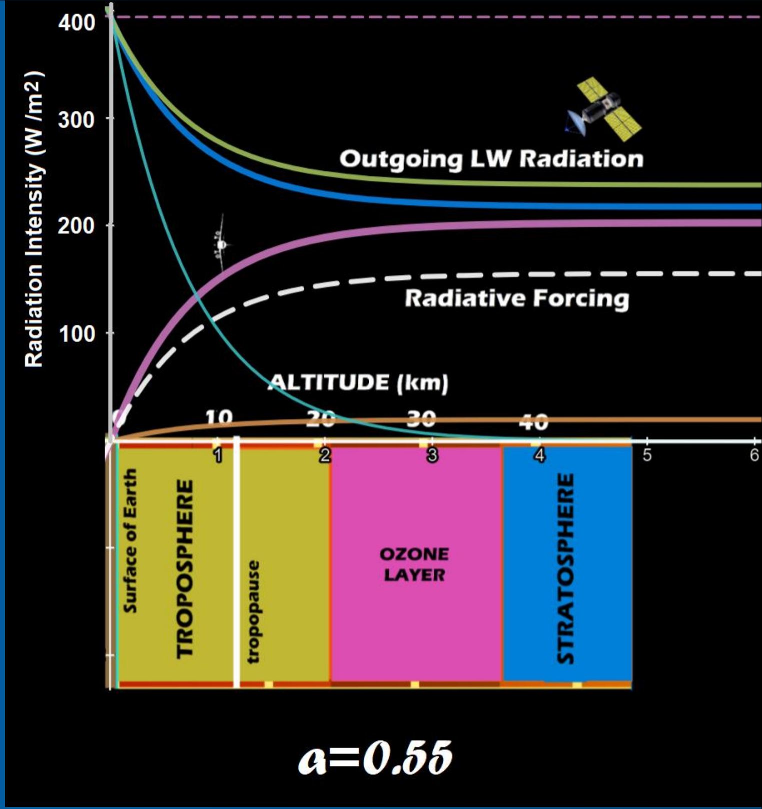
Yong Zhong



Basic Issues in the IPCC CO_2 Narrative

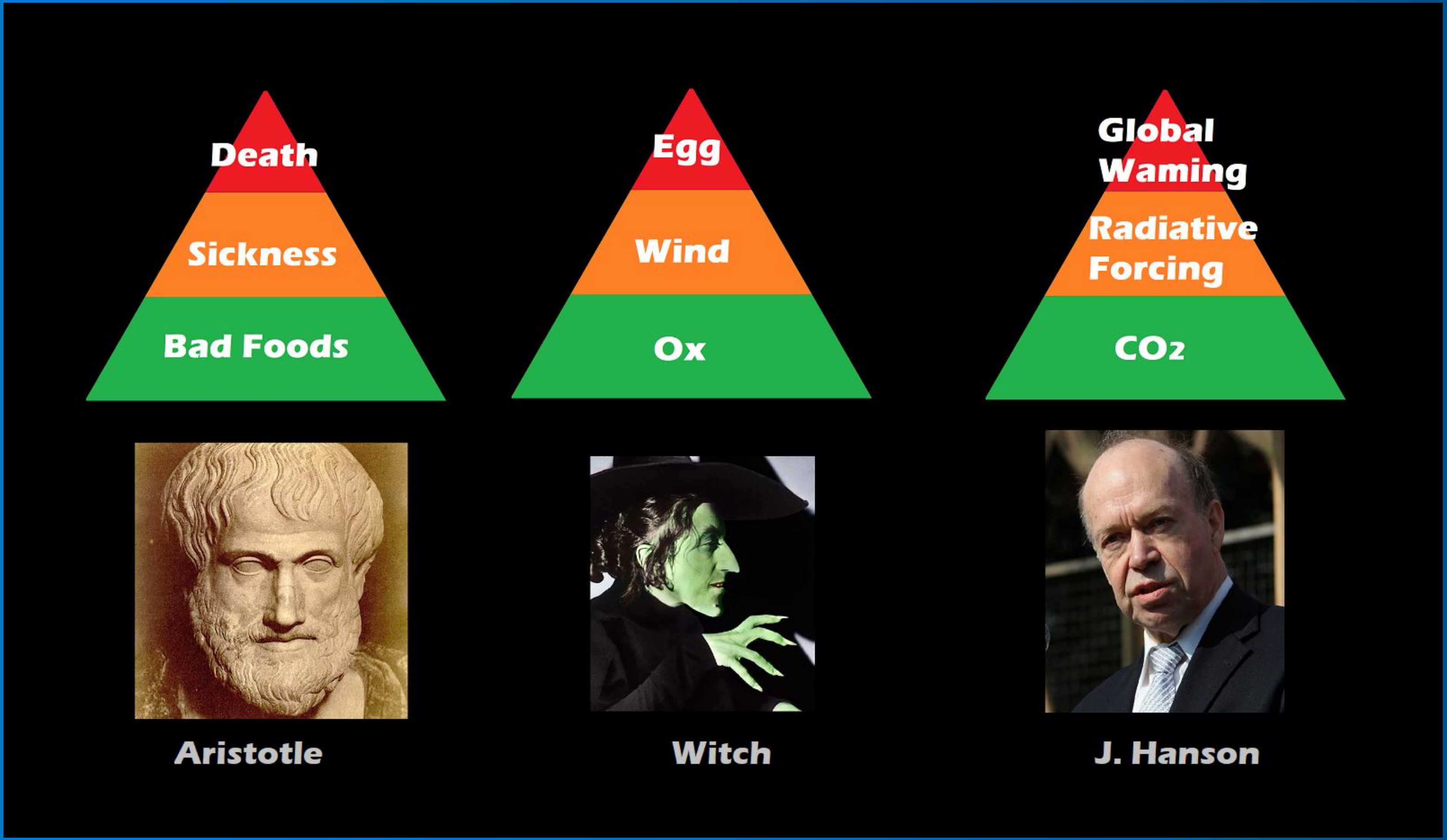
1. The IPCC CO_2 Narrative

1) Earth surface would be 33K colder without "Greenhouse Effect".
2) CO_2 can absorb over 30% of the surface LW radiation.
3) Then CO_2 can re-emit the LW radiation back to the surface.
4) The air temperature near the surface will be warmed up, as a result, the surface temperature will increase.
5) Based on the calculated climate sensitivity, CO_2 doubling can increase the surface temperature by over 3K.
6) The entire biosphere would be doomed.
7) Humans can control the surface temperature of the Earth by eliminating CO_2 release from human society.

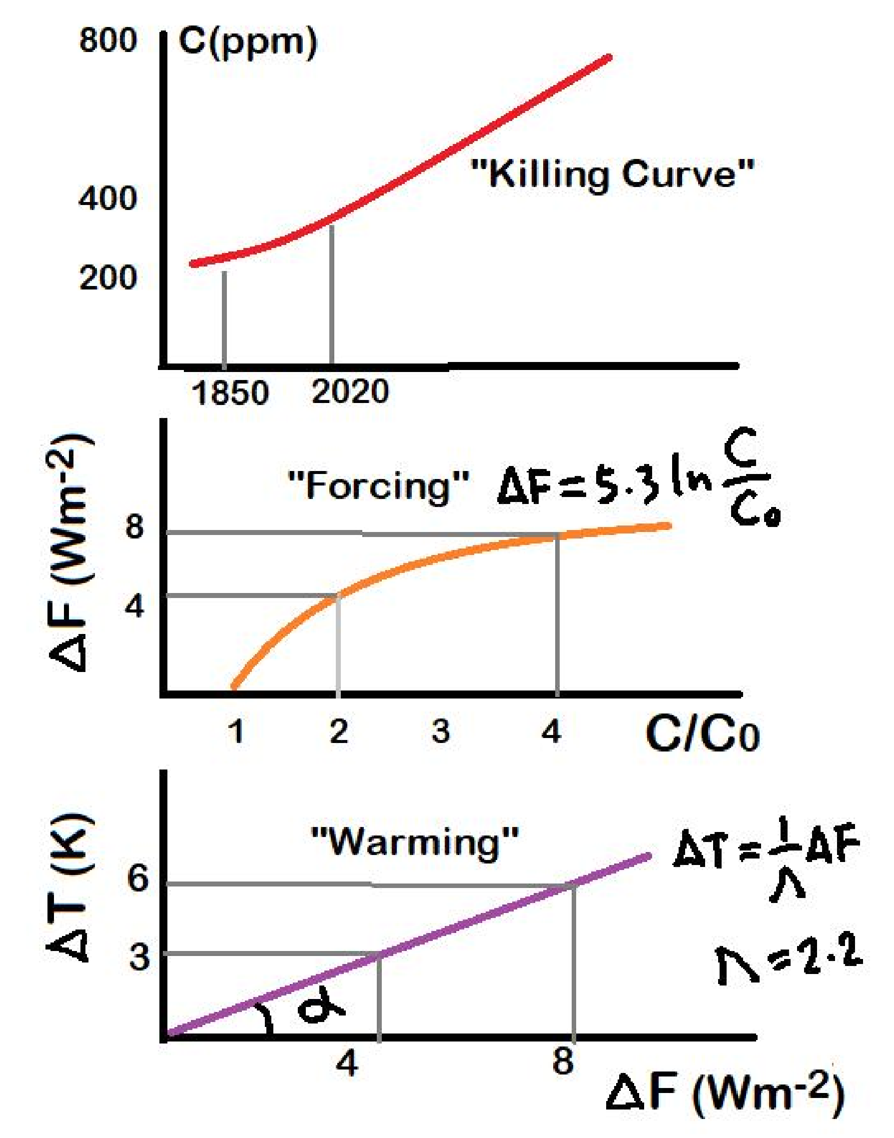
An Outline

1. Linking Unrelated Elements
2. Fabricating Climate Response and Sensitivity
3. The Miscalculated 33K Greenhouse Effect
4. Infrared CO_2 Absorption: Observable and Observed
5. Infrared CO_2 Emission: Calculated or Unobserved
6. The Unjustified Downward CO_2 Emission
7. The Imagined Imbalance in Downward Radiation at the TOA
8. The Unacceptable Instrumental Calibration for IRIS Nimbus 3 & 4
9. A New Dynamic Description of Atmospheric LW Emission
10. The Invisible Tower of Babel
11. Conclusion Remarks

2. Premise and Causality



3. Forcing and CO_2 Concentration



The formula to calculate the change in radiative forcing (F) based on CO_2 concentration (C).

$$\Delta F \approx 5.3 ln(\frac{2C_o}{C_o}) = 3.7 \text{ Wm}^{-2}$$

- This is not an empirical formula, but a hypothesis.
- FT-IR spectra show $\Delta F < 3.7/80 = 0.05$ Wm^{-2}
- It has been recently shown (Zhong 2021) that the absorption by CO2 is proportional to lnC, but F is independent of C, viz.

$$\Delta F = 0$$

4. Relation between ΔF and ΔT

Radiation intensity and the emission temperature is governed by Stefan-Boltzmann law and its differential form

$$\frac{\Delta T}{\Delta I} = \frac{1}{4\sigma T^3} = \frac{1}{5.5} = 0.18\ KW^{-1}m^2 \text{ (at T=288K)}$$

- **Trick 1** To replace the temperature by 255K

$$\frac{\Delta T}{\Delta F} = \frac{1}{\Lambda} = \frac{1}{4\sigma T^3} = \frac{1}{2.7} = 0.37\ KW^{-1}m^2 \text{ (at T=255K)}$$

- **Trick 2** To introduce f-factor (Hansen 1984).

$$\frac{\Delta T}{\Delta F} = \frac{f}{4\sigma T^3}$$

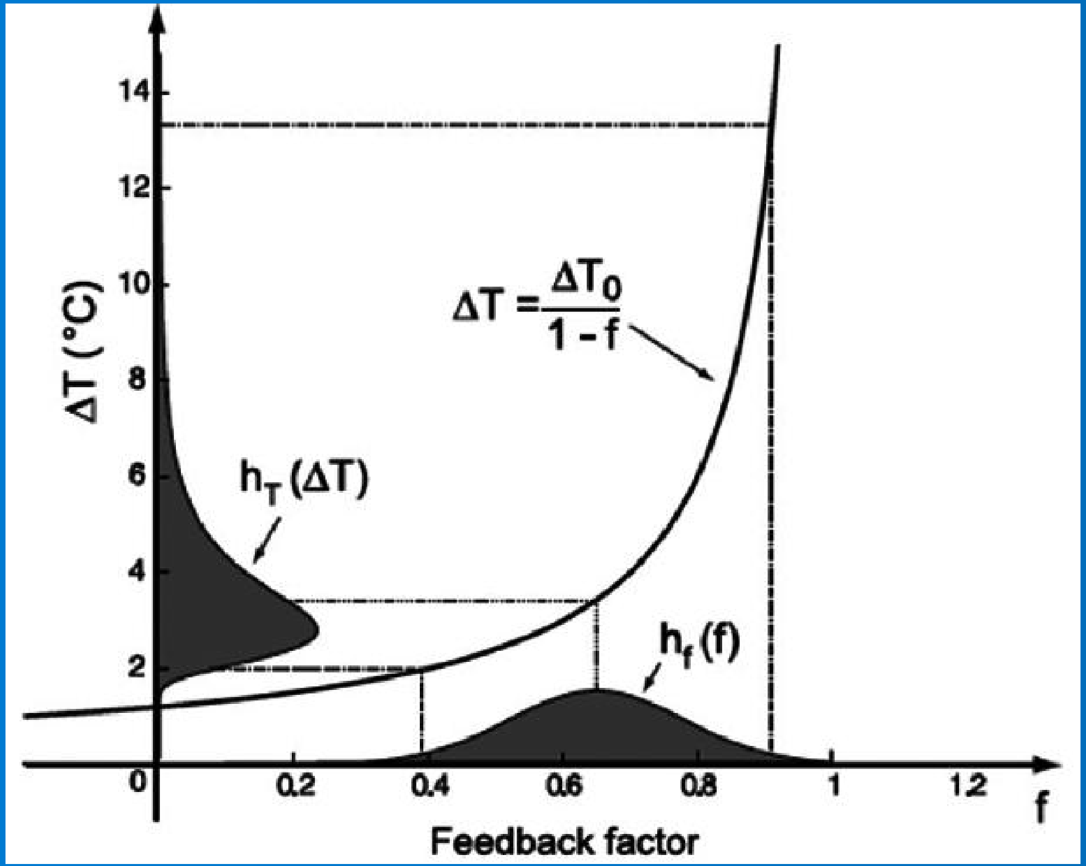
- **Trick 3** To introduce s-factor (Stevens 2023)

