

GSM - Grand Solar Minimum. The real "Climate Change" existential threat is right around the corner. Do the Research!

CSS-69a CO₂ Climate Sensitivity Schwartzchild Curve

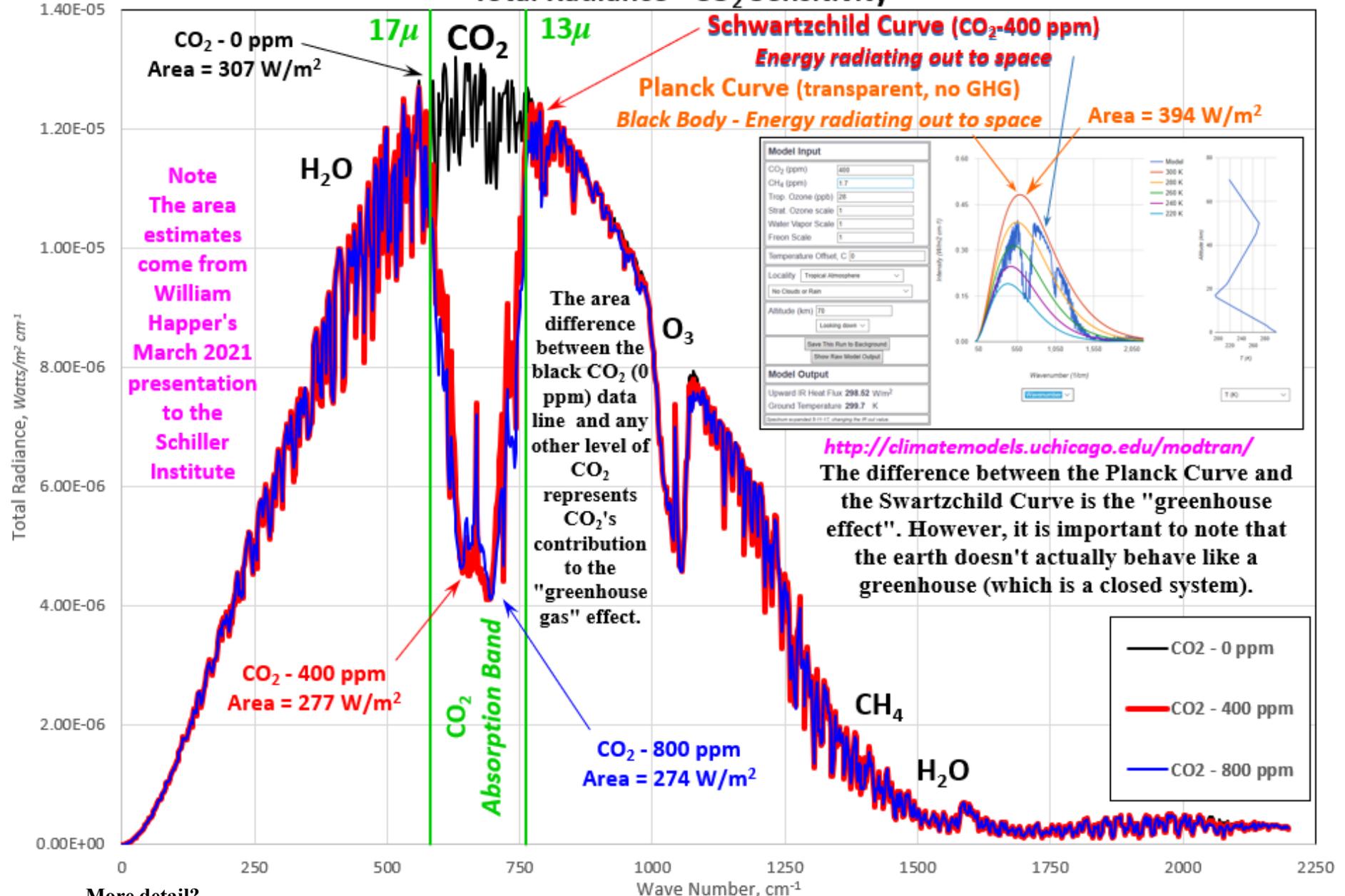
Atmospheric CO₂ concentrations will affect temperatures. The question comes down to how much? The narrative claims that CO₂ dominates climate change on our planet. Pay no attention to that large, hot orb that shows up every day delivering 95%++ of the energy that drives our oceanic and atmospheric circulations. Except on those days where those very poorly understood water accumulations (commonly known as clouds) show up. The All CO₂, All the Time alarmist community chooses to effectively ignore these very important processes, despite many papers that show the temperatures can be modeled

CO₂ (ECS) Climate Sensitivity

using a more realistic Solar Total Irradiance reconstruction, and/or sunshine hours (obviously solar related). The IPCC computer models (that "run way too hot" and use unrealistically high emission scenarios) use an "unsettled science" Equilibrium Climate Sensitivity (ECS) range of 1.8 to 5.7 °C. The satellite measured radiation levels (to the right) can provide some clarification on CO₂'s ECS (likely less than 1 °C).

[CO₂ is not a Pollutant — Exposing the Fraud Behind the Global Reset/Green New Deal - YouTube](#)

Data Source: University of Chicago (MODTRAN) modtran.spectral.com



More detail? climatechangeandmusic.com

It certainly looks like CO₂'s absorption band is becoming saturated!

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CO₂ Climate Sensitivity CO₂/Temperature Plot

The Schwartzchild curves on the previous page are produced by the University of Chicago's MODTRAN simulator for energy radiating out to space. The output has been calibrated to satellite measurements. The temperature changes associated with the CO₂ changes can be backed out of the model. What you find, is that model's CO₂ ECS is ±0.8 °C. This compares very well to CO₂ ECS estimates that factor in realistic TSI reconstructions and Urban Heat Island (UHI) effects. All IPCC computer models "run way too hot", so the ECS must be less than 1.8 °C (the lower end of the model range). With solar activity and the UHI effect, the ECS can easily be realistically

dropped into the 0.8 °C range. Temperatures fluctuated significantly over the Holocene (pre-1850) despite a virtually flat CO₂ concentration (at ±280 ppm). To assume natural forcings (solar/ocean/atmospheric cycles) are having virtually no effect on our climate is a simplistic, unscientific view of climate. The CO₂ ECS discussion is complex (OPS-80).

