ClimateBell.org

And then GHG Lab was released

A novel “engineering” approach to precision and accuracy in computing the greenhouse gas (GHG) effect on Earth’s temperature

The escalating greenhouse gas (GHG) mitigation actions

The escalation

- Governments and NGOs are claiming there is a climate crisis requiring immediate action
- They are imposing severe costs and restrictions on society to limit manmade GHGs of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O)
- They cite the Intergovernmental Panel on Climate Change (IPCC) and other groups that predict dangerous temperature increases due to rising GHG levels
- Those wide-ranging and shifting temperature predictions suggest improvements are needed to their methods and models
- So, the mitigation actions appear to be tethered to unstable inaccurate "science"

The ramifications and enabling de-escalation

Why Climate Bell?

Because transportation freedom and the security and affordability of food and energy are critically important to humanity. They are now being thwarted by agendas that leverage misguided science.

"Science is the belief in the ignorance of experts"

...Richard Feynman, Physicist

Why GHG Lab?

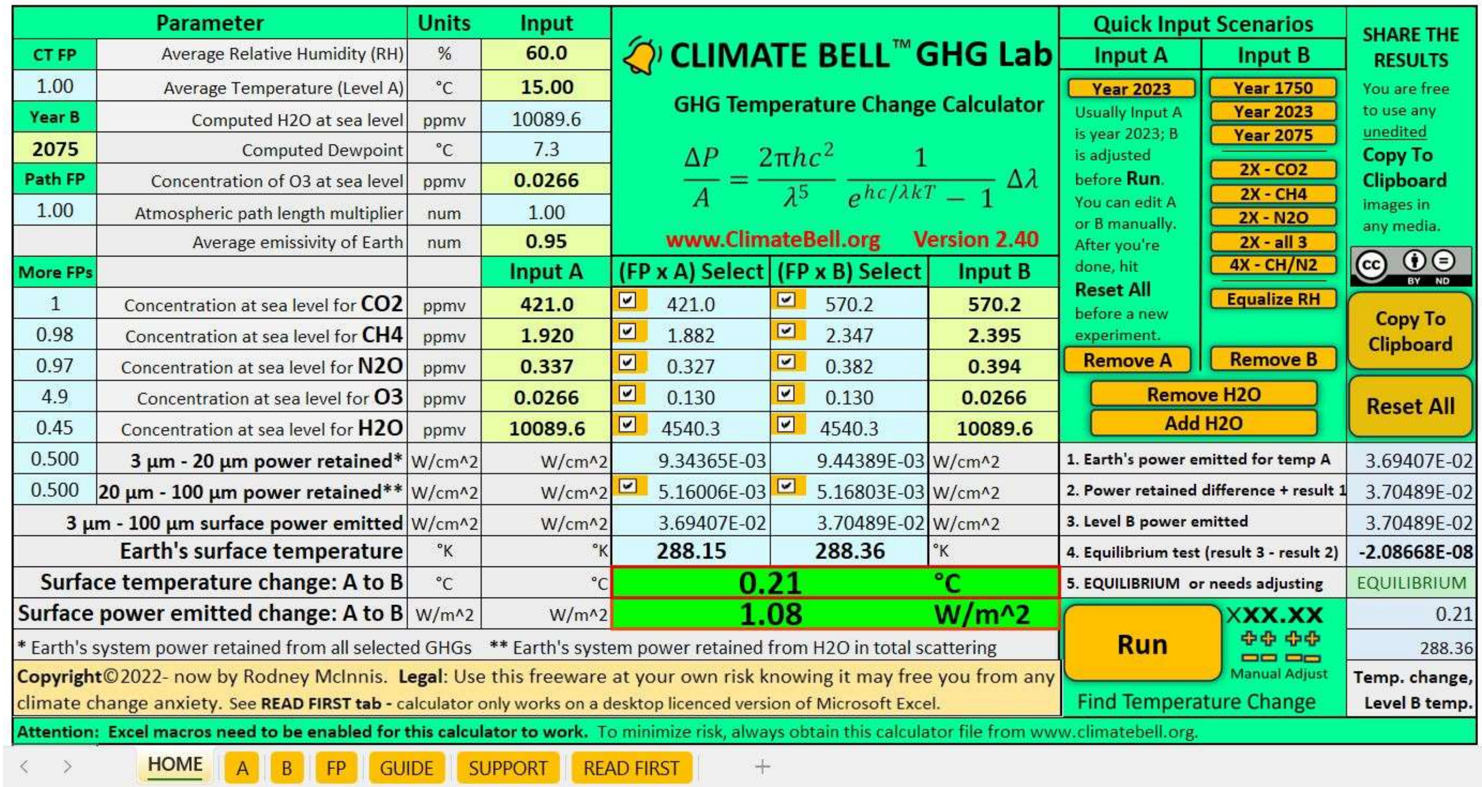
Because people need accurate temperature change answers without depending on gurus. GHG Lab is a freely available calculation tool that encapsulates the science to solve it accurately by performing full-spectrum infrared GHG calculations in seconds on the Earth System model.

The "engineering" approach is to assemble the set of components that fulfill solving the problem now

GHG Lab screenshot – simple to use

GHG Lab appears complicated, but an elementary school child could use it by themself to get quick answers for changes in GHG levels.

With GHG Lab there is no longer any need to ask supposed climate change gurus for their enigmatic temperature change prognostications for any future GHG increases.



The personal challenge

Source: https://www.youtube.com/watch?v=1NOdTEIihFU

Greenhouse Effect, Senate Environment and Public Works Committee, Dec 1985 (Carl Sagan)

Referring to greenhouse effects on other planets:

"In addition, it has been possible to calculate those greenhouse effects accurately… Greenhouse effect changes on the Earth is also used for other planets and therefore can be calibrated to some extent against those other planets. If we keep coming up with the right answer in all those different cases, we probably understand fairly well how greenhouse effects work."

… Carl Sagan, PhD astrophysics, author, Cosmos host

- My hypothesis upon watching his talk – I have a physics degree and figured some 40 years after Sagan's talk, with a wealth of new information on the Internet about CO_2 as a GHG, I'd be able to calculate temperature change for a rise in CO_2. I estimated it should only take a few days at most to round up the info and have a result.

This presentation will express my current understanding based on over two years of personal effort that started back in 2022.

Presentation scope

The next four slides are a preamble and include defining these helpful tag icons

CCIF — Point

NTA — Point

SERENDIPITY — Point

FLASH — Slide

Slide

Balancing the presentation for both audience groups

For scientists specifically

- I'm seeking peer reviews of the science (the physics and modeling) in an open forum that was created for this purpose
- To encourage those reviews from scientists and engineers soon, the elements of the physics and modeling will be explained
- I'm really hoping to get reviews from industry scientists and engineers too who understand the importance of this research to defend their interests
- Through my R&D, there appears to me to be significant **climate change industry flaws** in physics and modeling. I'll mention 7 during the presentation.

CCIF
point

For all - scientists and laypeople (non-scientists)

- An overview of GHG lab, and a demo
- I will share some of the interesting and surprising results – it is great news
- I will also use **non-technical analogies** to teach important parts of the science to all
- We should strive to inform critical industries about GHG Lab as a tool to defend their interests, which benefits all of us
- **Flash** slides have details but will only be explained as to the slide significance to shorten the presentation so the interested people can return later and study it for the content. Noting such page numbers during the talk may help you

NTA
point

FLASH
slide

Hints of what this presentation will show

Some highlights

- An explanation of the GHG puzzle pieces used to accurately solve temperature
- Screenshots for various experiments done using GHG Lab
- GHG Lab validation and accuracy
- Dramatic differences between temperature predictions from the climate change industry such as IPCC and what GHG Lab computes
- Calculations that raise questions of our understanding of Venus's greenhouse effect
- Explain the industry-connection strategy and invitation for any interested listeners
- A live demo of GHG Lab

Sharing previous learning events

- I value my previous work activities and education as **learning experiences**, and some have assisted in this initiative.
- **Serendipity** played a role a few times too and will be noted.

slide

SERENDIPITY

point

Definition: "Serendipity is an unplanned fortunate discovery. Serendipity is a common occurrence throughout the history of product invention and scientific discovery."

Source: Wikipedia

Philosophy

- Believing
- Guessing (Thinking of) a solution
- Understanding
- Knowing

- Believing may carry the day in religion and sports but isn't appropriate as a basis for sorting out scientific matters, especially when there is much contention and debate
- Guessing is a physics approach to a one-dimensional problem, but must be followed up with calculations that could be considered a "proof" to confirm the guess
- Reasoned understanding is the ideal for building multidimensional "component-based" modeling and simulation, allowing flexibility to refine or reconsider
- Knowing is not where one wants to be; it is the room occupied by the settled science crowd

First-principles approach to understanding

- The climate change "science" landscape seemed to me a cluttered mess of errors and red herrings
- So, my approach was to build my "understanding" with a goal to select a complete set of valued pieces
- The valued pieces container must be guarded like a fort to avoid incorrect or needless items entering

Rejection criteria:
(requires only one to qualify)

- Useless or unnecessary
- Inaccurate
- Questionable modeling
- Too simple or too complex
- Unappreciated due to lack of my understanding

Rejected Items

Acceptance criteria:
(requires all to qualify)

- Essential piece of the puzzle
- Accurate
- Physically realistic modeling
- Right amount of detail
- Sufficient understanding to include

Valued Pieces

Introduction

Source: NASA

Focusing on just the GHG "thermostat"

Complexity of Earth's temperature changes

Earth experiences multiple mechanisms (effects) that heat and cool the planet:

∑
- Change in solar activity
- Milankovitch cycles
- Change in cosmic rays
- Change in atmospheric volcanic activity
- Change in undersea volcanic activity
- Other known or unknown mechanisms
- Change in GHG levels

1 CCIF Assuming historical temperature rise is just from CO2 alone is a major flaw

2 CCIF The claimed rise is shown to be suspect by others

The thermostat analogy and a GHG focus

- Earth's temperature depends on the superposition (simultaneous application) of all the effects that control the temperature
- One can think of each effect as a separate thermostat on a separate heat pump and a change in conditions of that effect will adjust that specific thermostat causing a change in heat flow from that specific heat pump NTA
- Essentially, all but one thermostat changes naturally. The GHG changes are as a result of both manmade and natural causes.
- GHG thermostat only – the Climate Bell focus is getting this precise and accurate to avoid needless mitigation policy mistakes

Defining camps of "belief" regarding rising GHGs

These four sub-camps define most opinionated people regarding concern over rising GHG levels:

Camp 1 – no need to do anything

Camp 1A

- "Zero" effect
- Totally saturated
- Scoffing disbelief

Camp 1B

- Small effect
- Warming too small to be noticed with any certainty
- No detectable worsening of weather events
- Nothing to worry about and no mitigation action needed

Camp 2 – we need to take action

Camp 2A

- Significant effect
- Has caused noticed warming and/or more severe weather events
- We are going to suffer somewhat and must mitigate to lessen the effects

Camp 2B

- Major effect
- Many degree rise this century
- Point of no return around the corner
- We are going to cause mass extinction
- We need to spend trillions to fight it

For the presentation: **Both Camps** defined as all of Camp 1 and all of Camp 2

A lesson learned - exploiting a non-obvious simplicity when it exists and is realized

1st

The situation

- In year 2000, I was working at a startup company developing the world's first computer server using a Transmeta CPU
- Transmeta was a new competitor to Intel. Their processor consumed 1/6 the power of an equivalent performing Intel processor
- In tackling a technical concern we encountered on our prototype product, we wanted to understand how much power the CPU consumed under various computing load conditions for a system power budget
- Like most processors needing some cooling, the CPU had built-in temperature measuring circuitry that could be read in software

Measuring power vs simulation of temp. for power

1. Measuring power wasn't feasible as it was a 10-layer circuit board and 4 power supply voltages for the processor were carried on buried layers and shared by other-circuitry
2. Doing a simulation correlated to die temperature using finite element analysis with thermal models of the circuit board and components seemed like the only way

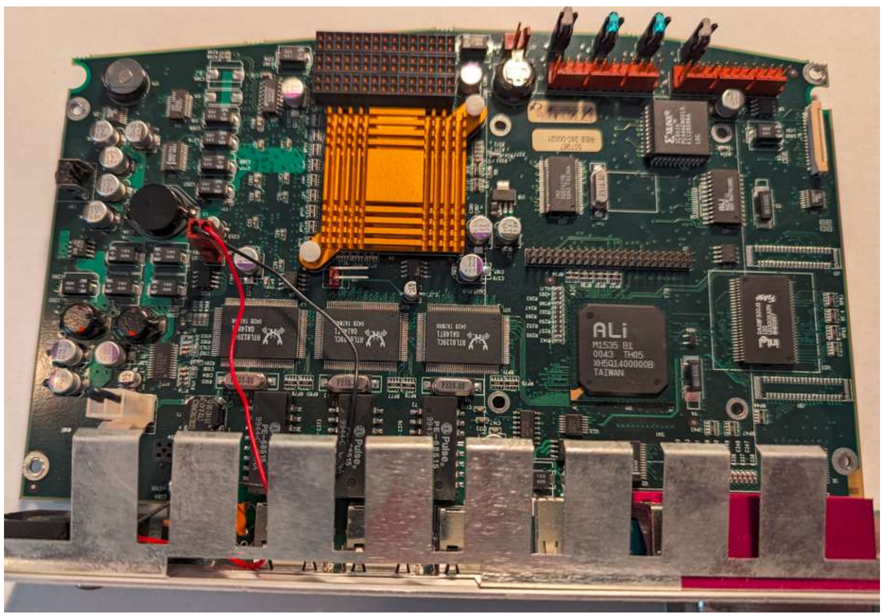
However, for the simulation method, the software was expensive and modeling all other heating components nearby and, on the back, would be difficult and time consuming – we were resource constrained

Server board back and front

1st

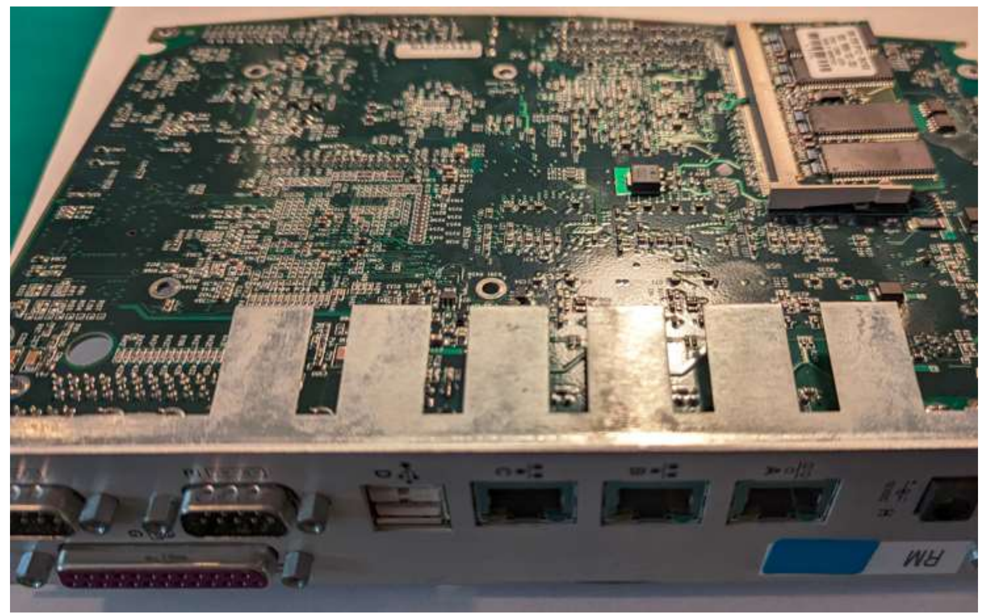
Front of server board

- CPU is a flip chip on 474 pin BGA package
- A gold passive heat sink removes CPU heat



Back of server board

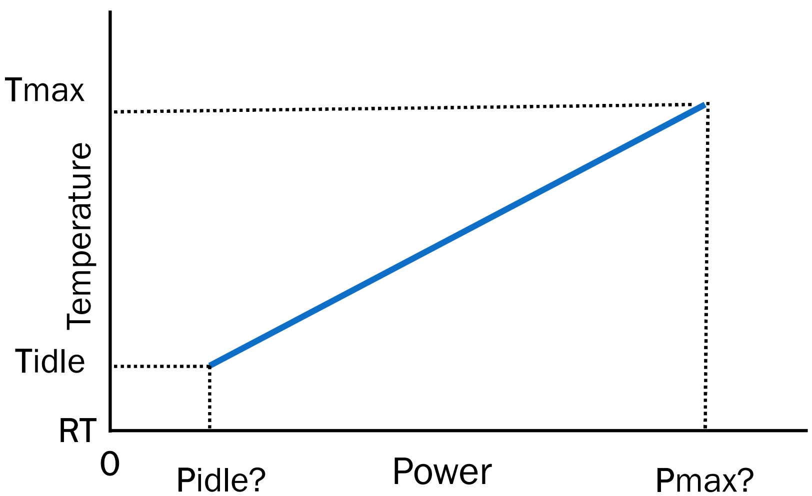
- Memory on back and in same area as CPU
- Memory gets quite hot under full compute load



