Deviant Vocabulary

By Howard “Cork” Hayden

Starting with a supposition by Fourier in 1827 that atmospheric gases might trap heat from the sun, scientists in the 19th century experimentally investigated the notion that H2O and CO2 were the important heat-trapping gases.

Other 19th-century measurements were also important. The law of conservation of energy said that the heat absorbed from the sun must equal the amount of heat radiated to space, but how could anything be measured?

Imagine that on a clear day in mid-summer, you measured the intensity of sunlight reaching a surface facing the sun from dawn until noon. The intensity increases during that time because you’re looking through decreasing amounts of air. For example, when the sun is 14.5º above the horizon, you’re looking through 4 thicknesses of the atmosphere; at 19.5º, three layers; at 30º, two layers; 42º, 1.5 layers, 53º; 1.25 layers, and so forth. Draw a graph and extrapolate to 0 layers to get a very good estimate of sunlight intensity reaching our orbit. This measurement was accomplished by the late 19th century.

The earth reflects sunlight, and the amount was measured by looking at the reflected sunlight that hit the moon and was reflected back to earth. That is, astronomers knew how much sunlight reached the earth and how much was reflected long before any satellites were sent into orbit. Therefore, scientists could readily calculate the amount of heat absorbed from the sun and the amount radiated to space.

The Stefan-Boltzmann law [1] allows the calculation of heat radiated per square meter from a surface at absolute temperature T:

 

where the emissivity ɛ (0 to 100%) is a measured quantity. The average emissivity of the earth’s surface is 0.95.

It is a shameful fact that climate modelers have never—repeat, NEVER—applied the Stefan-Boltzmann law to any of their predicted surface temperatures. At present temperatures, each increase of 1ºC would increase the amount of IR leaving the surface by about 5.5 watts per square meter. Climate models predict both the “radiative forcing” (increase in IR-stopping ability) and the average increase in surface temperature for various times in the future. In no case is the former enough to account for the 5.5 W/m2 increase in surface IR due to temperature increase.

The Stefan-Boltzmann law does not apply to gases or to shiny metallic surfaces; in particular, it does not apply to the planet as a whole, because radiation to space is largely dependent on those heat-absorbing (and emitting) gases in the atmosphere. That is, the heat emitted to space, calculated from astronomical measurements, is not pure blackbody radiation.

There is a hypothetical would-be temperature of the earth in the absence of greenhouse gases: 255K (ca. –18ºC, –0.7ºF). The average temperature of the surface of our planet was about 288K (ca. 15ºC; 59ºF) in 1990, at the time of IPCC’s First Assessment Report, which says

First, the mean temperature of the Earth’s surface is already warmed by about 33 ºC (assuming the same reflectivity of the earth) than it would be if the natural greenhouse gases were not present.

The 33K (=33ºC) difference is attributed to greenhouse gases. However, the calculation is a bit phony. Absent greenhouse gases, the planet would have no water vapor, no clouds, no ice, no snow, and no green plants. It would resemble Mars. Clearly, it would reflect a different amount of sunlight to space. The hypothetical would-be temperature is based on the false (but acknowledged) assumption that the earth’s albedo (reflectivity) would be the same if we had no greenhouse gases as it is with greenhouse gases.

At this point, we are beginning to see a deviation from curiosity-driven science to something with political overtones. The 33ºC difference between the hypothetical temperature and the average surface temperature is called (in some instances) the greenhouse effect, and any increase in it is (or was) called “global warming.” Because weather phenomena are always changing, “global warming” became renamed with a more ambiguous term “climate change.” As noted in the March 2024 issue of TEA [The Energy Advocate], the United Nations Framework Convention on Climate Change (UNFCC) defined the term climate change to refer only to changes of climate (supposedly) due to human activities. So, humans became responsible for all “climate change.” By the UNFCCC’s definition, there has been no climate change for 4.6 billion years of Earth’s history.

The primary villain for causing “climate change” became CO2. The odorless colorless gas CO2 became labelled “carbon,” as in “carbon emissions” and “carbon pollution.” (The natural forms of pure carbon are graphite and diamonds.) To confuse things further, “carbon emissions” has become “emissions,” which necessarily conflates CO2 with H2O, SO2, CH4, nitrogen oxides, and particulate matter (smoke). Now, journalists, politicians, and (sorry to say) climate scientists can imply that “emissions” are causing “climate change.” And, of course, unpleasant local weather events are equated with “climate change,” while pleasant ones are just “nice weather.”

[1] https://www.britannica.com/science/Stefan-Boltzmann-law