

WHY LUNAR HEATING/COOLING IS SO IMPORTANT TO DISPROVE THE GREENHOUSE EFFECT THEORY ON EARTH

By Alberto Miatello, July 9, 2014

I have been asked to explain the main concepts of my article of 2012: "[Lunar Cooling Refutes the Greenhouse Effect Theory](#)", without using too much mathematical symbolism and I am pleased to do that.

I know that many readers find calculations and math of many technical articles quite unpleasant (even when they are necessary to prove some ideas/assumptions) and it is also true that before writing down math and calculations, all the physicists think about the main concepts they want to prove.

Therefore, I am pleased to explain the main concepts of that article here, also because I have been persuaded that the study of Moon heating and cooling rate, is probably one of the most powerful experimental tools, to prove that Greenhouse Effect Theory (GHE) is a bogus, pseudo-scientific theory that for too many years now has been upheld by political and media propaganda (with a silent indifference of the scientific establishment), but with no actual physical law supporting it.

Why the Moon?

Firstly, our Moon receives exactly the same quantity of solar irradiance (1367 W/m^2) as our Earth.

Secondly, our Moon has no atmosphere, whereas our Earth is surrounded by nearly 10 km of Troposphere, that lower part of our atmosphere in which the main climatic phenomena and weather reactions are taking place.

Thus, our Moon is the most splendid natural physical location in the Universe to make a comparison with our Earth and to challenge the most important points that GHE advocates are upholding:

1. Questions

a) Does our atmosphere really keep our Earth's surface "warmer" by nearly 33°C ?

b) What would happen if we "removed" our atmosphere? Would we really be "frozen" by the "cold" outer space, in the same way as the flowers inside a greenhouse would be, in a cold winter, after removal of the transparent plastic layers/tents of the greenhouse?

The main point that GHE supporters seem keen to try and hide is that here on Earth's surface [the highest temperature ever recorded](#) (in the Death Valley, California, USA) was just 56°C - 57°C , a meager highpoint when compared to the Moon's equator where the temperature normally reaches 117°C (390K) – <http://en.wikipedia.org/wiki/Moon>. That is more than double the value, although – as we know – the quantity of solar irradiance is the same: 1367 W/m^2 in both places.

So, far from being totally "frozen" by the lack of atmosphere, our Moon is "over-heated" by the same solar irradiance which is impinging our Earth. The reason lies in Earth's albedo (due to clouds + atmosphere + Earth's surface) is 0.3, whereas the Moon's albedo (due to regolith of surface) is just 0.12. This means Earth reflects away nearly 30% of the solar radiation, whereas our Moon reflects just 12%. Therefore, the Moon absorbs much more heat enabling it to reach a higher temperature.

However, in an attempt to disguise this “inconvenient truth”, GHE supporters are trying to put confusion in the minds of their readers. For instance, “[Skepticalscience](#)” tells its readers that on the Moon the temperature “drops almost immediately ... in several hours” from 117°C to minus 110°C. They say it is “due to the absence of atmosphere (such as here on Earth) which (in their opinion) should “protect” our surface from the “cold” of outer space.

But this statement, as we have seen, is clearly wrong.

Far from its temperature “dropping almost immediately ... in several hours”, we have observed that on the Moon it takes 14.75 terrestrial days = 354 hours (!), at the lunar equator, to “cool off” from the highest temperature (117°C = 390K) to reach the lowest i.e. -173°C = 100K

So, the cooling rate of the Moon is very much slower than that of our Earth: the Moon’s surface is cooling at a rate of $290/354 = 0.8^{\circ}\text{C}/\text{hour}$, whereas here on Earth, on a warm summer’s night, at over 20°C in the ambient outside environment, we have calculated that a cubic meter of boiling water (100°C) would lose 64°C in nearly 12.7 hours, which is 5°C/hour, i.e. a cooling rate more than 6 times faster!

2. Cooling mechanism of the Moon

The reason why our Moon cools so slowly, with respect to our Earth, is due to the cooling of the Moon’s surface being through radiation only (because the Moon has no atmosphere). It is not cooled through radiation + conduction + convection of the gaseous masses as per our atmosphere.

As we know, convective heat transfer (i.e. transfer of heat from one place to another through the movement of fluids such as gases or liquids) is an effective and powerful way to remove heat from one place to another.

Because it has no atmosphere, i.e. no fluids surrounding its surface, our Moon can cool off only via radiation. Radiation is a slow and steady transfer of heat through the emission of electromagnetic waves from the lunar surface, after solar heating, to the vacuum of space surrounding the Moon. It is no coincidence that our simple boiled water experiment above explains why the cooling rate of the Moon is at least 6 times slower than that of Earth, even on summer nights.

Now think of convective heat transfer and cooling of our atmosphere compared to the cooling of a car engine through a fan + water cooler.

Once the engine of a car has been sufficiently heated, an automatic device switches on a fan that blows air through the surfaces of the radiator whilst the cooler water is pumped around the interconnected coolant channels.