Discovering a new solution

1st

- From idle compute load to maximum compute load the temperature of the CPU die can be read in software

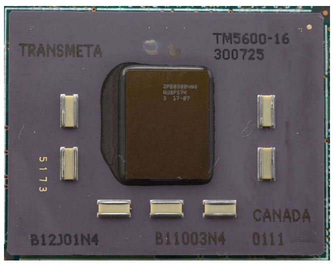


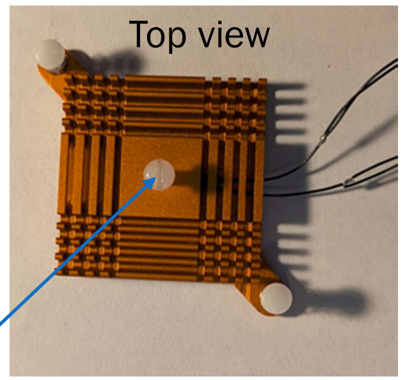
- Our heat sink choice was from different options with varied mechanical and thermal attributes
- Its mechanical characteristics inspired an idea
- **Idea:** Create a known thermal disturbance to characterize the system and solve for power
- Without that specific heat sink geometry, I don't think I'd have thought of the idea
- Heat sink choice was the **SERENDIPITY**

Mechanical solution to inject heat

1st

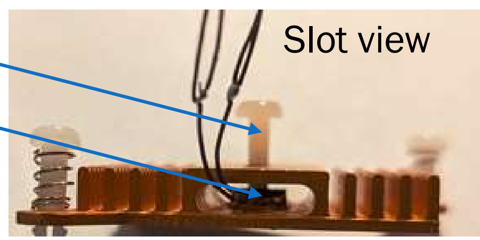
- A Transmeta processor without heatsink showing flip chip die on top





Nylon pressure screw

Power transistor



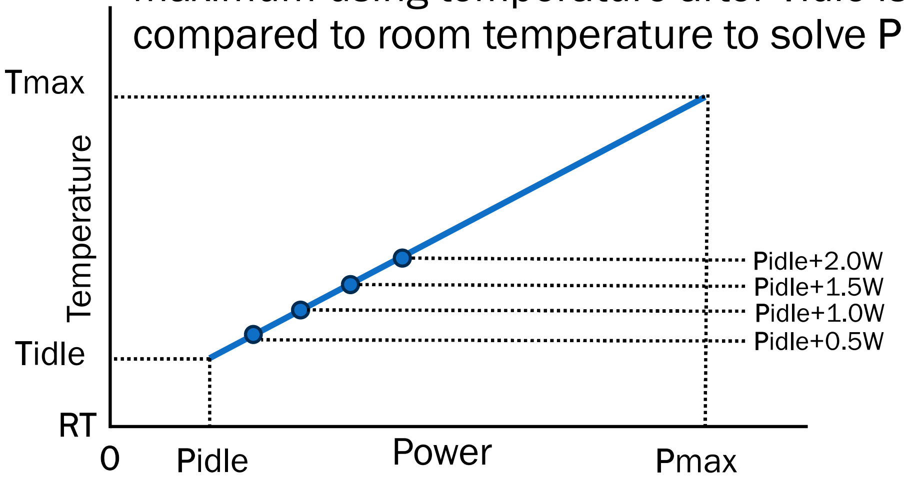
- Idea came about because the heat sink had a slot that went right over die and aluminum thickness to die was only 0.050” (1.3mm)
- Inserting a power transistor in the slot allows adding a known amount of heat to the system
- A threaded hole was added, and a nylon screw applied pressure to the transistor, wetted with thermal grease, and centered over the die
- Fine wires allowed current to be applied to forward bias one of the diode junctions. A second set of wires measures voltage to know accurate power in the transistor $P = V * I$
- Powers of 0.5W, 1.0W, 1.5W, and 2.0W were applied and final temperature recorded for each

This simplicity is a paradigm for GHG calculations

1st

From an unknown to a self-evident solution

- Using the 4 new data points, and knowing both temperature and power, the system is now characterized with a fitted equation, and power is known anywhere between idle and maximum using temperature after Tidle is compared to room temperature to solve Pidle



- **Takeaway lesson:** A complicated thermal modeling problem was solved by realizing a simplicity and creating a new method – the cost was only a $0.50 part and 2 hours work
- **Lesson applied:** The first year of research included searching for the existence of any simplicities that could be exploited for solving accurate temperature computation for a change in GHGs
- The great news is they've been found and used in the physics and modeling to achieve accurate computations expressed through the GHG Lab tool
- The next section includes the set of four needed to solve the computations

“Everything should be made as simple as possible, but not simpler”

…Albert Einstein

How to compute the GHG effect

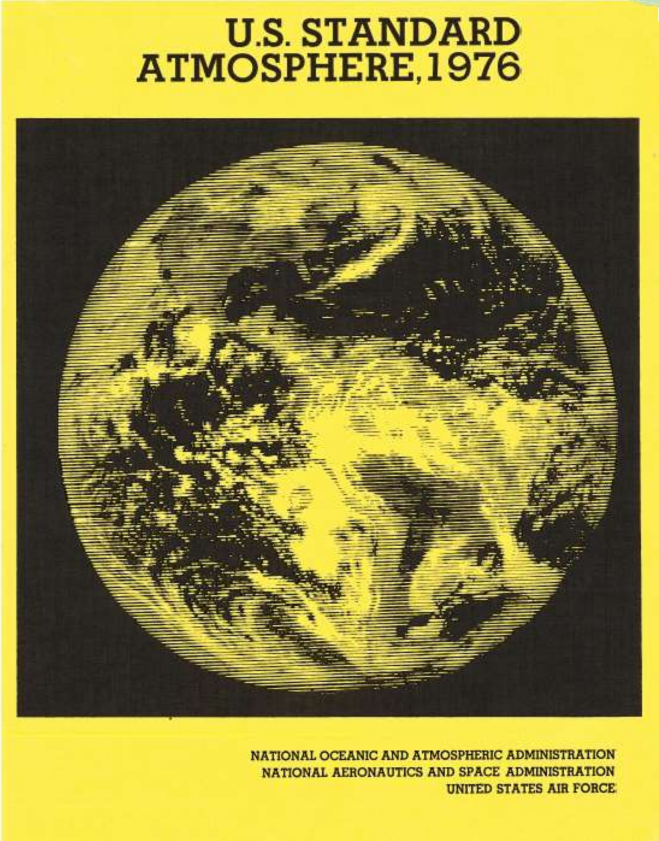
Assembling a 12-piece puzzle to achieve temperature accuracy

Modeling the vertical (zenith) atmosphere

1

- Built a 16-layer model from the surface of the Earth to 50,000 meters altitude
- First 10,000 m were divided into ten 1,000 m layers, followed by four 5000 m layers, and finally two 10,000 m layers
- From the US Standard Atmosphere 1976 report (NASA, NOAA, and USAF) extracted the average temperature, pressure, and density versus altitude for the 16 layers
- Computations could then be done for absorption by GHGs using this equation

$$A = 1 - e^{(-\alpha x)}$$



Total scattering simplification realization 1 2

Climate Bell's modeling concept of total scattering

- Based on the absorption coefficient in a wavelength region and the average density in that layer, the amount of absorption could be calculated going through each layer
- Once 99%+ of all the infrared emitted by Earth's surface in a wavelength region is intercepted by GHGs, no further heating effect can occur in that region. <u>This is what Climate Bell refers to as "total scattering"</u>
- For Earth's atmosphere, a value of 5.4E-4 m^{-1} (5.4E-6 cm^{-1}) was computed to be the absorption coefficient to produce total scattering
- NTA Light and fog analogy

Computed Absorption Coefficient for Total Scattering in Earth's Atmosphere

Altitude above Sea Level	Temp.	Absolute Pressure	Density	Abs. Coeff.	Percentage absorbed (scattered)
(m)	*(°C)*	*(10^4 N/m^2)*	*(kg/m^3)*	*(m^{-1})*	*(%)*
0	15	10.13	1.225	**5.40E-04**	n/a
1000	8.5	8.988	1.112	4.90E-04	40.26%
2000	2	7.95	1.007	4.44E-04	62.55%
3000	-4.49	7.012	0.9093	4.01E-04	75.45%
4000	-10.98	6.166	0.8194	3.61E-04	83.23%
5000	-17.47	5.405	0.7364	3.25E-04	88.10%
6000	-23.96	4.722	0.6601	2.91E-04	91.25%
7000	-30.45	4.111	0.59	2.60E-04	93.36%
8000	-36.94	3.565	0.5258	2.32E-04	94.81%
9000	-43.42	3.08	0.4671	2.06E-04	95.83%
10000	-49.9	2.65	0.4135	1.82E-04	96.56%
15000	-56.5	1.211	0.1948	8.59E-05	98.24%
20000	-56.5	0.5529	0.08891	3.92E-05	98.71%
25000	-51.6	0.2549	0.04008	1.77E-05	98.88%
30000	-46.64	0.1197	0.01841	8.12E-06	98.95%
40000	-22.8	0.0287	0.003996	1.76E-06	99.00%
50000	-2.5	0.007978	0.001027	4.53E-07	**99.02%**

Earth's surface

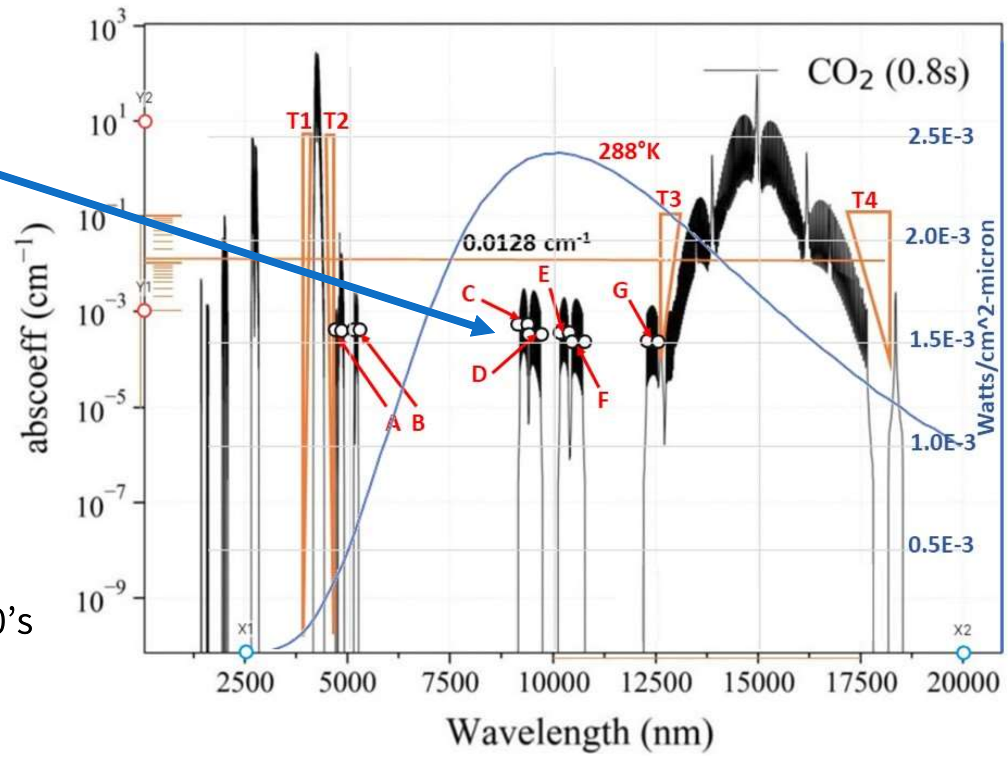
HITRAN database of absorption coefficients

Progression steps over many months

1. First used research papers citing average absorption coefficients for CO2 bands
2. Then switched to digitizing plots for CO2, CH4, and N2O
3. Finally found the HITRAN database of detailed absorption spectrums
4. Extracted approximately 180,000 lines between 3um and 20 um for each of the five GHGs including O3 and H2O

HITRAN is an acronym for *hi*gh-resolution *tran*smission molecular absorption database. HITRAN, started in the 1960's and is a compilation of spectroscopic data that quantify the transmission and emission of light in the atmosphere.

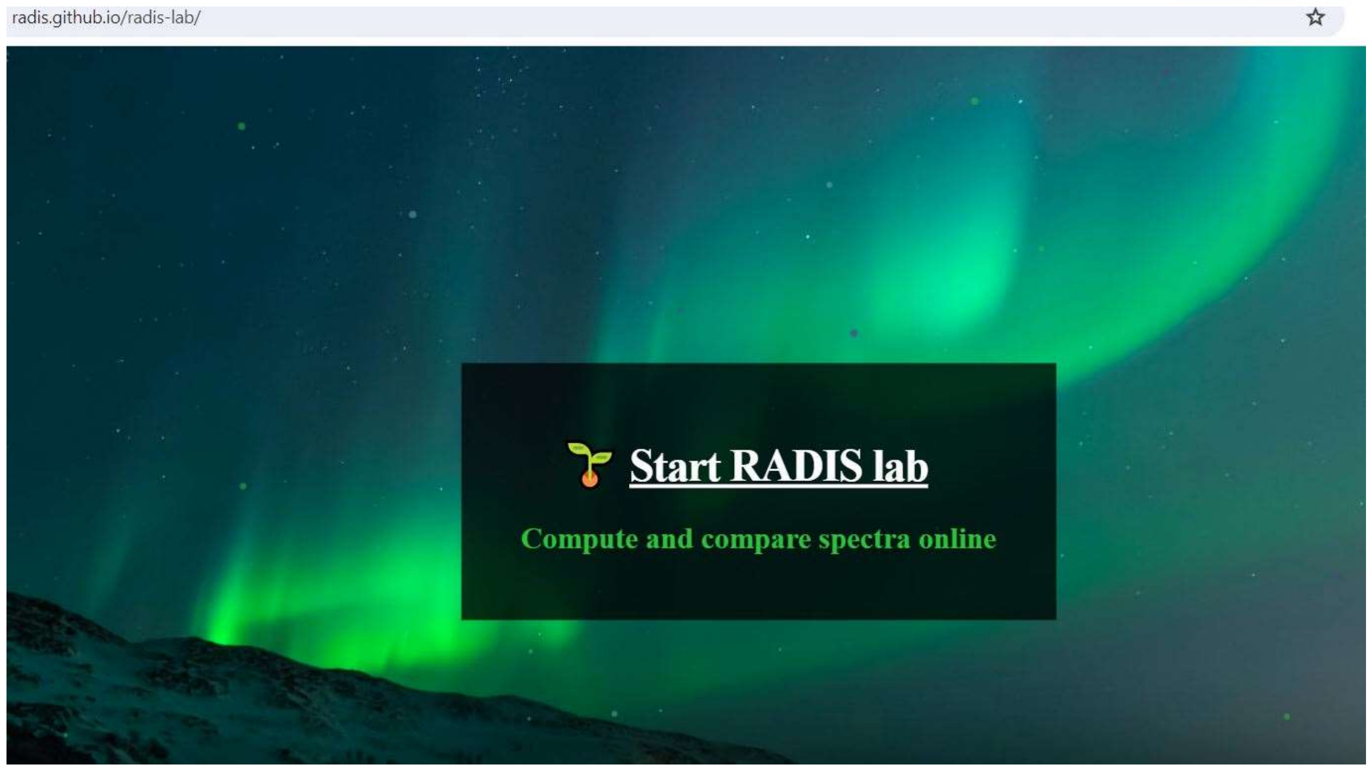
Absorption coefficient for 1 ATM pure CO2



