The Question of Thermal Balance on Venus
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From a letter to the editors of UFO Magazine and part of a compendium of Venus related articles at:

http://www.bearfabrique.org/Catastrophism/venus/venus.htm

This document is in pdf format because of the difficulty in creating the equation which F.W. Taylor cites in html.

If one assumes that Venus is a sister planet to Earth, formed up out of swirling stellar material 4 billion years ago along with Earth, then Venus should be about 20 degrees warmer at any given latitude than Earth is and, in fact, that is what was taught 50 years ago. When the 900 degree F surface temperatures of Venus were discovered later in the space age, there should have been a line of scientists in front of Immanuel Velikovsky's house waiting to apologize. Needless to say, you could easily die of old age waiting for something like that to happen in America. What actually did happen was that Carl Sagan devised his "super greenhouse" theory, and that instantly became the standard theory for explaining the extreme surface temperatures on Venus. Sagan of course is also on record to the effect that we should all be dead from a similar greenhouse effect due to the oil fires of the Gulf War of 1991.

Trying to run to ground any of the lines of argument involved in the controversies in Velikovsky's theories is more work than most people are willing to do. In the several instances in which I've done that, I have always found that the raw data supports Velikovsky, and that the data which is published has always been doctored in some manner in order to conform with uniformitarian precepts. This is invariably because the scientists and scholars in question live in a publish/perish sort of a world, and their careers would not withstand publishing something which totally conflicted with accepted overall science paradigms.

The clearest such case involves the question of thermal balance on Venus.

Sagan's theory would require that Venus' atmosphere be in thermal balance, i.e. since all the heat would be derived from the sun, heat taken in and given out should equal eachother.

This is in fact in sharp disagreement with actual findings; astronomers have therefore actually found themselves in the position of having to explain AWAY 100% of the raw data. All of the Pioneer Venus (1979) probes which carried infra-red flux (upward vs. downward readings) meters to the surface measured a sharp upward ir flux, which is in keeping with Velikovsky's version, but not that of Sagan. Astronomers have posted official position papers (Revercomb/ Suomi et. al) explaining the manner in which each and every such probe "failed", without bothering to try to explain why they should not all be fired for failing to oversee the proper manufacture of so simple an instrument in even one case out of at least four (instruments were not all the same).

And then there is the question of F.W. Taylor's description of massive thermal imbalance as measured from outside Venus' atmosphere. Taylor is one of the foremost experts on questions of thermal balance on Venus. An article of his in New Scientist shortly after the PV mission described a massive thermal imbalance of 20%.

The primary book of findings from the Pioneer Venus probe is "VENUS", Hunton, Colin, Donahue, Moroz, Univ. of Ariz. Press, 1983, ISBN 0-8165-0788-0. An article by F.W. Taylor on pp 657-658 of that book notes:

> "Measurements of albedo are more difficult to calibrate than those of thermal flux, because of the problem of obtaining an accurate reference source. Using earth-based measurements, Irvine (1968) calculated a value for A [albedo] of 0.77 ñ 0.07, which was later revised upward to 0.80 ñ 0.07 by Travis (1975). The Pioneer Venus infrared radiometer had a 0.4 to 4.0 m channel calibrated by a lamp from which Tomasko et al. (1980b) obtained a preliminary albedo for Venus of 0.80 ñ 0.02.
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> "Another approach to determining the albedo is simply to assume that the atmosphere is in net radiative balance, whence the equation:
>
> $$rh_b^4 = (1-A)E_0 / a^2$$
>
> should apply. Here E_0 is the solar constant, and a the distance from the sun. This expression allows the albedo to be calculated from thermal measurements alone.
>
> "In this way, a value of $0.79^{+0.02}_{-0.01}$ has been obtained from Venera radiometry (Ksanfomality, 1977, 1980b) and [a value] of 0.76 +-0.006 [has been obtained] from Pioneer Venus emission measurements (Schofield et al., 1982).
>
> "Clearly the Pioneer measurements of emission and reflection are not consistent with each other if net radiative balance applies. A source inside Venus equal in magnitude to 20% of the solar input (i.e., accounting for the difference between A = 0.76 and A = 0.80) is very unlikely, since Venus is thought to have an Earth-like makeup, which would imply internal heat sources several orders of magnitude less than this. Also, even if such sources were postulated, it is difficult to construct a model in which these fairly large amounts of heat can be transported from the core to the atmosphere via a rocky crust without the latter becoming sufficiently plastic to collapse of the observed surface relief. This could be avoided if the transport was very localized, i.e., via a relatively small number of giant volcanoes. Although large, fresh-looking volcanoes do appear to exist on Venus...and the composition of the atmosphere is consistent with vigorous output from these, a simple comparison with terrestrial volcanism shows that the volcanic activity on Venus would have to be on an awesome scale to account for the missing 5 X 1015 W [watts], or so, of power. A more acceptable alternative is that the preliminary estimate of 0.80 +- 0.2 for the albedo from the P. V. [Pioneer Venus] measurements is too high, since the uncertainty limit is now known from further work to be too conservative. (J. V. Martonchik, personal communication.) A fuller analysis of the P. V. [Pioneer Venus]

