

A COMPUTER MODEL OF THE PRE-FLOOD ATMOSPHERE

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ABSTRACT

The existence of a pre-flood water vapor canopy on top of the existing atmosphere is strongly implied in the Scriptures (Genesis 1:7, 7:11-12, Proverbs 3:20)[1]. This paper studies the properties and characteristics of such a canopy by the development of a computer model. The model accurately predicts the vertical temperature profile of the U.S. Standard Atmosphere, thereby gaining credibility in its use on the pre-flood atmosphere.

The model reveals a pre-flood utopia over the entire face of the planet. The average ground temperature would have been a moderate 15 to 25 degrees Celsius and the base of the canopy, at 5 to 6 kilometers, would have been 70 to 90 degrees Celsius. This temperature inversion created a very calm stable atmosphere, with no clouds, no storm systems (just gentle breezes), no rain (Genesis 2:5). This condition allowed the base of the canopy to exist in a state of supersaturation (below dew point), due to the lack of precipitating nuclei. When the great deep broke up (Genesis 7:11), believed here to be volcanic eruptions, the hot dusty gases rose up despite the inversion and provided condensing nuclei for the supersaturated canopy, which then rained out. The extensive volcanic activity caused the continents to sink, and this, along with the water held in the canopy (5 to 10 meters), created a world-wide flood. As the canopy condensed a world-wide cloud cover would have developed, decreasing the amount of solar radiation on the earth, which in turn caused a great ice age after the flood. The canopy would also prevent the formation of carbon 14, and therefore, anything which existed under the canopy would contain no carbon 14 and when examined today would yield a false old age. The collapse of the canopy explains the extinction of many of the life forms on the planet, and the formation of fossils, coal, oil, and gas.

INTRODUCTION

The existence of the pre-flood canopy is a powerful tool in explaining the earth's young age and much of today's sedimentary geology. The canopy would create a world-wide utopia perfect for lush plant and animal life, even at the poles. This is corroborated by the evidence seen today. But is a pure water vapor canopy technically feasible? Would it not mix and precipitate out? What about the winter season, especially at the poles, how could the canopy survive there? To answer these and other valid questions, a model will have to be developed. A model is a mathematical prototype which attempts to simulate some real process. Models can be simple or very complex. The simpler the model, the easier it is to understand and manipulate. It also takes much less time and effort to develop. Once a simple model is made and well understood, a more complex and accurate model can be developed. This paper develops a simple model and attempts to achieve an intuitive understanding of the earth's atmospheric radiation balance. The computer program, written in Basic, is provided and it is hoped that interested parties will use this program to develop a more complex model.

UNDERSTANDING THE ATMOSPHERIC RADIATION BALANCE

Figure 1 shows the details in calculating the average energy striking the earth as one quarter of the incoming solar flux.

During the winter season, the pole receives very little sunlight and it is difficult to imagine the canopy not precipitating out. For this reason, it will be argued that the pre-flood earth had a declination angle close to zero. It is a widely accepted theory that a large meteorite hit the earth and perhaps this is what caused the 23 1/2 degree declination we observe today.

Figure 2 illustrates that the surface area of a sphere, for a uniform width of incident solar radiation, is the same at 60 or 80 degrees latitude as it is at the equator [2]. At 80 degrees the incident radiation strikes the surface at an angle (greater unit area) but the circumference is less. This means that the poles would receive the same average amount of solar radiation per unit area as would the equator (some thought will prove this out). The poles would be cooler, however, due to greater reflection of solar rays. This can also be understood by realizing that

the equator only receives 12 hours of sunlight per day and the polar regions receive continuous sunlight. It is the 23.5 degree angle of declination which is mostly responsible for today's cold polar regions.

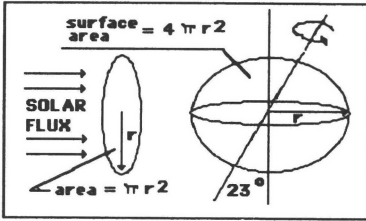


FIG 1 AVG. INTENSITY = SOLAR FLUX / 4

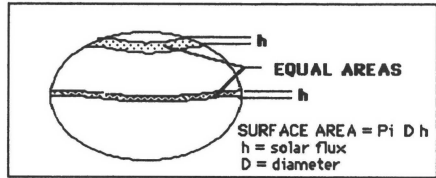


FIG 2 WITH NO DECLINATION THE POLE RECEIVES THE SAME SOLAR ENERGY AS THE EQUATOR

Radiation

Every object in the universe above absolute zero (-273 degrees Celsius) radiates energy due to atomic vibrations. The hotter an object is, the faster its atoms vibrate, causing shorter wavelengths and a higher energy output. When a body becomes increasingly hot it begins to radiate waves so short they enter the region of visible light (approximately .5 microns). An extremely hot body such as the sun emits a range of short wave radiation as shown in Figure 3. It is interesting that God designed the sun to emit a significant part of its energy in the visible region.