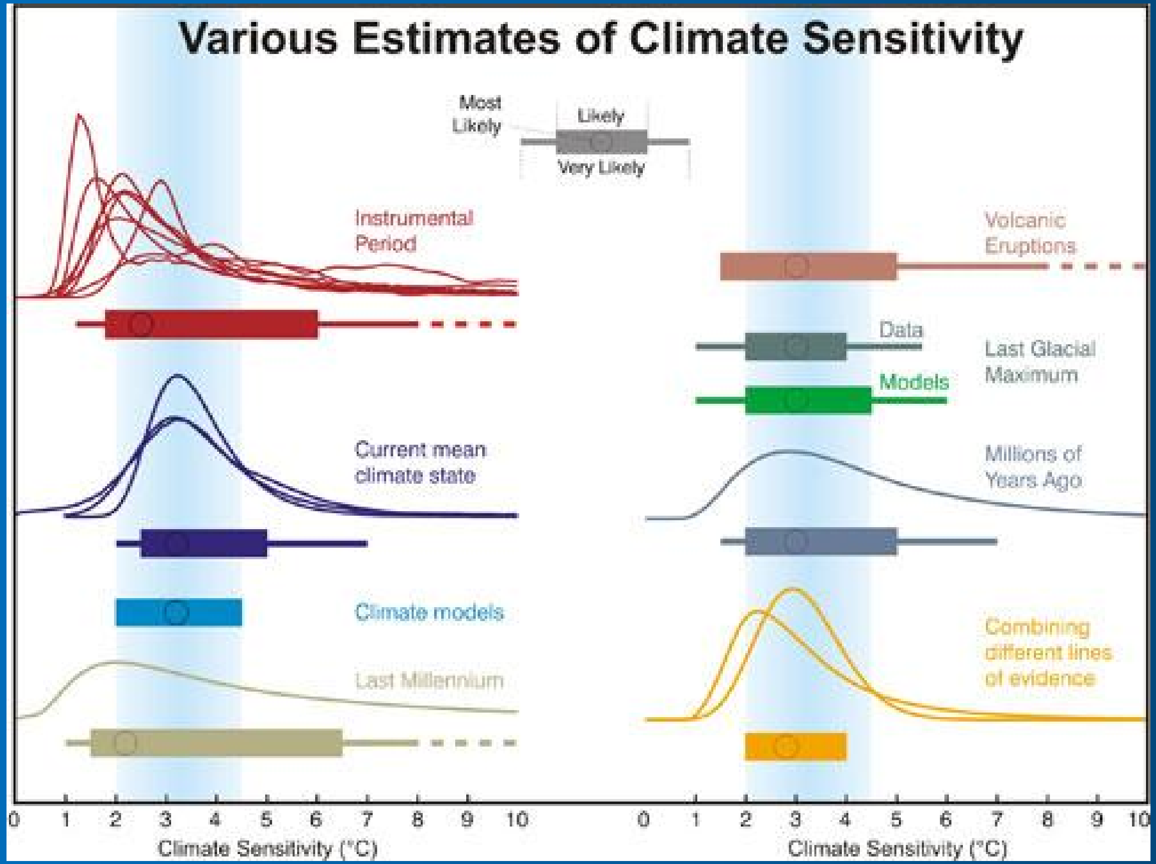
$$\frac{\Delta T}{\Delta F} = \frac{1}{4s\sigma T^3} = \frac{1}{2.2} = 0.45$$

5. CO_2 Climate Sensitivity: A Joke

Response Λ	Formula for Λ	$\Delta F_{2\times CO2}$ (Wm^{-2})	ECS $\Delta T = \frac{\Delta F_{2\times CO2}}{\Lambda}$ (K)	Author(s)
5.5 (Planckian response)	$4\sigma(288)^3$	**0.0**	**0.0**	Zhong (2021)
2.7	$4\sigma(255)^3$	**3.0**	**1.1**	van Wijngaarden and Happer (2023)
2.2	$4s\sigma(288)^3$ $s = 0.4$	**4.3**	**2.0**	Stevens and Kluft (2023)
	$\sigma = 5.67 \times 10^{-8}$			

6. Abusing Inferential Statistics





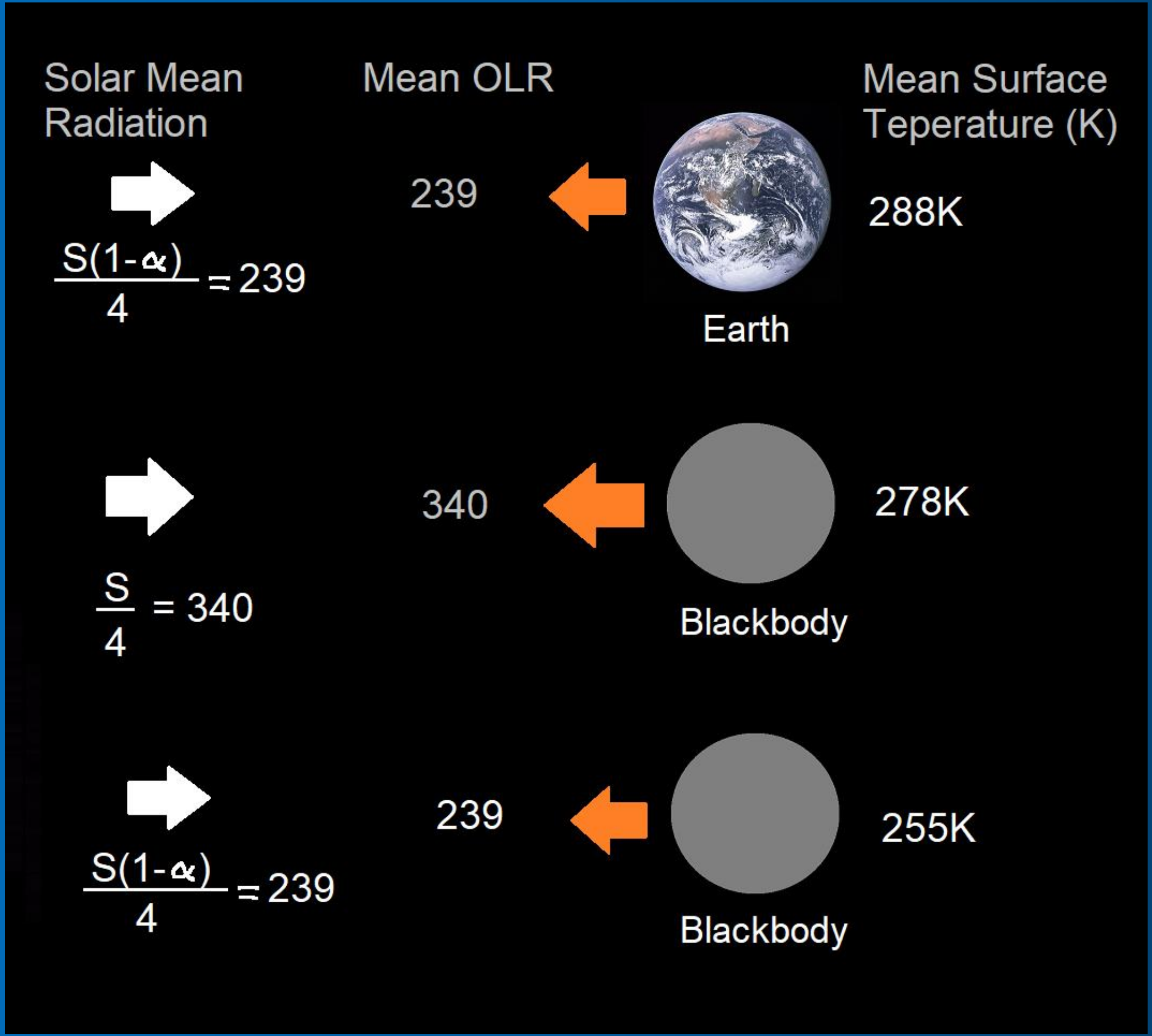
7. No 33K Greenhouse Effect

- Without the atmosphere, let alone the Greenhouse effect, the surface temperature would be 278K, only10K lower than 288K.
- The 278K is the emission temperature of a blackbody with the mean solar radiation 340 Wm^{-2}.
- The 255K is the emision temperature of a blackbody with a reduced mean solar radiation 239 Wm^{-2}.

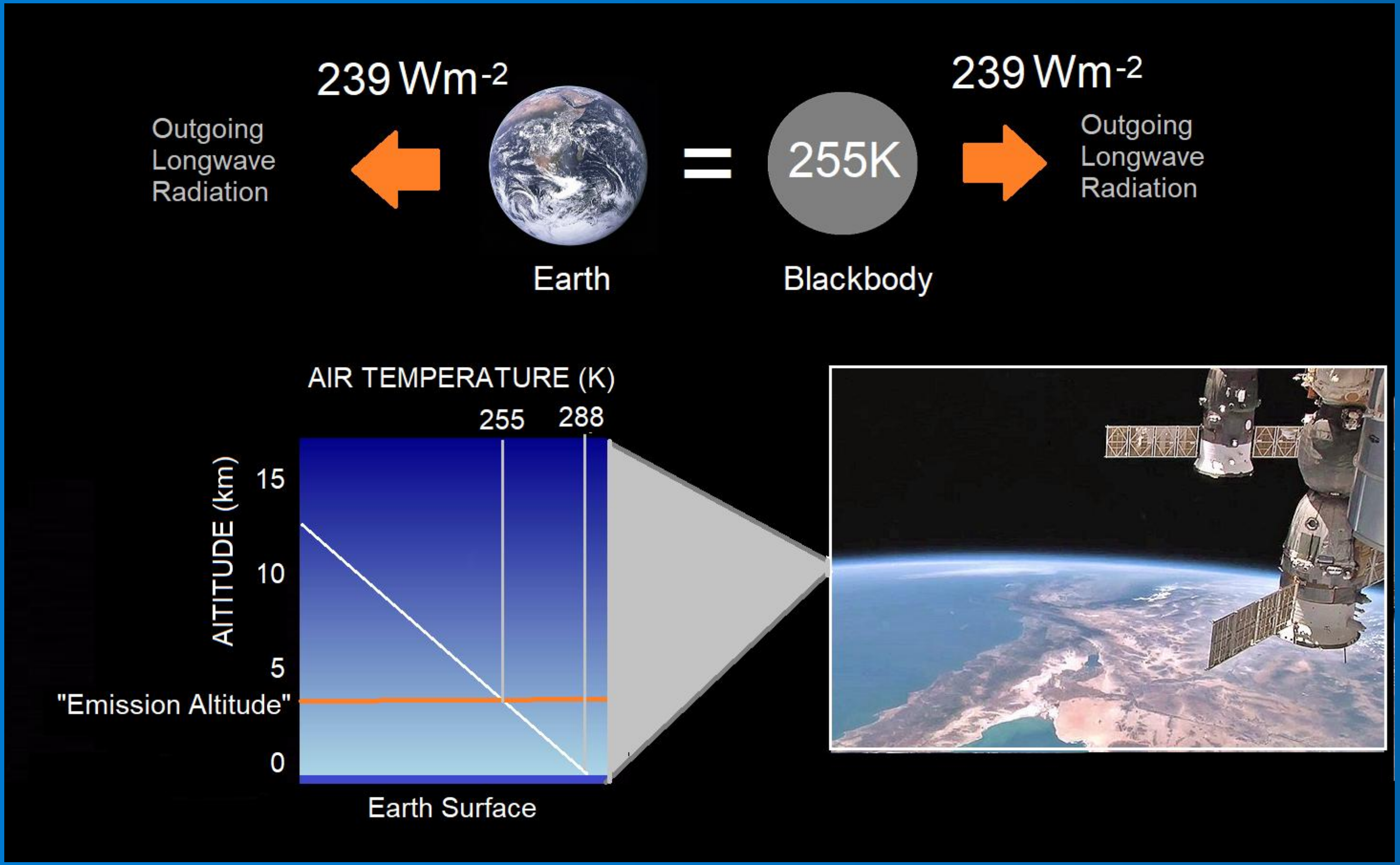
The related energy balance equation

$$\frac{S(1-\alpha)}{4} = \varepsilon\sigma T^4$$

ε	α	T
1.0	**0**	**278K**
1.0	0.3	255K
0.87	0	288K
0.6	0.3	288K



8. Where Does the Earth Emit OLR?



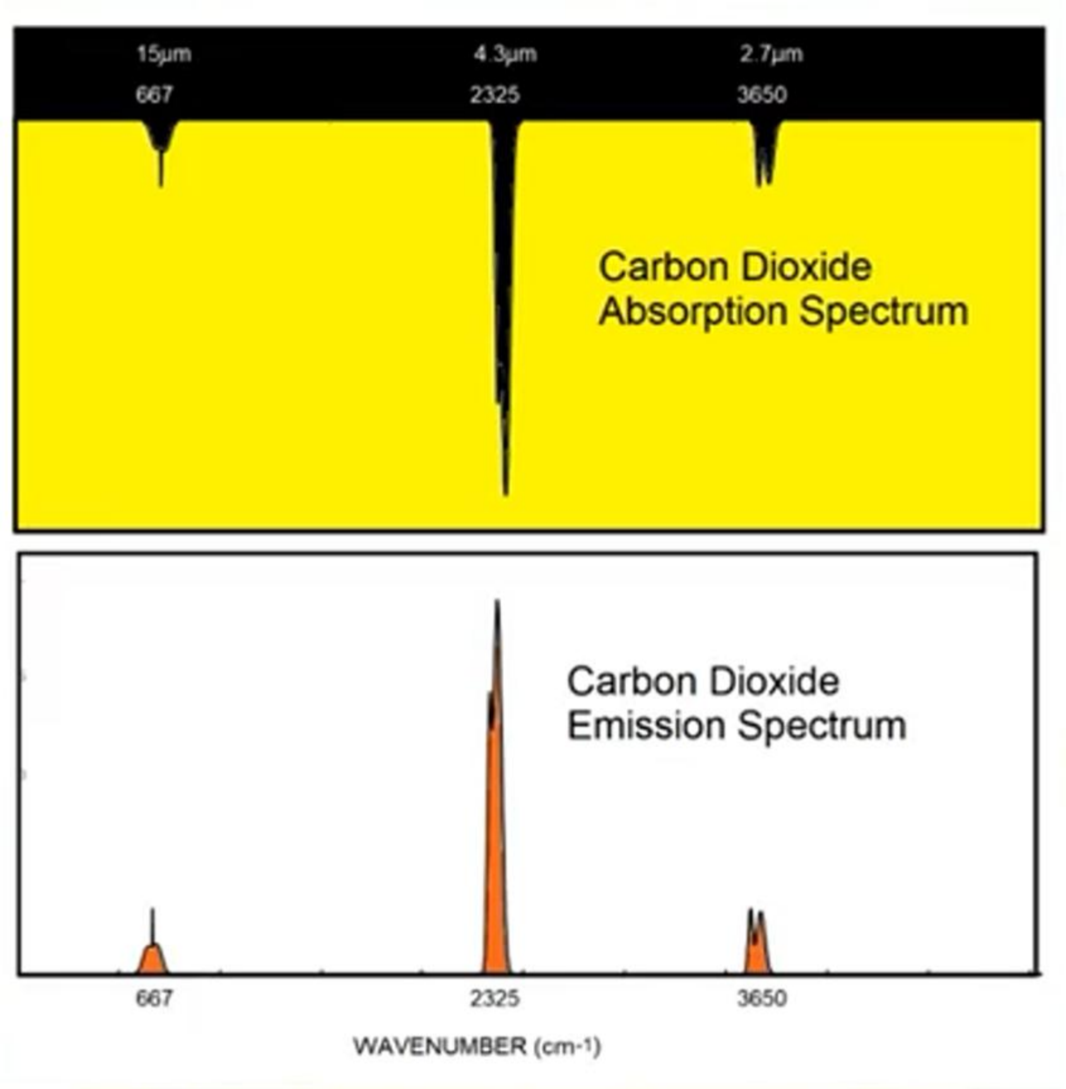
- ➢ The Earth emits 239Wm^{-2} (OLR).
- ➢ It is equivalent to a black body with its surface temperatue 255K.