> albedo data--still the best, in terms of wavelength, spacial and phase coverage, and radiometric precision, which is likely to be obtained for the foreseeable future--is likely to resolve this puzzle. In conclusion, then, the best thermal measurements of Venus ***WITH THE ASSUMPTION OF GLOBAL ENERGY BALANCE*** yield a value for the albedo of 0.76 +- 0.1; this is the most probable value."

Let's examine what Taylor is saying. The term "albedo", stripped of the four-syllable adjectives, is a measure of reflectivity, the percentage of light which bounces back from something.

Taylor is saying that there are two ways to measure this albedo, a direct method, and an indirect method involving a formula which relates albedo to thermal emissions, assuming thermal balance holds. The direct method:

> "The Pioneer Venus infrared radiometer had a 0.4 to 4.0 m channel calibrated by a lamp from which Tomasko et al. (1980b) obtained a preliminary albedo for Venus of 0.80 +- 0.02."

doesn't go into detail, but makes it clear that they either did one of the following things, or something entirely like one of them:

a. Brought the satellite to the dark side of Venus, beamed a light towards Venus, and measured how much of that light returned.

b. Brought the satellite to the light side of Venus, and simply turned the instrument towards the sun, and then towards Venus, and computed a ratio of the light intensities.

Taylor also mentions the indirect method:

> "Another approach to determining the albedo is simply to assume that the atmosphere is in net radiative balance, whence the equation:
>
> $rh_b^4 = (1-A)E_0 / a^2$
>
> should apply. Here E_0 is the solar constant, and a the distance from the sun. This expression allows the albedo to be calculated from thermal measurements alone.

Taylor notes that, if thermal balance does hold, the two techniques should produce the same number, but that they don't, and that the difference is so great, that a massive heat source on Venus would be needed to explain it, entirely in keeping with Velikovsky's version of the entire thing.

He notes that further study is needed, since he sees no way for Venus to have such a heat source given standard versions of solar-system history, and that the .76 value derived for albedo is therefore the "most probable" value.

He notes that the Pioneer Venus readings are the best we've had and the best we're likely to get for a long time:

> A fuller analysis of the P. V. [Pioneer Venus] albedo data--still the best, in terms of wavelength, spacial and phase coverage, and radiometric precision, which is likely to be obtained for the foreseeable future--is likely to resolve this puzzle.

Thus between the infra-red flux meters of the descender probes and the phenomena Taylor describes, all of the raw data flatly contradict Sagan and "super-greenhouse", and scientists are left having to explain away 100% of the raw data. In my estimation, that is no way to do science.

Taylor notes that:

> “Also, even if such sources were postulated, it is difficult to construct a model in which these fairly large amounts of heat can be transported from the core to the atmosphere via a rocky crust without the latter becoming sufficiently plastic to collapse the observed surface relief.”

This is the only semi-serious argument I’ve ever seen put forward when mentioning these facts on internet forums. In other words, the crust of Venus is supposedly too thick and too much of a barrier to heat for so much heat to be escaping past it. In real life, however, we do not have any real measurements of crust thickness for Venus and this idea of a thick crust is basically another assumption. Other planetary geologists have noted that the “observed surface relief” could simply be being thrown up as fast as it can melt down.