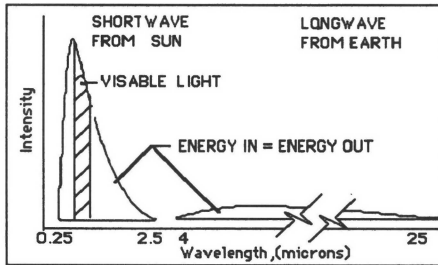


FIG 3 SUN-EARTH RADIATION EQUILIBRIUM

Atmospheric Absorption

As solar radiation strikes the earth's atmosphere, it can be reflected back into space, scattered, absorbed by the atmosphere, or transmitted to the ground where the remaining energy can be absorbed or reflected back to space. All the energy absorbed by the atmosphere and the ground must be radiated back to space in the form of long wave radiation to achieve an equilibrium (see Figures 3 and 4) [3].

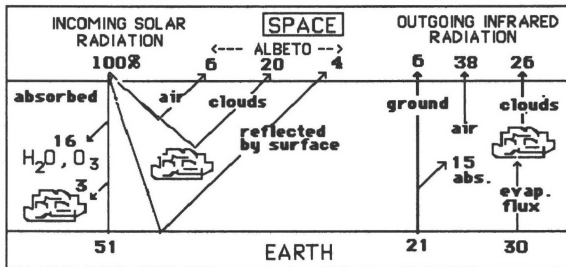


FIG 4 AVERAGE GLOBAL ENERGY BALANCE [2]

Figure 5 shows the development of the temperature profile of Earth's atmosphere. Figure 5a is the temperature profile of an atmosphere which does not absorb any incoming solar radiation. It cools exponentially with height until it reaches outer space temperatures. Figure 5b shows what would happen if there was a heat source at the 50 kilometer region. The ozone layer, which is a good absorber of a certain part of the solar spectrum, becomes the heat source. Figure 5c shows the temperature profile of today's atmosphere which absorbs heat in the outermost layers of the atmosphere and at the 50 kilometer ozone region. The reason this absorption is confined to bands, is because there is only so much energy available in the wavelengths being absorbed, or there is a limited number of absorbing molecules. By the time the sunlight hits the ground, it has been filtered in certain wavelengths.

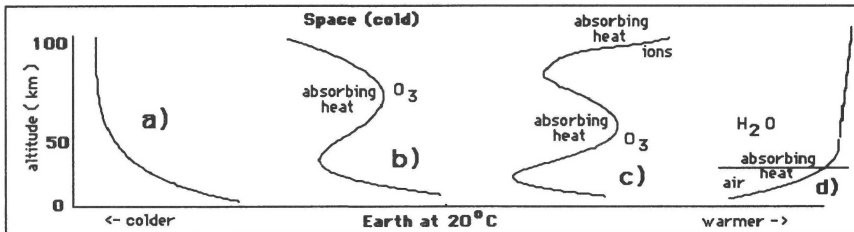


FIG 5 understanding Earth's temp. profile a) no sun b) heat at 50km c) heat at 50 & 100+ km (U.S. standard atmosphere) d) water vapor canopy

MODEL SETUP

For the sake of completeness, it would be desirable to develop all pertinent equations required, but this is not possible in a report of this length. The equations are all basic to atmospheric physics and developed in detail in the references given.

The following simplifications are made:

- It is assumed that radiation is monochromatic (ie. same average or representative wavelength). This is of course not the case in a real atmosphere; in spite of this, the model accurately predicts today's atmospheric temperature profile.
- There is only one species of molecule capable of absorbing radiation (this is essentially accurate for a water vapor canopy).
- The temperature profile is due to radiation transfer only. Convection and conduction are only a tiny part of the balance, and so can be ignored without significant loss in accuracy.
- The atmosphere can be treated as a number of thin layers which absorb and emit radiation.
- The first layer is deep enough to absorb approximately 60 percent of the long wave radiation from the Earth. This is about the same as in today's atmosphere. Some of the radiation not absorbed by the first layer will be absorbed by the base of the canopy as its absorption cross section is greater than the air layer below (see Figure 8). The remaining long wave radiation is lost to space through what is referred to as the atmospheric window.