- ➢ Manabe and Wetherald (1967) used an “effective emission layer/centre” to treat the altitude with its atmospheric temperature 255K as a real physical location for the OLR.

- ➢ Optical depth is invoked to calculate emission altitudes associated with the absorption spectrum, but it can be conceptually misleading.

9. CO_2 Absorption & Emission Spectra

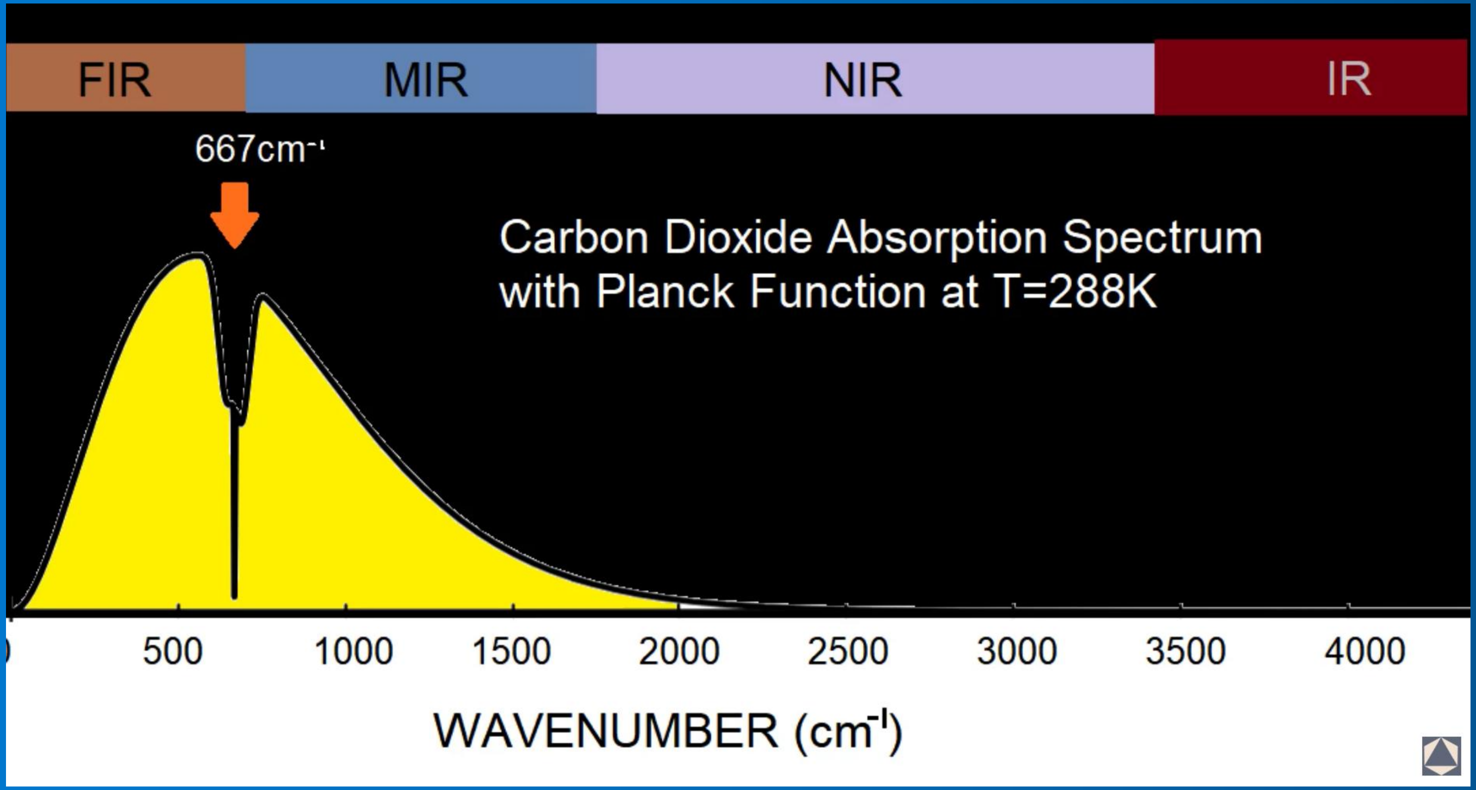
- Absorption is detected from the transmission signal and hence is upside down.
- Emission signal is often weaker due to de-phasing and local thermal transfer.
- Three main bands are detectable at 2.7, 4.3, and 15 μm which is relativey weak.



10. CO_2 Absorption in Atmosphere

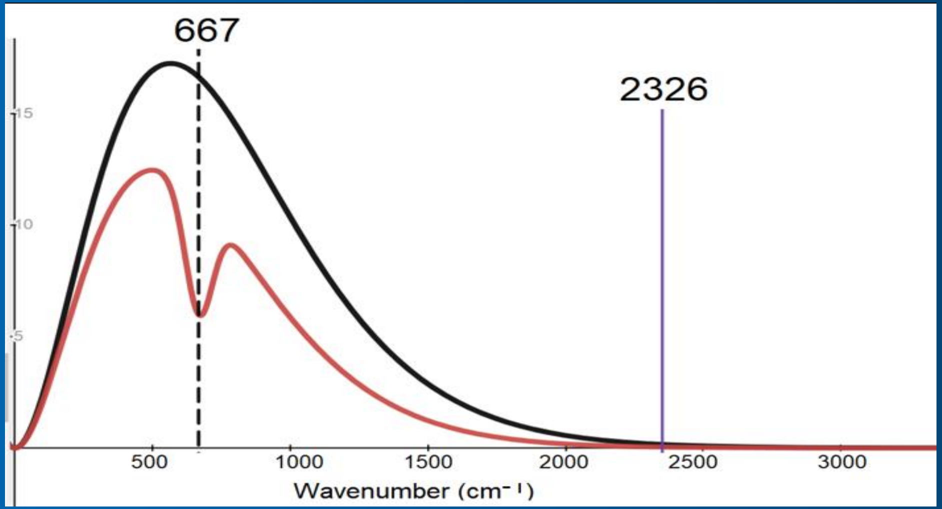
Only the 15 μm peak can be detected with the terrestrial radiation subject to its concentration.

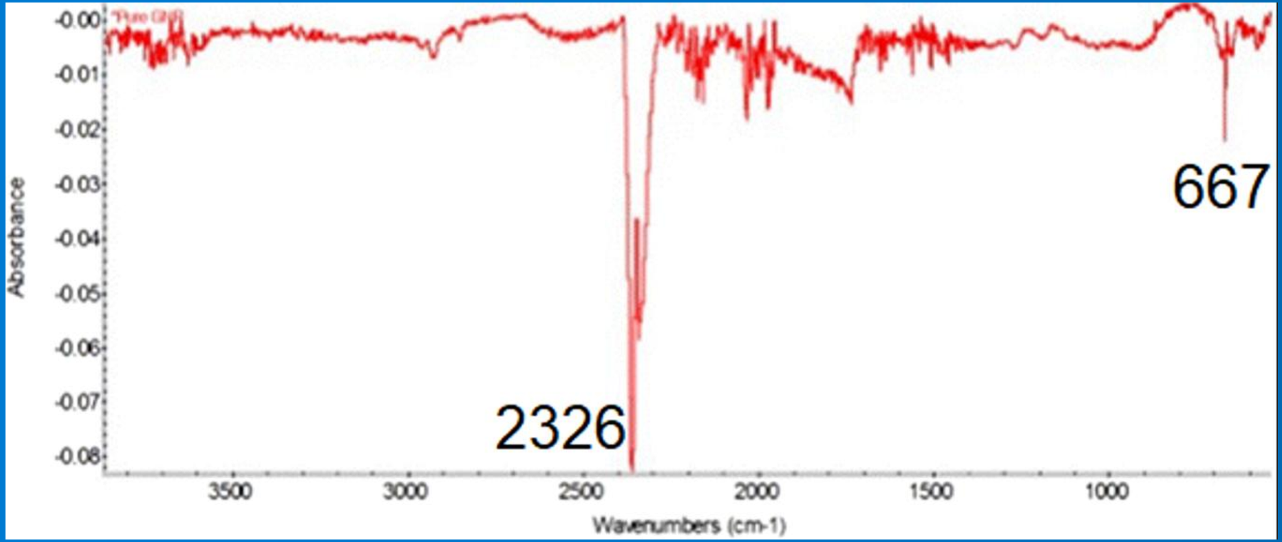
$$S(\nu) = a_{CO2}(\nu)B(\nu, T)$$

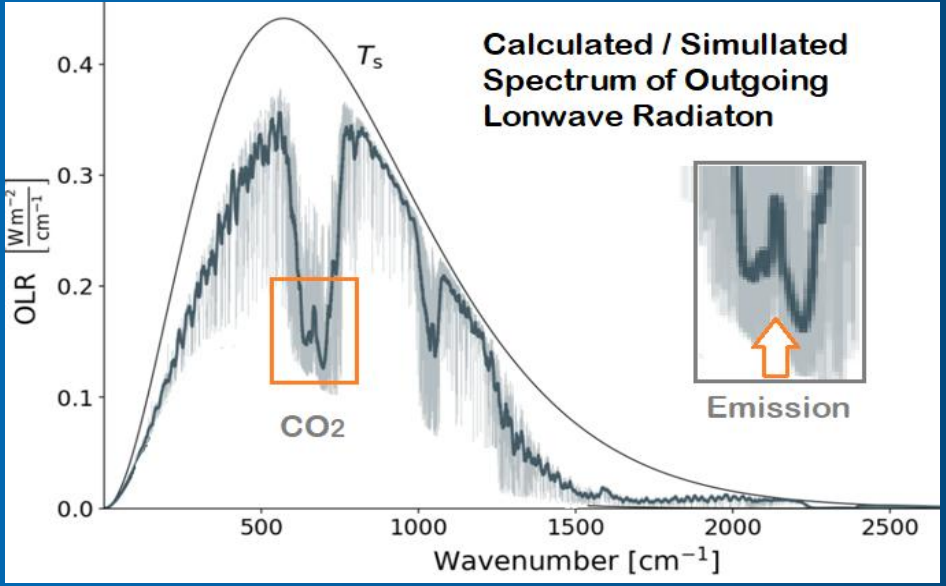


11. CO_2 Absorption Spectra

- Uniform excitation, or base-line corrected, CO_2 absorption spectrum (below)
- Blackbody-excitation at T=288K and simplified CO_2 absorption spectrum (right)
- Calculated atmospheric absorption spectrum with CO_2 and O_3. (right below)







12. Measured CO_2 absorption in Lab

- The CO_2 peak at 15 μm first observed by Rubens and Aschkinass in1898 (right).
- The CO_2 peak at 15 μm observed by Gerakines et al. in 1995 (below).

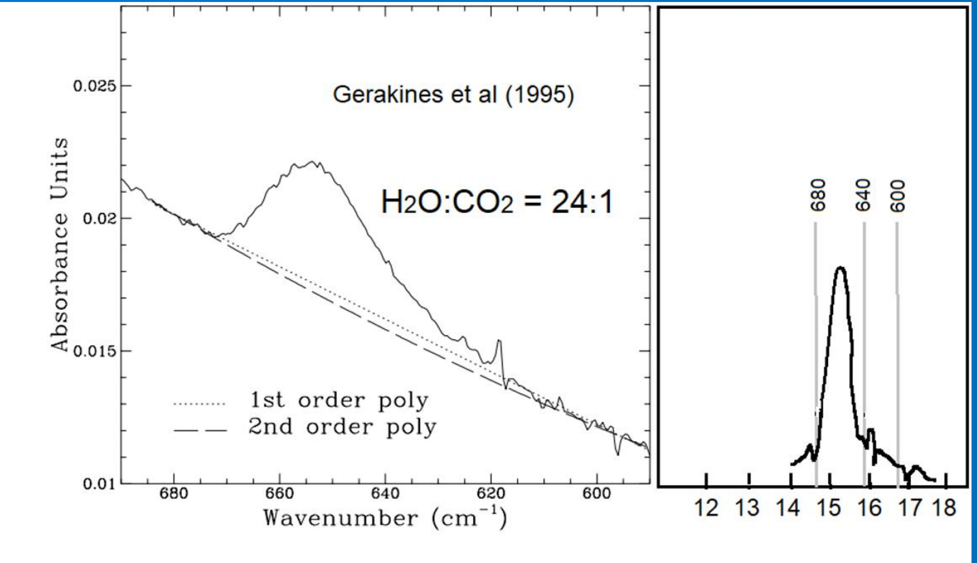
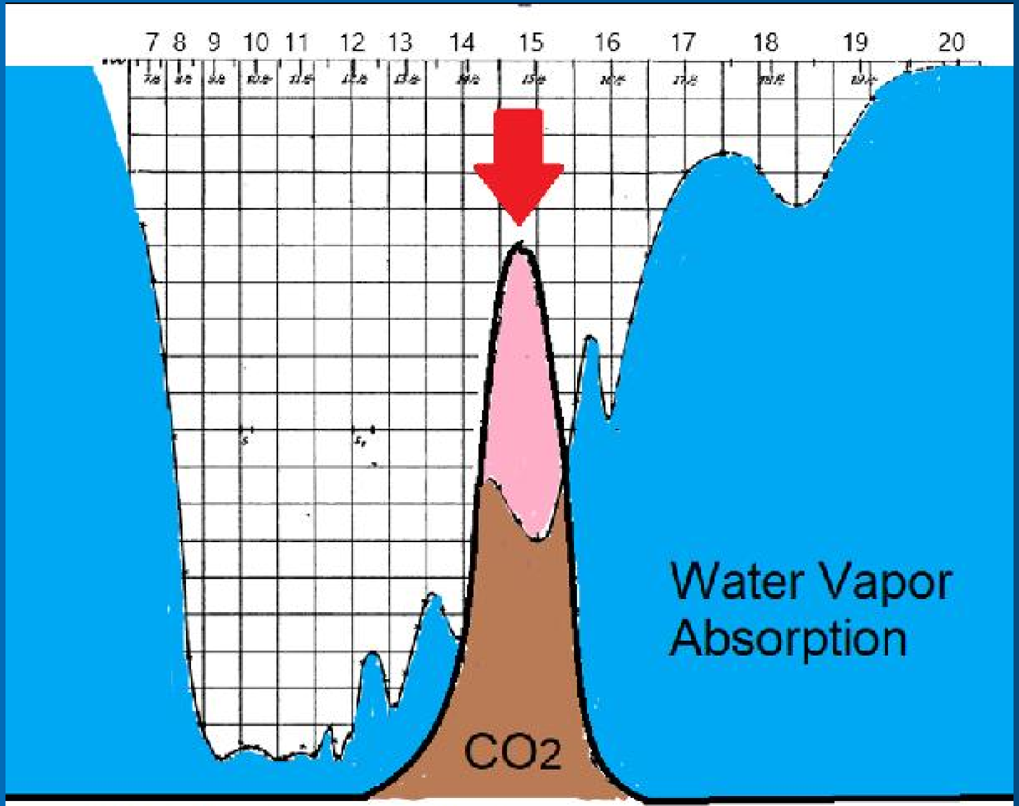