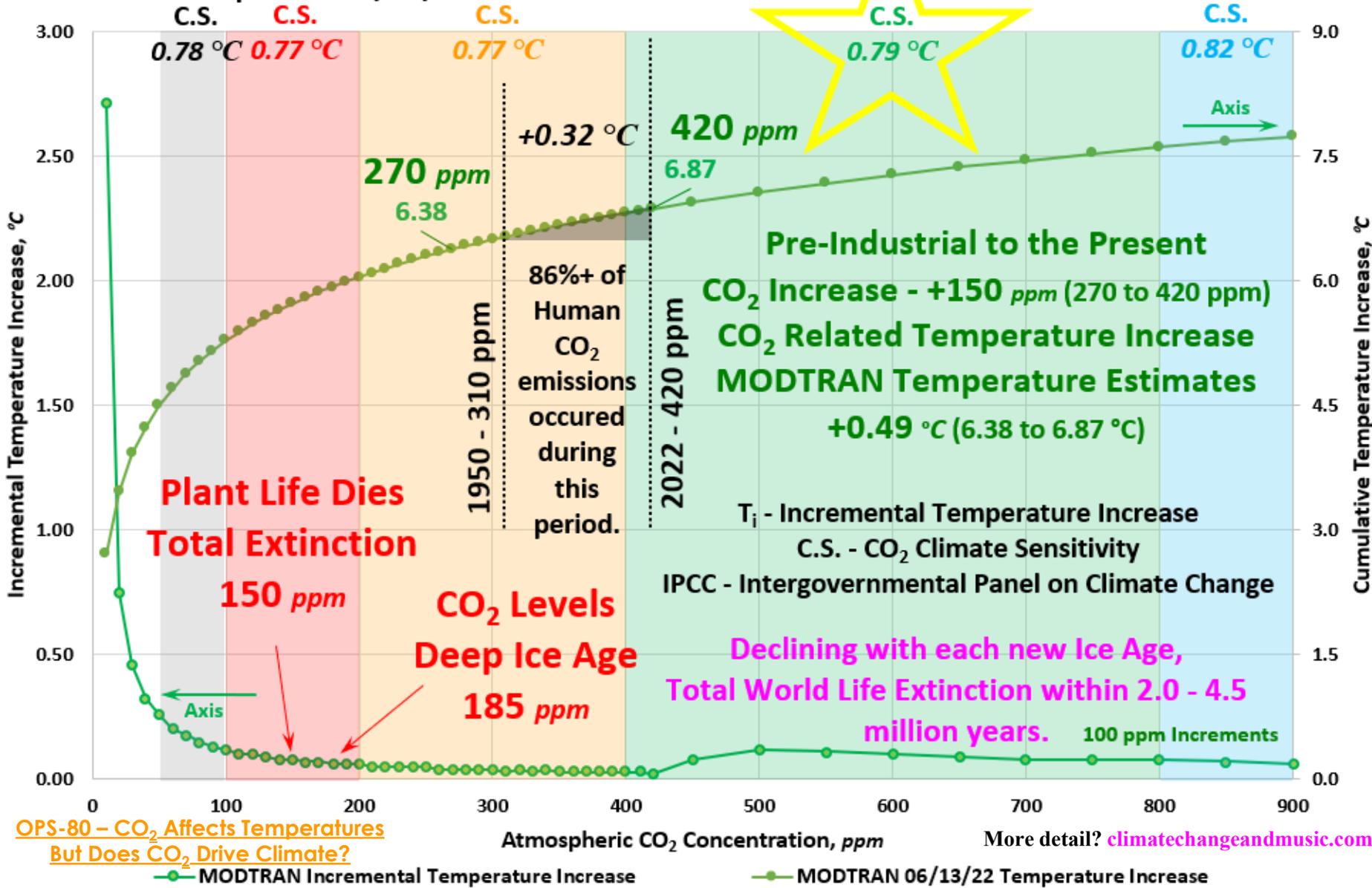
CO₂ (ECS) Temperature Relationship

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Heating Effect of CO₂ - 10 ppm increments

MODTRAN - Update - 06/13/22

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CO₂ Warming (1950 to 2022, +0.32 °C) as determined by the University of Chicago's MODTRAN model. Not Dangerous, Not an Emergency!

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CSS-69c

CO₂ - Infrared Radiation MODTRAN Temperature

The IPCC focuses on CO₂'s Infrared Radiation warming potential. But CO₂ also has two other characteristics that inconveniently cool as CO₂ concentrations rise (details on the next two slides). This slide focuses on CO₂'s IR temperature increases. A CO₂ ECS of $\approx 0.8^\circ\text{C}$ means CO₂'s contribution to warming since the pre-industrial era is 0.48°C (less than 50% of the roughly 1.2°C total). Additional warming to the end of the century would be $\pm 0.37^\circ\text{C}$ (Not Dangerous and Not an Emergency). CO₂ warming is logarithmic, not linear! As CO₂ concentrations increase, the

