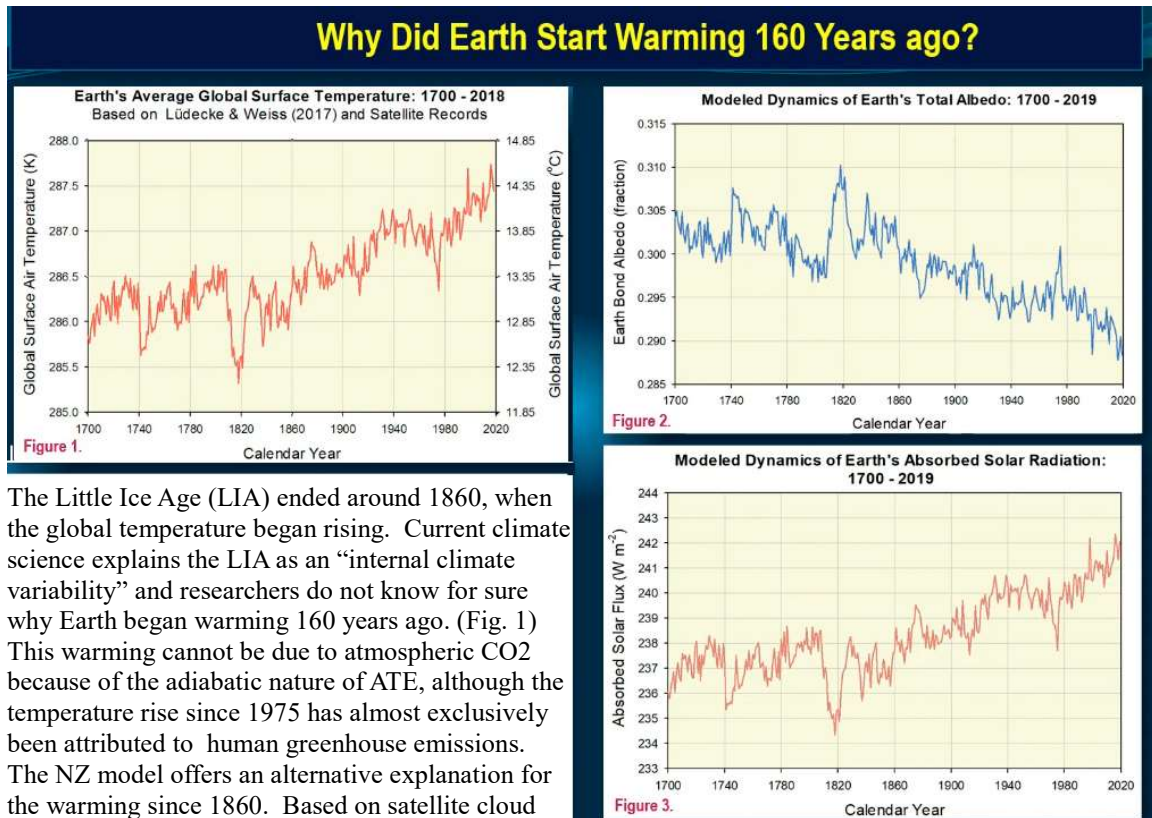
The Little Ice Age (LIA) ended around 1860, when the global temperature began rising. Current climate science explains the LIA as an "internal climate variability" and researchers do not know for sure why Earth began warming 160 years ago. (Fig. 1) This warming cannot be due to atmospheric CO_2 because of the adiabatic nature of ATE, although the temperature rise since 1975 has almost exclusively been attributed to human greenhouse emissions. The NZ model offers an alternative explanation for the warming since 1860. Based on satellite cloud data from 1980 to 2019, we propose that the global cloud albedo has decreased about 1.1% over the past 160 years due to increasing solar magnetic activity. This boosted Earth's absorption of solar radiation by about 3.7 watts/m^2 thus warming the surface by 1.1° Celsius as a result. Figure 2 shows the estimated total albedo decline since the LIA, while Figure 3 depicts the resulting increase in shortwave radiation absorbed by Earth.