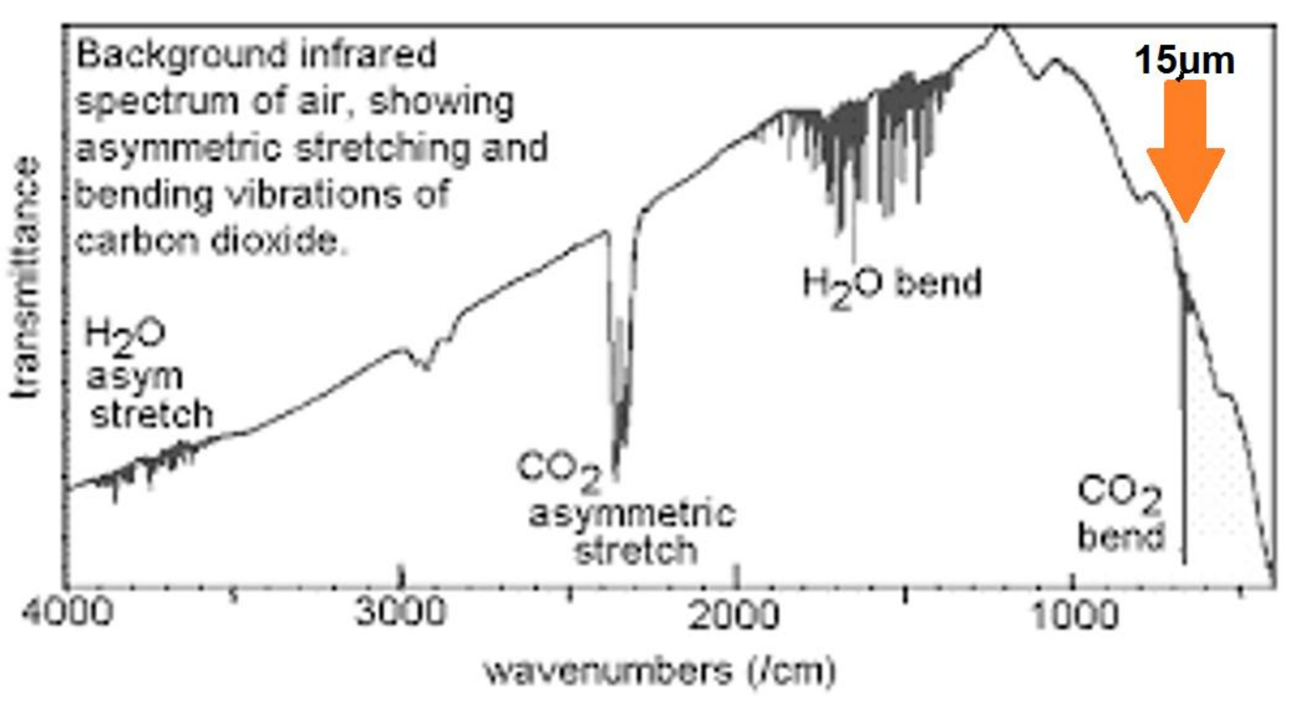
Figure 2. The 660 cm^{-1} (15μm) band of CO_2 in an H_2O:CO_2 = 24:1 mixture demonstrates the uncertainty involved in producing a baseline fit due to the underlying feature of H_2O. Dotted line– 1st order polynomial fit to the H_2O band; dashed line– 2nd order fit in the same region

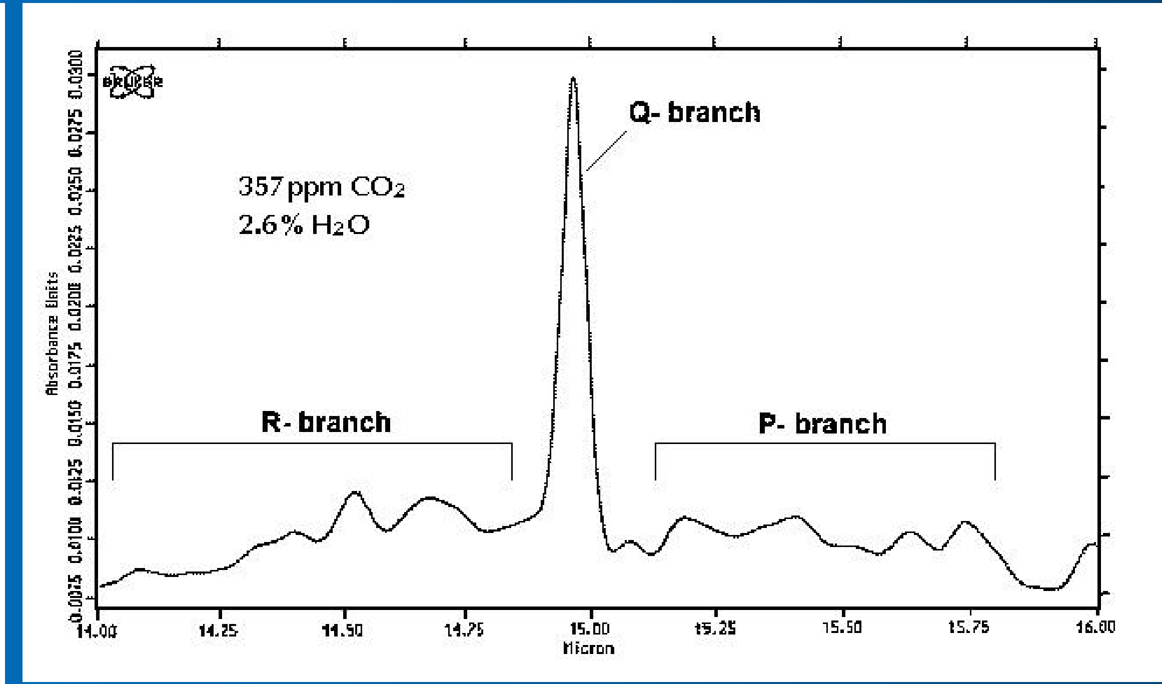


Notice the two gases IR absorption spectra were separately measued without the exact proportions.

13. Measured CO_2 absorption in Lab

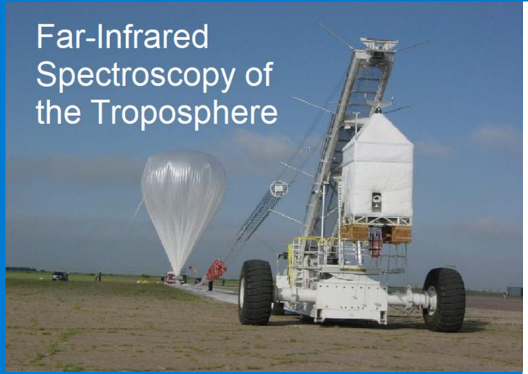
- A FT-Infrared absorption spectrum of CO_2 in air at room temperature (about 300K) without baseline correction.
- Notice the single narrow CO_2 absorption at 15 μm is higher than the R and P branches.





14. Measured CO_2 Absorption in Field

- The original **FIR**ST CO_2 Far-IR spectrum (Below)
- The radiation source is the surface about 300K.
- The CO_2 peak seems digitally added. (right).



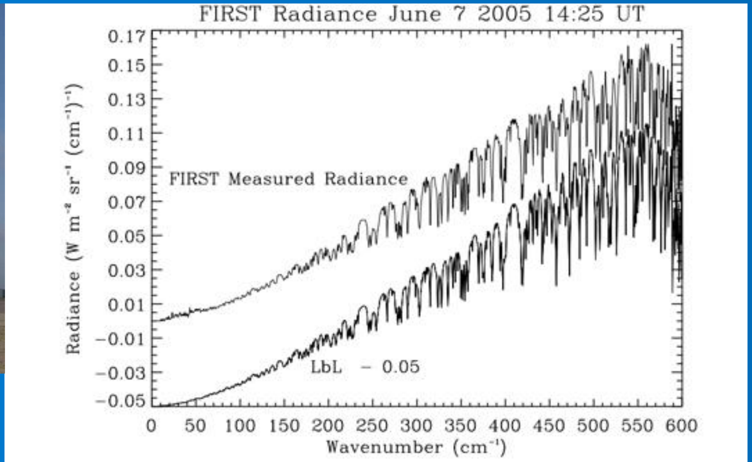
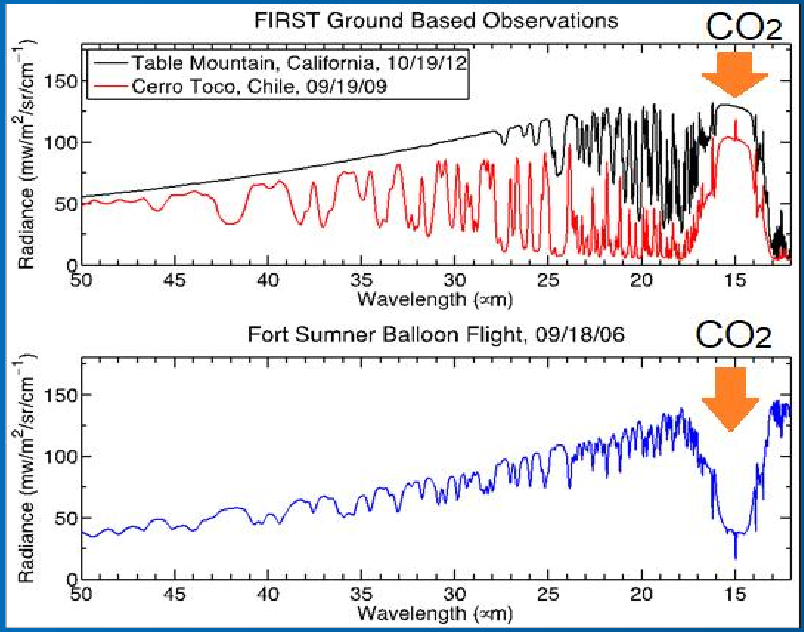
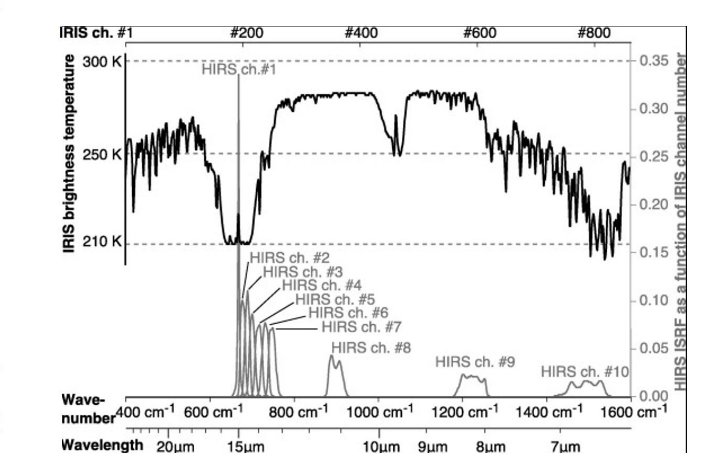


Figure 9. Far-infrared spectrum (80 to 600 wavenumbers) measured by FIRST (top curve) and line-by-line radiative transfer calculations based on AIRS soundings (bottom curve, offset by -0.05 radiance units), demonstrating spectral fidelity of the FIRST measurement relative to theory.



- Theoretically calculated near IR and middle IR atmospheric absorption spectrum (Right). Notice the noise added.



15. Where Are You, CO_2?

- In these transmission spectra obseved (?) at the top of the atmosphere, CO_2 absorption at 15 μm does not show up. (left below)
- Calculated Far-IR atmospheric emission spectrum shows both CO_2 and O_3 peaks (right below)
- The CO_2 peak at 15 μm stored in IRIS Nimbus 3.