Equations Required

$$n = n_0 e^{-Z/H} \tag{1}$$

where:

- n = number density of molecules.
- n₀ = number density at base of atmosphere (Z=0).
- Z = height from ground.
- H = scale height = RT/g.
- R = gas constant.
- T = temperature in degrees Kelvin.
- g = local acceleration due to gravity
- For this model H can be assumed to be

8000 meters for air and 15000 meters for water vapor.

$$\frac{di}{dz} = i c n \quad (2)$$

where:

di/dz = differential change in intensity with height.
 i = intensity of radiation.
 C = molecular cross sectional area (same hypothetical area on each molecule which is capable of absorbing energy).
 n = number density of molecules (as above).

$$q = E s b T^4 \quad (3)$$

where:

q = energy absorbed (as above).
 E = emissivity, the fraction of a body which can emit energy. When $E=1$ is referred to as blackbody radiation. E for polished foil is as low as .006. In the energy balance equation E is replaced by Cn_0 .
 T = absolute temperature in degrees Kelvin (deg.C + 273).
 Sb = Stefan Boltzmann constant ($5.67E-8$).

Absorption Profile (Chapman Profile) [4]

The total number of absorbing molecules above a level Z , using equation (1), is given by:

$$n_o = \int_z^{\infty} n dz = n_o H e^{-Z/H} \quad (4)$$

Integration of (2) substituting (1) for n gives:

$$i = i_{\infty} e^{[c n_o H e^{-Z/H}]} = i_{\infty} e^{-c n_o} \quad (5)$$

Introducing (1) and (5) into (2) gives a profile of absorption q as a function of height z as:

$$q = c n_0 i_{\infty} e^{[-(Z/H + c n_0 H e^{-Z/H})]} \quad (6)$$

This function is maximum when the exponent has a minimum absolute value. By differentiating it and equating to 0, this is found to occur when:

$$Z = Z_m = H \ln(c n_0 H) \quad (7)$$

Equation (7) is a very useful formula because it gives the cross section times the number of absorption molecules as a function of the penetration depth and scale height (two predictable variables).

$$c n_0 = \frac{e^{z/H}}{H} \tag{8}$$

Figure 6 shows this profile graphically. Some thought should bring meaning to the profile.

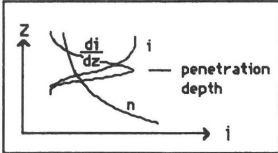


FIG 6 ABSORPTION PROFILE

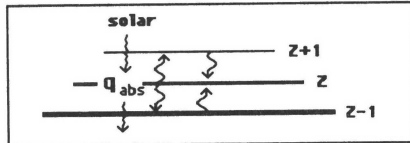


FIG 7 RADIATION BALANCE (FOR LAYER Z ENERGY IN = ENERGY OUT)

Energy Balance

From Figure 7 we can write the following energy balance:

	ENERGY IN		
absorbed short & longwave	+ # transmitting molecules from above	# transmitting form Z-1 = # from Z (Kirchoff's Law)	= ENERGY OUT = up & down transmission

$$q_a + c n_0 e^{-(z+1/H)} sb T_{Z+1}^4 + c n_0 e^{-z/H} sb T_{Z-1}^4 = 2 c n_0 e^{-z/H} sb T_Z^4 \tag{9}$$

Figure 8 attempts to show graphically why layer Z can only absorb part of the energy transmitted from the layer below. The length of the lines represents the total absorbing cross section for that layer, and the thickness of the lines represents the relative number density of absorbing and emitting molecules.