The extended Planetary Temperature Model of NZ was applied to reconstruct the dynamics of the Earth's albedo and the amount of absorbed radiation by the Planet for the last 2020 years. Input to the model is a time series of reconstructed Global Surface Air Temperature (GSAT) shown in Figure 1 below based on work by Ludecke & Weiss (2017) from year zero to 1978 and UAH satellite record from 1979 to the present.

Modeling the Dynamics of Earth's Albedo for the Past 2,020 Years

Figure 1. Earth's Average Global Surface Temperature for the Past 2,020 Years Based on Lüdecke & Weiss (2017) and Satellite Records

Figure 2. Modeled Dynamics of Earth's Albedo for the Past 2,020 Years

Figure 3. Modeled Dynamics of Absorpbed Solar Radiation by the Earth-Atmosphere System for the Past 2,020 Years

The baseline GSAT in Figure 1 is determined by total solar irradiance (TSI) (Egorova et. al. 2018) and amospheric pressure (98.55 kPa). Temperature variations around this baseline are assumed to have been caused by Sun-induced perturbations of cloud albedo around a long-term mean. The reconstructed albedo dynamic is shown in Figure 2 and the corresponding variations of Earth's absorbed solar radiation are depicted in Figure 3. Modeled albedos during the satellite era (1978 – 2020) closely match NASA observations made by ERBE and CERES instruments (Loeb et. al. 2009, 2012).
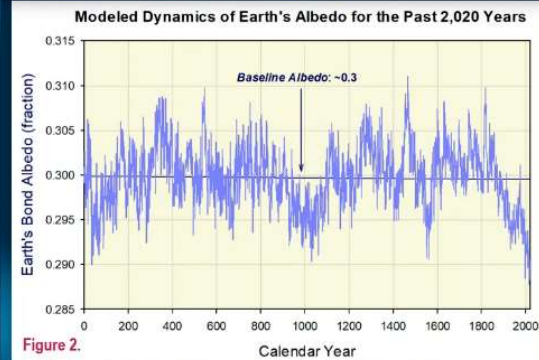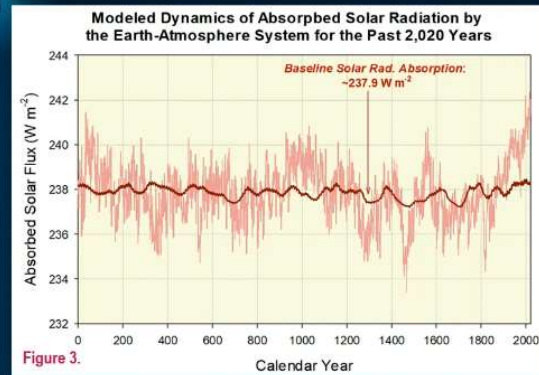
Note that the well documented 200 year medieval drought in California is probably correlated to the higher temperatures shown in Figure 1 and reflected in the albedo and absorbed solar radiation in Figures 2 and 3. Figure 3 shows the increase absorbed solar radiation since 1860 that corresponds to higher global temperatures since the beginning of the industrial revolution. Of particular interest is the increase over the last twenty years that agree within +/- 0.5% with radiometer measurements of the CERES satellite.

The model predicts a decrease in albedo in modern times (more solar radiation absorbed by earth). The warming at the beginning of the industrial revolution, 1800, is NOT due to greenhouse gas from fossil fuel burning but due to the change in the albedo of the earth system (brightening of the clouds) probably due to solar activity. Note that figure 2 shows decreasing albedo starting in the early 1800s which corresponds to rising temperatures the last 160 years. This research shows that the warming in the late 20th century is caused by higher absorption of solar radiation not an increase in atmospheric CO_2 due to the burning of fossil fuels.

This paper is based on the work of Dr. Ned Nikolov and Dr. Karl Zeller. Any inaccuracies in reporting on their work are mine. More detailed information is available at www.climate-veritas.com where you can find references to the research that is the basis for this paper.

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