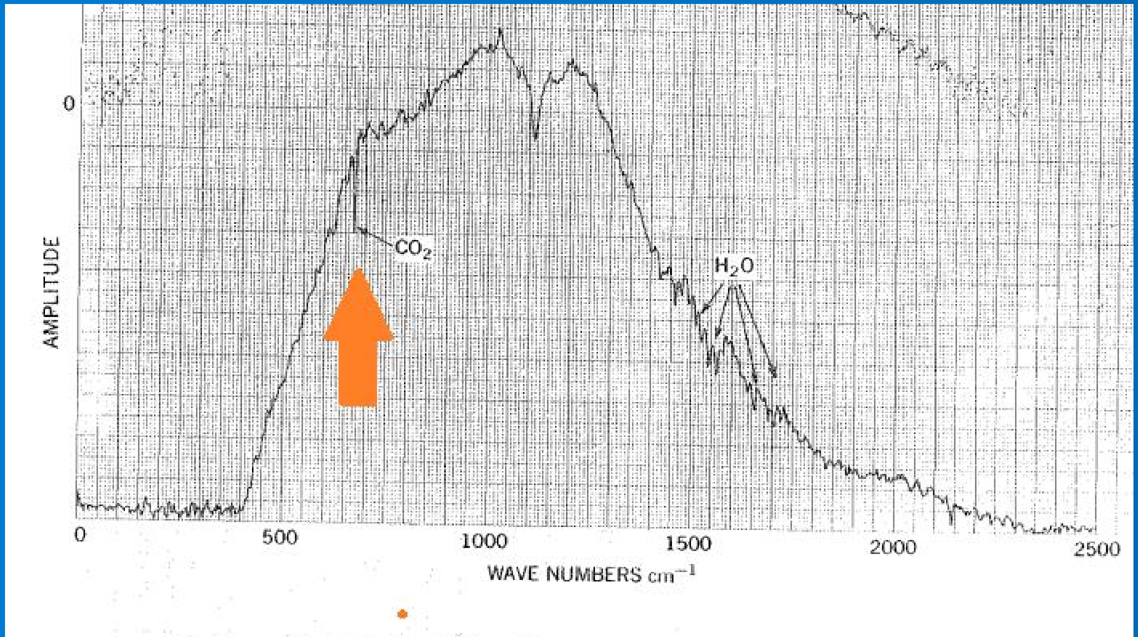
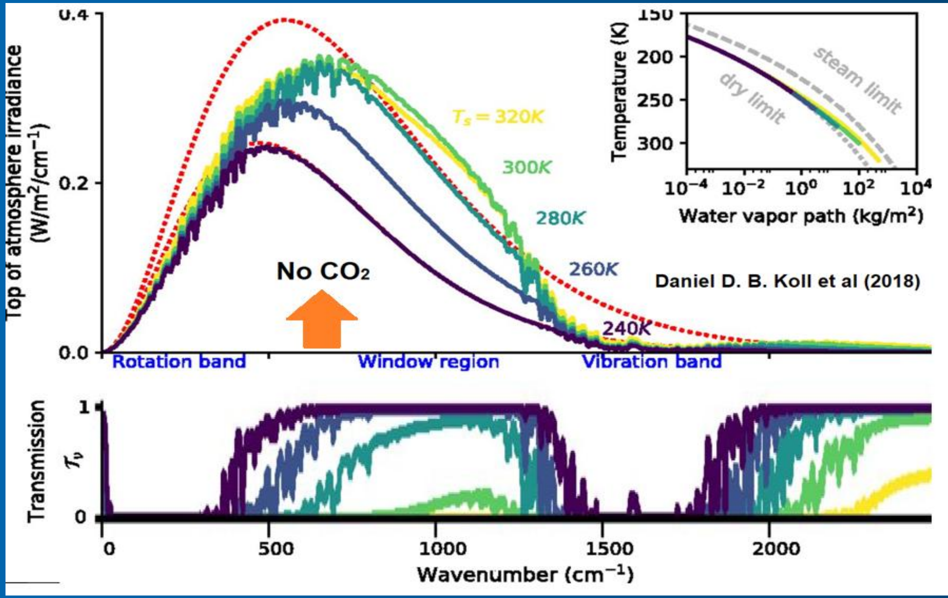
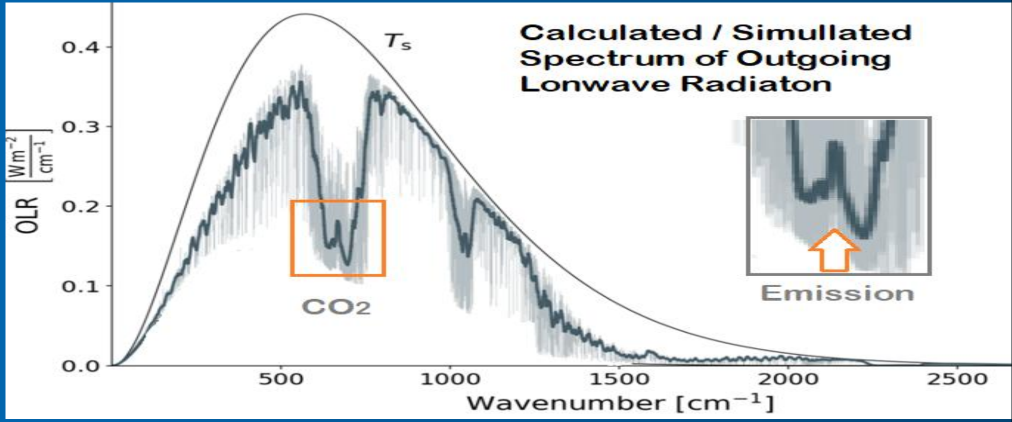


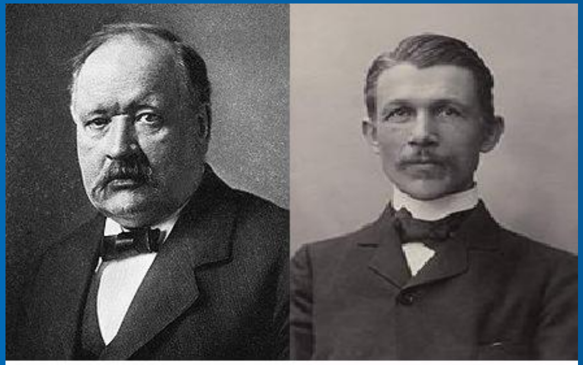
Figure 5-9--Amplitude and Phase Plot Derived From the Interferogram Shown in Figure 5-4



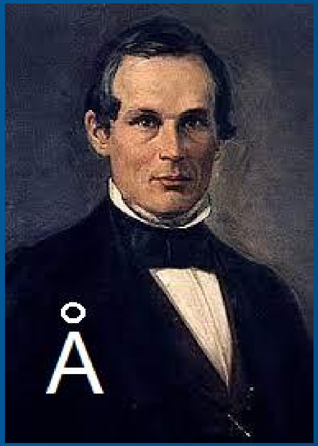


16. The Proportion of CO_2 Absorption

- It is often claimed that CO_2 can absorb **30%** of the terrestrial LW radiation, over 118 Wm^{-2}.
- In 1900, after Arrhenius published his climate model in 1896, Knut Angstrom quantitatively showed CO_2 can at most absorb **16%** of the terrestrial radiation.
- By the way, Angstrom Jr used his formula for the thermal radiation before Max Planck.



Svante Arrhenius　　Knut Ångström



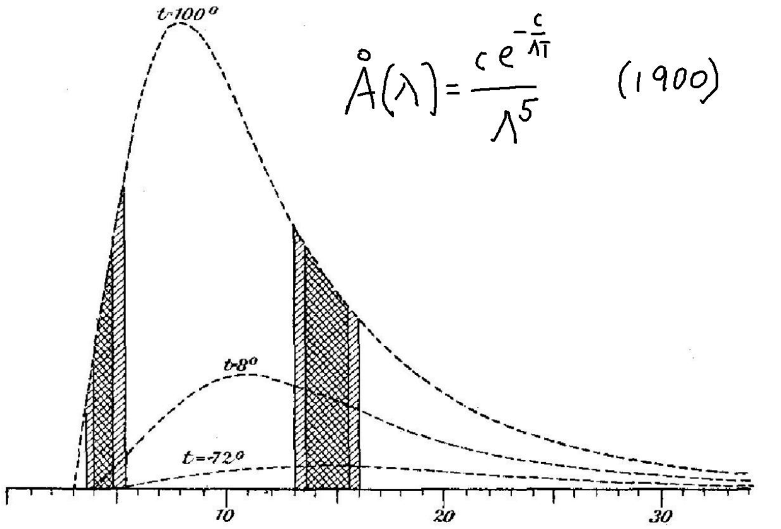
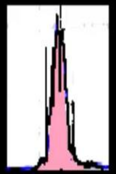
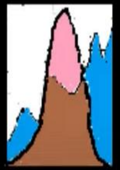
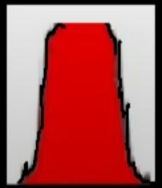


Fig. 2.

17. How Much Can CO_2 Absorb?

- My recent re-analysis has shown that the maximum proportion of CO_2 LW absorption from the surface is **less than 10%** in the absence of water vapor.
- Ths proportion could be less than **5%** if the overlapped water vapor absorption is taken into account.
- THIS NEW ESTIMATE IS IN AGREEMENT WITH THE EXPERIMENTAL OBSERVATION BY JOHN TYNDALL IN 1860.

BAND WIDTH		PROPORTION OF CO2 ABSORPTION FROM THE SURFACE IR RADIATION
	1.5 µm	3.6% - 7.2%
	2.0 µm	4.7% - 9.4%
	4.0 µm	9.4% - 18.8%

18. What was Tyndall Measured?

I found from the original report by John Tyndall in 1861 that the proportion of the CO_2 infrared absorpion in his experiment is

17.7/360= **4.9%**.

PHILOSOPHICAL TRANSACTIONS.

I. The Bakerian Lecture.—*On the Absorption and Radiation of Heat by Gases and Vapours, and on the Physical Connexion of Radiation, Absorption, and Conduction. By* John Tyndall, *Esq., F.R.S., Member of the Academies and Societies of Holland, Geneva, Göttingen, Zürich, Halle, Marburg, Breslau, la Société Philomathique of Paris, &c.; Professor of Natural Philosophy in the Royal Institution, and in the Government School of Mines.*

Received January 10,—Read February 7, 1861.

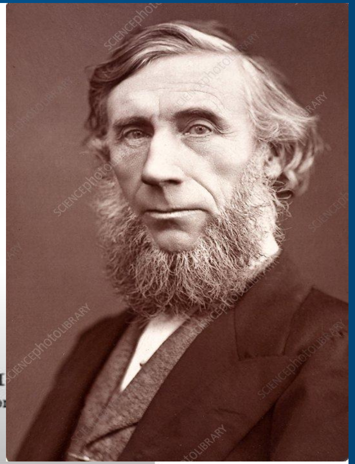
the mercurial gauge.

Table XIX.—Carbonic Oxide. CO_2

Tension in inches.	Absorption. Observed.	Calculated.
0·5	2·5	2·5
1·0	5·6	5·0
1·5	8·0	7·5
2·0	10·0	10·0
2·5	12·0	12·5
3·0	15·0	15·0
3·5	17·5	17·5

* In illustration of this I may state, that of two specimens of methylic alcohol with which I by two of my chemical friends, one gave an absorption of 84 and the other of 203. The fo

MDCCCLXI. E



The gas being completely removed, and the equilibrium re-established, a plate of polished metal was interposed between one of the faces of the pile and the source of heat adjacent. The total amount of heat passing through the exhausted tube was thus found to produce a deflection of

75°.

Now a deflection of 70°·3 is equivalent to 290 units, and a deflection of 75° is equivalent to 360 units; hence more than seven-ninths of the total heat was cut off by the olefiant gas, or about 81 per cent.

19. How Did IPCC derive Its Claim?

- In 1906, Arrhenius amended his results from **5-6K** down to **1.5-3.9K** by adopting **22%** as the proportion for CO_2 absorption from the terrestrial radiation.
- It is likely IPCC has endorsed up to 3.7K warming by the end of the 21st centure due to CO_2 as the standard for their narrative from Arrhenius (1906).

	CLIMATE SENSITIVITY
Arrhenius (1896) CO_2 can absorb over 30%	5-6K
Arrhenius (1906) CO_2 can absorb 22%	**1.5-3.9K**
IPCC	**1.0-3.7K**

20. Measured CO_2 Emission in Lab

- The first emission spectrum of CO_2 observed by Rubens et al.(1898)
- Notice the CO_2 gas was heated by using a Bunsen burner. Hence the CO_2 gas temperature was over 500K.
- Nowadays, CO_2 emission spectrum is detected from flame in lab with the temperature over 1,000 K.
- The "back radiation" belongs to emission, but can it be measured?

Rubens et al. (1898) Observation on the Absorption and Emission of Aqueous Vapor and Carbon Dioxide in the Infra-red Spectrum. Astrophysical Journal, v.8, p.176.

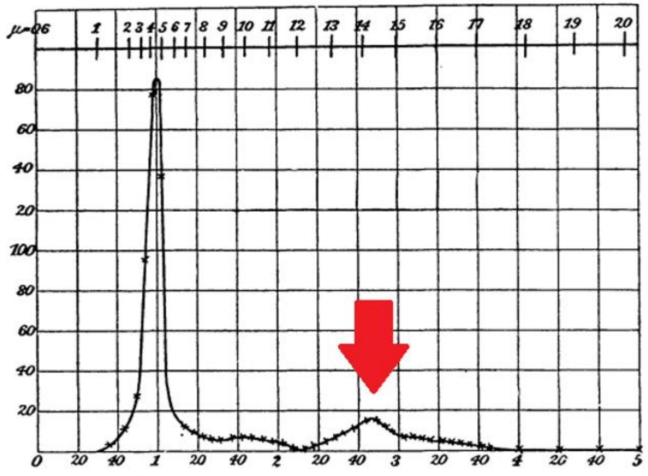


FIG. 6. The emission spectrum of CO2 gas.

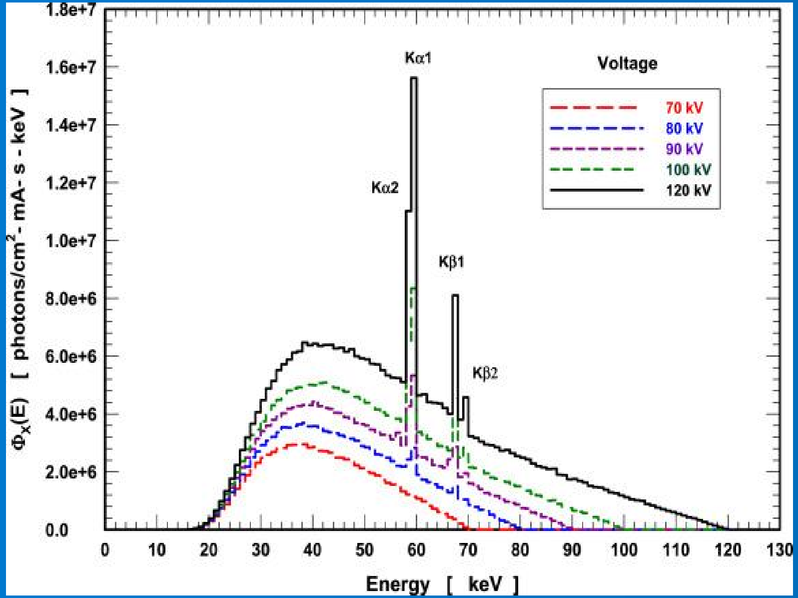
The curve in Fig. 6, which represents the results of our observations of the emission of hot carbon dioxide, shows that beside the previously known emission bands at $\lambda = 4^{\mu}.4$ and $\lambda = 2^{\mu}.7$, there is a third maximum with its greatest elevation at about $\lambda = 14^{\mu}.1$. The probable reason for its non-appearance in the emission curve of the Bunsen burner is because it is covered up by the considerably stronger maximum of water vapor lying near it.

