SURFRAD Data Falsifies the "Greenhouse Effect" Hypothesis

By Carl Brehmer, 3 October 2017

There exists over a dozen different explanations of what the "greenhouse effect" hypothesis is exactly, explanations of just how an increase in the concentration of "greenhouse gases" in the atmosphere might cause the average temperature of surface-level air to increase. I chose three of these definitions to test using the data being gathered at two of NOAA's SURFRAD (surface radiation monitoring) sites. Since the "greenhouse effect" hypothesis defines itself using a specific parameter, the "average yearly surface-level air temperature" and water vapor (humidity) is presumably the most powerful "greenhouse gas" that is what I focused on. What effect do varying levels of water vapor (humidity) have on the "average yearly near-surface air temperature?"

1) The first hypothesis tested is the simple assertion that higher concentrations of "greenhouse gases" will cause the average yearly surface-level air temperature to go up. *"Without these greenhouse gases the Earth's average surface temperature would be about 33 degrees Celsius cooler."*[1]
2) The second hypothesis tested is the assertion that the "average surface-level air temperature" is determined by the size of the "atmospheric window." *"The **infrared** **[IR]** **atmospheric window** . . . lets some infrared radiation from the cloud tops and land-sea surface pass directly to space without intermediate absorption and re-emission, and thus **without heating** the atmosphere."*[2] This hypothesis asserts that if no "greenhouse gases" were present in the atmosphere the "atmospheric window" would be wide open, i.e., the *transmissivity*[3] of the atmosphere to infrared radiation (IR) radiation would be 1.0, and this, they postulate, would allow the ground to cool much faster via the emission of IR radiation directly out into space. Ergo, the lower the concentration of "greenhouse gases" in the air the cooler the "average yearly surface-level air temperature" would be. Stated another way, it is assumed that an inverse relationship exists between the *transmissivity* of the atmosphere to IR radiation and surface-level air temperature.
3) The third hypothesis tested is the assertion that the surface is heated by down-welling IR radiation. This hypothesis postulates that "greenhouse gases" absorb up-going IR radiation and then re-radiate a portion of that energy back towards the surface and that this "back-radiation" acts like a second heat source, the first being the Sun. *"The atmosphere, heated by the absorption of Earth radiation by these greenhouse gasses, in turn radiates heat back to the Earth's surface increasing the Earth's surface temperature."*[4] This hypothesis asserts that there is a direct relationship between the intensity of down-welling IR radiation and surface-level air temperature.

I chose for comparison data from two SURFRAD sites that lie roughly along the same latitude and therefore receive the same amount of Solar energy daily, year around—Desert Rock, Nevada and Goodwin Creek, Mississippi. The table below are the yearly averages of all readings taken of the parameters listed during the year 2016.

	Up-Welling IR	Down-Welling IR	Net Up-welling IR	Temperature	Specific Humidity
	W/m^2	W/m^2	W/m^2	°C	g/kg
Desert Rock	428	309	119	19	4
Goodwin Creek	401.6	356	45	17.5	9.6

Hypothesis #1

Do higher levels of the most potent "greenhouse gas" water vapor (humidity) cause the average yearly surface-level air temperature to go up? No. Even though the air at Goodwin Creek had more than double the average humidity in g/kg compared to Desert Rock, the yearly average surface-level air temperature at Goodwin Creek was 1.5 °C cooler. Water vapor cannot cause "global" warming if it does not cause "regional" warming. Please note that this is not an isolated observation. Surface-level air in humid climates everywhere tends to have a lower yearly average temperature than does surface-level air in arid climates that lie along the same latitude. Hypothesis #1 is falsified.

Hypothesis #2

Does the size of the "atmospheric window" have an inverse relationship with the yearly average surface-level air temperature? Does the narrowing of the "atmospheric widow" by high humidity force the yearly average surface-level air temperature to go up? Another name for the "atmospheric window" is *transmissivity.* I calculated the transmissivity of the atmosphere at each location by dividing the net up-going IR radiation by the total up-going IR radiation.