HITRAN database of absorption coefficients

3

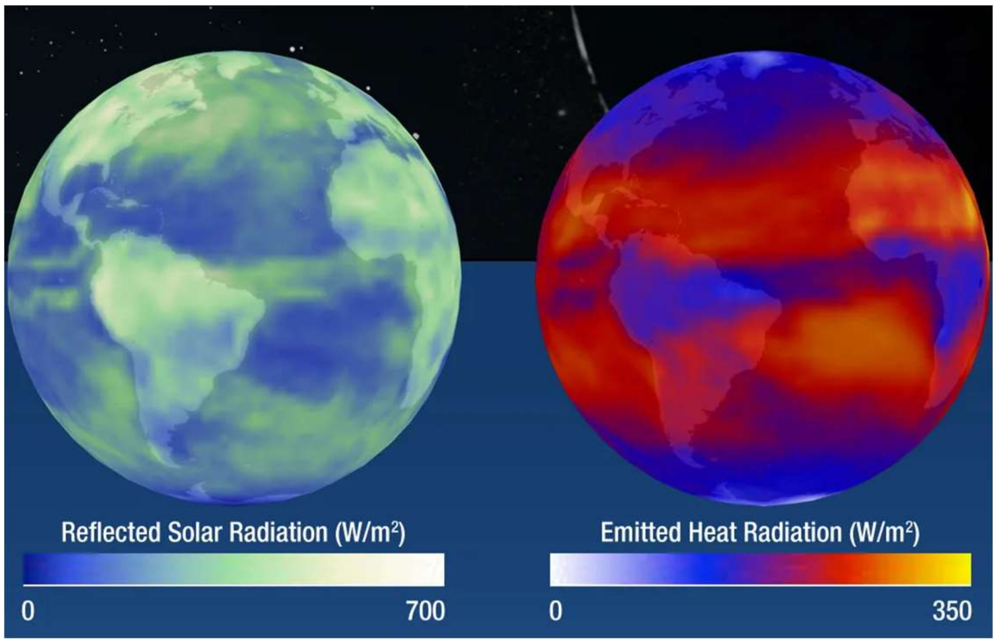
- Accessing HITRAN
- radis.github.io



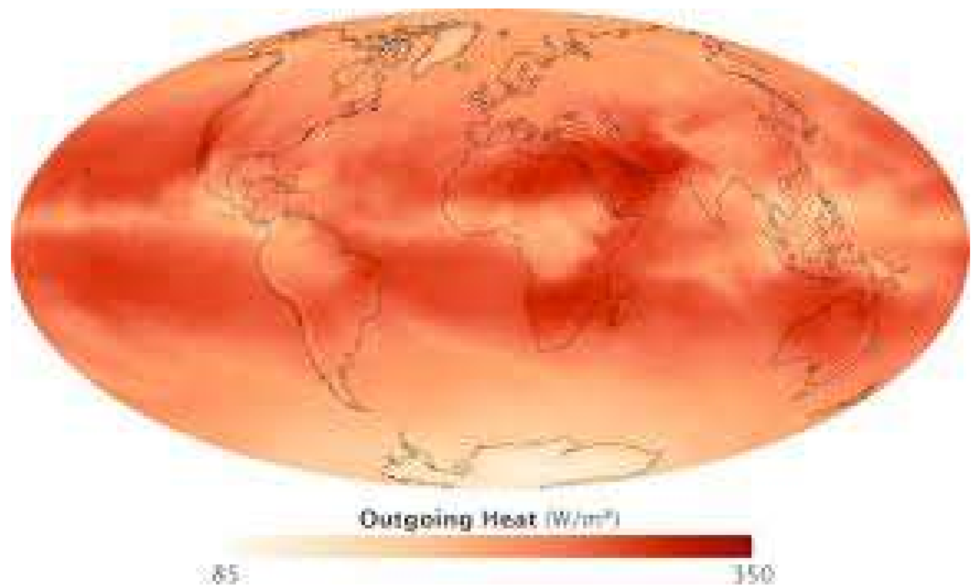
Credit: Dr. Erwan Pannier for his assistance with Radis Lab and to him and all who created this wonderful database tool.

The Earth System simplification realization 2

4

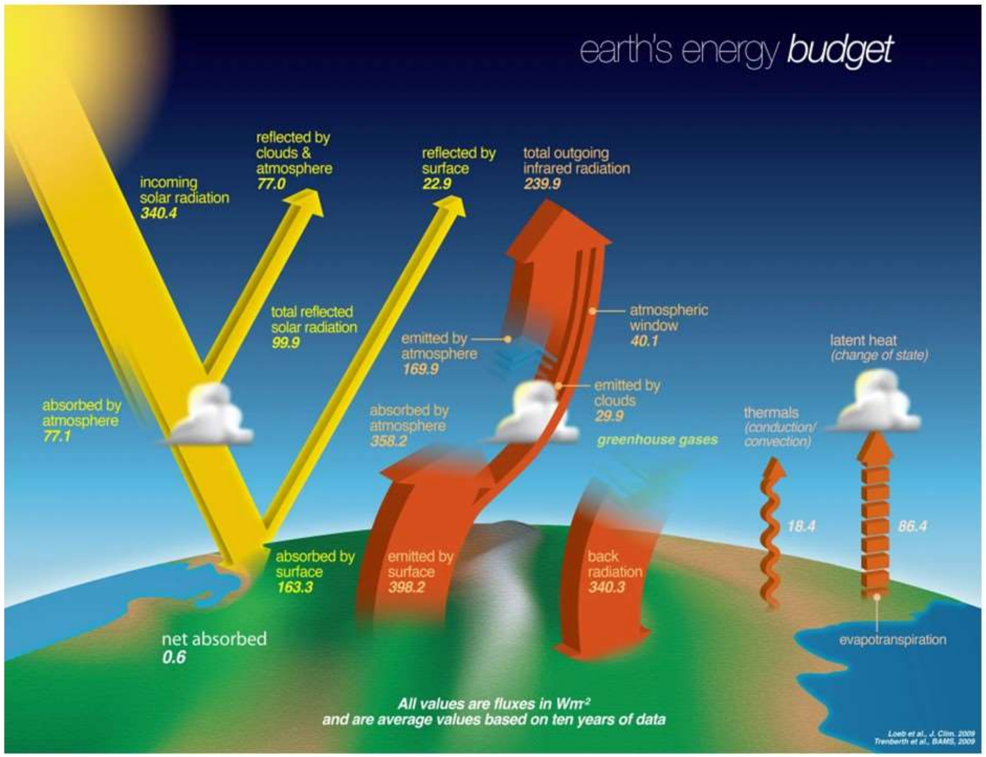


Source: NASA one side globe view



Source: NASA full globe projection

The Earth System simplification realization



"The answer's is not in the box; it is in the band."
... from the movie AntiTrust (2001)

This was a pivotal line in that geek suspense thriller.

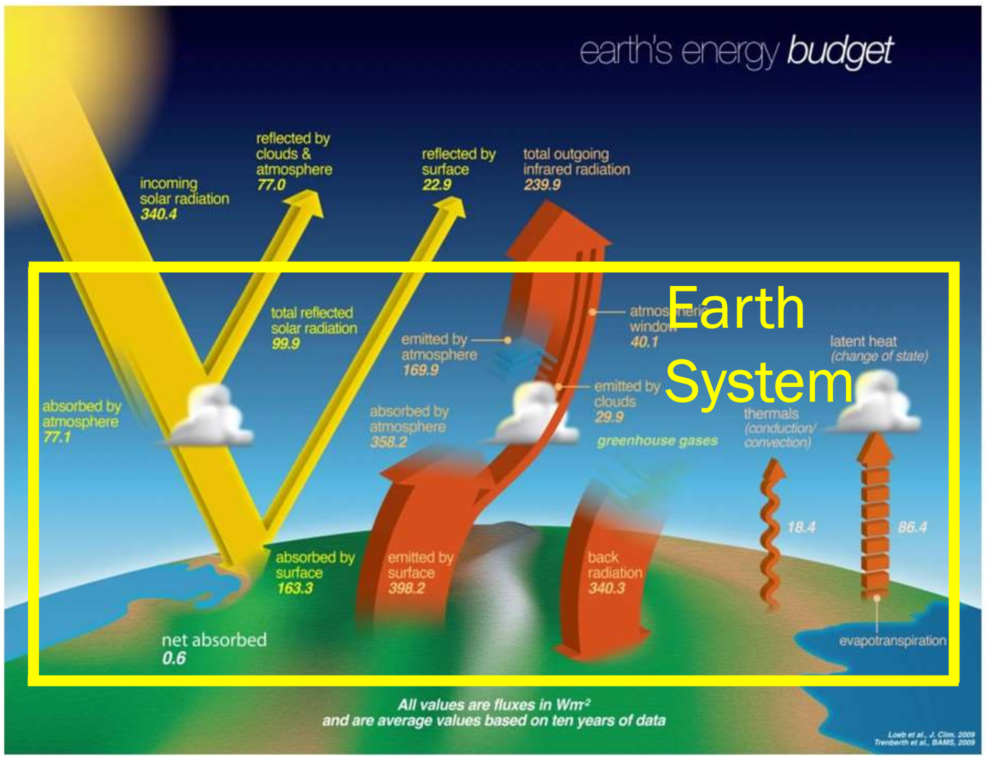
I found the pivotal line to compute the GHG effect is:

The answer's in the box and in the bands.

- The box is the whole Earth System
- The bands are the absorption bands of the five GHGs that get integrated into one
- The computation is how much blackbody infrared energy destined for outer space gets intercepted by GHGs, and how much returns to outer space.

Note: I'm speculating the net absorbed of 0.6 is due to sunlight being locked up in chemical storage from photosynthesis

The Earth System simplification realization



Five rules for computing the GHG effect

1. The only sources outer space bound full-spectrum blackbody radiation are:
   - Earth's surface (dominant)
   - Cloud tops and haze top (minor)

2. The only source of outer space bound resonant-band radiation are:
   - GHGs

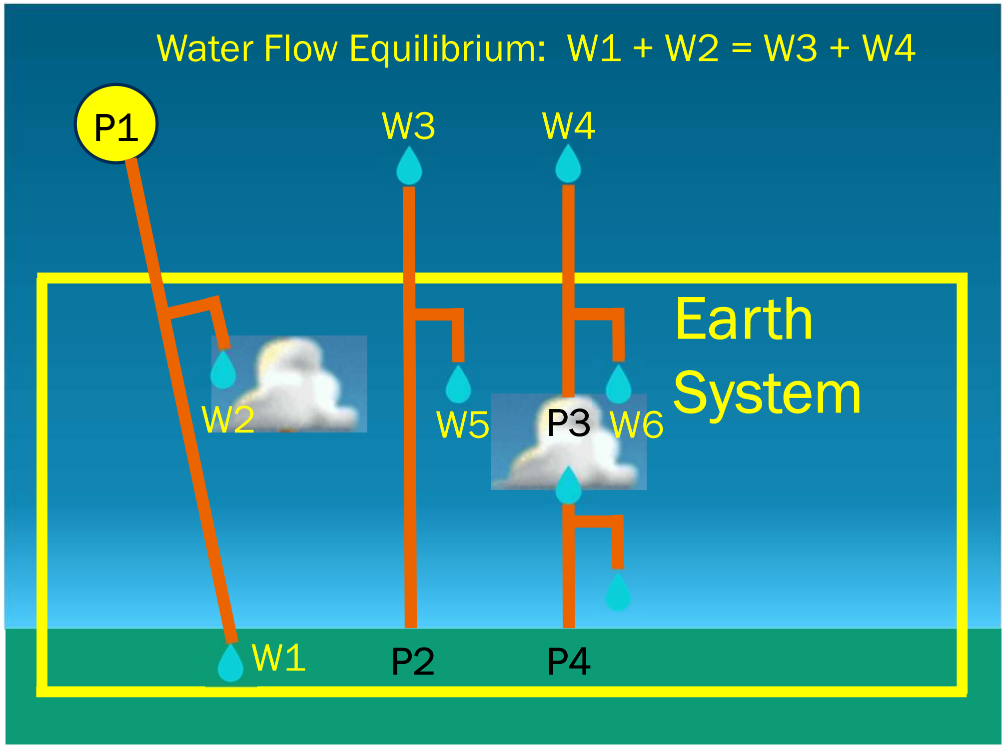
3. Only the outer space bound radiation counts for the GHG effect

4. GHG absorption and emission control the capture of space bound radiation by the Earth System and the release of some of that energy back to outer space

5. All other thermodynamic activity within the Earth system is irrelevant to computing the global GHG heating effect for the Earth

The Earth System simplification realization

NTA 4



The water analogy blackbody part of the GHG effect

- P1 - Sun pumps water to Earth's surface and the atmosphere (W1 + W2) – like heating Earth System
- P2 – Earth's surface pumps water into space (W3) and a tap pipe traps some water in the Earth's System (W5) – feedback like the GHG effect
- P3 – cloud tops pumps water into space (W4) and a tap pipe traps some water in the Earth's System (W6) – feedback like the GHG effect
- P4 – Earth's surface pumps water that is blocked by the clouds, none of the water could escape Earth's System; the tap pipe is meaningless feedback
- Pipes supplying W5 and W6 become larger increasing W5 and W6 – more feedback like increasing GHGs
- So, pumps P2 and P3 must push more water to satisfy the Water Flow Equilibrium equation – like the GHG effect heating the Earth System and causing more blackbody radiation

The Earth System simplification realization

4

NTA The hiking calculator analogy

Inputs:

- Person's weight
- Backpack weight
- Distance traveled
- Time traveling
- Elevation change
- Terrain surface

Output:

- Calories to be eaten

Hiking calculators used by military and recreational hikers are to maintain digestive energy and avoid fat-burning slowdown

Modeling internal energy transfer isn't productive

- Hiking calculators work due to a known calories input and work output efficiency – about 95%
- Internal modeling of food to muscle-usable energy processes and transportation processes to move it to the muscles is not needed or productive
- Except for GHG space-bound infrared absorption, regarding all other forms of heat energy transfer within the Earth System including other infrared absorption, convection, conduction, heat of condensation, heat of fusion, and any others – nothing is gained or lost in internal exchanges
- If amount of outer space bound infrared radiation intercepted can be computed and the percentage that is returned to space is known, modeling any heat energy exchanges between internal forms inside the Earth System is not needed or productive

TRIPLE SERENDIPITY

50% to outer space realization simplification

3 5

The intercepted infrared radiation

"As CO_2 soaks up this infrared energy, it vibrates and re-emits the infrared energy back in all directions. About half of that energy goes out into space, and about half of it returns to Earth as heat, contributing to the greenhouse effect."

... Climate School, Columbia University

Why 50% goes to outer space

"At some height, most radiation emitted upwards makes it to outer space without being reabsorbed on the way. The effective radiating level – the lowest level in the atmosphere from which infrared radiation is able, on average, to escape upwards to outer space without be absorbed."

... Atmospheric Oceanic Sciences, University of Wisconsin-Madison

It's an esoteric logical modeling realization

The infrared from the blackbody sources of Earth's surface and cloud tops is already accounted for in their emissions to outer space, some getting through, and the rest intercepted by GHGs, Thus, GHG emissions are the only mechanism for returning the intercepted energy to outer space. The Earth's curvature, and hence the Earth's atmosphere curvature favors slightly more than 50% getting to outer space and slightly less than 50% staying in the Earth System.

