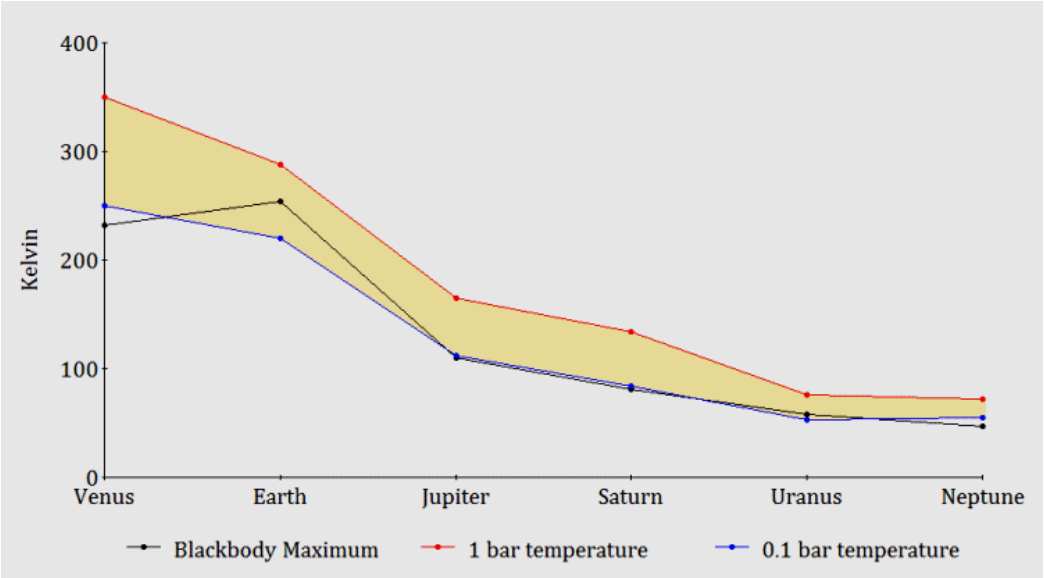
Rethinking the "greenhouse effect"

It is widely believed that without the greenhouse effect our planet's near-surface temperature would be about -18° Celsius, so we have greenhouse gases to thank for an average of +15° instead. Water vapor, carbon dioxide and other such gases all combine to raise the air's temperature 33 degrees.

But is this true? Actually, all we're going on is (1) that our atmosphere is much warmer than radiant energy calculations predict, and (2) that the air contains trace gases that react to infrared. So we have assumed that these two things must be related.

The evidence challenges that assumption, however. 1 bar being the earth's air pressure at sea level, the graph below depicts temperature changes between 0.1 and 1 bar of pressure on earth and five other planets. Most figures are from NASA's *Planetary Fact Sheets*

http://nssdc.gsfc.nasa.gov/planetary/planetfact.html

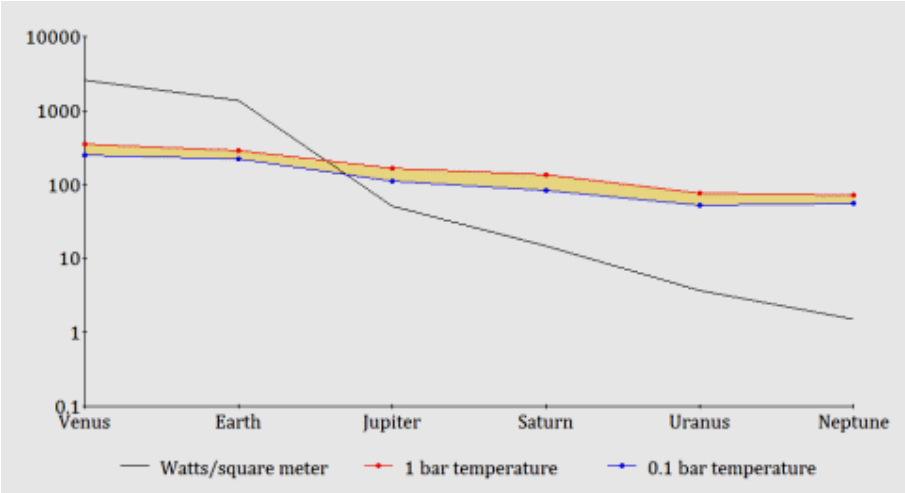


From 0.1 to 1 bar...

Venus rises 100°C.
Earth rises 68°.
Jupiter rises 53°.
Saturn rises 50°.
Uranus rises 23°.
Neptune rises 17°.

Yet...