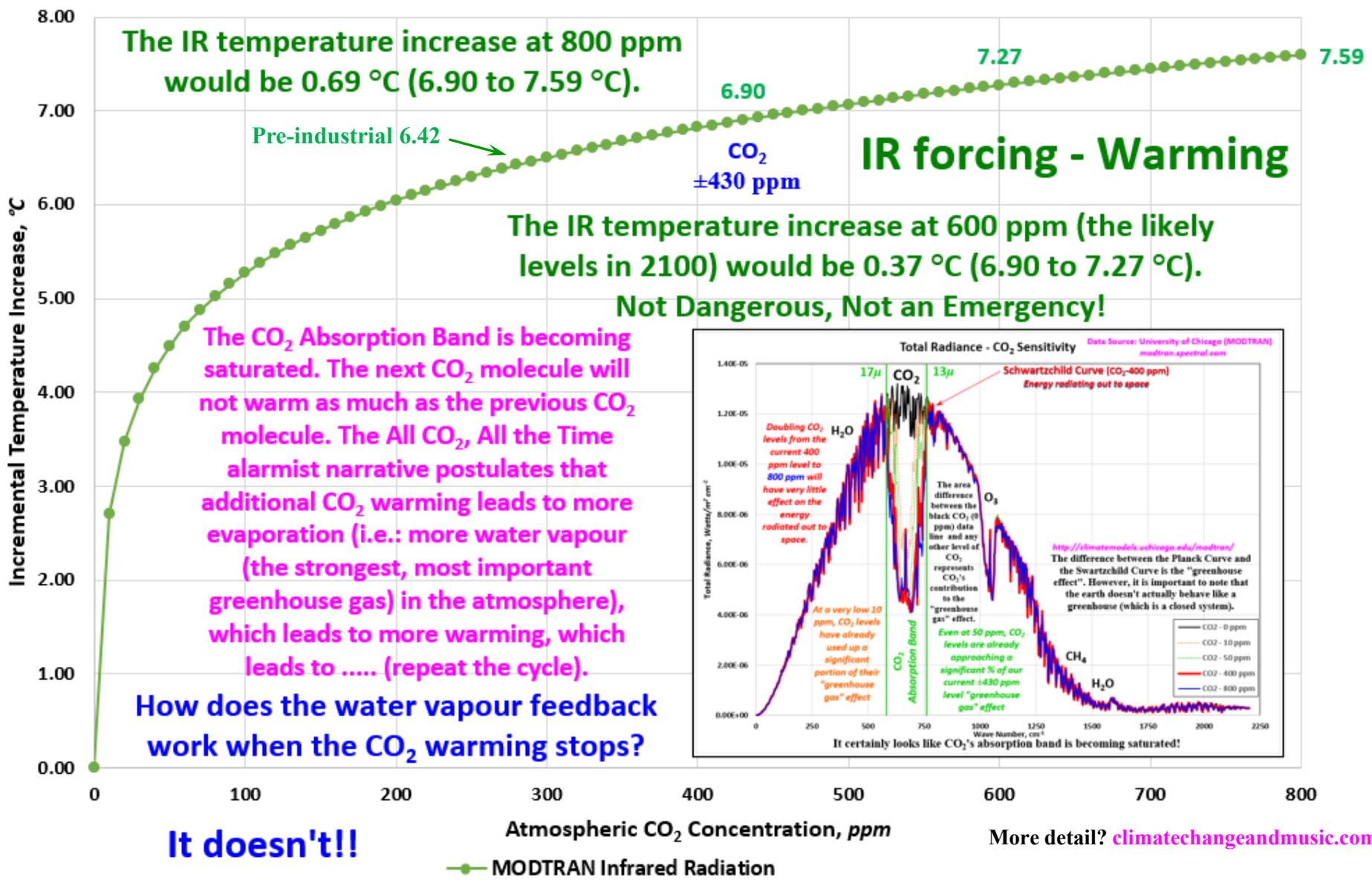
CO₂ - IR MODTRAN Temperature

warming potential decreases logarithmically. CO₂'s narrow absorption band is becoming saturated. That does not mean the warming will not continue. It just means the warming becomes insignificant. Note, humanity's contribution ends well before $\pm 1,600$ ppm (based on our global hydrocarbon (oil, natural gas, and coal) reserves). **There is No Climate Emergency!**

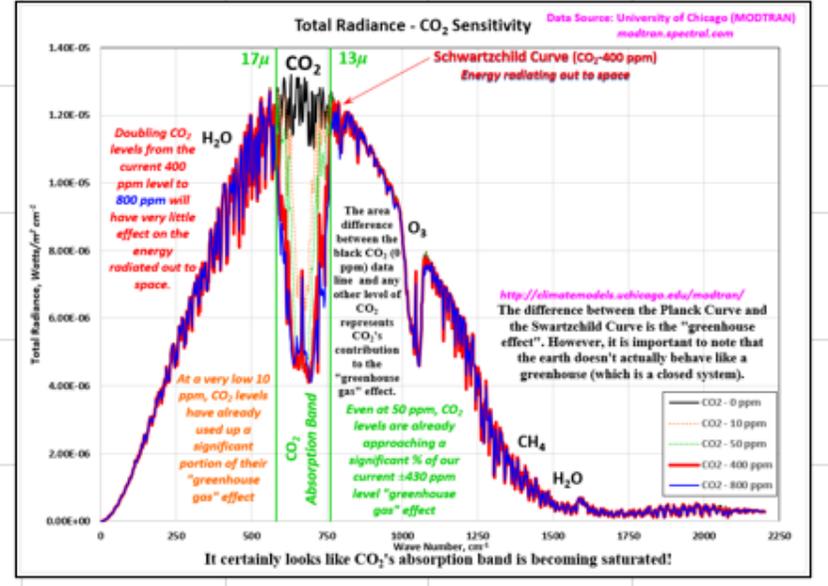
Heating Effect of CO₂ - 10 ppm increments

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MODTRAN - $T_i = 1.1164 * \ln(\text{CO}_2) + 0.1313$



CO₂ Warming (430 to 800 ppm, +0.69 °C) as determined by the University of Chicago's MODTRAN model. Not Dangerous, Not an Emergency!



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CSS-69d

CO₂ - Leaf Cover Add

MODTRAN Temperature

But you can not look at the IR warming in isolation. NASA has recognized that global "Leaf Cover" is increasing and increasing Leaf Cover cools the planet. NASA's estimate of cooling since the early 1980s is 0.2 to 0.25 °C. I took a more conservative approach and assumed the cooling to date is only 0.12 °C (the blue curve to the right). I also delayed the cooling until 1950 (roughly 310 ppm) since 87%+ of humanity's emissions are post-1950. This curve (assumed to be linear) is qualitative, not quantitative. The cooling concept is just being presented schematically. The details should be investigated further. Most people should understand the concept based