Integrating absorption coefficients

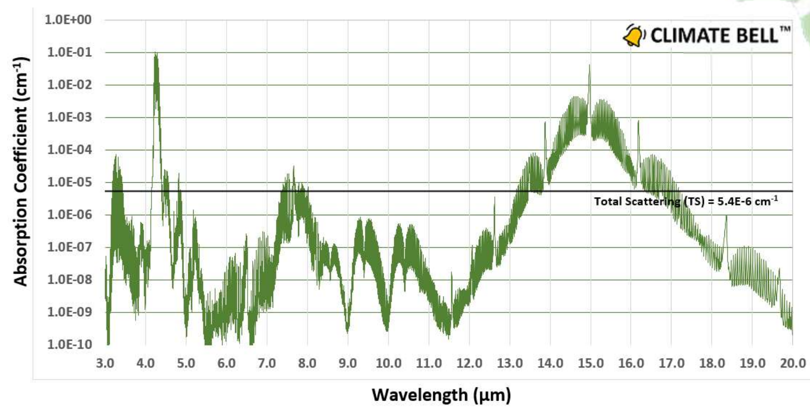
6

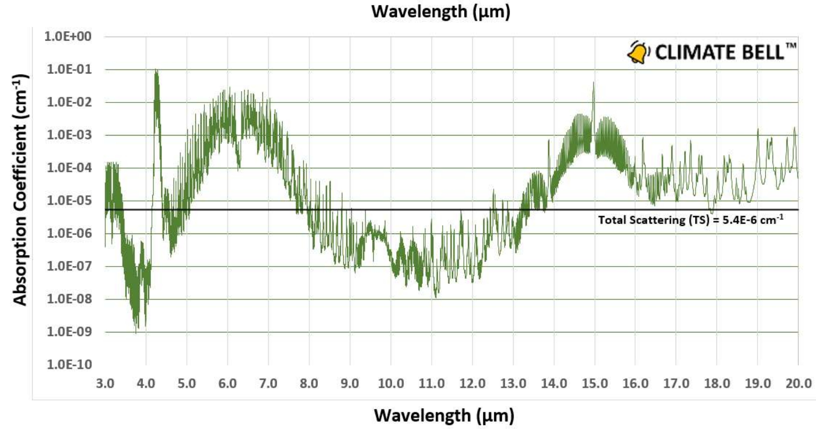
- GHG absorption coefficients are proportional to their concentration (PPMV) and the air density in the atmosphere
- By taking fine steps across the spectrum when extracting the HITRAN data for each GHG, and having those increments matching between GHGs, blending can be done
- At each step in the spectra, blending GHGs creates a single absorption coefficient that is the sum of each GHG's value
- The natural GHGs of O3 and H2O, where overlapping with other GHGs, lessen the impact of those other GHGs because of the total scatter realization
- The climate change industry's approach of adding radiative forcing only works if there is no overlapping bands. They fail to address that. CCIF 3
- Saying H2O is a strong GHG and has the effect of amplifying other GHGs is a major flaw in their understanding CCIF 4
- For the blackbody infrared emissions of Earth's surface and cloud tops heading to outer space, the flow can be compared to fish swimming up a stream
- A fish net downstream intercepting the fish first will lessen the effectiveness of a net upstream. The net downstream is like H2O absorbing infrared first before CO2. And if no fish get through the upstream net, that is like total scattering as all are captured NTA

3um to 20 um region

7

- Year 2023 levels of CO2, CH4, and N2O in a single absorption coefficient in upper right
- All five GHGs including O3 and H2O below
- Total scattering from 5 um to 8 um and 14 um to 20 um (black line is total scattering)
- Approaching 20 um the absorption coefficient is driven by H2O and continues its upward trend beyond 20 um as shown in the next chart



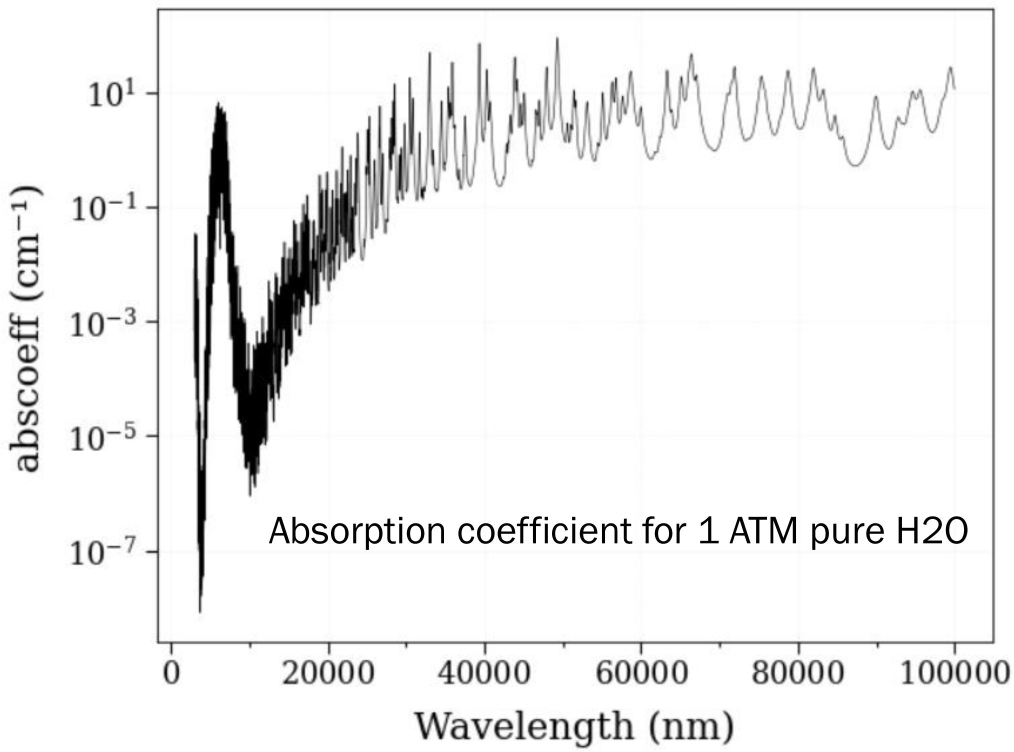


20um to 100um region simplification realization

4

8

- From 20 um to 100 um, the absorption coefficient for H2O keeps rising
- H2O's absorption coefficient when scaled for its typical PPMV is deep into total scatter
- Therefore, all infrared photons from Earth's surface in that region are captured by H2O alone
- When Earth's temperature rises, this region adds about 10% more to the temperature rise due to the 50% release to outer space factor



GHG concentrations up through atmosphere

- Atmospheric Constituent Profiles report, 1986, Air Force Geophysics Lab
- Data for CO2, CH4, N2O as well as ozone (O3) and water vapor (H2O) were extracted
- Tables of Earth's average values for GHG concentrations in PPMV for the 16-level atmospheric model previously created became part of GHG Lab
- Average densities were used for each layer
- In GHG Lab, a sea level H2O is computed based on an average humidity level to scale the H2O data shown in the table on the right

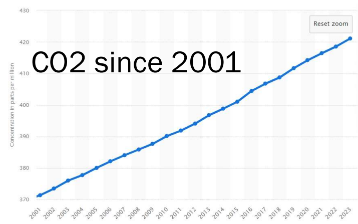
m	CO2	CH4	N2O	O3	H20
0	3.30E+02	1.70E+00	3.20E-01	2.66E-02	7.75E+03
1000	3.30E+02	1.70E+00	3.20E-01	2.93E-02	6.07E+03
2000	3.30E+02	1.70E+00	3.20E-01	3.24E-02	4.03E+03
3000	3.30E+02	1.70E+00	3.20E-01	3.32E-02	3.18E+03
4000	3.30E+02	1.70E+00	3.20E-01	3.39E-02	2.16E+03
5000	3.30E+02	1.70E+00	3.20E-01	3.77E-02	1.40E+03
6000	3.30E+02	1.70E+00	3.20E-01	4.11E-02	9.25E+02
7000	3.30E+02	1.70E+00	3.20E-01	5.02E-02	5.72E+02
8000	3.30E+02	1.70E+00	3.20E-01	5.97E-02	3.67E+02
9000	3.30E+02	1.69E+00	3.20E-01	9.17E-02	1.58E+02
10000	3.30E+02	1.69E+00	3.18E-01	1.31E-01	7.00E+01
15000	3.30E+02	1.61E+00	2.94E-01	6.51E-01	5.00E+00
20000	3.30E+02	1.42E+00	2.37E-01	2.58E+00	3.90E+00
25000	3.30E+02	1.06E+00	1.76E-01	5.12E+00	4.43E+00
30000	3.30E+02	9.14E-01	1.42E-01	6.55E+00	4.73E+00
40000	3.30E+02	5.64E-01	4.51E-02	7.30E+00	5.03E+00
50000	3.30E+02	2.10E-01	4.75E-03	3.10E+00	5.23E+00

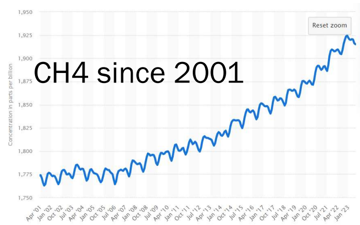
GHG trend curves

10

GHG historical data from Statista.com

- Exponential fitting curves were computed from 2005-2023
- Curves below tested on 19 data points for fit using average error. CO was 0.12%, CH4 was 0.39%, and N20 was 0.07%.
- For CH4, month of April was used to handle seasonal variation, and only 19 years were used because of CH4's anomaly before 2005

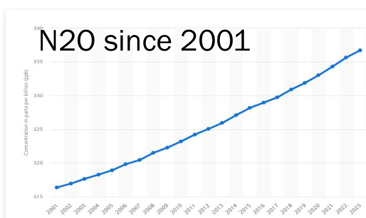




$CO2(PPM) = 0.0034 \times e^{0.0058 \times YEAR} - 2.85$

$CH4(PPB) = 0.326 \times e^{0.0043 \times YEAR} - 49.33$

$N2O(PPB) = 0.7896 \times e^{0.0030 \times YEAR} - 5.01$



Equations used in GHG Lab to year 2100

- Rewriting equations computes year of doubling assuming trend continues
- CO2, CH4, N2O – years 2141, 2177, 2247 resp.
- However, the UN's probabilistic population models predict a population peak of 10.4B later this century and then a multi-hundred-year decline
- Median predicted population in year 2300 is 7.5B
- From claims around the actual half-lives of the GHGs, it is likely we never get to a doubling of any of the GHGs from manmade causes due to the upcoming population collapse
- For this century, all predictions of GHG levels should follow trend line instead of guesses
- Guesses only serve to fabricate worst-case scenarios to exploit for meritless fear attention

CCIF 5

A lesson learned – Excel simulator development

2nd

The problem

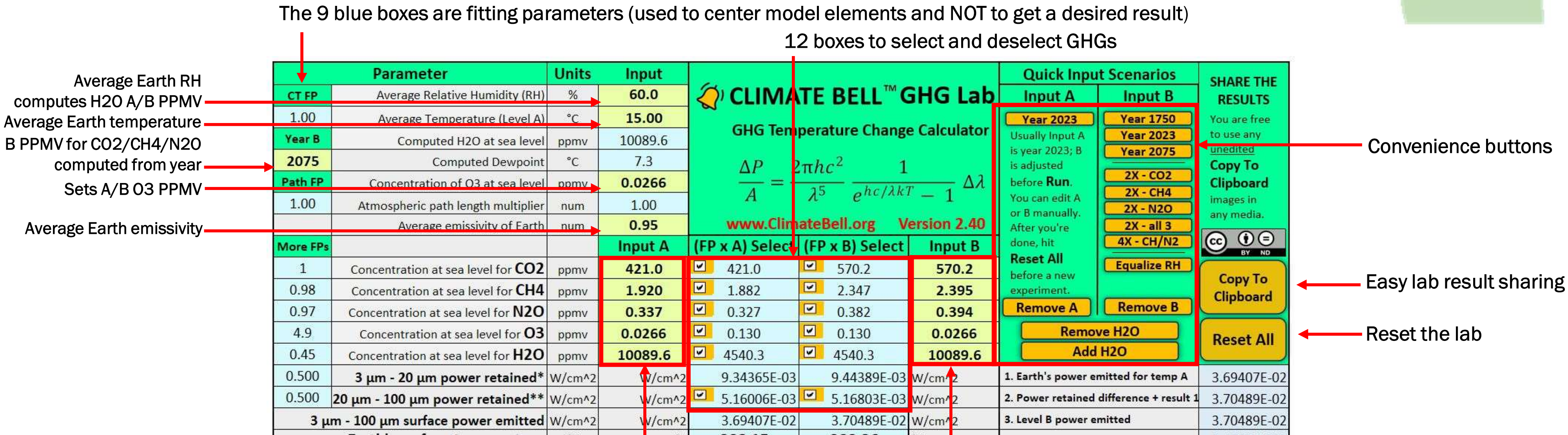
- Contractors were doing custom lighting designs with low voltage LED lighting on the outside of homes, backyards, and driveways
- Upon installation, issues could arise from long wire runs and the number and location of lights on those runs
- There were various models of lights with different I-V characteristics and wiring runs sometimes had branches going in two different directions
- A successful design and installation needed to keep the total load at the power supply below its maximum rating and the voltage at every light above its minimum rating
- The contractors needed a tool to simulate a representative situation prior to installation so they'd be confident they'd avoid a problem regarding current or voltage

The solution

- The timeframe was about 15 years ago. A custom tool was designed and coded using Microsoft Excel 2007 to automate the calculations for an arbitrary network they'd enter of wire lengths, branches, and location and models of lights on that network
- Takeaway lesson: Even Excel 2007 had rich visual basic programming capability back then, and math features to iteratively solve a system of equations. Also, the visual control of cells made it relatively easy to create a user-friendly graphical user interface.
- Lesson applied: For Climate Bell, after it was realized integrating the HITRAN data for the GHGs was part of solving the puzzle, it was obvious that a user-friendly tool was the way to go, and Excel would be a very efficient way to code a user-friendly calculator.

GHG Lab coded in Excel

11



Tabs at the bottom:

HOME – current view
A – plot of A abs. coeff.
B – plot of B abs. coeff.
FP – experts adjusting FP
GUIDE – User Guide link
SUPPORT – mutual support
READ FIRST – general info

A lesson learned – chip design simulator

3rd

The situation and impact costs

- The time frame was mid-1980s and silicon chips were 100K-500K transistors back then
- Some designs were failing due to timing errors that the simulator wasn't catching
- Our company peaked at 30B in sales. The small consequence of a failure was a few months slip in schedule and $500K. The big consequence was missing the buying decision of a big telecom carrier, and that could be 100's of millions over a 10+ year network buildout
- I was assigned the task of figuring out what was wrong and fixing it – became a two-year project

The importance of centering for accuracy

- First checked out models – they were OK
- Second checked out simulator for errors on implementing the models, it was OK
- Then tackled data behind the models and found multiple problems around centering and also tightened the silicon foundry's process screening
- **Takeaway lesson:** Always center a simulation with the goal of symmetric error bars.
- **Lesson applied:** For Climate Bell, even though the target was hit without FPs, it was important to add the FPs to center each modeling aspect and also allow users to do a sensitivity analysis.

Centering GHG Lab – Fitting Parameters

12

Fitting parameters

- Fitting parameters (FPs) are NOT used to fit for a desired temperature result; they are purely to center separate elements of GHG Lab's modeling
- FPs have not been hard coded for two reasons:
  - expert users may wish to use their own values
  - expert users may wish to do a sensitivity analysis to test the importance of an FP's accuracy
- FPs will be elaborated on in the expert section of the User Guide

The FPs in GHG Lab

- There five **GHG FPs**, one for each GHG to compensate for variations in PPMV up through atmosphere as GHG Lab was built on uniform PPMV (well-mixed gases)
- There is a **Path Length FP** to compensate for the average path and concentration distortion for a hemispherical emission from Earth's surface
- There is a **Cloud Top FP** to compensate for top of cloud emissions being closer to outer space
- There is a **Power Retained FP** for the 50% to outer space calculation to compensate for the curvature of the Earth
- The last 3 FPs are somewhat esoteric, the third being extremely esoteric

Invitation offer to co-author peer-reviewed paper(s)

FLASH

Assuming a favorable response to presentation

- If any wants to co-author, I'd be willing to share that with a small select group that are favorable to the Climate Bell physics and modeling analysis
- A paper on the Earth computations and perhaps another paper on Venus too
- I'm only interested in papers if they will do some good. It seems we are the mess and decades of papers didn't correct the problem
- I do have some concerns over the biases in journals from what I've been hearing so I do have some skepticism about the quality and integrity of the gatekeepers

Some notions

- Myself and a team of 6 co-authors, 4 from Camp 1, and ideally 2 converts from Camp 2
- It would be nice if the 6 have institutional access to various journals where they've published in recent years. The team of 6 pick the journals
- It would be nice if some of the 6 are from industry and not just academia
- Papers should be as short and efficient as possible without the sometimes long repetitive preambles if that can be avoided
- No compromising the science or pandering to wrong science to get published – it isn't worth it. I'm not in academia so it isn't my currency of recognition to publish.