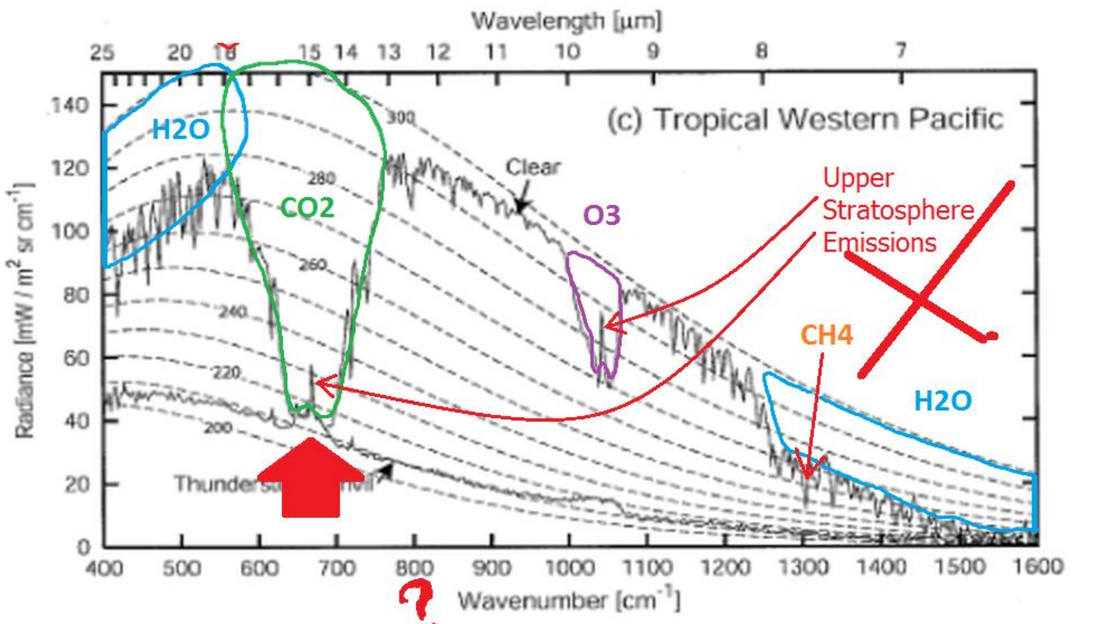
ABSORPTION SPECTRA.

21. Can CO_2 Emit in the Stratosphere?

- It has been claimed that the emission spectrum of CO_2 at 15 μm in the stratosphere was observed from Nimbus-4 IRIS at T=190K (Hanel and Canter, 1970).
- It appears that the CO_2, O_3, and CH_4 peaks were calculated for the IRIS instrumental calibration.
- The emission peaks were fabricated by using instrumental setup, rather than actually detected.
- The onset of X-ray emission by high-energy electron beam (below)

> Between 640 cm^{-1} and 690 cm^{-1}, the strongest portion of the CO_2 band, only brightness temperatures colder than 250°K are to be expected. In that spectral interval the phase is therefore taken equal to 180° and the magnitude c_ν is assigned a negative sign; wherever the phase changes by ±90°, the sign is alternated.
>
> Rudolf A. Hanel
>
> THE NIMBUS III USER'S GUIDE





Earth's emission spectrum, measured by satellite over the tropical western Pacific

22. One Reason Why It Is Unlikely

- To demonstrate how an emission peak appears in an absorption peak in a NMR spectrum via dynamic nuclear polarization.
- Inversion of population vs inversion of atmospheric temperature.
- Stimulated emission can only be observed with high temperature or using strong coherent excitation field, as in ammonia **maser** and CO_2 **laser**.

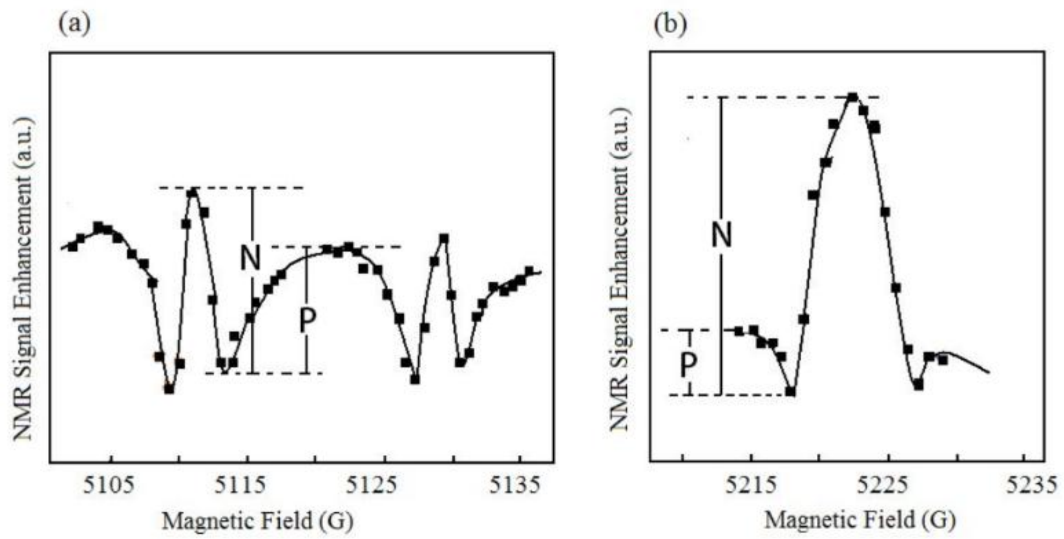


图 3 在两个不同的微波频率观察到的 DNP 现象: (a) 14.34 GHz, 对应 EPR 共振磁场 5112G; (b)14.67 GHz, 对应 EPR 共振磁场 5222 G. 图中的参数 P 和 N 的定义见正文.

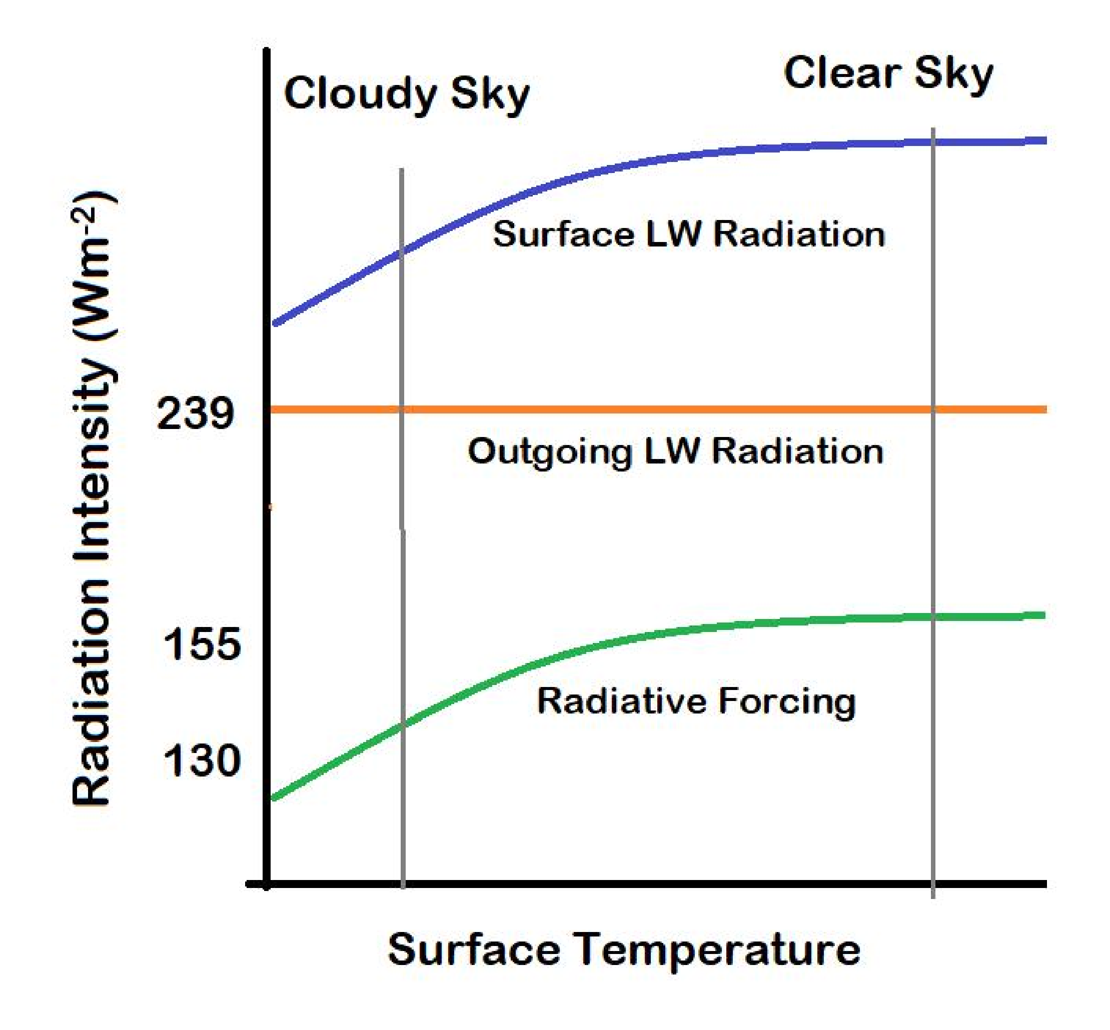
Fig. 3 DNP effects observed at two different microwave frequencies: (a) 14.34GHz, corresponding the EPR resonance field at 5112 G; (b) 14.67 GHz, corresponding the EPR resonance field at 5222 G. For definitions of the two parameters P and N in the figure, see the text.

23. The "Calculation" of Forcing

Radiative forcing (F) is derived from **energy conservation law**.

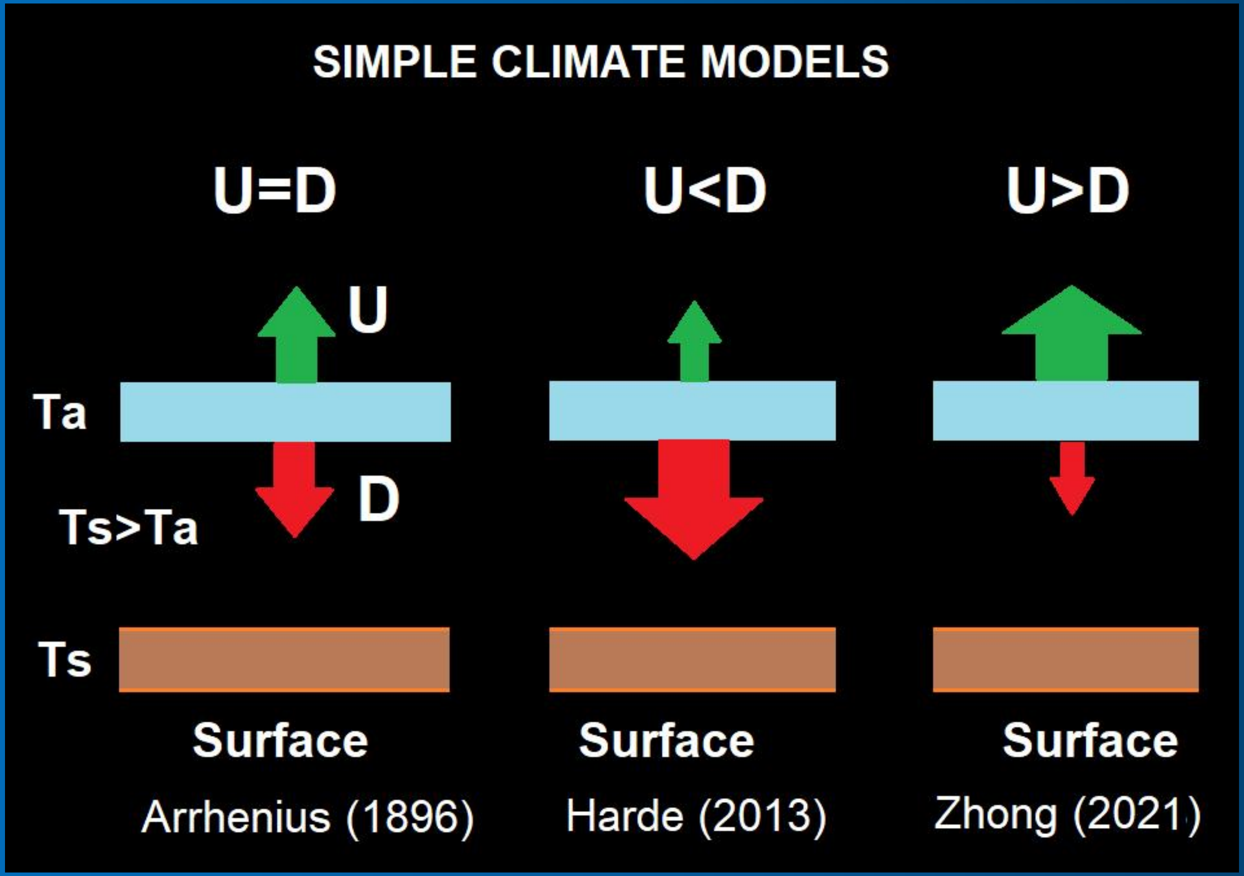
$F = I_S - I_{OLR}$=155 Wm^{-2}

- F decreases as the surface temperature decreases.
- F is independent of CO_2 absorption
- To want $\Delta F > 0$, OLR must decrease whilst energy conservation law is violated.
- To force OLR decreases by using Schwarzschild RT equation, it must be assumed D>U under the two-stream approximation, which is invalid.
- Line-by-line calculation of the emission is based on the total $\sum_i A_i = E = D + U$ (including sensible and latent heat.)