CO₂ - Leaf MODTRAN Temperature

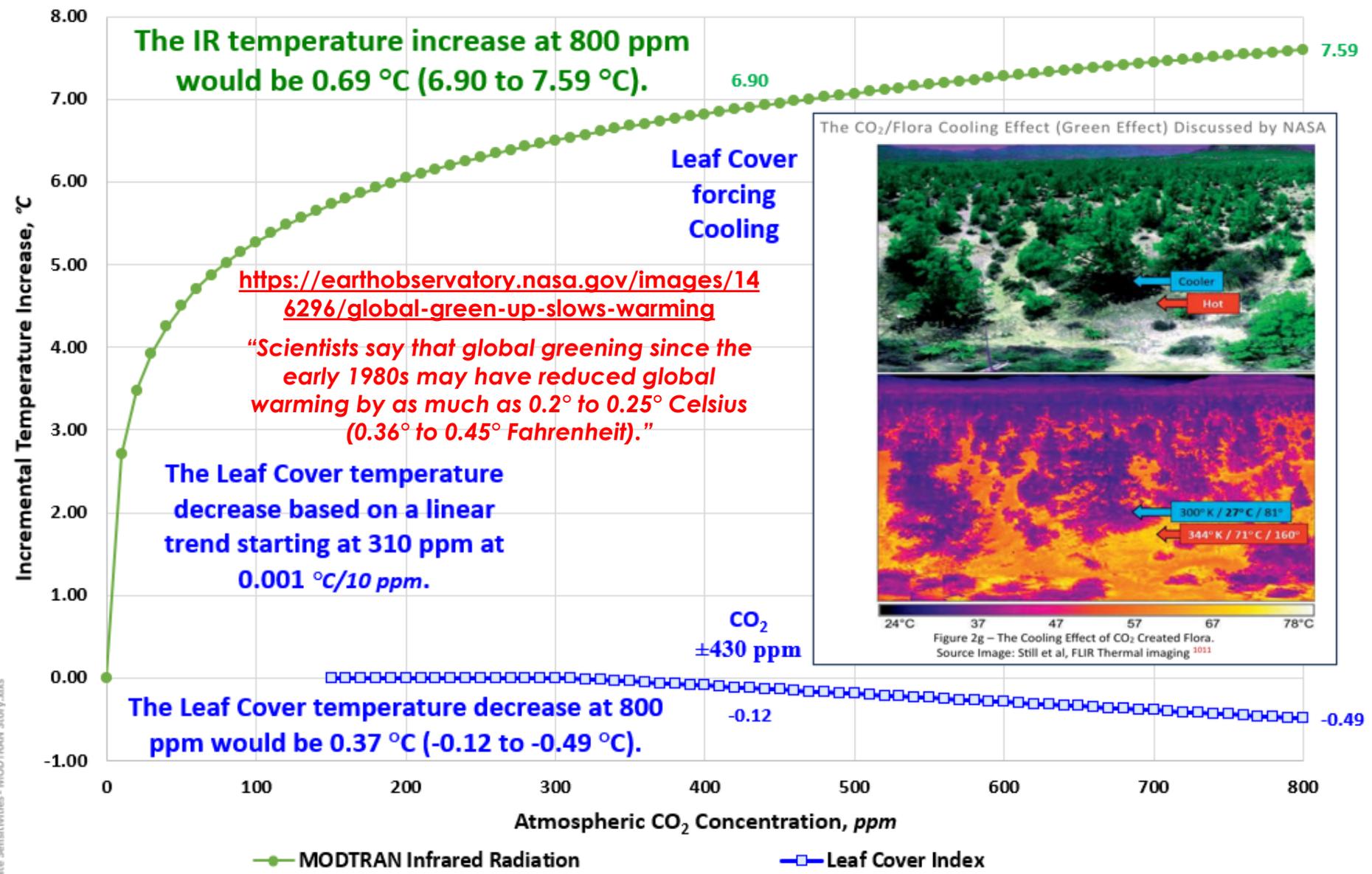
life experience. As shown in the inset, temperatures in open areas can be much hotter than the vegetated areas. Shade cools, and also "as vegetation consumes some of the heat-trapping carbon dioxide it also performs evapotranspiration—a function similar to human sweating—which can have a cooling effect on the air."

Heating Effect of CO₂ - 10 ppm increments

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$$T_i = 1.1164 * \ln(\text{CO}_2) + 0.1313$$

MODTRAN -



More detail? climatechangeandmusic.com

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CSS-69e

CO₂ - Co-Aerosol Add MODTRAN Temperature

A second component to cooling is the "Co-Aerosol" effect. As hydrocarbons are burnt, they produce H₂O, CO₂ and other particles (some of which act as aerosols). Aerosols act as nuclei for cloud formation. The more lower-level cloud cover, the more cooling. Note, vegetation also gives off aerosols (i.e.: with increased Leaf Cover adding to the co-aerosol effect). I have ZERO problem with H₂O and CO₂ emissions (we can use more of both). The aerosol emissions are a different story. The chemical composition would dictate whether the aerosols should be scrubbed from the emission stream.

CO₂ - Aerosol MODTRAN Temperature

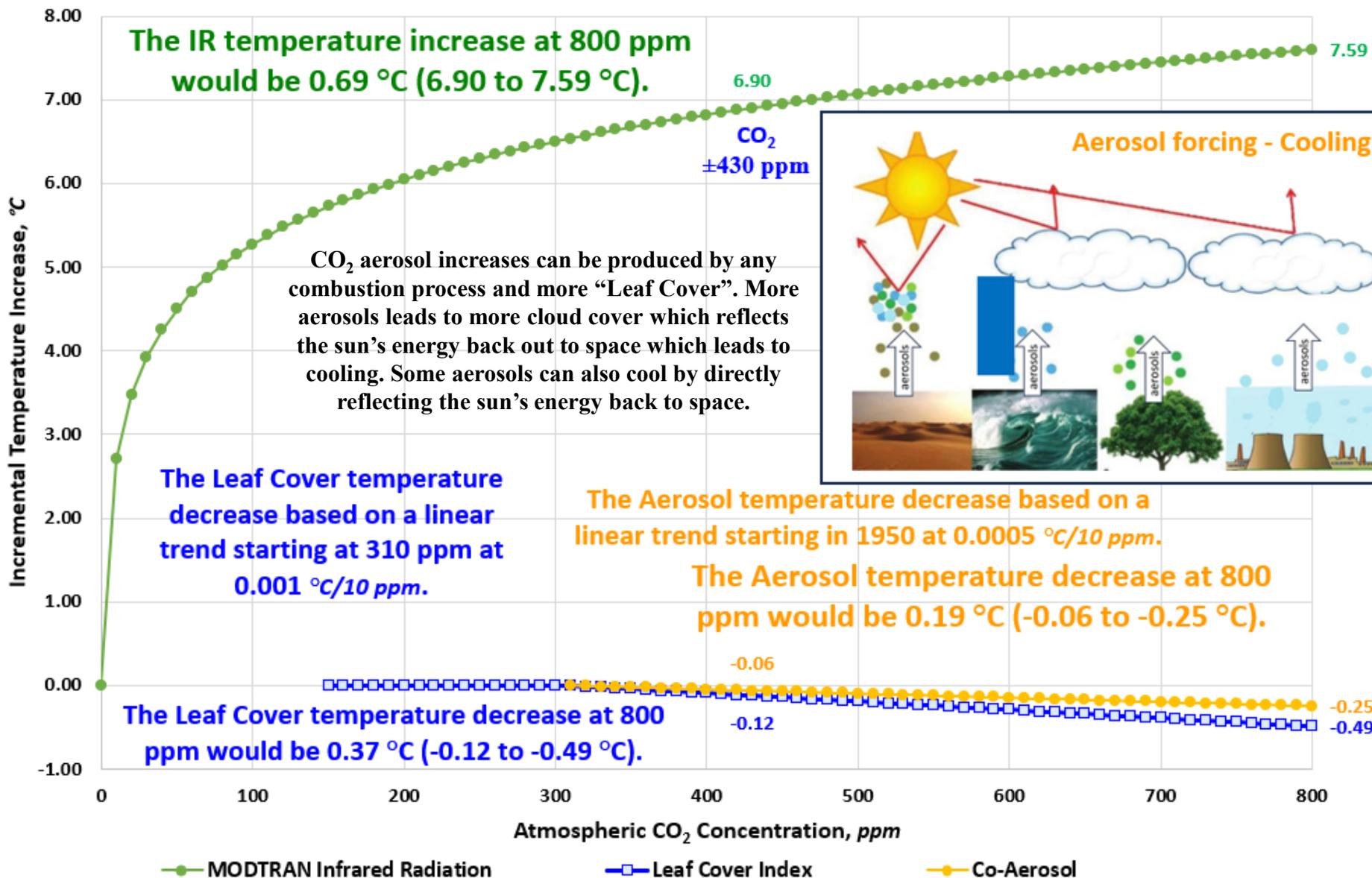
That technology is already available and should be applied where necessary. Aerosols can have measurable effects on global temperature. The improved ocean shipping emission regulations have likely played a significant role in the anomalously higher temperatures in 2023 and 2024. I have added some minor cooling (the gold curve) for the Co-Aerosol effect (minimal aerosols).