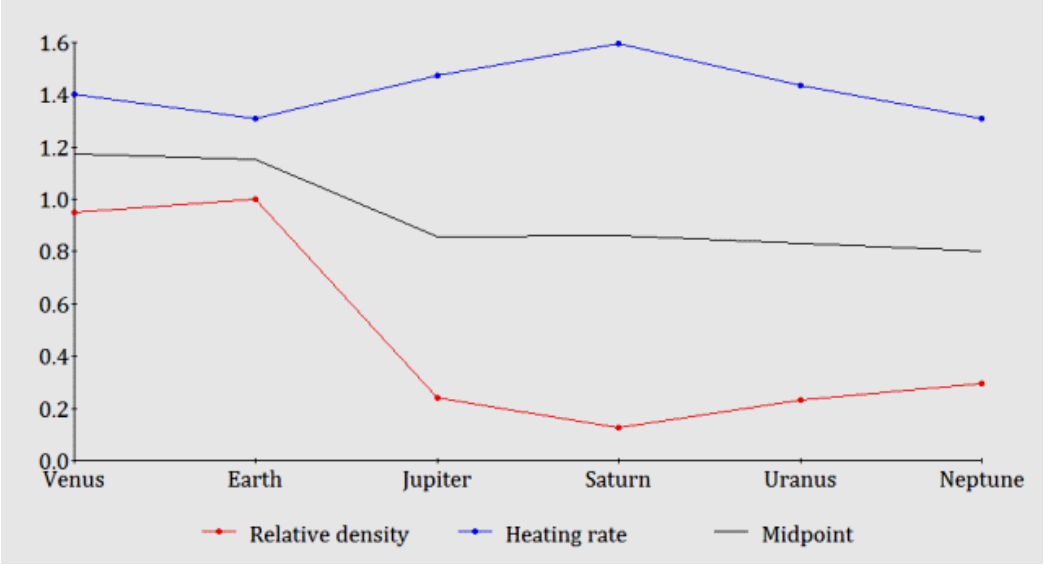
Venus receives 2614 watts per square meter from the sun.
Earth receives 1368 watts from the sun.
Jupiter receives 50.5 watts from the sun.
Saturn receives 14.9 watts from the sun.
Uranus receives 3.71 watts from the sun.
And Neptune receives a piddling 1.51 watts from the sun.



The solid line that you see shows the solar irradiance a planet receives measured in Watts per square meter. Notice in particular that although it collects **less than 2 watts per square meter** — 0.058% of what Venus enjoys — Neptune's atmosphere at a mere one bar of pressure manages to raise the planet to 154% of the temperature that a purely radiative (blackbody) model would predict.

What trait do these planets share? Just the presence of an atmosphere dense enough to reach 1 bar of pressure. Jupiter's enormous pressure doesn't stop there, of course. It continues until the temperature is *far higher* than Earth's - and it does this with hydrogen and helium, which are not greenhouse gases. Measurements indicate that Saturn, too, having only 15 watts to deal with compared to Earth's 1368, falls short of Earth by only 15 degrees. Or might also surpass it.

The *rate* of heating is an intriguing feature here. For instance, Earth climbs from 220° Kelvin to 288, making for a rate of 1.3 (288/220), while Saturn goes from 84 to 134, a rate of 1.6. A planet's overall density appears to be a key factor, for comparing 1 bar heating rates to densities relative to Earth reveals an inverse relationship.



It seems as a general rule that the greater the ratio of gas to solid and liquid, the greater the heating rate. But it should also be pointed out that the rates for Earth and Neptune are identical. Loss of solar energy does play a role, as the falling midpoint line suggests.

One last detail about the first chart. Notice that ***in every case*** the temperature of a planet even at **1** earth-atmosphere is higher than a blackbody temperature prediction. The reason for this discrepancy seems obvious: A blackbody equation only calculates for **radiant** energy; it ignores the inherent thermal impact of an atmosphere. How such heating is accomplished is a matter of conjecture. It's possible that gas expansion on the sunlit side of a planet and contraction on the shadow side induces a pumping effect that gets convection currents going so that cool descending air — encountering pressure —acquires a higher temperature, the result that always occurs when gases are compressed. But by whatever means atmospheric pressure due to gravity generates heat by itself, the evidence clearly indicates that it does.

Alan Siddons

Venus	Earth	Jupiter	Saturn	Uranus	Neptune	
2613.9	1368	50.5	14.9	3.71	1.51	Irradiance
231.7	254.3	110	81.1	58.2	46.6	Blackbody
350	288	165	134	76	72	1 bar
250	220	112	84	53	55	0.1 bar
100	68	53	50	23	17	Delta
1.40	1.31	1.47	1.60	1.43	1.31	Rate of rise

See also:

http://www.ilovemycarbondioxide.com/pdf/Carbon_Dioxide_The_Houdini_of_Gases.pdf

http://www.ilovemycarbondioxide.com/pdf/Greenhouse_Effect_Poppycock.pdf

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