The car’s cooling system is a designed mixture of air + water convective + conductive to stop engines over-heating and is very similar to Earth’s atmospheric cooling mechanism whereby the water cycle of rain, hail or snow plus powerful winds, effectively removes and mitigates the heat that Earth receives from the Sun. Our atmosphere is actually a sort of “radiator” surrounding the “over-heated engine” of the Earth’s surface.

So, contrary to the claims of GHE supporters, our Moon with no atmosphere, no water cycle and no convective cooling mechanism, is limited to cooling just through radiation; a slow and steady loss of heat by electromagnetic waves from an over-heated lunar surface to the vacuum of outer space.

3. Outer Vacuum Space is not cold!

Another misconception that “Skepticalscience” and many other GHE theory defenders are promoting is that the outer space surrounding our Earth and the Moon is “cold.” They tell you that once the Moon is no longer heated by the Sun the “cold” outer space serves to quickly “freeze” the Moon’s surface.

This is WRONG!

Vacuum outer space is neither cold nor hot, because VACUUM space has NO TEMPERATURE:

“Temperature is a macroscopic concept that is proportional to the average random kinetic energy of the molecules of a substance. (b) Heat or thermal energy is the energy that is exchanged between two bodies as a result of a temperature difference between them. (c) Internal energy is the sum of the total random kinetic energy and the total intermolecular potential energy of the molecules of a substance.”

(<http://www.katsokos.com/pdf/PhysicsSolutions/Chapter%203/Chapter%203.1C.pdf>.)

Therefore temperature, for climatic and meteorological purposes, can just refer to heat exchanges between macroscopic bodies, such as soils, sea and ocean waters, big masses of atmospheric gas, humans, animals, plants, etc.

In vacuum space, there is no macroscopic body, but just a few microscopic atoms or molecules per cubic meter and so vacuum space has no temperature at all.

And the number 2.7K, which is often mentioned as the “fossil temperature of space from the Big Bang” is not an actual temperature of the outer space, it is the CMBR (Cosmic Microwave Background Radiation) just a feeble radiation spreading throughout the Universe, allegedly produced by the Big Bang some 15 billion years ago, or the “lowest” temperature that a body would reach when, after many weeks (no immediate freeze!), its whole thermal energy has been radiated away.

Thus, the Moon surface cannot be instantly “frozen” by the outer vacuum space around it, because outer vacuum space has no temperature and only allows matter to cool slowly.

4. No “greenhouse effect” for bodies surrounded by vacuum space.

And now we begin to understand why the “greenhouse effect theory” is a totally pseudo-scientific concept: the “greenhouse effect” is conceivable JUST for bodies surrounded by a colder mass of gas.

To correctly speak about a “greenhouse effect” we need 3 different bodies/surfaces/layers:

- 1) A warm surface/body, such as the warm interior of a greenhouse in winter season, or the warm surface of our skin, or the warm interior of an igloo in a polar environment.**
- 2) A cold surface/diaphragm in close contact with the warm surface/body above, such as the plastic tents of the greenhouse, or the blanket on our skin in a cold room, or the snow walls of the igloo.**
- 3) An even colder gaseous environment, around the cold surface/diaphragm above.**

Then the cold surface/diaphragm 2) can “protect” the warm body below it (interior of the greenhouse, or human skin, or interior of the igloo) against the colder environment outside, by slowing down the cooling rate of the warm body, and thereby keeping more heat inside the warm surface/body 1)

But our “cold” atmosphere is NOT surrounded by a colder environment, as vacuum space is not cold and therefore the cooling mechanism of our Earth is that of a warm body (Earth’s surface, whose average temperature is around 14.5°/15.5°C) surrounded by a colder body (Troposphere/atmosphere whose average temperature is -18°C), and then ... nothing! Just vacuum space that has no temperature.

Hence, we have just 2 layers: a warm body (Earth surface) surrounded by a colder gaseous body (atmosphere) and this has nothing to do with a “greenhouse effect” with 3 bodies/layers.

Therefore, our atmosphere is just cooling and not heating our Earth’s surface, because we have just a colder atmosphere surrounding a warmer Earth surface. As such, heat is just flowing from a warmer (Earth’s surface) to a colder body the (atmosphere) according to the lapse-rate and the 2nd Law of Thermodynamics (heat naturally flows only from hotter to colder bodies).

And finally, I recommend readers review the evidence in the “Moon paper” by Siddons, Hertzberg and Schreuder - http://www.ilovemycarbon dioxide.com/pdf/Greenhouse_Effect_on_the_Moon.pdf - and the research by Professor Nasif Nahle – http://www.biocab.org/Conduction_Boundary_Layer.html.

These analysts show that those who are upholding the GHE theory forget to take into account the release of heat stored during the day time that - after sun set - is released by the inner layers of the lunar regolith (just as does soil during the night here on Earth), which is a further factor of heating normally neglected by the supporters of the GHE.

Alberto Miatello