Heating Effect of CO₂ - 10 ppm increments

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MODTRAN -

$$T_i = 1.1164 * \ln(\text{CO}_2) + 0.1313$$



Climate Sensitivities - MODTRAN Story.xls

More detail? climatechangeandmusic.com

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CSS-69f

CO₂ - Consolidated MODTRAN Temperature

This slide consolidates the green, blue and gold estimates of CO₂ induced temperature change and are presented as the red curve. With minor cooling from the Leaf Cover and Co-Aerosol effects, the combined temperature effect could easily be considered very close to saturated already (effectively saturated around the end of the century, 6.84 °C at 600 ppm (in this scenario)). CO₂'s warming potential has likely reached 98% of its capacity (6.72 °C/6.86 °C). That leaves very little additional warming even with the IPCC's unsubstantiated positive water feedback hypothesis applied. If CO₂

warming stops, so does the CO₂ induced positive water feedback!

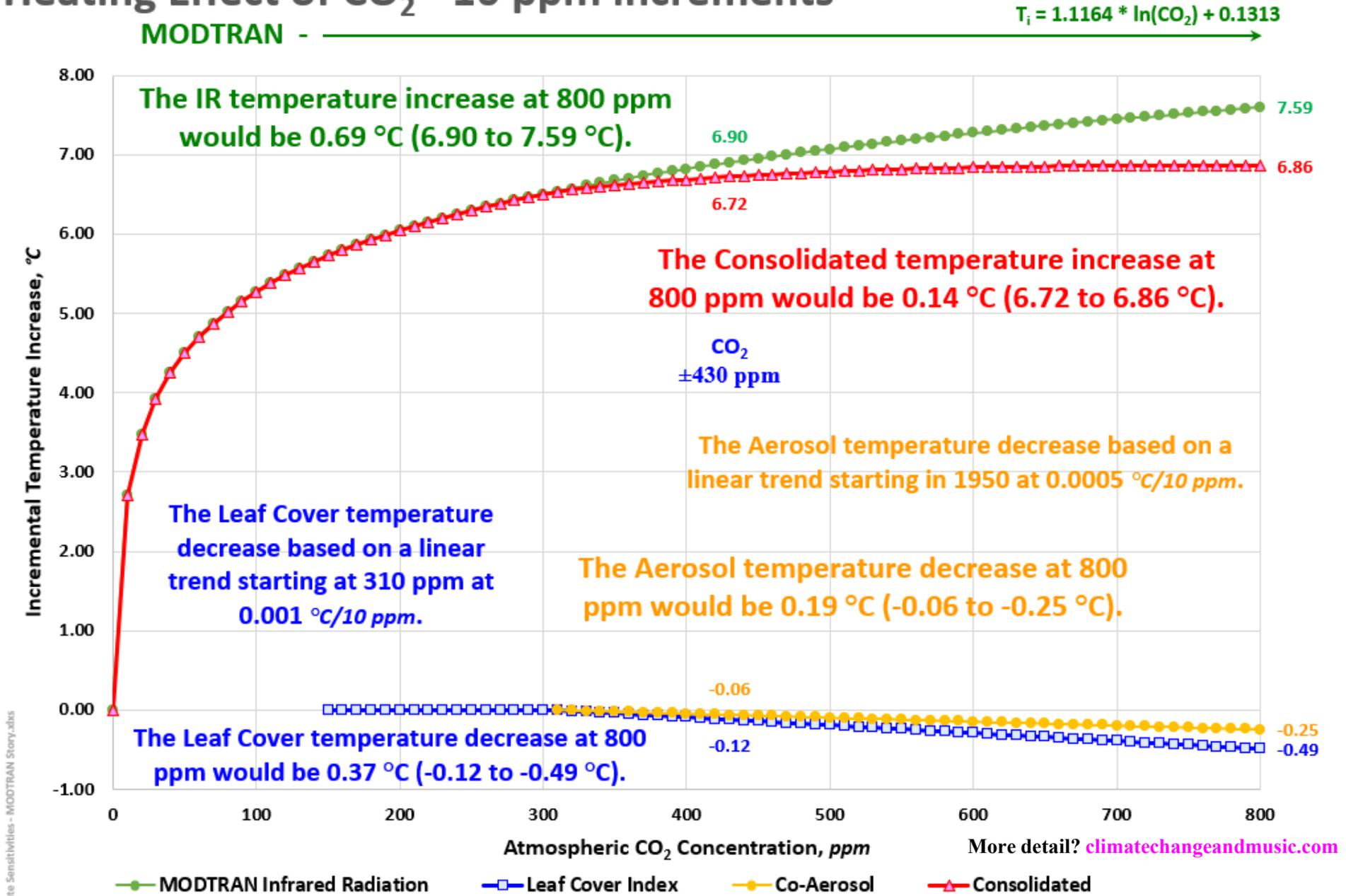
Consolidated MODTRAN Temperature

Humanity's additional emissions are very likely meaningless going forward. Emergency cancelled! Net Zero a total waste of time and money!

No need to continue indoctrinating and scaring our children with unfounded claims of climate disaster! Natural forcings will totally dominate and they all point to cooling!

Heating Effect of CO₂ - 10 ppm increments

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CO₂ Warming (430 to 800 ppm, +0.14 °C) as determined by the UofC MODTRAN model (IR, Leaf Cover & Aerosol. Not Dangerous, Not an Emergency!