How GHG Lab works (main compute engine table)

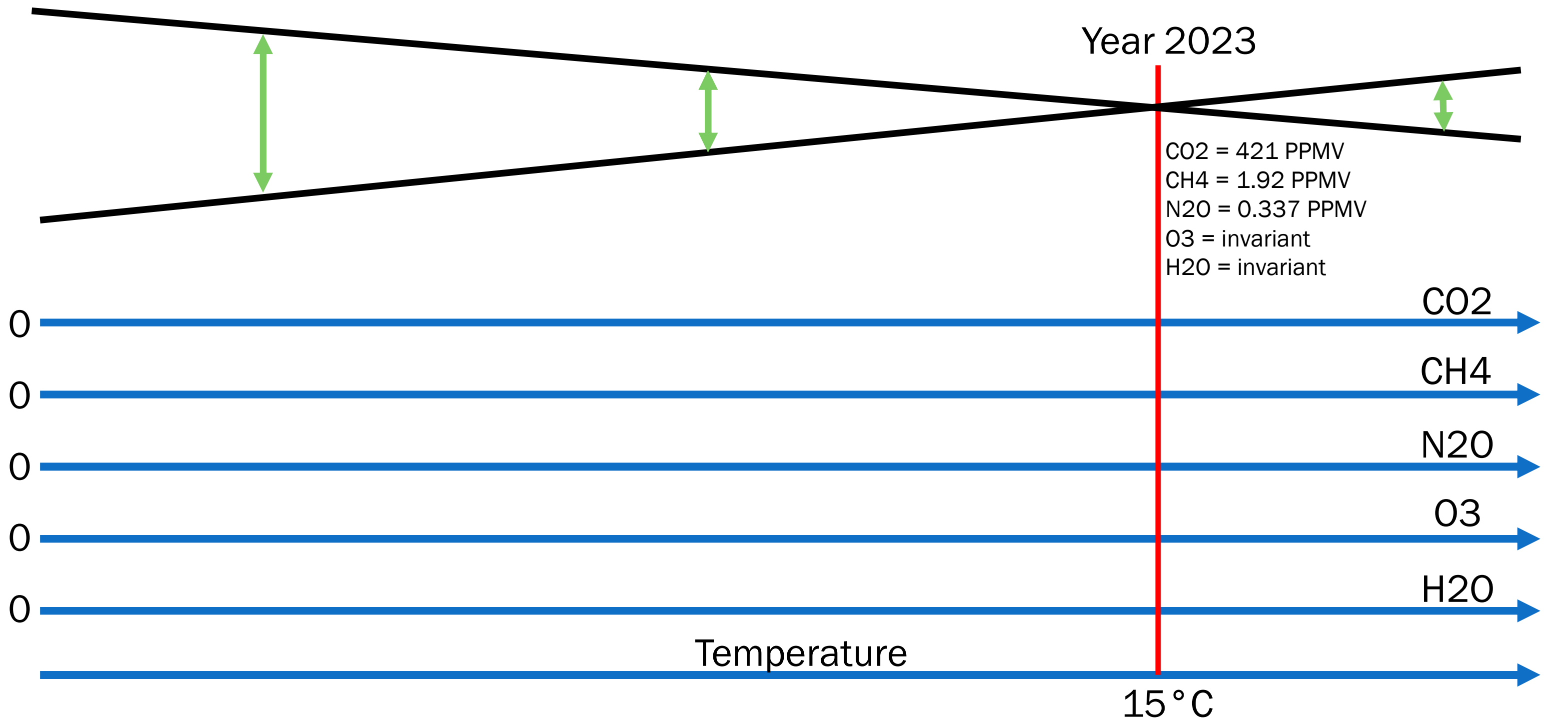
Basic overview of key table elements

- Input A is the reference point because we know what Earth's temperature and GHG levels are in 2023
- Input B is where changes are made
- The HITRAN data has been compressed into nearly 18,000 fine slices between 3 um and 20 um
- A and B each have their own integrated absorption coefficient column representing "absorption coefficient-in-the-slice" for A and for B
- A and B each have their own "power-in-the slice" columns
- A and B each have their own "absorbed-in-the-slice" columns
- The A and B absorbed-in-the-slice columns are summed for total power in each of A and B
- Each sum represents the absorbed power and 50% of that is retained while 50% goes to outer space

Running the GHG physics to solve temperature B

- For the absorbed-in-the-slice sums, if sum-B is greater than sum-A, temperature of B will be higher, and if sum-B is lower than sum-A, temperature of B will be lower
- An iterative algorithm works the temperature of B until equilibrium is restored
- Equilibrium is deemed restored when a comparison is made that differs by only $3x10^{-6}$ W/cm^2 or less
- The precision of the computation is +/- 0.01 °C and the accuracy of the convergence is +/- 0.02 °C and can be verified with the manual adjust controls for temperature B found near the Run button

Accuracy



Green lines represent the error bar (+/- °C) for a computed temperature change in Input B GHGs
By definition, the error bar is zero at year 2023 but grows the further away computed temperature is from year 2023

1st shot hit the target – no FPs even needed

Early version 1.11 of GHG Lab

Parameter with Units	Value
Average Relative Humidity (RH) %	60
Average Temperature (Level A) °C	15
Computed H2O PPMV	10090
Computed Dewpoint °C	7.3
Atmospheric path length multiplier	1
Average emissivity of Earth	0.95

CLIMATE BELL™
GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi h c^2}{\lambda^5}\,\frac{1}{e^{hc/\lambda kT}-1}\,\Delta\lambda$$

www.ClimateBell.org Version 1.11

Parameter	Units	Level A Select	Level B Select	Input B
Concentration at sea level for **CO2**	ppm	☑ 420	☐ 0	520
Concentration at sea level for **CH4**	ppm	☑ 1.9	☐ 0	2.5
Concentration at sea level for **N2O**	ppm	☑ 0.334	☐ 0	0.39
Concentration at sea level for **H2O**	ppm	☑ 10090	☐ 0	10090
a) 3-20 um* GHG **power back**	W/cm^2	9.74668E-03	0.00000E+00	**Input A**
b) 20-100 um* GHG **power back**	W/cm^2	☑ 5.16006E-03	☐ 0.00000E+00	420
Earth power emitted 3-100 um	W/cm^2	3.69407E-02	2.20325E-02	1.9
Earth temperature for each level	°K	288.15	253.37	0.334
Temperature change: A to B	**°C**	**-34.78**		10090

*combined power scattered back to the Earth from all four selected GHGs

**apply H2O amplification - total scattering is across entire band when selected

When two separate methods agree, it is a good thing

- Version 1.11 did not have O3 and FPs included
- From the solar calculation, both camps agree that Earth would be 33°C to 35°C colder if it weren't for GHGs
- So, the target center is 34°C +/- 1°C which is approximately a +/- 3% error bar. The target was hit on the first computation of Level B GHGs going to zero at 34.78°C
- Considering accuracy, if the actual GHG effect was on the low side of 33°C and the calculator computed 35°C, or vice versa, that would about a 6% error
- To avoid needless debate, I've arbitrarily set the absolute accuracy to a high value of +/- 10%.
- So, the GHG Lab calculation accuracy is +/- 0.02°C or +/- 10%, whichever is larger

Version 2.40 with FPs

GHG Lab 2.40 includes O3 and using default FPs

	Parameter	Units	Input
CT FP	Average Relative Humidity (RH)	%	60.0
1.00	Average Temperature (Level A)	°C	15.00
Year B	Computed H2O at sea level	ppmv	10089.6
n/a	Computed Dewpoint	°C	7.3
Path FP	Concentration of O3 at sea level	ppmv	0.0266
1.00	Atmospheric path length multiplier	num	1.00
	Average emissivity of Earth	num	0.95

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi hc^2}{\lambda^5} \frac{1}{e^{hc/\lambda kT} - 1} \Delta\lambda$$

www.ClimateBell.org Version 2.40

More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for **CO2**	ppmv	421.0	☑ 421.0	☐ 0.0	421.0
0.98	Concentration at sea level for **CH4**	ppmv	1.920	☑ 1.882	☐ 0.000	1.920
0.97	Concentration at sea level for **N2O**	ppmv	0.337	☑ 0.327	☐ 0.000	0.337
4.9	Concentration at sea level for **O3**	ppmv	0.0266	☑ 0.130	☐ 0.000	0.0266
0.45	Concentration at sea level for **H2O**	ppmv	10089.6	☑ 4540.3	☐ 0.0	10089.6
0.500	3 µm - 20 µm power retained*	W/cm^2	W/cm^2	9.34365E-03	0.00000E+00	W/cm^2
0.500	20 µm - 100 µm power retained**	W/cm^2	W/cm^2	☑ 5.16006E-03	☐ 0.00000E+00	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	3.69407E-02	2.24374E-02	W/cm^2
	Earth's surface temperature	°K	°K	288.15	254.52	°K
	Surface temperature change: A to B	°C	°C	-33.63		°C
	Surface power emitted change: A to B	W/m^2	W/m^2	-145.03		W/m^2

* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

GHG Lab 2.40 with my guesstimate FPs

	Parameter	Units	Input
CT FP	Average Relative Humidity (RH)	%	60.0
0.96	Average Temperature (Level A)	°C	15.00
Year B	Computed H2O at sea level	ppmv	10089.6
n/a	Computed Dewpoint	°C	7.3
Path FP	Concentration of O3 at sea level	ppmv	0.0266
2.80	Atmospheric path length multiplier	num	2.80
	Average emissivity of Earth	num	0.95

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi hc^2}{\lambda^5} \frac{1}{e^{hc/\lambda kT} - 1} \Delta\lambda$$

www.ClimateBell.org Version 2.40

More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for **CO2**	ppmv	421.0	☑ 421.0	☐ 0.0	421.0
0.98	Concentration at sea level for **CH4**	ppmv	1.920	☑ 1.882	☐ 0.000	1.920
0.97	Concentration at sea level for **N2O**	ppmv	0.337	☑ 0.327	☐ 0.000	0.337
4.9	Concentration at sea level for **O3**	ppmv	0.0266	☑ 0.130	☐ 0.000	0.0266
0.45	Concentration at sea level for **H2O**	ppmv	10089.6	☑ 4540.3	☐ 0.0	10089.6
0.480	3 µm - 20 µm power retained*	W/cm^2	W/cm^2	9.78843E-03	0.00000E+00	W/cm^2
0.480	20 µm - 100 µm power retained**	W/cm^2	W/cm^2	☑ 4.95365E-03	☐ 0.00000E+00	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	3.69407E-02	2.21973E-02	W/cm^2
	Earth's surface temperature	°K	°K	288.15	253.84	°K
	Surface temperature change: A to B	°C	°C	-34.31		°C
	Surface power emitted change: A to B	W/m^2	W/m^2	-147.43		W/m^2

* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

More GHG Lab results

Example results from GHG Lab experiments

A collection of GHG lab result highlights

Double just CO2, with H2O and other GHGs

	Parameter	Units	Input
CT FP	Average Relative Humidity (RH)	%	60.0
1.00	Average Temperature (Level A)	°C	15.00
Year B	Computed H2O at sea level	ppmv	10089.6
n/a	Computed Dewpoint	°C	7.3
Path FP	Concentration of O3 at sea level	ppmv	0.0266
1.00	Atmospheric path length multiplier	num	1.00
	Average emissivity of Earth	num	0.95

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi hc^2}{\lambda^5} \frac{1}{e^{hc/\lambda kT} - 1} \Delta\lambda$$

www.ClimateBell.org Version 2.40

More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for **CO2**	ppmv	421.0	☑ 421.0	☑ 842.0	842.0
0.98	Concentration at sea level for **CH4**	ppmv	1.920	☑ 1.882	☑ 1.882	1.920
0.97	Concentration at sea level for **N2O**	ppmv	0.337	☑ 0.327	☑ 0.327	0.337
4.9	Concentration at sea level for **O3**	ppmv	0.0266	☑ 0.130	☑ 0.130	0.0266
0.45	Concentration at sea level for **H2O**	ppmv	10089.6	☑ 4540.3	☑ 4540.3	10089.6
[illegible]	**3 µm - 20 µm power retained***	W/cm^2	W/cm^2	[illegible]E-03	9.56989E-03	W/cm^2
0.500	**20 µm - 100 µm power retained****	W/cm^2	W/cm^2	☑ 5.16006E-03	☑ 5.17792E-03	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	3.69407E-02	3.71832E-02	W/cm^2
	Earth's surface temperature	°K	°K	288.15	288.62	°K
	Surface temperature change: A to B	°C	°C	0.47		°C
	Surface power emitted change: A to B	W/m^2	W/m^2	2.42		W/m^2

* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

Double just CO2, without H2O but other GHGs remain

	Parameter	Units	Input
CT FP	Average Relative Humidity (RH)	%	60.0
1.00	Average Temperature (Level A)	°C	15.00
Year B	Computed H2O at sea level	ppmv	10089.6
n/a	Computed Dewpoint	°C	7.3
Path FP	Concentration of O3 at sea level	ppmv	0.0266
1.00	Atmospheric path length multiplier	num	1.00
	Average emissivity of Earth	num	0.95

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi hc^2}{\lambda^5} \frac{1}{e^{hc/\lambda kT} - 1} \Delta\lambda$$

www.ClimateBell.org Version 2.40

More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for **CO2**	ppmv	421.0	☑ 421.0	☑ 842.0	842.0
0.98	Concentration at sea level for **CH4**	ppmv	1.920	☑ 1.882	☑ 1.882	1.920
0.97	Concentration at sea level for **N2O**	ppmv	0.337	☑ 0.327	☑ 0.327	0.337
4.9	Concentration at sea level for **O3**	ppmv	0.0266	☑ 0.130	☑ 0.130	0.0266
0.45	Concentration at sea level for **H2O**	ppmv	10089.6	☐ 0.0	☐ 0.0	10089.6
0.500	**3 µm - 20 µm power retained***	W/cm^2	W/cm^2	4.75962E-03	5.17312E-03	W/cm^2
0.500	**20 µm - 100 µm power retained****	W/cm^2	W/cm^2	☐ 0.00000E+00	☐ 0.00000E+00	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	3.69407E-02	3.73541E-02	W/cm^2
	Earth's surface temperature	°K	°K	288.15	288.95	°K
	Surface temperature change: A to B	°C	°C	0.80		°C
	Surface power emitted change: A to B	W/m^2	W/m^2	4.13		W/m^2

* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

A collection of GHG lab result highlights

Double CH_4 (methane)

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi hc^2}{\lambda^5} \frac{1}{e^{hc/\lambda kT} - 1} \Delta\lambda$$

www.ClimateBell.org Version 2.40

	Parameter	Units	Input			
CT FP	Average Relative Humidity (RH)	%	60.0			
1.00	Average Temperature (Level A)	°C	15.00			
Year B	Computed H2O at sea level	ppmv	10089.6			
n/a	Computed Dewpoint	°C	7.3			
Path FP	Concentration of O3 at sea level	ppmv	0.0266			
1.00	Atmospheric path length multiplier	num	1.00			
	Average emissivity of Earth	num	0.95			
More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for **CO2**	ppmv	421.0	☑ 421.0	☑ 421.0	421.0
0.98	Concentration at sea level for **CH4**	ppmv	1.920	☑ 1.882	☑ 3.763	3.840
0.97	Concentration at sea level for **N2O**	ppmv	0.337	☑ 0.327	☑ 0.327	0.337
4.9	Concentration at sea level for **O3**	ppmv	0.0266	☑ 0.130	☑ 0.130	0.0266
0.45	Concentration at sea level for **H2O**	ppmv	10089.6	☑ 4540.3	☑ 4540.3	10089.6
0.500	**3 µm - 20 µm power retained***	W/cm^2	W/cm^2	9.34365E-03	9.36383E-03	W/cm^2
0.500	**20 µm - 100 µm power retained****	W/cm^2	W/cm^2	☑ 5.16006E-03	☑ 5.16158E-03	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	3.69407E-02	3.69613E-02	W/cm^2
	Earth's surface temperature	°K	°K	288.15	288.19	°K
	Surface temperature change: A to B	°C	°C	**0.04**		**°C**
	Surface power emitted change: A to B	W/m^2	W/m^2	**0.21**		**W/m^2**

* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

Copyright©2022- now by Rodney McInnis. **Legal**: Use this freeware at your own risk knowing it may free you from any climate change anxiety. See **READ FIRST tab -** calculator only works on a desktop licenced version of Microsoft Excel.

Double N2O (nitrous oxide)

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi hc^2}{\lambda^5} \frac{1}{e^{hc/\lambda kT} - 1} \Delta\lambda$$

www.ClimateBell.org Version 2.40

	Parameter	Units	Input			
CT FP	Average Relative Humidity (RH)	%	60.0			
1.00	Average Temperature (Level A)	°C	15.00			
Year B	Computed H2O at sea level	ppmv	10089.6			
n/a	Computed Dewpoint	°C	7.3			
Path FP	Concentration of O3 at sea level	ppmv	0.0266			
1.00	Atmospheric path length multiplier	num	1.00			
	Average emissivity of Earth	num	0.95			
More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for **CO2**	ppmv	421.0	☑ 421.0	☑ 421.0	421.0
0.98	Concentration at sea level for **CH4**	ppmv	1.920	☑ 1.882	☑ 1.882	1.920
0.97	Concentration at sea level for **N2O**	ppmv	0.337	☑ 0.327	☑ 0.654	0.674
4.9	Concentration at sea level for **O3**	ppmv	0.0266	☑ 0.130	☑ 0.130	0.0266
0.45	Concentration at sea level for **H2O**	ppmv	10089.6	☑ 4540.3	☑ 4540.3	10089.6
0.500	**3 µm - 20 µm power retained***	W/cm^2	W/cm^2	9.34365E-03	9.36790E-03	W/cm^2
0.500	**20 µm - 100 µm power retained****	W/cm^2	W/cm^2	☑ 5.16006E-03	☑ 5.16195E-03	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	3.69407E-02	3.69664E-02	W/cm^2
	Earth's surface temperature	°K	°K	288.15	288.20	°K
	Surface temperature change: A to B	°C	°C	**0.05**		**°C**
	Surface power emitted change: A to B	W/m^2	W/m^2	**0.26**		**W/m^2**

* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

Copyright©2022- now by Rodney McInnis. **Legal**: Use this freeware at your own risk knowing it may free you from any climate change anxiety. See **READ FIRST tab -** calculator only works on a desktop licenced version of Microsoft Excel.