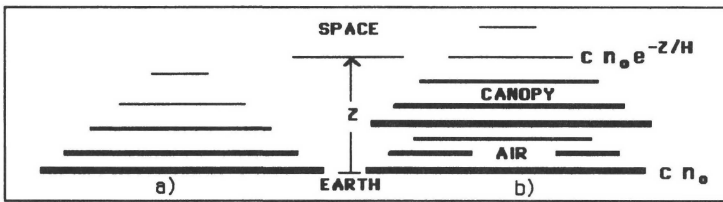


FIG 8 GRAPHIC REPRESENTATION OF RADIATING AREAS
a) today's atmosphere b) H₂O canopy atmosphere

Rearranging (9) gives the temperature of layer Z as a function of absorption and the temperatures from above and below.

$$\left[\frac{\frac{Q_a}{C n_0 s b} + e^{-(x+1/x) T_z} 4}{2 e^{-x/h}} \right]^{1/4} = T_z \quad (10)$$

Equation 10 can now be solved on a computer to give the temperature profile using the finite-difference method [5].

Figure 9 shows the computer's output profile in today's atmosphere and in the pre-flood atmosphere. Table 1 shows typical computer printout.

Note: supersaturation levels of 8 to 1 are possible in pure water vapor [6].



FIG 9 TEMPERATURE AND ABSORPTION PROFILES OF TODAY'S AND PRE-FLOOD ATMOSPHERES

TABLE 1 Typical output to 20000 meters (program works to a pressure of less than .5 millibars)

TEMPERATURE PROFILE FOR PRE-FLOOD CANOPY ATMOSPHERE

Solar flux=335 W/m2 ALBEDO= 15 % PRESSURE= 2 ATM.
 ZM= 6000 m Base of canopy= 6371 Meters
 Absorption of Insolation 22 % by canopy= 73 W/m2 top layer of air= 16.75 W/m2
 Absorption of lw in canopy = 20 % 39 Wm2

ALT.[m]	PRES.[mb]	TEMP.[C]	L.R.[C/Km]	LAYER #	q [W/m2]	SUPERSAT
0.0	1983	25				
2000	1735.06	21	-2.2	1	0	----
4000	1518.48	35	7	2	0	----
6000	1328.93	68	16.5	3	16.75	----
8000	1163.05	88	10.4	4	38.97	1.76 10000 1017.87
84	-2.1	5	5.7	1.82		
12000	890.81	83	-.7	6	5.57	1.68
14000	779.61	83	.3	7	5.36	1.43
16000	682.3	85	1	8	5.1	1.16
18000	597.13	88	1.5	9	4.8	.9

CONCLUSIONS

The penetration depth of water vapor was never reached in the canopy, therefore, it continued to absorb increasing amounts of energy down to its base. The excess long wave radiation, which was not absorbed in the first air layer or emitted directly to space through the atmospheric window, would also be absorbed by the first canopy layer. This was due to the canopy's increased absorption cross section as shown in Figure 8. The base of the canopy would be warmed by short and long wavelength radiation. Ozone would, no doubt, have been produced in the air layer just below the canopy by the same photochemistry as in today's atmosphere. The ozone molecules in this layer would be of greater number density than today's ozone layer, because of the mass of the canopy above, and would therefore absorb the solar energy at the ozone's

absorption wavelengths quickly. This in turn helped keep the canopy base warm enough not to precipitate.

As the water vapor began to diffuse down, it would heat up due to absorption of the long wave emission from the ground and rise back into the canopy. Remember that long wave emission occurs 24 hours per day and this would keep the base of the canopy warm at night.

Because of the temperature inversion, heated air at the ground could not rise and cool as it does today, therefore, there would have been no clouds under the canopy. However, hot gases from a volcano could rise against the inversion up into the canopy, providing precipitating nuclei. The supersaturated canopy would start to rain out and the entire planet would be engulfed in a thick cloud cover. This would greatly increase the albedo of the earth which would cause it to cool. The cloud cover would persist for many weeks and this would have caused the poles to freeze.

Further Studies:

- Broaden program to allow multiple penetration depths.
- Allow for selective absorption according to wavelength and temperature.
- Detailed look at diffusion.
- Detailed look at how volcanic ash rose up into the canopy.
- Details on the collapse and how long it would take the poles to freeze.
- Evidence to show Earth's near zero angle of declination before the flood.

REFERENCES

- [1] NEW AMERICAN STANDARD BIBLE, 1977.
- [2] CRC HANDBOOK, 19 Ed., 1971.
- [3] Wallace & Hobbs, ATMOSPHERIC SCIENCE AN INTRODUCTORY SURVEY, Academic Press, New York, NY, 1977, Fig. 7.1 p. 321.
- [4] Iribarne & Cho, ATMOSPHERIC PHYSICS, D. Reidel Publishing Co., Dordrecht, Holland, 1980, p. 56.
- [5] Incropera & Dewitt, FUNDAMENTALS OF HEAT TRANSFER, John Wiley & Sons, New York, NY, 1981, sections 4.4 & 4.5.
- [6] Miller & Thompson, ELEMENTS OF METEOROLOGY, 2nd Ed., Merrill, Columbus, OH, 1975, p. 34.