Net up-welling IR / Total up-welling IR = transmissivity

Transmissivity of the air:
Desert Rock: 119 W/m^2 / 428 W/m^2 = 0.28
Goodwin Creek: 45 W/m^2 / 401.6 W/m^2 = 0.11

Since water vapor increases the opacity of air (decreases its *transmissivity* to IR radiation), I attribute the decreased transmissivity of the atmosphere at Goodwin Creek to the 240% higher humidity present there. This affirms the portion of the "greenhouse effect" hypothesis that asserts that when the humidity goes up the surface emits less IR radiation directly into space because humid air is markedly more opaque to IR radiation than is arid air. Contrary to the "greenhouse effect" hypothesis though, this did not force the average yearly surface-level air temperature at Goodwin Creek to increase. When one looks at the data, even though the air at Goodwin Creek is more opaque and therefore allows less IR radiation to be emitted directly out into space than at Desert Rock, the average yearly surface-level air temperature at Goodwin Creek is lower than at Desert Rock. Hypothesis #2 is falsified because the average yearly surface-level air temperature is not inversely proportional to the size of the atmospheric window.

Hypothesis #3

Is there a direct relationship between the intensity of down-welling IR radiation and yearly average surface-level air temperature? In this experiment I simply compare the down-welling IR radiation between the two sites with their respective yearly average surface level air temperatures.

Down-welling IR radiation:

Desert Rock = 309 W/m2
Goodwin Creek = 356 W/m2

This observation confirms the portion of the "greenhouse effect" hypothesis that asserts that increasing the concentration of "greenhouse gases" in the air induces the atmosphere to emit more down-welling IR radiation (even at a lower temperature.) In this case the extra humidity in the atmosphere over Goodwin Creek caused an increase of 47 W/m_2 in down-welling IR radiation compared to Desert Rock, yet the average yearly surface-level air temperature at Goodwin Creek was lower than that at Desert Rock, which falsifies Hypothesis #3; the intensity of down-welling IR radiation is not directly proportional to surface-level air temperature.

Consider the following: For the purpose of creating general circulation computer models (GCMs) of the atmosphere that might predict the effect of increasing carbon dioxide levels on the average yearly global surface-level air temperature, a concept was created called the "climate sensitivity to carbon dioxide." The IPCC, in defining this concept, asserted that a doubling of carbon dioxide levels from pre-industrial times (from ~280 ppm to ~560 ppm) would result in a 3.7 W/m^2 increase in down-welling IR radiation, which they call "radiative forcing." This would in turn they say result in a 1 °C increase in yearly average surface-level air temperatures.[5] *"Without any feedbacks, a doubling of CO_2 (which amounts to a forcing of 3.7 W/m2) would result in 1°C global warming . . ."*[6]

The extra down-welling IR radiation at Goodwin Creek compared to Desert Rock was 47 W/m^2 and this exceeds the hypothetical effect of doubling carbon dioxide levels >10 times (without any feedbacks). This is equivalent to the hypothetical effect of carbon dioxide if it were 286,720 ppm, which would be an atmosphere that was 29% carbon dioxide! According to the IPCC this extra 47 W/m_2 of down-welling IR radiation should have caused a >10 °C increase in the yearly average surface-level air temperature at Goodwin Creek (even without feedbacks.) What we see instead is a 1.5 °C decrease in surface-level air temperatures at Goodwin Creek compared to Desert Rock. Therefore, the IPCC's "climate sensitivity of carbon dioxide" hypothesis is falsified by simple observation—an increase in down-welling IR radiation does not force surface-level air temperatures to rise.

In order for an "effect" to be real one has to demonstrate via empirical observation that something is actually being "caused" by it. In order for water vapor to be an actual "greenhouse gas" it has to be seen causing the average yearly surface-level air temperature to increase; yet the opposite is what we observe.

1 Australian Bureau of Meteorology

2 Wikipedia - https://en.wikipedia.org/wiki/Infrared_window

3 transmissivity: *"the degree to which a medium allows something, in particular electromagnetic radiation, to pass through it."*

4 Columbia University, Department of Earth & Environmental Sciences

5 IPCC, Climate Change 2001: Synthesis Report

6 Rahmstorf, Stefan, quoting the IPCC, Climate Change 2001: Synthesis Report in his 2008 paper