A collection of GHG lab result highlights

Double CO2, CH4, and N2O

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi hc^2}{\lambda^5} \frac{1}{e^{hc/\lambda kT} - 1} \Delta\lambda$$

www.ClimateBell.org Version 2.40

	Parameter	Units	Input			
CT FP	Average Relative Humidity (RH)	%	60.0			
1.00	Average Temperature (Level A)	°C	15.00			
Year B	Computed H_2O at sea level	ppmv	10089.6			
n/a	Computed Dewpoint	°C	7.3			
Path FP	Concentration of O_3 at sea level	ppmv	0.0266			
1.00	Atmospheric path length multiplier	num	1.00			
	Average emissivity of Earth	num	0.95			
More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for CO_2	ppmv	421.0	☑ 421.0	☑ 842.0	842.0
0.98	Concentration at sea level for CH_4	ppmv	1.920	☑ 1.882	☑ 3.763	3.840
0.97	Concentration at sea level for N_2O	ppmv	0.337	☑ 0.327	☑ 0.654	0.674
4.9	Concentration at sea level for O_3	ppmv	0.0266	☑ 0.130	☑ 0.130	0.0266
0.45	Concentration at sea level for H_2O	ppmv	10089.6	☑ 4540.3	☑ 4540.3	10089.6
0.500	3 µm - 20 µm power retained*	W/cm^2	W/cm^2	9.34365E-03	9.61574E-03	W/cm^2
0.500	20 µm - 100 µm power retained**	W/cm^2	W/cm^2	☑ 5.16006E-03	☑ 5.18172E-03	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	3.69407E-02	3.72349E-02	W/cm^2
	Earth's surface temperature	°K	°K	288.15	288.72	°K
	Surface temperature change: A to B	°C	°C	0.57		°C
	Surface power emitted change: A to B	W/m^2	W/m^2	2.94		W/m^2

* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

Double CO2, CH4, and N2O and Equalize RH

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi hc^2}{\lambda^5} \frac{1}{e^{hc/\lambda kT} - 1} \Delta\lambda$$

www.ClimateBell.org Version 2.40

	Parameter	Units	Input			
CT FP	Average Relative Humidity (RH)	%	60.0			
1.00	Average Temperature (Level A)	°C	15.00			
Year B	Computed H_2O at sea level	ppmv	10089.6			
n/a	Computed Dewpoint	°C	7.3			
Path FP	Concentration of O_3 at sea level	ppmv	0.0266			
1.00	Atmospheric path length multiplier	num	1.00			
	Average emissivity of Earth	num	0.95			
More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for CO_2	ppmv	421.0	☑ 421.0	☑ 842.0	842.0
0.98	Concentration at sea level for CH_4	ppmv	1.920	☑ 1.882	☑ 3.763	3.840
0.97	Concentration at sea level for N_2O	ppmv	0.337	☑ 0.327	☑ 0.654	0.674
4.9	Concentration at sea level for O_3	ppmv	0.0266	☑ 0.130	☑ 0.130	0.0266
0.45	Concentration at sea level for H_2O	ppmv	10089.6	☑ 4540.3	☑ 4709.7	10466.0
0.500	3 µm - 20 µm power retained*	W/cm^2	W/cm^2	9.34365E-03	9.65450E-03	W/cm^2
0.500	20 µm - 100 µm power retained**	W/cm^2	W/cm^2	☑ 5.16006E-03	☑ 5.18476E-03	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	3.69407E-02	3.72763E-02	W/cm^2
	Earth's surface temperature	°K	°K	288.15	288.80	°K
	Surface temperature change: A to B	°C	°C	0.65		°C
	Surface power emitted change: A to B	W/m^2	W/m^2	3.36		W/m^2

* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

A collection of GHG lab result highlights

Reducing GHG levels to pre-industrial 1750

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi hc^2}{\lambda^5}\frac{1}{e^{hc/\lambda kT}-1}\Delta\lambda$$

www.ClimateBell.org Version 2.40

	Parameter	Units	Input			
CT FP	Average Relative Humidity (RH)	%	60.0			
1.00	Average Temperature (Level A)	°C	15.00			
Year B	Computed H2O at sea level	ppmv	10089.6			
1750	Computed Dewpoint	°C	7.3			
Path FP	Concentration of O3 at sea level	ppmv	0.0266			
1.00	Atmospheric path length multiplier	num	1.00			
	Average emissivity of Earth	num	0.95			
More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for **CO2**	ppmv	421.0	☑ 421.0	☑ 280.0	280.0
0.98	Concentration at sea level for **CH4**	ppmv	1.920	☑ 1.882	☑ 0.706	0.720
0.97	Concentration at sea level for **N2O**	ppmv	0.337	☑ 0.327	☑ 0.262	0.270
4.9	Concentration at sea level for **O3**	ppmv	0.0266	☑ 0.130	☑ 0.130	0.0266
0.45	Concentration at sea level for **H2O**	ppmv	10089.6	☑ 4540.3	☑ 4540.3	10089.6
0.500	**3 µm - 20 µm power retained***	W/cm^2	W/cm^2	9.34365E-03	9.21524E-03	W/cm^2
0.500	**20 µm - 100 µm power retained****	W/cm^2	W/cm^2	☑ 5.16006E-03	☑ 5.14980E-03	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	3.69407E-02	3.68019E-02	W/cm^2
	Earth's surface temperature	°K	°K	288.15	287.88	°K
	Surface temperature change: A to B	°C	°C	-0.27		°C
	Surface power emitted change: A to B	W/m^2	W/m^2	-1.39		W/m^2

* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

Increasing GHG levels to year 2075

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi hc^2}{\lambda^5}\frac{1}{e^{hc/\lambda kT}-1}\Delta\lambda$$

www.ClimateBell.org Version 2.40

	Parameter	Units	Input			
CT FP	Average Relative Humidity (RH)	%	60.0			
1.00	Average Temperature (Level A)	°C	15.00			
Year B	Computed H2O at sea level	ppmv	10089.6			
2075	Computed Dewpoint	°C	7.3			
Path FP	Concentration of O3 at sea level	ppmv	0.0266			
1.00	Atmospheric path length multiplier	num	1.00			
	Average emissivity of Earth	num	0.95			
More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for **CO2**	ppmv	421.0	☑ 421.0	☑ 570.2	570.2
0.98	Concentration at sea level for **CH4**	ppmv	1.920	☑ 1.882	☑ 2.347	2.395
0.97	Concentration at sea level for **N2O**	ppmv	0.337	☑ 0.327	☑ 0.382	0.394
4.9	Concentration at sea level for **O3**	ppmv	0.0266	☑ 0.130	☑ 0.130	0.0266
0.45	Concentration at sea level for **H2O**	ppmv	10089.6	☑ 4540.3	☑ 4540.3	10089.6
0.500	**3 µm - 20 µm power retained***	W/cm^2	W/cm^2	9.34365E-03	9.44389E-03	W/cm^2
0.500	**20 µm - 100 µm power retained****	W/cm^2	W/cm^2	☑ 5.16006E-03	☑ 5.16803E-03	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	3.69407E-02	3.70489E-02	W/cm^2
	Earth's surface temperature	°K	°K	288.15	288.36	°K
	Surface temperature change: A to B	°C	°C	0.21		°C
	Surface power emitted change: A to B	W/m^2	W/m^2	1.08		W/m^2

* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

Copyright©2022- now by Rodney McInnis. **Legal**: Use this freeware at your own risk knowing it may free you from any climate change anxiety. See **READ FIRST tab** - calculator only works on a desktop licenced version of Microsoft Excel.

A collection of GHG lab result highlights

0 PPM to 10 PPM CO2 and no other GHGs

Parameter		Units	Input
CT FP	Average Relative Humidity (RH)	%	60.0
1.00	Average Temperature (Level A)	°C	15.00
Year B	Computed H2O at sea level	ppmv	10089.6
n/a	Computed Dewpoint	°C	7.3
Path FP	Concentration of O3 at sea level	ppmv	0.0266
1.00	Atmospheric path length multiplier	num	1.00
	Average emissivity of Earth	num	0.95

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi h c^2}{\lambda^5} \frac{1}{e^{hc/\lambda k T} - 1} \Delta\lambda$$

www.ClimateBell.org Version 2.40

More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for **CO2**	ppmv	421.0	0.0	10.0	10.0
0.98	Concentration at sea level for **CH4**	ppmv	1.920	0.000	0.000	1.920
0.97	Concentration at sea level for **N2O**	ppmv	0.337	0.000	0.000	0.337
4.9	Concentration at sea level for **O3**	ppmv	0.0266	0.000	0.000	0.0266
0.45	Concentration at sea level for **H2O**	ppmv	10089.6	0.0	0.0	10089.6
0.500	**3 µm - 20 µm power retained***	W/cm^2	W/cm^2	0.00000E+00	2.10704E-03	W/cm^2
0.500	**20 µm - 100 µm power retained****	W/cm^2	W/cm^2	0.00000E+00	0.00000E+00	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	3.69407E-02	3.90480E-02	W/cm^2
	Earth's surface temperature	°K	°K	288.15	292.16	°K
	Surface temperature change: A to B	°C	°C	4.01		°C
	Surface power emitted change: A to B	W/m^2	W/m^2	21.07		W/m^2

* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

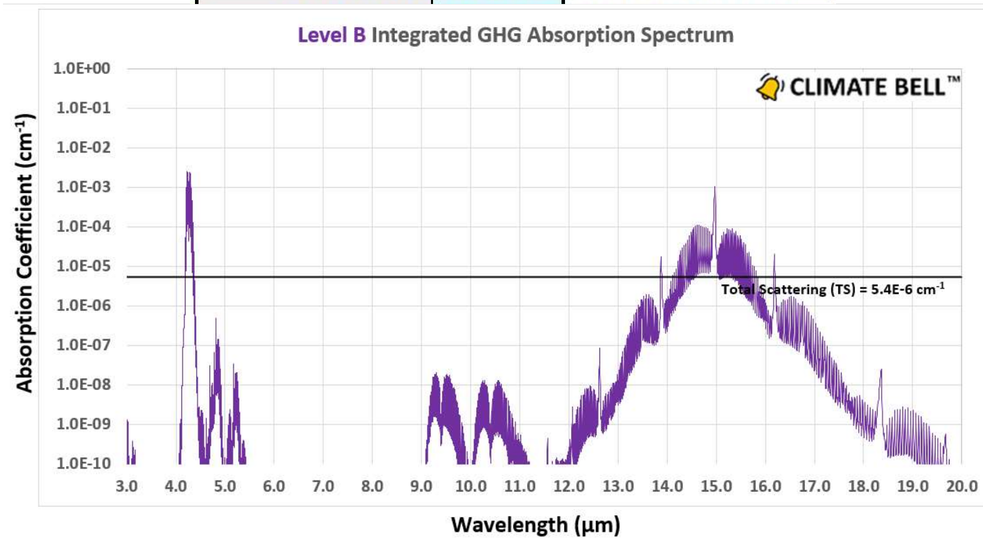
Absorption spectrum for CO2 at 10 PPM

Level A scattered power flux - 3um to 100um

0.00000E+00 W/cm^2 = **0.00%** of total

Level B scattered power flux - 3um to 100um

4.21409E-03 W/cm^2 = **10.79%** of total



A collection of GHG lab result highlights

421 PPM to 430 PPM CO2 and no other GHGs

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi hc^2}{\lambda^5}\frac{1}{e^{hc/\lambda kT} - 1}\Delta\lambda$$

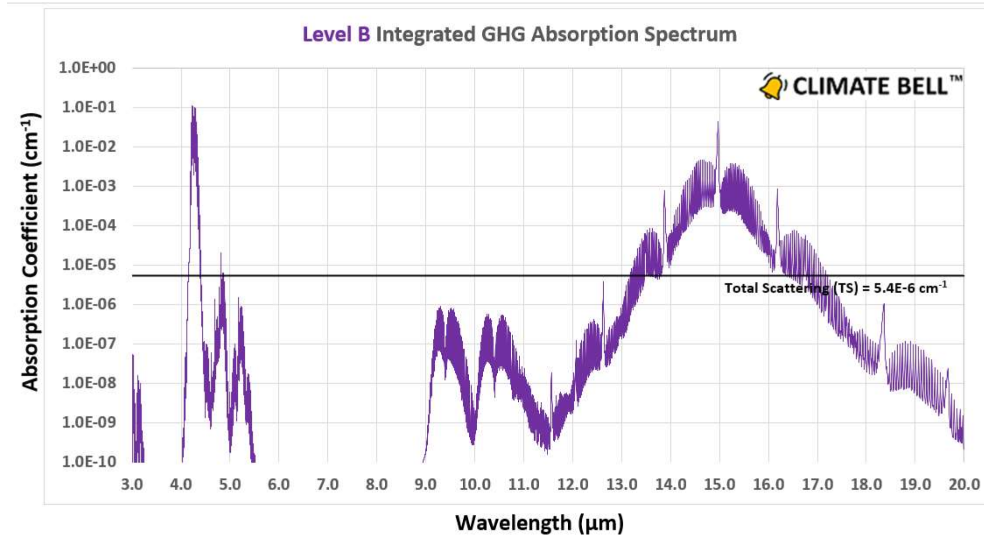
www.ClimateBell.org Version 2.40

	Parameter	Units	Input			
CT FP	Average Relative Humidity (RH)	%	60.0			
1.00	Average Temperature (Level A)	°C	15.00			
Year B	Computed H2O at sea level	ppmv	10089.6			
n/a	Computed Dewpoint	°C	7.3			
Path FP	Concentration of O3 at sea level	ppmv	0.0266			
1.00	Atmospheric path length multiplier	num	1.00			
	Average emissivity of Earth	num	0.95			
More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for **CO2**	ppmv	421.0	☑ 421.0	☑ 431.0	431.0
0.98	Concentration at sea level for **CH4**	ppmv	1.920	☐ 0.000	☐ 0.000	1.920
0.97	Concentration at sea level for **N2O**	ppmv	0.337	☐ 0.000	☐ 0.000	0.337
4.9	Concentration at sea level for **O3**	ppmv	0.0266	☐ 0.000	☐ 0.000	0.0266
0.45	Concentration at sea level for **H2O**	ppmv	10089.6	☐ 0.0	☐ 0.0	10089.6
0.500	**3 µm - 20 µm power retained***	W/cm^2	W/cm^2	3.84124E-03	3.85454E-03	W/cm^2
0.500	**20 µm - 100 µm power retained****	W/cm^2	W/cm^2	☐ 0.00000E+00	☐ 0.00000E+00	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	3.69407E-02	3.69561E-02	W/cm^2
	Earth's surface temperature	°K	°K	288.15	288.18	°K
	Surface temperature change: A to B	°C	°C	**0.03**		**°C**
	Surface power emitted change: A to B	W/m^2	W/m^2	**0.15**		**W/m^2**

* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

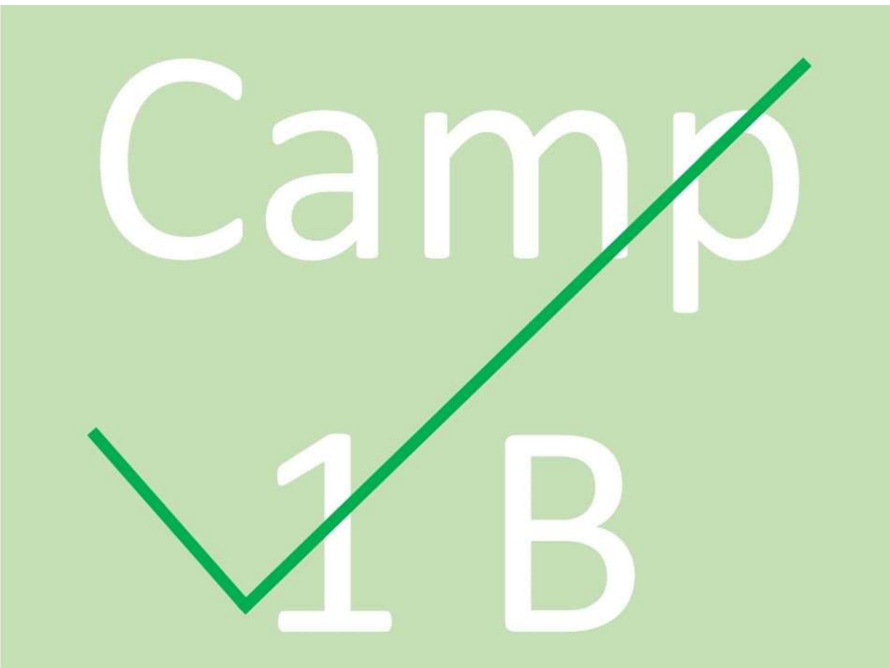
Absorption spectrum for CO2 at 10 PPM

Level A scattered power flux - 3um to 100um
7.68249E-03 W/cm^2 = **20.80%** of total
Level B scattered power flux - 3um to 100um
7.70909E-03 W/cm^2 = **20.86%** of total



Assembling the 12 pieces

It seems clear that Camp 1B was correct



My hope that GHG Lab is a catalyst for new dialog

- When I started this in 2022, I felt 1A and 2B are highly unlikely, but I was not entirely confident in picking a winner between 1B and 2A without computing results
- With the 12 modeling pieces assembled, and the results revealed, many may soon realize the virtual stalemate between both camps can now end quickly
- <u>We should welcome early converts from Camp 2 with kindness</u> as they may be some of the most inspired people to redeem themselves through helping end the mandates and inspire more converts from Camp 2

Learned from my observations of those medical people (doctors, nurses, and researchers) who realized both the pandemic narratives and treatment assurances were untrue after previously advocating for them.