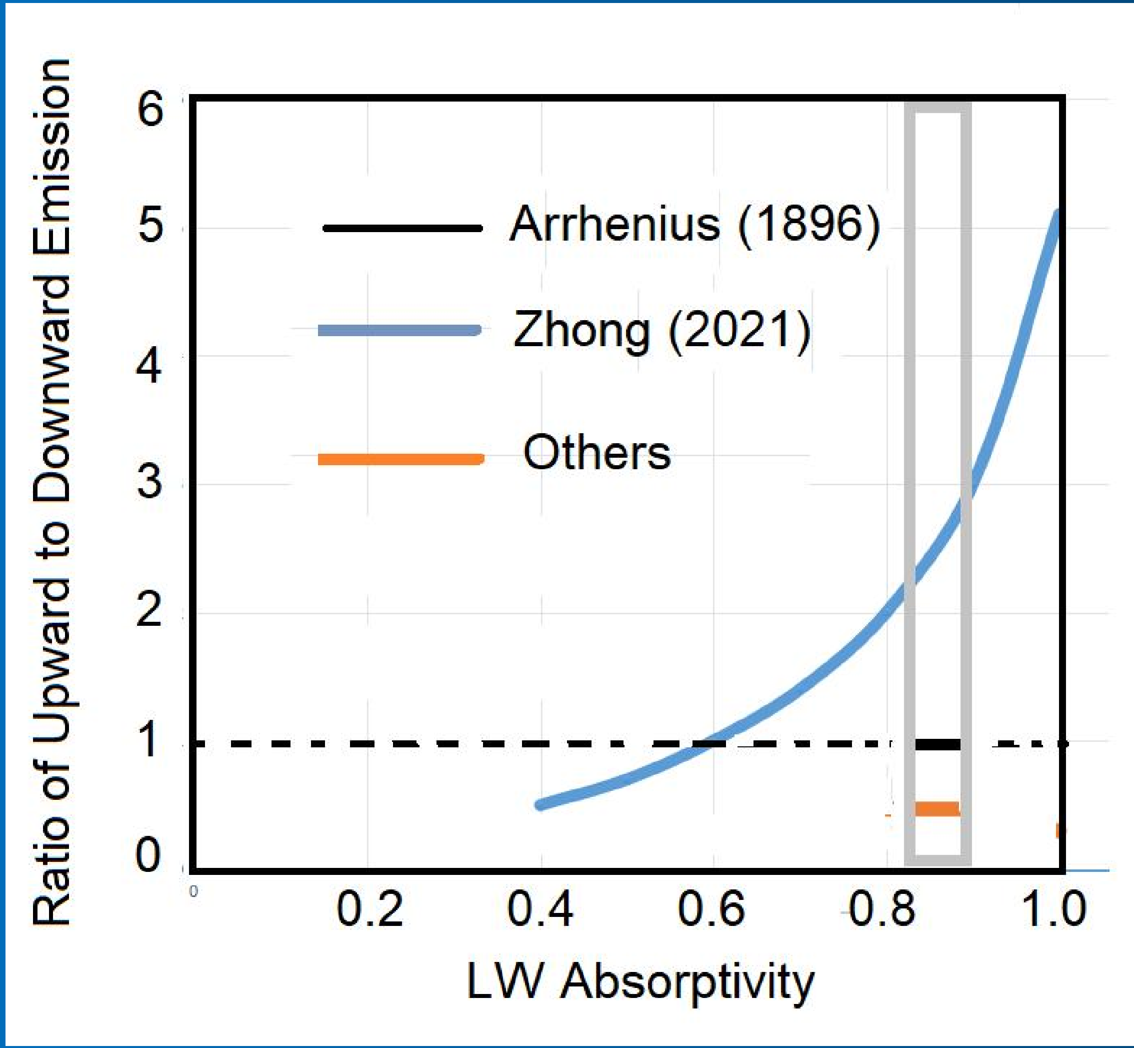
24. Upward & Downward LW Emisison

- In a climate model, the ratio of upward atmospheric emission(U) and the downward atmospheric emission (D) must be quantified.
- Arrhenius's model is incorrect, becuse he assumed U=D. But IPCC still adopted his modified estimate in 1906.
- Manabe and others used U< D to conform with the greenhouse effect hypothesis.
- U>D was used in a modified Arrhenius model I proposed, whose surface temperature can be 288K as long as U/D=0.6/0.4=3/2



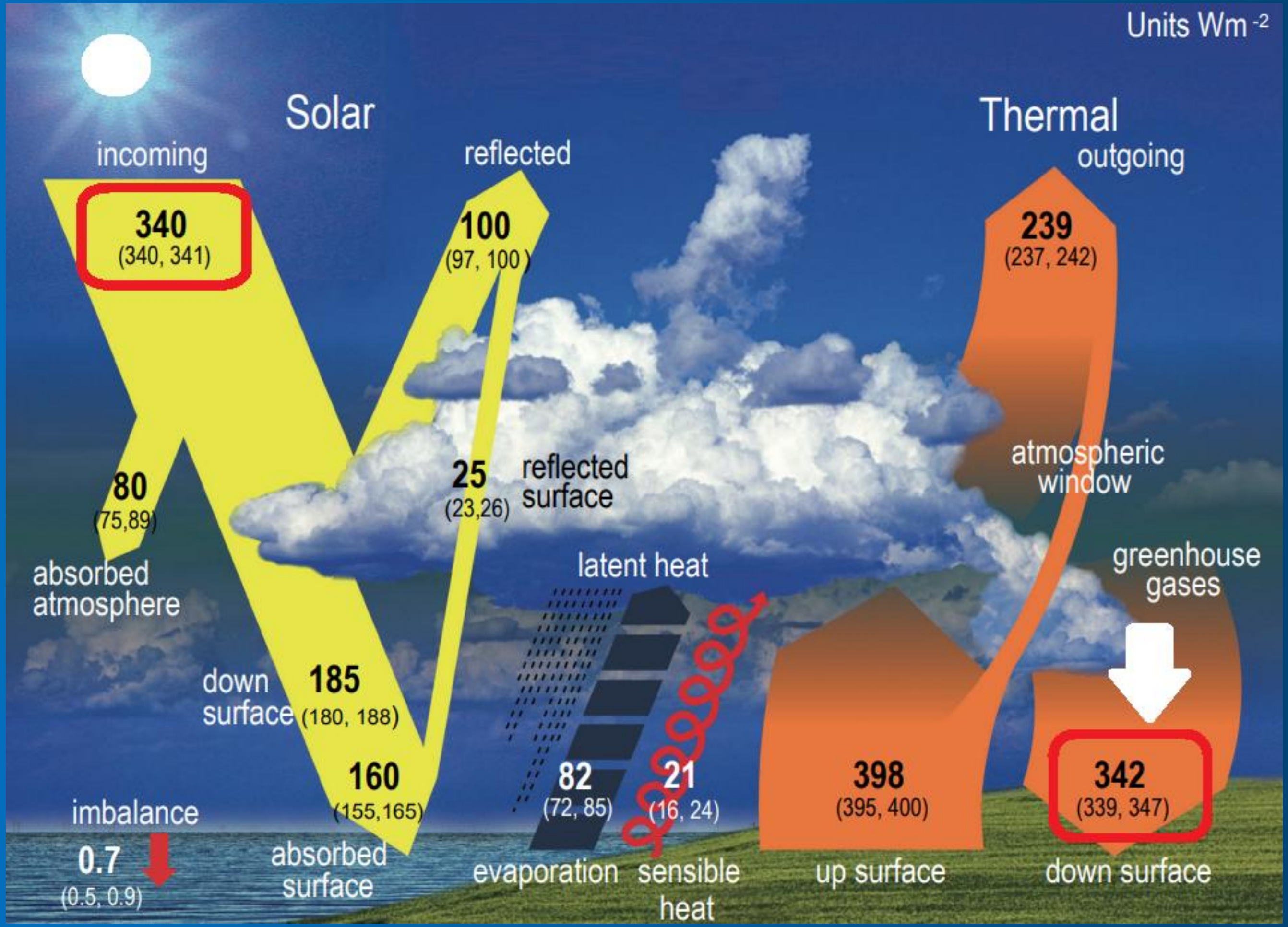
25. Formulation of Upward Emission

- The cumulative upward LW emission on the LW absorptivity is formulated (Zhong 2021).
- The upward LW radiation acts as the cooling knob for the earth.
- No gas in the atmosphere can disable this natural cooling mechanism.
- Further work is needed to incorporate this formulation into a hybrid climate model with explicit non-radiative processes.



26. The Static Heat FLow Diagram

- The IPCC's latest "global energy budget" (Stephens et al. 2012)
- One number changes, the whole diagram becomes useless.
- Notice D>U
- D=343Wm^{-2}
- U=239-39=200 Wm^{-2}
- The downward atmospheric emission at the surface is stronger than the solar radiation 340 Wm^{-2} at the TOA!
- The uncertainty at the surface is not 0.7 Wm^{-2}, but 17 Wm^{-2} (Wild 2012) compared with 3 Wm^{-2} imbalance at the TOA due to CO2 doubling"



27. Why Is The Uncertainty 17 Wm^{-2}?

- Wild team reported that there is a large uncertainty in the power balance equation at the surface, 17 Wm^{-2}.
- Where does this number 17 come from?
- The surface temperature is 289 K, then the blackbody radiation would be 395 Wm^{-2}.
- $I = \sigma T^4$ (Stefan-Boltzmann law)
- If the surface temperature increases to 292K due to CO_2, or 3K warming, then the blackbody radiation would be 412 Wm^{-2}.
- 412-395=17. (primary school math)
- This is part of his crisis management.

Published: 23 September 2012

An update on Earth's energy balance in light of the latest global observations

Graeme L. Stephens, Juilin Li, Martin Wild, Carol Anne Clayson, Norman Loeb, Seiji Kato, Tristan L'Ecuyer, Paul W. Stackhouse Jr, Matthew Lebsock & Timothy Andrews

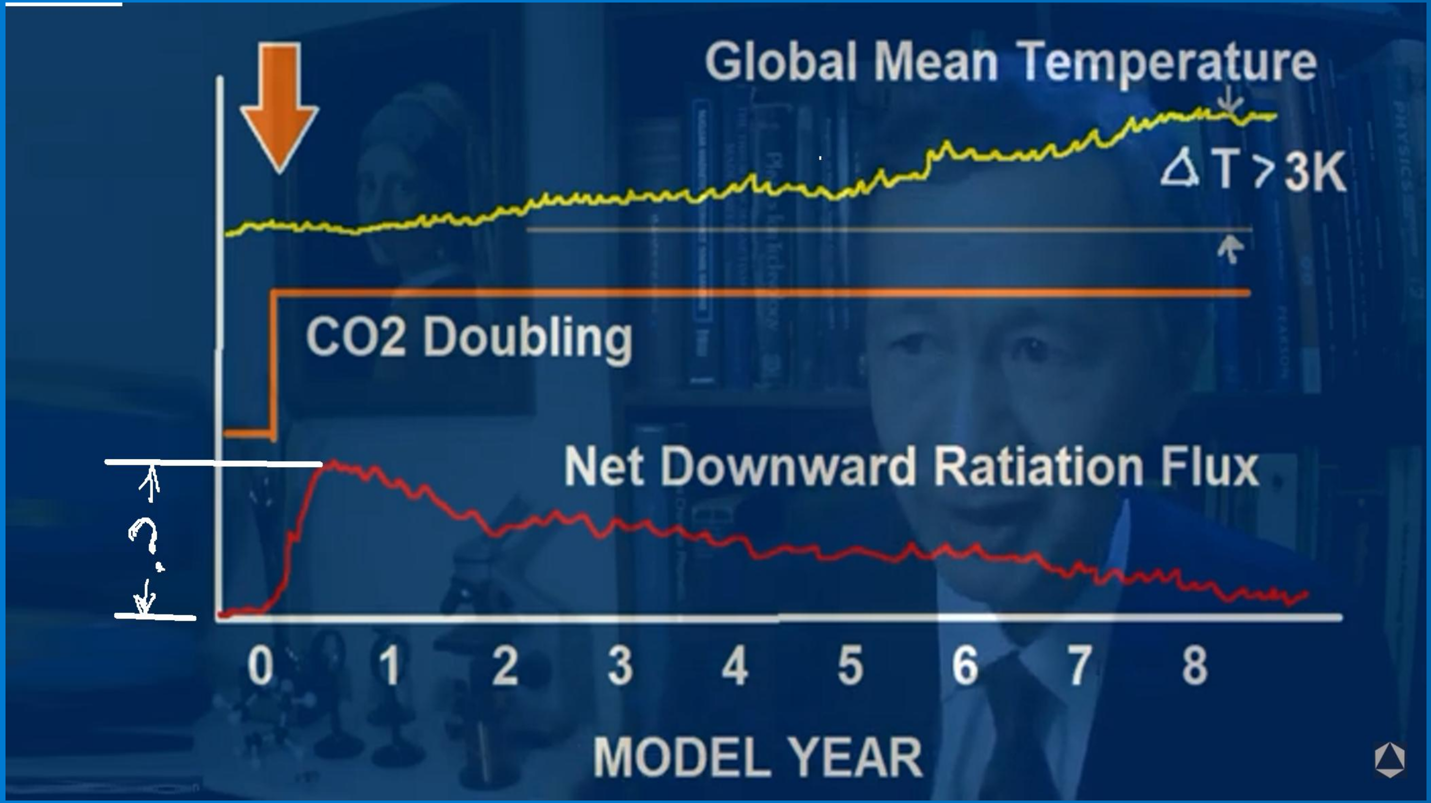
Nature Geoscience **5**, 691–696 (2012) | Cite this article

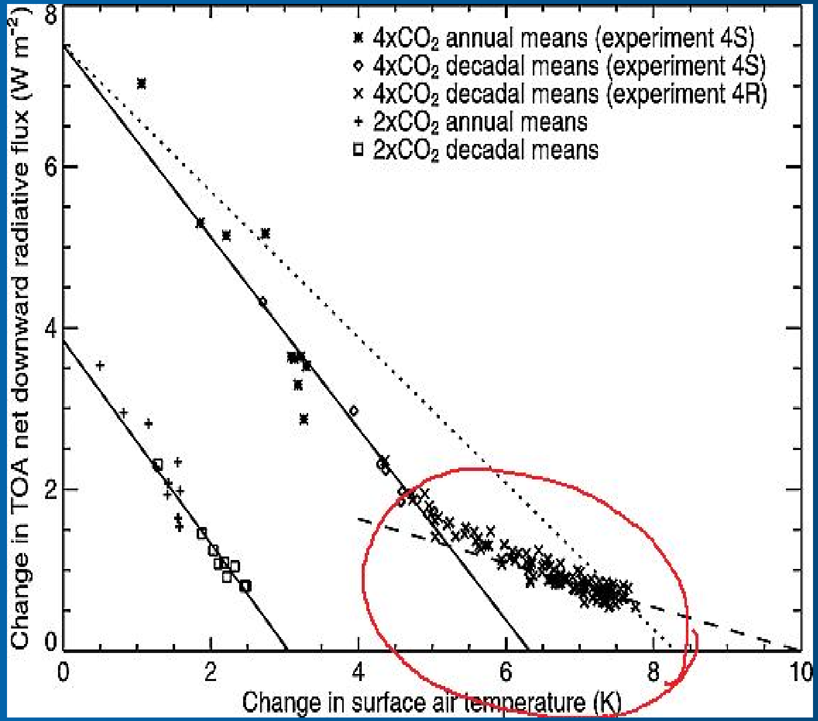
Abstract

Specifically, the longwave radiation received at the surface is estimated to be significantly larger, by between 10 and 17 Wm^{-2}, than earlier model-based estimates. Moreover, the latest satellite observations of global precipitation indicate that more precipitation is generated than previously thought. This

28. The Absurdity in Climate Modeling

A fitting method was by Gregory et al.(2004) to enable a climate model to determine both radiative forcing (F) and the climate sensitivy (ECS) at the same time as long as initial the embalance in radiation can be estimated.