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CSS-69g

Consolidated

Temperature Possibilities

This slide focuses in on the post-1950 period (NASA-GISS 1950 CO₂ Level, 311 ppm). I have added in two projections (the black curve) that doubles CO₂'s Leaf Cover and Co-Aerosol effects and the gold curve (double LC only). This is not an unreasonable scenario. As mentioned earlier, NASA stated that Leaf Cover "may have reduced global warming by as much as 0.2° to 0.25° Celsius". Doubling the first projection (the red curve's 0.12 °C cooling) is 0.24 °C, still within NASA's estimates. Under this scenario, CO₂'s warming has effectively ended (current 6.65 °C, maximum 6.67 °C) and will transition to cooling in the near future, despite the alarmist narrative to the contrary. This wider look at CO₂'s influence on temperatures was prompted by some important work done by Forrest Frantz (many thanks). At lower CO₂ concentrations, CO₂ warms, but at higher concentrations additional CO₂ will begin to cool. That transition point is open for discussion, but it will happen, or it may have already happened.

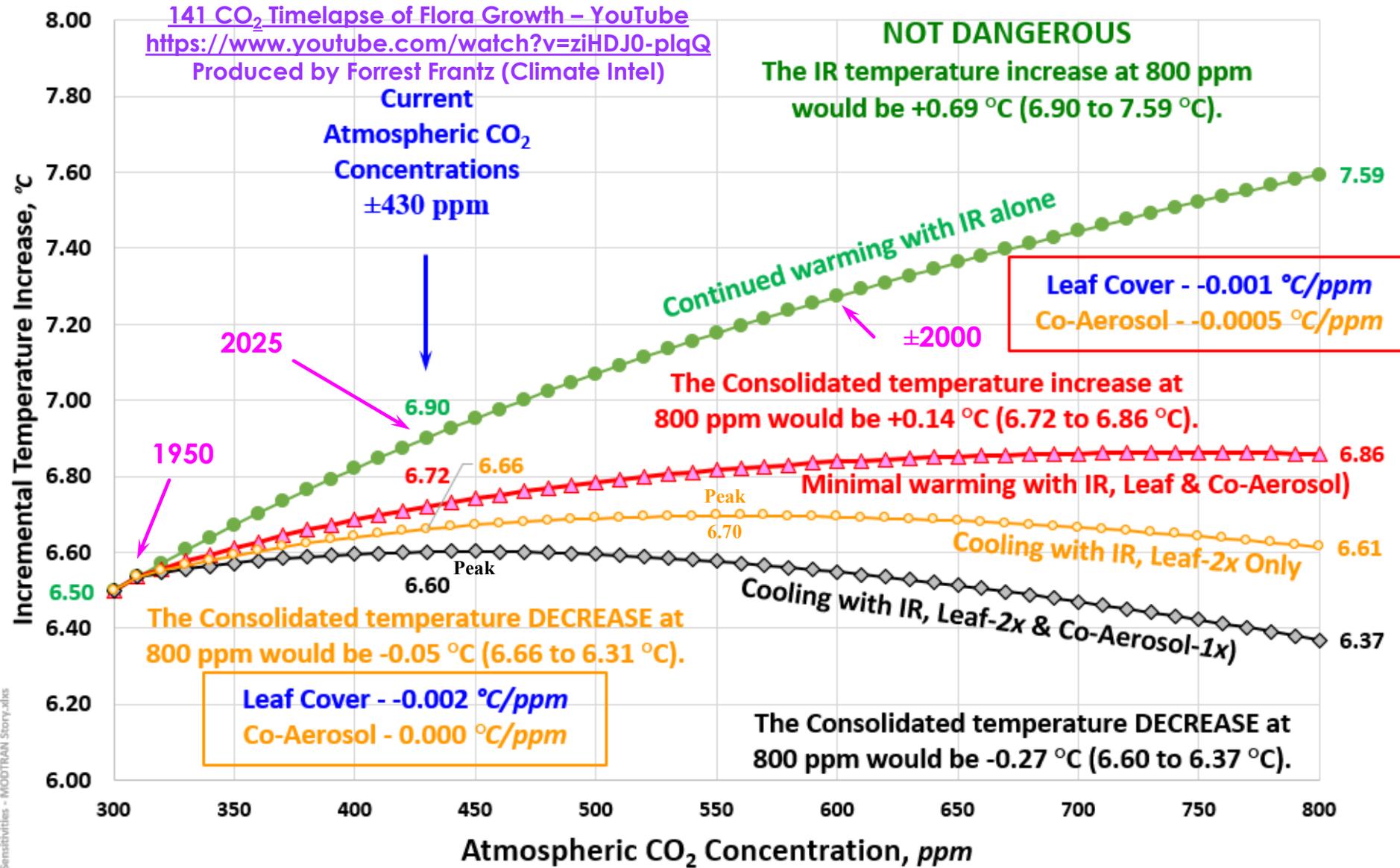
Consolidated Temperature Possibilities

Heating Effect of CO₂ - 10 ppm increments

More detail? climatechangeandmusic.com

$$T_i = 1.1164 * \ln(\text{CO}_2) + 0.1313$$

MODTRAN -



Climate Sensitivities - MODTRAN Story.xls

● MODTRAN Infrared Radiation
 ▲ Consolidated
 ◆ Consolidated - 2x
 ○ Consolidated - 2xLC

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CSS-69h

Possibilities Compared to the IPCC Estimate

Starting with an ECS of 0.8 °C based solely on CO₂'s Infrared Radiation heating (the green curve) makes sense given that the IPCC models produce temperature projections that are roughly 2 to 3 times higher than than observations. The IPCC's positive water vapor feed back hypothesis postulates that an increase in CO₂ causes some warming, that warming in turn causes additional evaporation, leading to warmer temperatures based on more water vapor in the atmosphere, and so on. In this scenario (the blue shaded area), a CO₂ temperature increase is increased by a factor 2.3 (0.8 °C to 1.8 °C, the lower end of the IPCC's