GHG Lab demo

Do a few runs navigating the HOME tab

Picking a year

Learning from the graphs

IPCC 6th assessment predictions on CO2 doubling

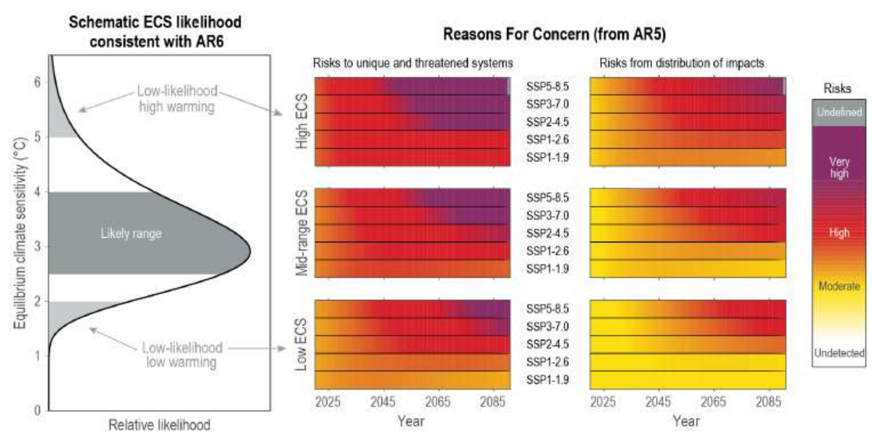


Fig 1.16 Illustrating concepts of low-likelihood outcomes

- IPCC: "... equilibrium climate sensitivity (ECS) is likely in the range 2.5 °C to 4.0 °C, and very likely between 2.0 °C and 5.0 °C."
- GHG Lab calculates 0.47 °C +/- 10% with default FPs and all five GHGs
- That is a huge discrepancy:

  2.0 °C = 425% higher!

  3.5 °C = 750% higher!

  5.0 °C = 1050% higher!

CCIF 6

Happer’s calculation in EIKE presentation

EIKE Climate and Energy Conference

- EIKE is the European Institute for Climate and Energy
- For just a doubling of CO2 without any other gases he calculates 0.80°C for Earth’s surface temperature at 290°K

Zeroth-order estimate of warming needed to compensate for attenuation of flux to space by 2 x CO_2

$$\frac{\Delta Z}{Z} \approx 1.1\% \quad \text{Decrease of flux to space from 2 x } CO_2$$

Radiation transfer calculation for cloud-free skies

and

$$Z \approx \sigma T^4 \quad \text{Stefan-Boltzmann radiation law, } (T^3 \text{ fits better than } T^4 \text{ for atmosphere with greenhouse gases})$$

so

$$\frac{\Delta Z}{Z} \approx 4\frac{\Delta T}{T}$$

or

$$\frac{\Delta T}{T} \approx \frac{1}{4} \times 1.1\%,$$

but

$$T \approx 290\ \text{K}, \quad \text{Mean surface temperature}$$

so

$$\Delta T \approx 0.80\ \text{C.} \quad \text{Zeroth-order estimate of warming from 2 x } CO_2$$

- Dr. Happer, says *“… so, I’m willing to bet within 50 years when the answer is actually known that it will be a lot closer to this than it is to IPCC models”*
- Dr. Happer’s calculation is confirmed now with GHG Lab. GHG Lab calculates 0.83°C for T = 290 using default FPs
- Source: https://www.youtube.com/watch?v=s-ab-ZNXnZ8&t=2120s

GHG Lab can handle any experiments now

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi h c^2}{\lambda^5} \frac{1}{e^{hc/\lambda kT} - 1} \Delta\lambda$$

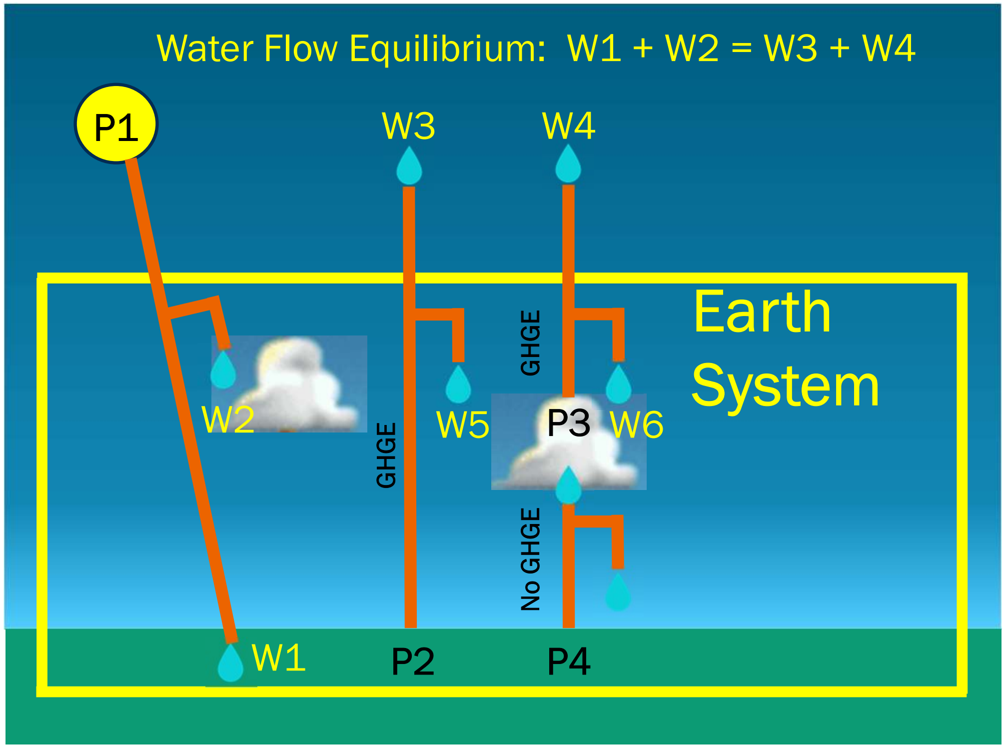
www.ClimateBell.org Version 2.40

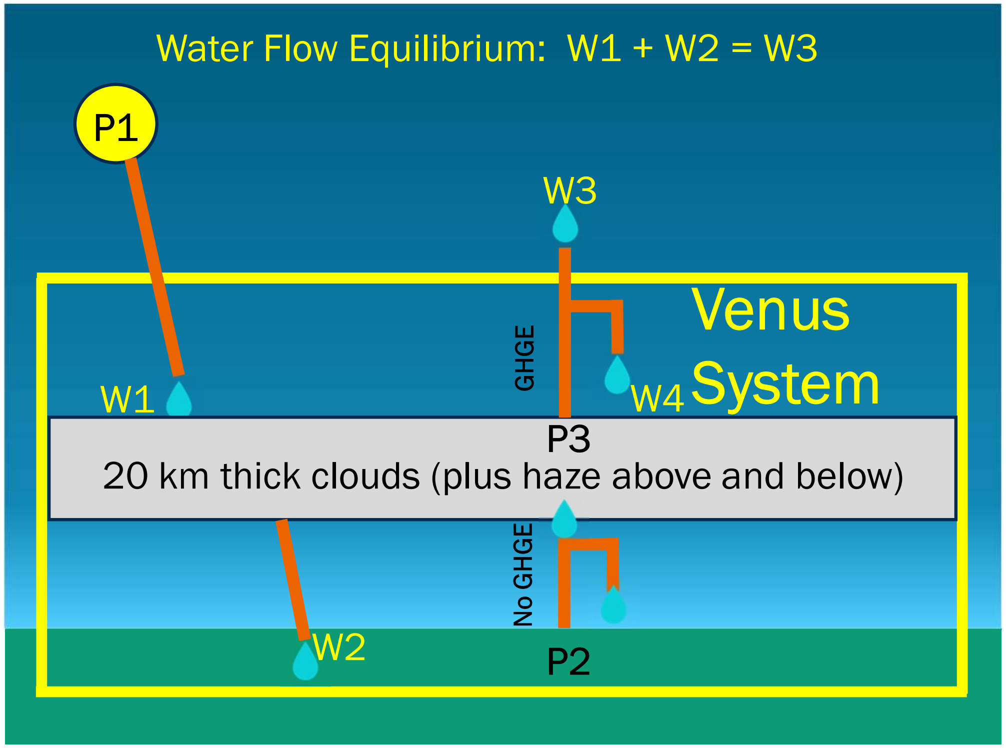
	Parameter	Units	Input
CT FP	Average Relative Humidity (RH)	%	60.0
1.00	Average Temperature (Level A)	°C	16.85
Year B	Computed H2O at sea level	ppmv	11356.5
n/a	Computed Dewpoint	°C	9.0
Path FP	Concentration of O3 at sea level	ppmv	0.0266
1.00	Atmospheric path length multiplier	num	1.00
	Average emissivity of Earth	num	0.95

More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for **CO2**	ppmv	421.0	☑ 421.0	☑ 842.0	842.0
0.98	Concentration at sea level for **CH4**	ppmv	1.920	☐ 0.000	☐ 0.000	1.920
0.97	Concentration at sea level for **N2O**	ppmv	0.337	☐ 0.000	☐ 0.000	0.337
4.9	Concentration at sea level for **O3**	ppmv	0.0266	☐ 0.000	☐ 0.000	0.0266
0.45	Concentration at sea level for **H2O**	ppmv	11356.5	☐ 0.0	☐ 0.0	11356.5
0.500	**3 µm - 20 µm power retained***	W/cm^2	W/cm^2	3.93103E-03	4.36778E-03	W/cm^2
0.500	**20 µm - 100 µm power retained****	W/cm^2	W/cm^2	☐ 0.00000E+00	☐ 0.00000E+00	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	3.79020E-02	3.83394E-02	W/cm^2
	Earth's surface temperature	°K	°K	290.00	290.83	°K
	Surface temperature change: A to B	°C	°C	0.83		°C
	Surface power emitted change: A to B	W/m^2	W/m^2	4.37		W/m^2

* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

The Venus System (pumps and pipes analogy)





Definition GHGE = Greenhouse gas effect

Revisiting the understanding of Venus

FLASH

Some relevant data: Earth vs. Venus

Venus and Earth differ in their dominant blackbody emission source to outer space. As can be seen in the table below, Venus has about a 30°C lower temperature as seen from outer space than Earth. This is explained by Venus's emission source being its cloud tops, whereas Earth's emission source is primarily its surface.

Parameter	Earth	Venus
Reflection of sunlight	0.306	0.77
Solar irradiance (W/m^2)	1361.0	2601.3
Average blackbody temp. from space(°K)	254.0	226.6
Average surface temp (°C)	15	464
Surface gravity (m/s^2)	9.82	8.87
Surface Pressure (Std. Earth Atm.)	1	90.7
CO2 level (%)	0.042	96.5
Source: NASA		

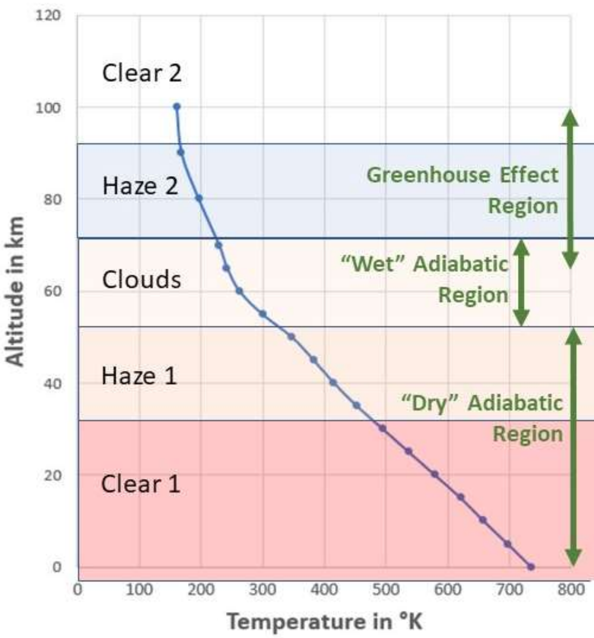
Accounting for Venus's high surface temperature

- All the infrared from Venus's surface is obstructed from getting to outer space by the thick clouds covering the planet. So, there can be no greenhouse effect from surface emissions
- There is a greenhouse effect from the cloud tops to outer space
- The phenomenon of a change in temperature with altitude on Earth is known as the lapse rate or adiabatic compression when pressure increases and adiabatic expansion when pressure decreases
- When plotting pressure versus altitude on Venus is has a characteristic negative slope as does Earth's in its troposphere (~0-10 km)
- Hypothesis: Venus's high surface temperature is from adiabatic compression and not a strong greenhouse effect

Revisiting the understanding of Venus

FLASH

Plot of temperature versus altitude



CLIMATE BELL™

Pressure (bar)	Temperature °K / °C	Altitude km
0.00002	161 / -112	100
0.00037	169 / -104	90
0.00476	197 / -76	80
0.0369	230 / -43	70
0.09765	243 / -30	65
0.2357	263 / -10	60
0.5314	300 / 27	55
1.066	348 / 75	50
1.979	383 / 110	45
3.501	416 / 143	40
5.917	453 / 180	35
9.851	495 / 222	30
14.93	537 / 264	25
22.52	579 / 306	20
33.04	621 / 348	15
47.39	658 / 385	10
66.65	697 / 424	5
92.1	735 / 462	0

Adiabatic compression calculations

$$T_2 = T_1 \cdot \left(\frac{P_2}{P_1}\right)^{\left(\frac{\gamma-1}{\gamma}\right)} \qquad \gamma = \frac{c_p}{c_v}$$

- Using the adiabatic compression equation for an ideal gas is a first order approximation to testing the hypothesis. T and P are temperature and pressure, gamma (also symbolized *k* is the specific heat ratio. c_p and c_v are the specific heat in constant pressure and constant volume, respectively.
- For simplicity, 100% CO2 will be used although it is 96.5% on Venus. A second calculation was done for N2 which is a non-greenhouse gas in the fictitious scenario if Venus had the same weight (pressure) of pure N2. Calculations are done from the cloud bottom to the surface spanning 50 km. The average k is used in the middle of the temperature range as seen on the next slide.
- The table below shows the calculations are supportive of the hypothesis of adiabatic compression stated on the previous slide. Computed surface T is 777K while actual measured by Venus's lander probes is 735K. If Venus were N2 instead, the surface temperature would 1208K.

gas type	50 km T	50 km T	50 km P	surface P	*k*	surface T	probe T
100%	**°C**	**°K**	**bar**	**bar**		**°K**	**°K**
CO2	75	348	1.066	92.1	1.22	778	735
N2	75	348	1.066	92.1	1.387	1208	n/a

Revisiting the understanding of Venus

Temperature, K	Air c_p kJ/kg·K	Air c_v kJ/kg·K	Air k	Carbon dioxide, CO_2 c_p kJ/kg·K	Carbon dioxide, CO_2 c_v kJ/kg·K	Carbon dioxide, CO_2 k	Carbon monoxide, CO c_p kJ/kg·K	Carbon monoxide, CO c_v kJ/kg·K	Carbon monoxide, CO k
250	1.003	0.716	1.401	0.791	0.602	1.314	1.039	0.743	1.400
300	1.005	0.718	1.400	0.846	0.657	1.288	1.040	0.744	1.399
→ 350	1.008	0.721	1.398	0.895	0.706	1.268	1.043	0.746	1.398
400	1.013	0.726	1.395	0.939	0.750	1.252	1.047	0.751	1.395
450	1.020	0.733	1.391	0.978	0.790	1.239	1.054	0.757	1.392
500	1.029	0.742	1.387	1.014	0.825	1.229	1.063	0.767	1.387
→ 550	1.040	0.753	1.381	1.046	0.857	1.220	1.075	0.778	1.382
600	1.051	0.764	1.376	1.075	0.886	1.213	1.087	0.790	1.376
650	1.063	0.776	1.370	1.102	0.913	1.207	1.100	0.803	1.370
700	1.075	0.788	1.364	1.126	0.937	1.202	1.113	0.816	1.364
→ 750	1.087	0.800	1.359	1.148	0.959	1.197	1.126	0.829	1.358
800	1.099	0.812	1.354	1.169	0.980	1.193	1.139	0.842	1.353
900	1.121	0.834	1.344	1.204	1.015	1.186	1.163	0.866	1.343
1000	1.142	0.855	1.336	1.234	1.045	1.181	1.185	0.888	1.335

Temperature, K	Hydrogen, H_2 c_p kJ/kg·K	Hydrogen, H_2 c_v kJ/kg·K	Hydrogen, H_2 k	Nitrogen, N_2 c_p kJ/kg·K	Nitrogen, N_2 c_v kJ/kg·K	Nitrogen, N_2 k	Oxygen, O_2 c_p kJ/kg·K	Oxygen, O_2 c_v kJ/kg·K	Oxygen, O_2 k
250	14.051	9.927	1.416	1.039	0.742	1.400	0.913	0.653	1.398
300	14.307	10.183	1.405	1.039	0.743	1.400	0.918	0.658	1.395
→ 350	14.427	10.302	1.400	1.041	0.744	1.399	0.928	0.668	1.389
400	14.476	10.352	1.398	1.044	0.747	1.397	0.941	0.681	1.382
450	14.501	10.377	1.398	1.049	0.752	1.395	0.956	0.696	1.373
500	14.513	10.389	1.397	1.056	0.759	1.391	0.972	0.712	1.365
→ 550	14.530	10.405	1.396	1.065	0.768	1.387	0.988	0.728	1.358
600	14.546	10.422	1.396	1.075	0.778	1.382	1.003	0.743	1.350
650	14.571	10.447	1.395	1.086	0.789	1.376	1.017	0.758	1.343
700	14.604	10.480	1.394	1.098	0.801	1.371	1.031	0.771	1.337
→ 750	14.645	10.521	1.392	1.110	0.813	1.365	1.043	0.783	1.332
800	14.695	10.570	1.390	1.121	0.825	1.360	1.054	0.794	1.327
900	14.822	10.698	1.385	1.145	0.849	1.349	1.074	0.814	1.319
1000	14.983	10.859	1.380	1.167	0.870	1.341	1.090	0.830	1.313

Source: Kenneth Wark, *Thermodynamics*, 4th ed. (New York: McGraw-Hill, 1983), p. 783, Table A–4M. Originally published in *Tables of Thermal Properties of Gases*, NBS Circular 564, 1955.