29. The Menu for Cooking the ECS

- CALL an initial net downward radiation flux (N) at the TOA

$$N = F - H$$

- ASSIGN N equal to an estimated change in radiative forcing

$$N = \Delta F \approx 5.3 ln(C/C_0)$$

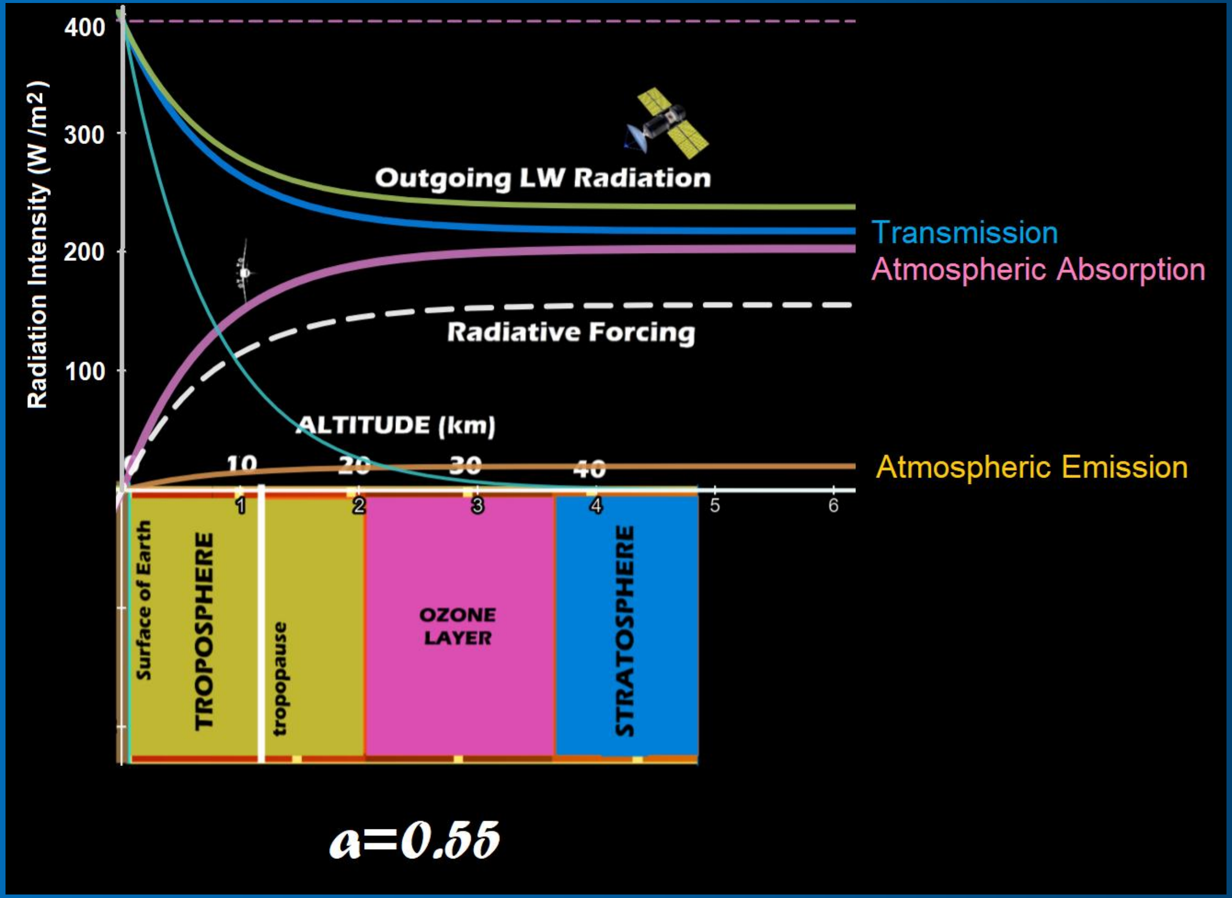
- RUN different climate models to determine the coefficient ("response")

$$H = \frac{1}{ECS}\Delta T$$

- PRINT "inter-model observations" to confirm the ECS.

30. A Dynamic Model That Can Breathe

1) Based on the power balance conditions at the surface and the TOA, a dynamic description was proposed (Zhong, 2021).
2) All quantitives are treated as continuous variables, instead of static numbers as in the IPPC Reports.
3) The surface temperature remains a constant inrespective of the infrared absorption, including CO_2.
4) Both the OLR and the radiative forcing are shown as invariants given the solar constant and the planetary albedo.



31.Two New Theoretical Predictions

- The atmospheric emission is almost **zero** at LW absorptivity 39% with the maxiumum entropy (Zhong 2021) (left).
- The LW transmittance remains 61% irrespective of the presence of infrared radiation absorbers, HO_2, CO_2, O_3, etc. (Zhong 2021). (right)

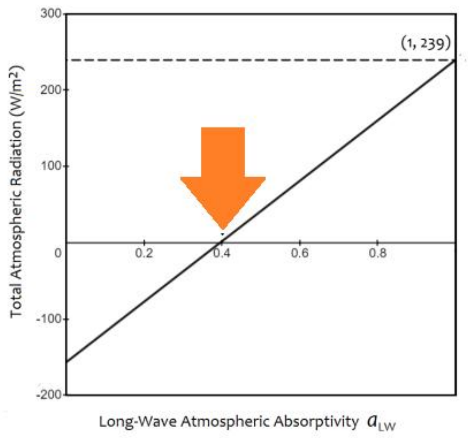


Fig. 4: Dependence of total atmospheric radiation on LW atmospheric absorptivity. Notice that the net atmospheric radiation is negative if LW atmospheric absorptivity a_{LW} is less than 0.4. The coordinate (1, 239) represents the maximum total cumulative atmospheric radiation at the TOA and the surface, 239 W m^{-2}, at the maximum LW atmospheric absorptivity a_{LW} = 100%.

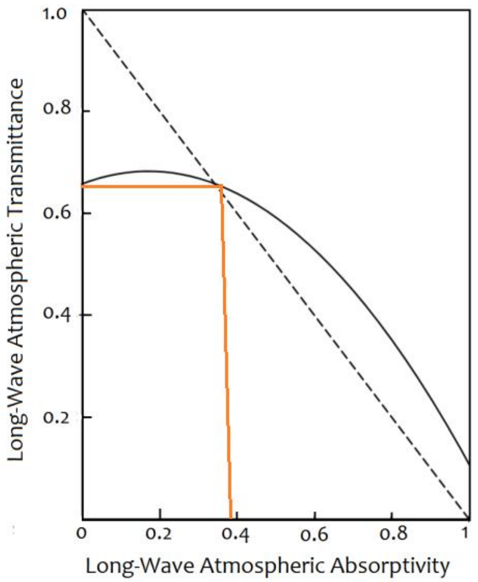
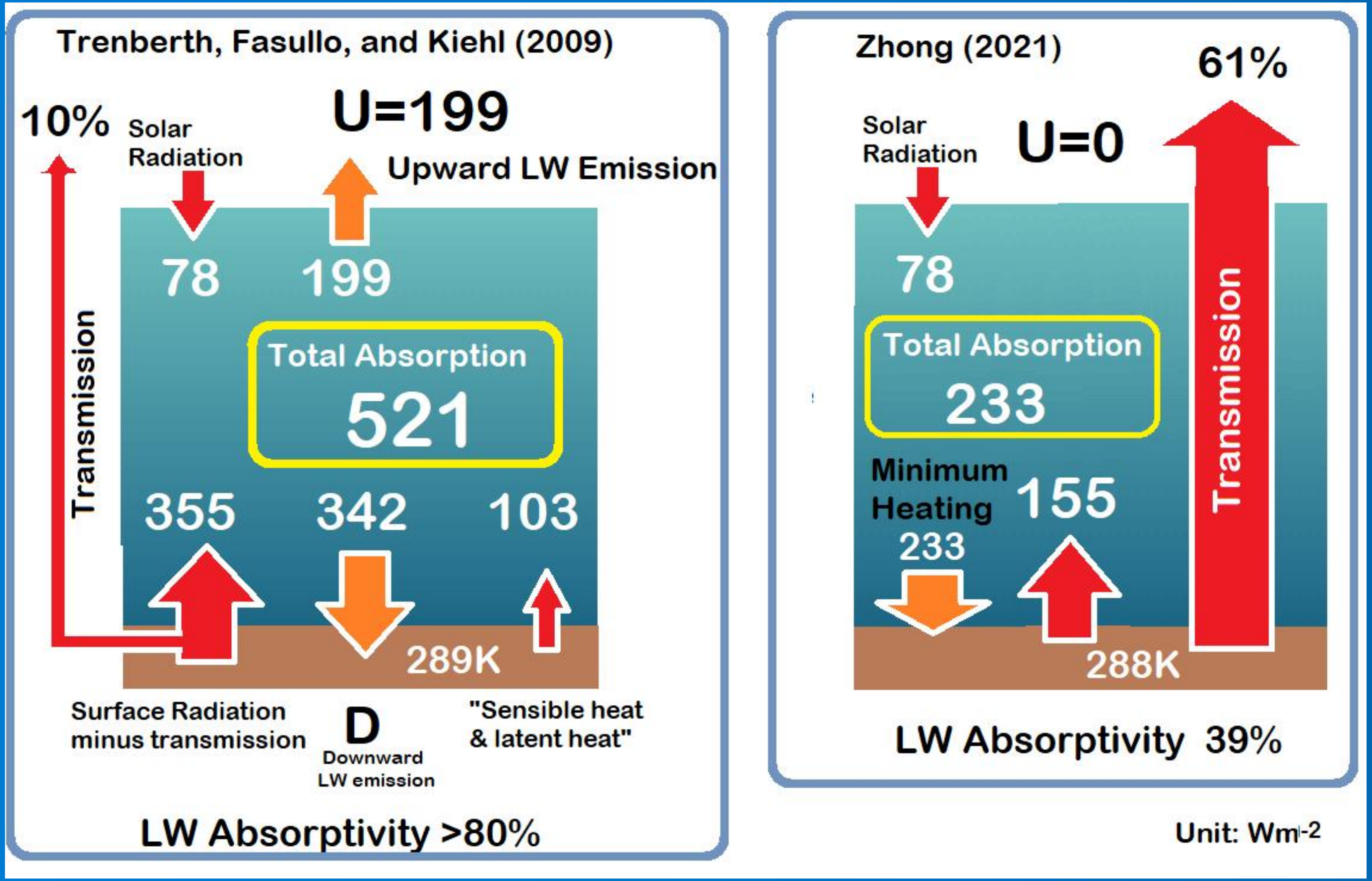


Fig. 2: Dependence of LW atmospheric transmittance on LW atmospheric absorptivity at the TOA, obtained from (21) in this study (solid curve) and from (8) (dashed line).

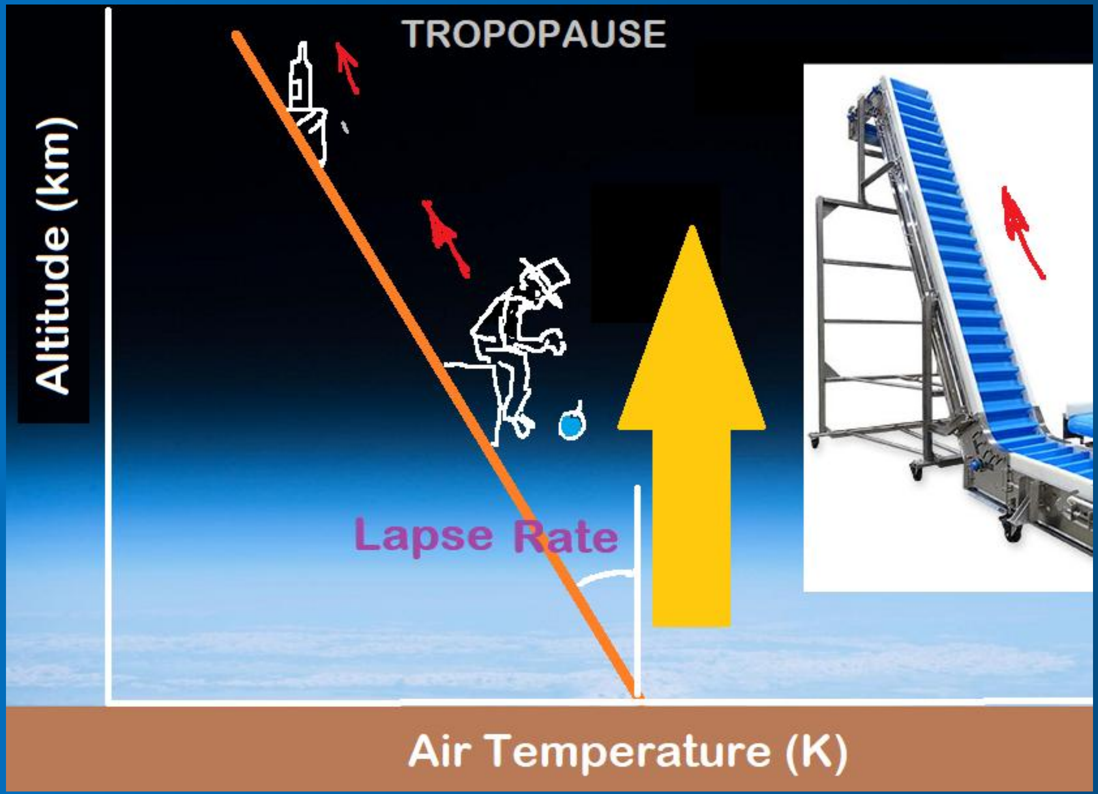
32. A Comparision of Two Descriptions



What have I been thinking?

1) The atmospheric LW emission into space seems close to zero, rather than 199 Wm^{-2}.
2) The budget to avoid the surface cooling is around 233 Wm^{-2} from the atmosphere.
3) The atmosphere is heated by the surface at up to155 W m^{-2} by means of conduction and convection.
4) The atmospheric window allows up to 239 wm^{-2} upward LW surface radiation into the outer space.
5) Water plays an essential role in relagulating local temperatures toward a never-achievable global thermal equilibrium.

33. The Invisible Tower of Babel



The lapse rate in fact represents a vertical temperature gradient for a continuous upward heat transfer.

34. Temperature Gradient by Gravity

scientific reports (2022)

www.nature.com/scientificreports

Temperature Gradient	Lapse Rate
2.22 Km^{-1}	0.006 Km^{-1}

OPEN

Temperature gradient of vertical air column in gravitational field

Han Mo Jeong & Sangyoun Park

The negative temperature gradient under gravity was observed with a vertical air column inside a practically insulated aluminum cylinder filled with sawdust. The temperature drop rate measured between 90 and 10 cm height positions was as much as 2.22 Km^{-1} when the diameter of the air column was 60 cm. This drop rate is much larger than the mean lapse rate of the earth's troposphere (0.0045–0.0065 Km^{-1}) and the previously reported experimental value (0.07 Km^{-1}) by Graeff for the air column in a relatively small system. We proposed a kinetic model based on classical mechanics to account for

35. Concluding Remarks

1) The claim of "the 33K Greenhouse Effect" is untrue.
2) The maximum infrared absorption by CO_2 in the atmosphere is less than 5%, rather than 30%.
3) The CO_2 absorption at 15 μm in the atmosphere is calculated, rather than directly observed.
4) CO_2 emission at 15 μm in the atmosphere is unlikely observable as both the temperature and the density are too low.
5) The greenhouse is a false analogy and misleading.
6) Thermal radiation remains to be further explored.

Thank you for your viewing

2023