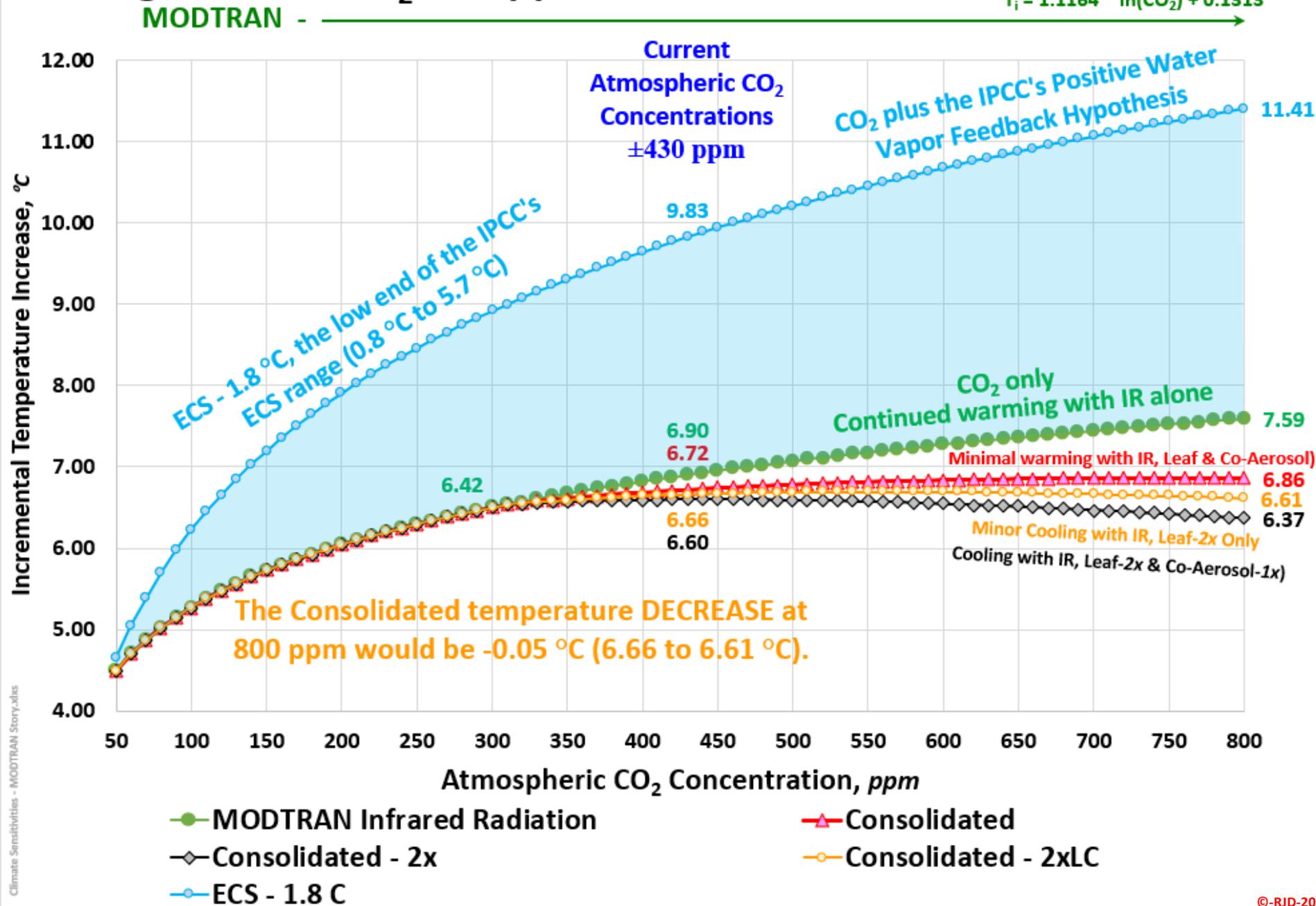
Possibilities Compared to the IPCC

1.8 to 5.7 °C "settled science" range). We know the ECS is less than 1.8 °C,

because the existing models are self-acknowledged to "run way too hot". Adding in "Leaf Cover" and/or "Co-Aerosol" parameters easily moves CO₂'s overall warming capabilities into a stagnant phase, eventually transitioning to a cooling phase. CO₂'s ECS remains constant but the apparent ECS transitions to negative.

Heating Effect of CO₂ - 10 ppm increments

More detail? climatechangeandmusic.com



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CSS-69i Positive Water Vapor Feedback Implications

This slide compares the IPCC low end 1.8 C ECS's CO₂ plus positive water vapor feedback warming directly with the CO₂ Infrared Radiation plus "Leaf Cover" plus positive water vapor feedback warming. The "Leaf Cover" cooling used here (0.24 °C from 1950 to 2025) is well within the NASA estimates (0.2 to 0.25 °C from the 1980s to the early 2020s). The IPCC's positive water vapor feedback warming has virtually disappeared. Not surprising given that the warming from CO₂ has levelled out and is transitioning to cooling. Adding in the Co-Aerosol parameter will just augment the cooling (as shown earlier).

Water Vapor Feedback Implications

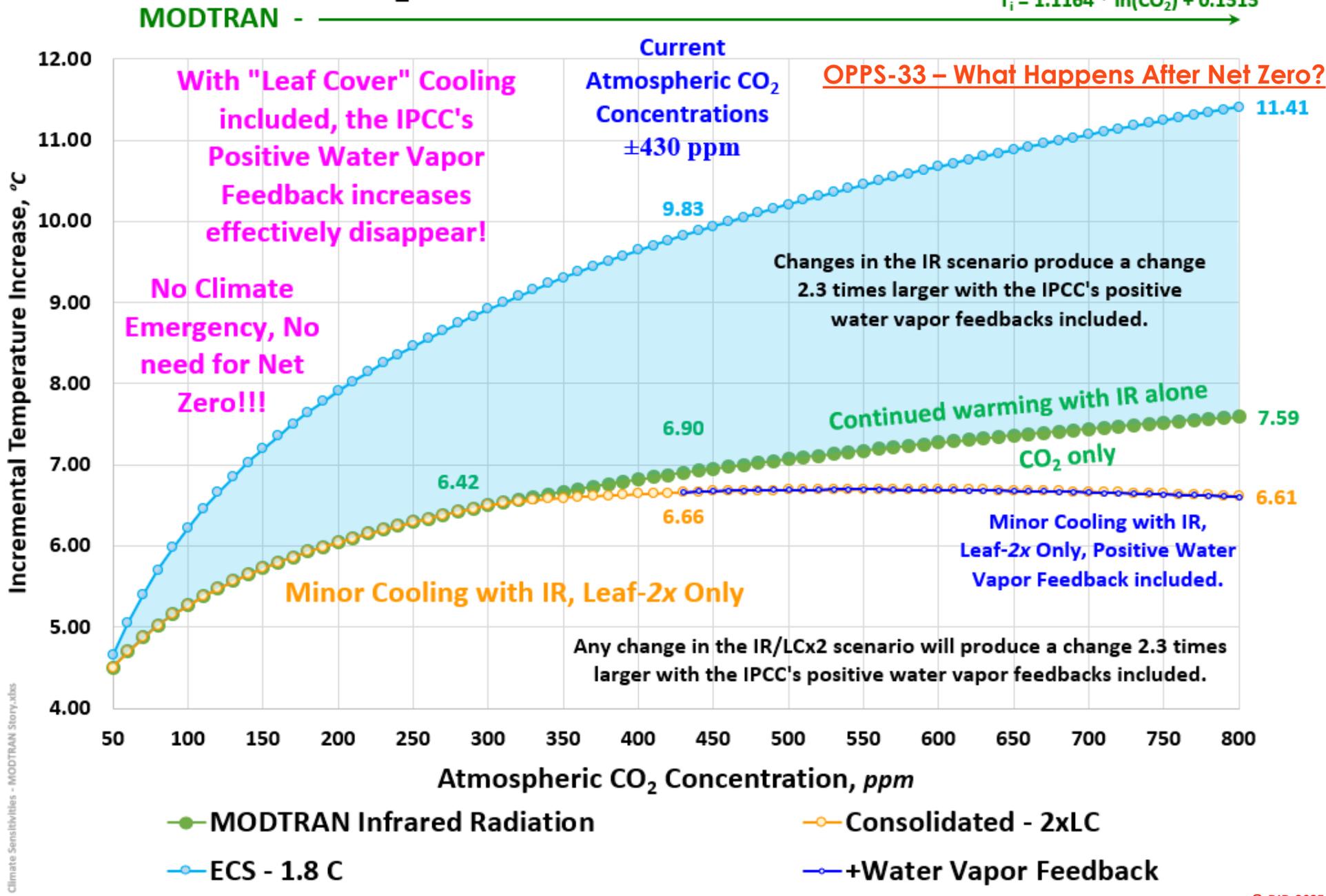
Future CO₂ warming (with Leaf Cover) is an insignificant