Using GHG Lab to calculate Venus's GHG effect

- The heat being removed from Venus is coming off the top region of the clouds and haze. The superposition of this blackbody emission is the power equivalent of blackbody emission at a temperature of 226.6°K
- By picking a data point in that temperature region, the greenhouse gas effect can be computed with GHG Lab from the CO2 above that data point, factoring in weight, concentration, and Venus's lighter gravity. Two representative datapoints were selected, the nearest to the temperature above and the next one lower in the atmosphere to do a sensitivity test. The results was that Venus has a greenhouse effect that is heating the planet by only about 12°C, about one third that of Earth
- Venus is understood to be 4.6B years old and may indeed have had oceans much earlier and an inflection point came where the oceans were evaporated. If Venus's high temperature is driven by adiabatic compression it seems misleading to refer to Venus in the present tense as an example of a "runaway greenhouse effect". CCIF 7
- The analogy would be referring to a city where crime was once out of control but was cleaned up a long time ago, as an example of a city with "runaway crime" in the present tense. NTA

Temp. °K	Pressure bar	GHG Entry PPMV	Temp Change °C
230	0.0369	39400	12.0
243	0.09765	104000	13.2

Revisiting the understanding of Venus

Venus's greenhouse effect is only from cloud top emissions

The greenhouse effect on Venus is about 12.0°C

	Parameter	Units	Input
CT FP	Average Relative Humidity (RH)	%	60.0
1.00	Average Temperature (Level A)	°C	-46.55
Year B	Computed H2O at sea level	ppmv	54.6
n/a	Computed Dewpoint	°C	-51.0
Path FP	Concentration of O3 at sea level	ppmv	0.0266
1.00	Atmospheric path length multiplier	num	1.00
	Average emissivity of Earth	num	0.95

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi hc^2}{\lambda^5}\frac{1}{e^{hc/\lambda kT}-1}\Delta\lambda$$

www.ClimateBell.org Version 2.40

More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for **CO2**	ppmv	39400.0	☑ 39400.0	0.0	421.0
0.98	Concentration at sea level for **CH4**	ppmv	1.920	0.000	0.000	1.920
0.97	Concentration at sea level for **N2O**	ppmv	0.337	0.000	0.000	0.337
4.9	Concentration at sea level for **O3**	ppmv	0.0266	0.000	0.000	0.0266
0.45	Concentration at sea level for **H2O**	ppmv	54.6	0.0	0.0	54.6
0.500	**3 µm - 20 µm power retained***	W/cm^2	W/cm^2	2.75636E-03	0.00000E+00	W/cm^2
0.500	**20 µm - 100 µm power retained****	W/cm^2	W/cm^2	0.00000E+00	0.00000E+00	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	1.40569E-02	1.13014E-02	W/cm^2
	Earth's surface temperature	°K	°K	226.60	214.66	°K
	Surface temperature change: A to B	°C	°C	-11.94		°C
	Surface power emitted change: A to B	W/m^2	W/m^2	-27.55		W/m^2

* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

Sensitivity check going deeper doesn't change much

	Parameter	Units	Input
CT FP	Average Relative Humidity (RH)	%	60.0
1.00	Average Temperature (Level A)	°C	-46.55
Year B	Computed H2O at sea level	ppmv	54.6
n/a	Computed Dewpoint	°C	-51.0
Path FP	Concentration of O3 at sea level	ppmv	0.0266
1.00	Atmospheric path length multiplier	num	1.00
	Average emissivity of Earth	num	0.95

CLIMATE BELL™ GHG Lab

GHG Temperature Change Calculator

$$\frac{\Delta P}{A} = \frac{2\pi hc^2}{\lambda^5}\frac{1}{e^{hc/\lambda kT}-1}\Delta\lambda$$

www.ClimateBell.org Version 2.40

More FPs			Input A	(FP x A) Select	(FP x B) Select	Input B
1	Concentration at sea level for **CO2**	ppmv	104000.0	☑ 104000.0	0.0	421.0
0.98	Concentration at sea level for **CH4**	ppmv	1.920	0.000	0.000	1.920
0.97	Concentration at sea level for **N2O**	ppmv	0.337	0.000	0.000	0.337
4.9	Concentration at sea level for **O3**	ppmv	0.0266	0.000	0.000	0.0266
0.45	Concentration at sea level for **H2O**	ppmv	54.6	0.0	0.0	54.6
0.500	**3 µm - 20 µm power retained***	W/cm^2	W/cm^2	3.02610E-03	0.00000E+00	W/cm^2
0.500	**20 µm - 100 µm power retained****	W/cm^2	W/cm^2	0.00000E+00	0.00000E+00	W/cm^2
	3 µm - 100 µm surface power emitted	W/cm^2	W/cm^2	1.40569E-02	1.10321E-02	W/cm^2
	Earth's surface temperature	°K	°K	226.60	213.38	°K
	Surface temperature change: A to B	°C	°C	-13.22		°C
	Surface power emitted change: A to B	W/m^2	W/m^2	-30.25		W/m^2

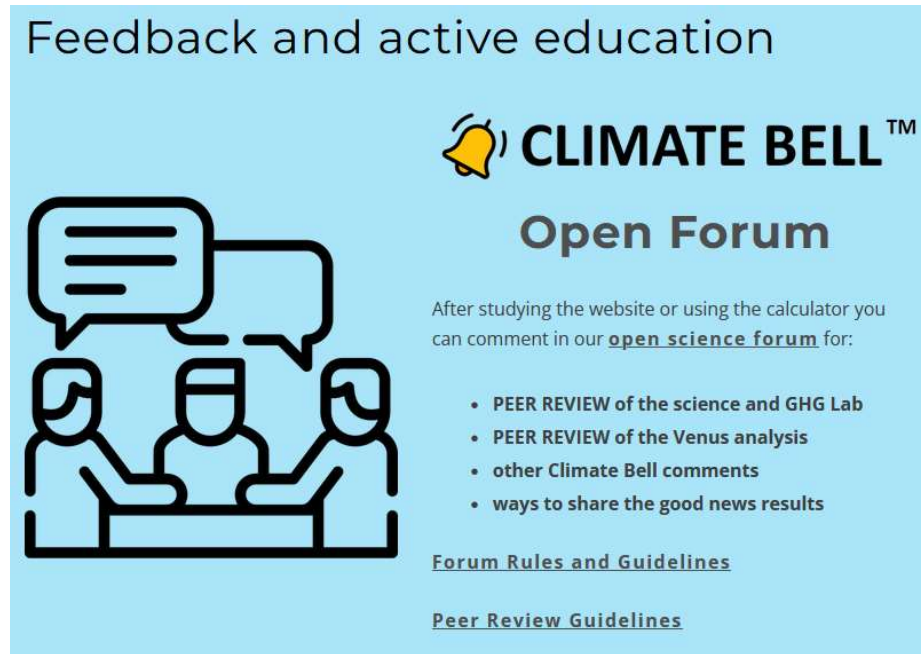
* Earth's system power retained from all selected GHGs ** Earth's system power retained from H2O in total scattering

Invitation to peer review in Climate Bell’s open forum

Online forum created

- Please read the Create-a-forum rules and Climate Bell forum rules before posting
- Participation from scientists and engineers in both camps encouraged
- You are reviewing Earth’s GHG physics and modeling on one board and Venus’s on another board in the Climate Bell forum
- There are two other boards for all to participate in regardless of their scientific understanding

- https://climatebell.createaforum.com/index.php



Blackbody physics calculator online

FLASH

opticsthewebsite.com/OpticsCalculators

OPTICS: THE WEBSITE | BLACKBODY | DIFFRACTION | ABERRATIONS | VISION | Y-NU RAY TRACE | MISC. | CODE | ABOUT THE AUTHOR

Input Parameters

Cuton Wavelength λ_1 (microns): 3.0

Cutoff Wavelength λ_2 (microns): 100

Temperature T (Kelvin): 288

Emissivity ε: 0.95

Update Results

Calculate

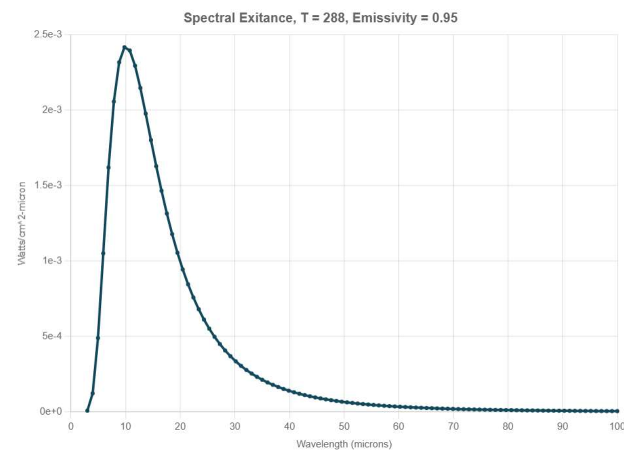
https://www.opticsthewebsite.com/OpticsCalculators

Photons / sec

Value	Quantity	Units
In-band Radiance	1.05019868e+18	Photons/sec-cm^2-sr
In-band Radiant Exitance	3.29929647e+18	Photons/sec-cm^2
Total Radiance	1.09831380e+18	Photons/sec-cm^2-sr
Total Radiant Exitance	3.45045457e+18	Photons/sec-cm^2
Peak Wavelength	1.27420238e+1	Microns
Peak Spectral Radiance	4.37103103e+16	Photons/sec-cm^2-sr-micron
Peak Spectral Radiant Exitance	1.37319990e+17	Photons/sec-cm^2-micron

Watts

Value	Quantity	Units
In-band Radiance	1.17336774e-2	Watts/cm^2-sr
In-band Radiant Exitance	3.68624348e-2	Watts/cm^2
Total Radiance	1.17965611e-2	Watts/cm^2-sr
Total Radiant Exitance	3.70599896e-2	Watts/cm^2
Peak Wavelength	1.00617082e+1	Microns
Peak Spectral Radiance	7.70923877e-4	Watts/cm^2-sr-micron
Peak Spectral Radiant Exitance	2.42192879e-3	Watts/cm^2-micron

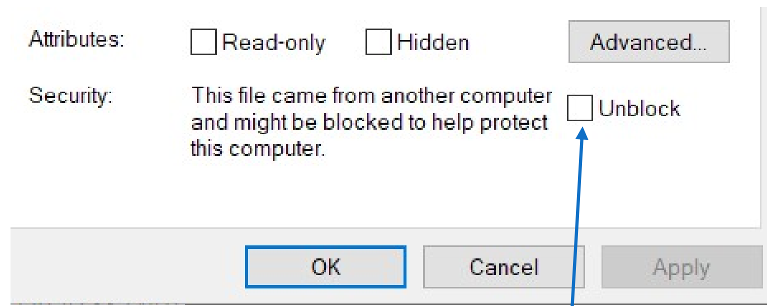


Trying GHG Lab and Microsoft Excel

FLASH

- GHG Lab needs a modern licensed Microsoft Excel
- If you don't own it on your Mac or PC, here are some suggestions
  - Free 30-day trial
  - Single annual seat of Microsoft Office 365 is $79 in Canada (less in the US)
  - Five machine annual seat is $109 in Canada (less in the US)
  - Go to a friend or family member that has it

GHG Lab does not require an Internet connection to work. However, without an Internet connection, you won't be able to access the GUIDE or the mutual SUPPORT links from the tool.



After downloading GHG Lab onto your PC, right mouse click on the file and check the **Unblock** box to allow macros to work on GHG Lab. Then click OK.

If you are unsure about using macros on your main computer, consider installing this on an old PC or Mac that you aren't worried about.

Wolf! Wolf!

FLASH

- From the story of "The little boy who cried wolf". For those who fall for each cry of alarm from the climate change zealots, perhaps they've never heard of that story
- I'd like to express some personal perspective on just 3 of the recent wolf wolf cries!
- Waste heat 10X every century
  - Claim that in 400 years it may boil away the oceans.
  - Waste heat currently warms Earth less than 0.01°C
  - If the population is peaking this century, why 10,000X more waste heat in 400 years?
  - So, did urban waste heat corrupt nearby historical temperature measurements?
  - If so, ECS (equilibrium climate sensitivity) value claimed is meaningless
- There will be an extinction event if Earth's temperature rises a few degrees
  - Life does fine with daily and season temperature swings
  - For each degree of latitude (69 miles) the Earth's average temperature shifts by 0.7°C
  - Even a 3.5°C change is a migration of only 350 miles
- The permafrost will thaw and release massive amounts of methane
  - It isn't a freezer door left open and everything thaws
  - The freeze thaw/zone moves north 100 miles for each degree Celsius

Sharing to help critical industries

Downloadable poster for your social media

Find it at ClimateBell.org

GHG Lab – as defensive tool for threatened industries

- I put my best effort into GHG Lab including embedding detailed science into it and polishing it with useful features so it would be solid for GHG education and producing convincingly accurate results
- The goal was so others will use it and share it with those who'd benefit the most
- Industries like oil and gas, agriculture, and automotive have been threatened and maligned by establishment climate narratives for years.
- Increasingly severe climate mandates are now getting pushback and a tool to refute the bad science could strengthen them and encourage others
- Maybe the climate mandates can fall quickly

“Oh the humanity”

Agriculture – example of strengthening the defense

Those protecting agriculture are equipped now

- The equations for the future projected levels of CH4 and N2O were shown
- Several climate change industry flaws were revealed
- GHG Lab now provides the evidence of the real temperature rise for doublings of CH4 or N2O – 0.04°C and 0.05°C respectively
- Half-lives of CH4 and N2O are now of no significance in terms of the actual temperature rise and the likelihood that Earths population is expected to go into a long decline after 2100
- So, the claimed potency of CH4 and N2O are in their absorption spectra and concentrations and nothing more

Avoiding a senseless food shortage

- Let's stop the needless culling of livestock (example 200,000 cattle allegedly going to be destroyed in Ireland in the next 2 years)
- Let's stop the theft of farmland to repurpose it
- Let's stop the forced reduction in fertilizer use

Those who can help in this struggle may prevent mass starvation

A truth many seem to never learn

"One of the great commandments of science is,
'Mistrust arguments from authority.' *... Too many such arguments have proved too painfully wrong. Authorities must prove their contentions like everybody else."*

... Carl Sagan

"The Demon-Haunted World: Science as a Candle in the Dark"

My objective - I look forward to team up with any individuals, organizations, and industries that seek to halt the direction society is being forced into by the establishment with their narratives around climate change.

My feeling – It feels to me like we are in a "relay race" for the preservation of freedom and human progress. Perhaps this is the final leg of that race. Let's win it for the prize of a long overdue end to authority's dangerous nonsense.

My hope - Many have put in fine effort's pursuing that same direction to halt the mandates. I hope the R&D I've worked on, including releasing GHG Lab, can help tip the scales to that end goal as early as this year.

We can win this working as a team

Thank you for your attention. Feel free to help in any way you feel inspired.