DISCUSSION

1) The "widely accepted theory" about a meteorite impact is that discussed with dinosaur extinctions. That meteorite was supposed to be only tens of kilometers wide, hardly large enough to tilt the earth. Do you have a reference for something larger, perhaps the size of the moon?

2a) Figure 2 discussion: The incremental surface areas on the sphere are indeed equal for equal h . They are also equal to the incremental surface area on a cylinder that is tangent to the equator. But the total solar energy intercepted by the polar regions is much less than that intercepted by the equator. The solar rays that are nearly an equatorial radius away from the rotation axis in the polar regions will miss the earth completely. The total intercepted energy, for equal h , varies with the cosine of the latitude. The poles will therefore intercept less energy and be cooler.

2b) The polar regions do not receive continuous sunlight. On an untilted earth all locations will have a 12 hour day except the exact points of the two poles themselves. For the tilted earth the continuous sunlight is only for a fraction of the year for regions poleward of the arctic and antarctic circles. The poles each have a six month day and a six month night.

3) Appendix comment on albedo. Albedo is the ratio of reflected to incident radiation. Most surfaces are assumed to be "Lambertian" in simple models like yours, meaning that the albedo is independent of incidence angle. This is not precisely true. When you fly in an airplane, the terrain is brighter close to the shadow of the airplane because direct backscatter is greater than scatter in other directions. Glass beads in signs, road paints, and on the moon have an even higher degree of direct backscatter and appear very bright when viewed from the direction of the light source. An increased albedo from low incidence angle would result from surfaces, like water, which are more mirror-like than uniform scatterers.

4) Water vapor is a good infrared black body at the canopy temperatures you produce. The top of the canopy should therefore radiate an abundance of energy into space, making the top of the canopy much cooler than the base. Such is shown in the Dillow model and the superior Rush and Vardiman model to be presented at this conference. Your lack of such a cold top makes your simple model highly suspect. You are probably getting nice results for wrong reasons.

Edmond W. Holroyd III, Ph.D.
Arvada, Colorado

Mr. Jorgensen has taken on the same project that a number of us have -- the reconstruction of the ancient earth's climate by means of the hypothesis of a vapor canopy. He has started with a simple model that allows room for expansion in the future. However, I have several points which I feel Mr. Jorgensen needs to address.

Mr. Jorgensen claims his model is valid because without a vapor canopy it accurately reconstructs today's atmospheric temperature profile, in Figure 9. However, since he does not consider convection, he should compare his model results with a pure radiational profile, not the actual profile. A pure radiational profile will have surface temperatures at 320-330 K, and a coolest temperature at about 10 Kilometers of 170-180 K. His model does not meet these criteria, and therefore further results are immediately suspect.

In canopy research reported elsewhere in this conference (Rush and Vardiman), we divided the longwave spectrum into as many as 350 separate intervals. Applied to a canopy of 1013 mb, each and every interval showed absorption by the canopy of 100.0% of incident terrestrial radiation. This disagrees sharply with the 20% figure reported by Mr. Jorgensen in Table 1. The effect of 100% absorption was the production of a very efficient "greenhouse," which raised surface temperatures above the boiling point of water.

Also concerning Mr. Jorgensen's Table 1, he lists the base of the canopy at 6371 meters; however, in the figures just below that, he lists a pressure of about 1300 mb at 6300 meters. This would give a canopy of about 1300 mb pressure and an atmosphere of only 700 mb, instead of 1013 mb for the canopy and 1013 mb for the atmosphere. His canopy also extends well into what is now space. At 180 kilometers, he shows a canopy pressure of nearly 600 mb. Even though our atmosphere and canopy were considerably hotter than his, and therefore would show a greater tendency to expand toward space, at a level of 100 km (the "top" of our canopy), we showed a pressure of only 2 mb. Also, our canopy showed a drop in temperature with increasing altitude as is typical with increase in temperature with altitude. It is not clear how a water vapor canopy would produce this unique effect.