0.045 °C prior to the cooling phase. The IPCC's unsubstantiated positive water vapor feedback would only make the total warming 0.10 °C. Not much justification for Net Zero and the trillions (Canada - 3.92 trillion) of taxpayer dollars required to get there. Canada's share of 0.10 °C is just 0.0015 °C (2.6 quadrillion per °C)!

Heating Effect of CO₂ - 10 ppm increments

More detail? climatechangeandmusic.com

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CSS-69j

Holocene

CO₂/Temperature

This slide puts the recent ±1 °C of MTR (Modern Temperature Record, 1850 to the present) warming in perspective. Temperatures fluctuated significantly while CO₂ concentrations remained virtually flat. CO₂ was obviously not controlling the climate pre-MTR. The natural forcings (pre-MTR) did not stop acting on our climate just because CO₂ emissions have begun rising. They are still active and will be in the future. Has CO₂ participated in the MTR warming? Yes, but to what level? More on that discussion in my

[OPS-80 - CO₂ Affects Temperatures But Does CO₂](#)

[Drive Temperature?](#) post.

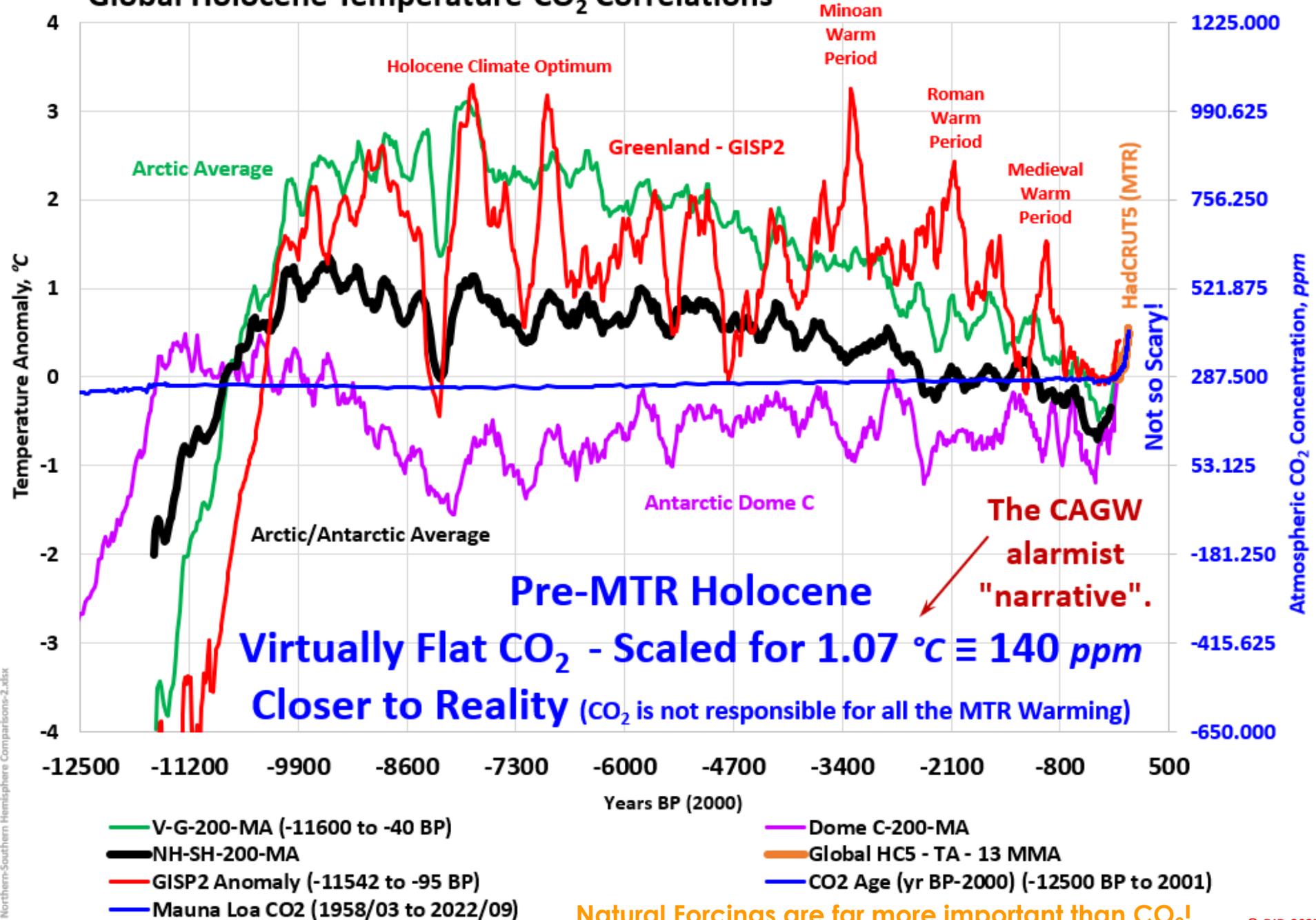
Consolidating Leaf Cover and Co-Aerosol cooling effects with IR warming confirms that CO₂ is a minor player. The natural forcings that have dominated historically, will continue to do so in the future.

Cooling, not warming is far more likely based on the natural solar and ocean cycles. Rising CO₂ appears to be poised to augment that cooling!

Holocene CO₂ & Temperature

Global Holocene Temperature-CO₂ Correlations

More detail? climatechangeandmusic.com



Natural Forcings are far more important than CO₂!