David Rush, B.S.
San Diego, California

Mr. Jorgensen is to be commended on developing a relatively simple model of the pre-flood atmosphere and presenting a clear description of the workings of radiation in an atmosphere. However, I have two concerns which Mr. Jorgensen should address:

1. He makes the statement at the top of the second page of his paper that, "It is the 23.5 degree angle of declination (obliquity of the ecliptic) which is mostly responsible for today's cold polar regions." I believe this statement is in serious error and should be corrected so as not to mislead other researchers in this field. The 23 1/2 degree angle that the plane through the equator makes with the plane of the earth's orbit around the sun is the cause for the seasons and its magnitude determines the contrast between the seasons. If the obliquity is large, winters will be cold and summers hot; if the obliquity is small, both summers and winters are mild. But, even if the obliquity is zero - the earth's equator lies in the same plane as the earth's orbit around the sun - the polar regions will be cold and the equatorial regions hot. Further discussion of these points may be found in Hess, S.L., 1959: *Introduction to Theoretical Meteorology*, Krieger Press, pp. 131-134, 155-160, Lorenz, E.N., 1967: *The Nature and Theory of the General Circulation of the Atmosphere*, World Meteorological Organization, pp. 54-55; Sellers, W.D., 1965: *Physical Climatology*, The University of Chicago Press, pp. 19-33, 225-227.

I have prepared a graph (below) of the solar radiation as a function of latitude at equinox. These observations shown in Sellers were extracted and shown for an obliquity of 0 degrees proposed by Mr. Jorgensen. It is evident from this graph that solar heating would be a maximum at the equator and a minimum at the poles for today's atmosphere. It is not true that the 23 1/2 degree obliquity is responsible for today's cold polar regions.

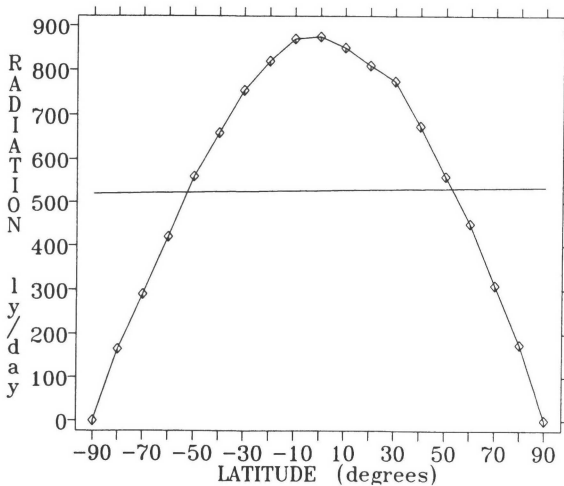
I believe warm polar regions likely existed in the past under vapor canopy conditions. However, this could have been true whether the earth was tilted or not due to the trapping of infrared radiation by the canopy and heating of polar regions by atmospheric and oceanic circulations.

2. The temperature distribution shown in Figure 9 shows "cool" surface temperatures and "hot" temperatures aloft, exceeding 100° to 200 km and beyond. These results, although desirable, are in disagreement with those of a much more complex model reported by Rush and Vardiman in this conference. In our results we found an isothermal temperature distribution below an assumed vapor canopy which was too hot for human habitation, if the canopy had 50 mb or more of water content. We hope adding cloud layers to our model in the future will reduce the temperature problems.

Mr. Jorgensen does not describe his initial temperature conditions, the changes in the profile as the computer model runs, or boundary conditions. Because of this I am unable to determine why there is such a discrepancy between his result and ours.

Mr. Jorgensen refers to an "atmospheric window" for long-wave radiation in his conclusions. Vardiman and Rush have found that a canopy of the mass used in this paper has no "windows" left to radiate long-wave energy to space. This may explain the difference in our results. I would be pleased to learn of a "window" we may have overlooked.

Larry Vardiman, Ph.D.
Santee, California



SOLAR RADIATION AS A FUNCTION OF LATITUDE AT EQUINOX

This paper begins by assuming the discredited Canopy Theory of the pre-Flood atmosphere, and builds an ingenious sophisticated mathematical and physical model on that basis.

Inasmuch as several in-depth analyses of the Canopy Theory (1) have shown it to be totally unwarranted by scripture as well as untenable by present natural laws, Mr. Jorgensen should have addressed this fact at the outset and given reasons for dismissing the strong case against the Canopy Theory in these earlier papers. Not having done so, this reviewer feels the paper is of purely academic value, regardless of its ingenuity. Furthermore, the author does not propose that the Creator operated the cosmos under a different set of natural laws before the Flood, yet the Canopy Theory clearly demands it!

(1) Whitelaw, R.L., THE FOUNTAINS OF THE GREAT DEEP AND THE WINDOWS OF HEAVEN, Science at the Crossroads, Proceedings of the National Creation Conference, Minneapolis, MN., 1983, pp. 95-104.

Robert L. Whitelaw, M.S.
Blacksburg, Virginia

CLOSURE

All comments were very helpful in revising my model. Fig.2 of the main paper states that "with no declination the pole receives the same solar energy as the equator". This statement is wrong. Even with a near zero inclination (declination is improper notation), the average energy received by the surface continually decreases to a value of zero at the poles (see Fig.2 below). The energy absorbed by the canopy was however, uniform over the entire globe or may even have increased at higher latitudes as shown in Fig.2. This enabled the canopy to remain intact.

The surface at the poles would have been frozen as shown in Fig. 1 below. This is quite contrary to the belief that at one time the entire planet was tropical. I believe now that there were ice caps at both poles under the canopy. This would answer the nagging questions about the origins of cold climate animals. They obviously did not adapt to cold climates after the flood because their physiology strongly indicates they were designed to live in cold climates. Some whales even have antifreeze in their bodies so they can survive in sub-zero salt water. The reason we see an ancient tropical climate at the poles is because of continental drift or the break-up of "Pangaea".

It has also come to my attention that the amount of water in the canopy was probably a lot less than previously reported. A careful reading of Genesis, Chapter One, verses 1 to 8 will reveal that the firmament was the oxygen and nitrogen atmosphere that God created on the second day. This means that before this, there was a water filled earth with only a water vapor atmosphere with a surface pressure dependent on the temperature of the water as shown in Table 1 below.

ANSWERS TO DISCUSSION:

Dr. Edmond W. Holroyd III

Comment 1) To my knowledge there is no direct evidence for an impact that would incline the earth to today's 23 1/2 deg., but I offer the following circumstantial evidence:

- A vapor canopy could not survive 6 months of darkness at the poles.
- A near 0 inclination would give the stable atmosphere required to keep the canopy from mixing and precipitating out.
- Many believe the year was created to be 360 days. Something massive must have hit the Earth to bring it to our present 365 days.
- A huge meteor impact would be an ideal trigger for breaking up the oceanic lithosphere required in Dr. Baumgardner's model.
- Uranus appears to have been "knocked over" 90 deg., and its core is still lagging behind. This would explain its strange magnetic field.
- Dr. Humphreys appears to need a mechanism to trigger strong convection in the Earth's core during the Deluge. Could this not have been a large meteor or even a large body passing close by the earth?

Comment 2) As stated above, Fig. 2 of the main paper is in error. Revised absorption curves are shown in Fig. 2 below.

Comment 3) Some of this backscatter at higher latitudes was absorbed by the canopy and was partly responsible for its maintenance.

Comment 4) It is true that water vapor is a good infrared black body, much higher than air. This is depicted graphically in Fig. 8 of the main paper. It is also true that water vapor is a better overall absorber of solar radiation than air. The canopy was warmer at higher altitudes for the same reasons ozone is warmer in today's atmosphere. The water vapor does take a dip in temperature at the 30,000 meter point. This is the point where the vapor may have become supersaturated and formed clouds.

Mr. David Rush

Comment 1) Does not match pure radiation curve.

I did not consider convection in my model. If there was a temperature inversion from the canopy to the ground, there would be little or no convection. This is why the canopy was so stable. In today's atmosphere, Fig.9 of the main paper, I hand fed some convection into the lower levels. When I plot a pure radiation curve and compare it to those provided by Mr. Rush, they are a close match, so I still have confidence in the equations. Now however, I believe that the canopy was high enough so that the inversion would not reach the ground. My model will have to be revised to include convection. The expected influence by convection is shown by the dashed line in Fig.1 below.

Comment 2) Errors pointed out in Table 1 as follows:

Twenty percent absorption of lw in canopy instead of 100%. Fig. 1 below is corrected to 100% absorption of lw radiation by the canopy. Base of canopy in Table 1 is in error: this is corrected in Fig.1. The 600 mb pressure is at 18 km not 180 km. My canopy now drops in temperature with height, but at 30,000 meters it starts to climb again due to solar absorption.

Dr. Larry Vardiman

Comment 1) I am in error in saying that the tilt of the earth's axis is responsible for today's cold poles.

Comment 2) The reason my model does not agree with yours is that I did not include convection. I feel however that the temperature does not have to be isothermal below the canopy because it was calm enough that the influence of convection heat transfer lagged behind the influence of radiation heat transfer. This is an area which needs some research.

- Initial conditions comment) My model gives the long-term equilibrium conditions only and is not designed to give the transient conditions to achieve this equilibrium.

- Atmospheric window comment) Fig. 1 below assumes no window.

Prof. Robert Whitelaw

Comment 1) Unwarranted by Scripture.

The Bible clearly teaches of the waters above and below the atmosphere. The created earth had no air, only water so would have had a water vapor atmosphere as described in my opening comments above.

Comment 2) Unable to exist by today's laws.

In his paper "THE FOUNTAINS OF THE GREAT DEEP AND THE WINDOWS OF HEAVEN", Prof. Whitelaw presents the following arguments as to why the canopy could not exist:

- It would diffuse to the ground in a matter of minutes) This is a common argument against the existence of the canopy, but it is simply not true. Most do not take the time to calculate it. Any fundamental book on transient mass transfer could be used to calculate it. Results show that after 2000 years little or no water vapor has diffused to the ground. These calculations ignore the gravitational field which would have helped buoy up the water vapor. Also ignored was the fact that as water molecules diffused down into the air below, they would have absorbed some long-wave radiation from below, warmed up, and rose back up into the canopy.

- Temperatures would not be high enough) It has been amply demonstrated that water vapor can be cooled, in the absence of precipitating nuclei, to -40 C.

I am confident that if we trust God's word and study the physics of a vapor canopy long enough we will come to the conclusion that it could and did exist by today's laws.

Closure Tables and Figures

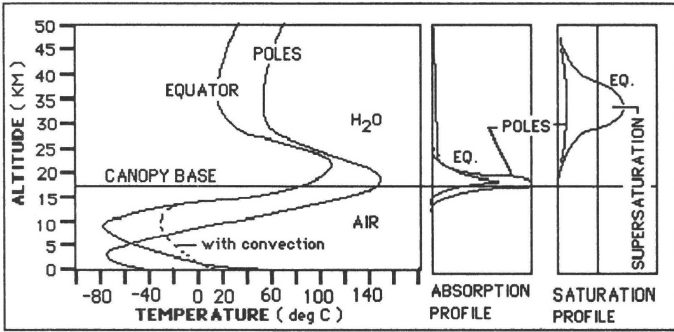


FIG 1 TEMPERATURE PROFILE FOR A 50 mb CANOPY ATMOSPHERE

OCEAN TEMP.		CANOPY PRESSURE		
°C	°F	ft of water	ATM	mb
100	212	34	1.00	1013
80	176	16	0.47	474
60	140	7	0.20	200
40	104	2.4	0.07	74
30	86	1.4	0.04	42
20	68	0.7	0.02	23

TABLE 1 Canopy pressure depends on Gen. 1:1 ocean temp.

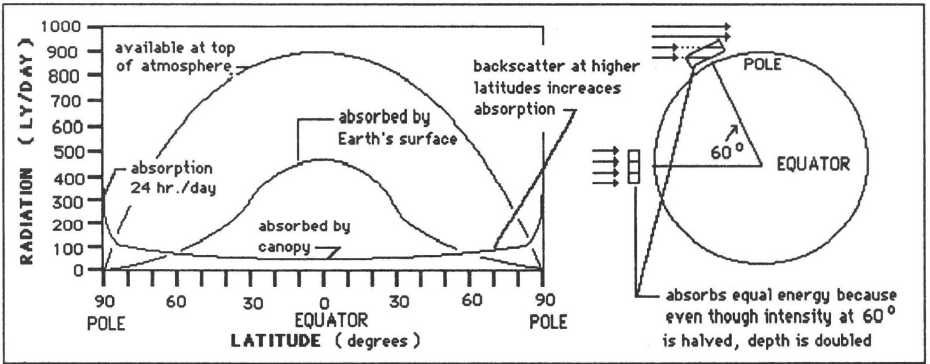


FIG 2 SOLAR ABSORPTION AS A FUNCTION OF LATITUDE FOR CANOPY & SURFACE (0° INCLINATION)

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