INTRODUCTION TO
CHAPTER TWENTY

In the pages ahead, let us examine the firmament, or expanse of the Earth's atmosphere, which God originally set in place on Day Two of the Creation week. This chapter presents a few important facts about this firmament, which will help to better understand that special layer of water which was originally (and to a degree, still is) above the firmament. Certain fundamental physical principles are shown which would have easily allowed the ancient layer of water to be maintained in the upper atmosphere. As a passing note, it appears that the special layer of atmospheric water was altered, and possibly greatly reduced, at the time of the Noahic Flood.

The following discussion touches upon the magnetosphere, that immense magnetic field which surrounds this Earth, and also reversals in the polarity of this magnetic field. By the time the Reader is finished with this book, they may begin to understand what causes these apparent magnetic reversals. Turning to another subject, a special type of atmospheric windstorm is noted, and also, for those studious individuals who enjoy further research, an interesting chemical cycle which is ongoing in the upper atmosphere.

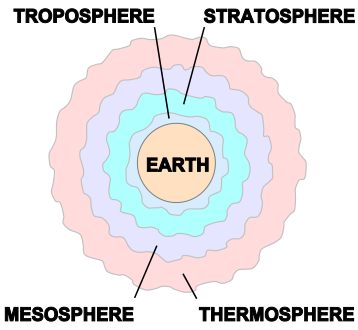
This chapter examines the nature of the firmament, as it appears to us today. The various layers in the atmosphere, as labeled by modern reference sources, are given. A logical explanation for the cause of these various layers is also given. By the time this chapter is finished, it may readily be understood why there were not the various heat layers, or heat patterns within the atmosphere (as we find them today), before the sun came into existence. By this basic discussion, may the Reader begin to understand the great wisdom of God which was used, step by step, in the Creation of the Earth, the universe, and all things contained therein.

Chapter 20: ATMOSPHERIC OBSERVATION

CLEAR VISION

The man of God proclaims: *"I would seek unto God, and unto God would I commit my cause: which doeth great things and unsearchable; marvellous things without number..."*[1] Another man of God declares: *"For the invisible things of him from the creation of the world are clearly seen, being understood by the things that are made, even his eternal power and Godhead..."*[2]

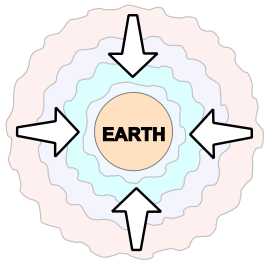
GENERAL STRUCTURE



This chapter is a very basic, nonetheless an important study of the atmosphere which God placed around this Earth on the second day of Creation. This atmosphere is composed of various layers. These layers generally form concentric spherical shells. The individual layers are composed of various materials, some of which are more specific to certain layers. These spherical shells are not perfectly shaped, but rather, they are continually moving, and distorted in various ways by the numerous forces of nature acting upon them.

This chapter also examines the effects which specific atmospheric conditions have upon water vapor. The following examination will, to a certain degree, allow us to more easily comprehend a number of the phenomena which occurred within those special waters which were trapped above the firmament, once the sun came into being.

A FEW FACTS



EFFECTS OF GRAVITY

It appears that the overall atmosphere is held inward toward the Earth to a large degree by the force of gravity. But as we have seen in the preceding chapter, magnetism is also involved in shaping this vast, gaseous structure.

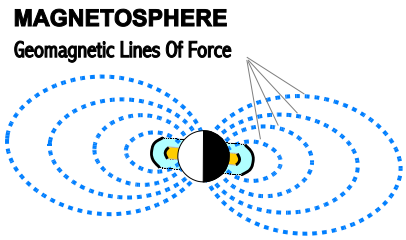
Another force effecting the shape and various conditions within the atmosphere is the sun. The sun effects the atmosphere both by its magnetic and gravitational forces, and also by the interactions of the sun's electromagnetic radiation with components of our atmosphere. But this is not all.

Yet another force which distorts the shape of the otherwise concentric atmospheric shells are those immense, wavelike windstorms. These powerful windstorms often turn into continental-sized regions of extreme turbulence. They originally start in the lower atmosphere, and then rise steadily upward. As these storms gain altitude, they become larger and more powerful. Ultimately, they break apart into immense, extremely violent windstorms in the upper atmosphere.[3]

OUTWARD EXPANSION

The temperature in the thermosphere (the outermost main region of the atmosphere) increases rapidly as altitude is gained. This increase in temperature causes the volume of gases in this region to greatly expand. The ultimate effect of this expansion is to force the overall atmospheric envelope outward from the Earth to a degree far beyond that which would be attained if the temperature steadily reduced with a gain in altitude, as it does in the lower atmosphere.[4]

FULL SIZE



The protective magnetic sheath which envelops the atmosphere of this Earth is called the magnetosphere. This magnetosphere is generally believed to be about 62,000 miles (100,000 km) in diameter at the equator.[5]

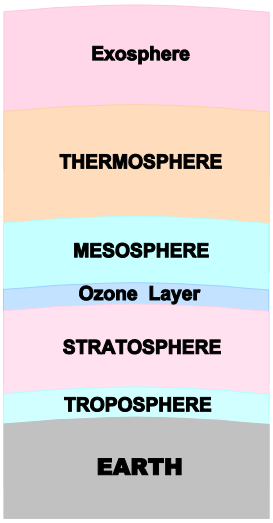
Within the magnetosphere occur such phenomenon as magnetic storms. At times, these storms can be extremely powerful. They can cause the magnetosphere to become highly unstable for a certain period of time.[6] During this unstable period of time, the electronic communications systems of mankind (and many other electrical things) may be adversely effected.[7]

The powerful magnetic storms are believed to be caused by gusty solar winds which emanate from the sun. These intense magnetic storms appear to be related to the peak period in the sunspot cycles.[8] These peak periods occur about every 11 years, with a complete cycle lasting 22 years.

REVERSALS

The magnetosphere is just a part of the magnetic field of this Earth. Concerning the magnetic field, studies by the scientists appear to indicate that this field has reversed its polarity a number of times since Creation.[9] This magnetic reversal of the Earth's field is of interest because the sun also has reversals in the polarity of its magnetic field. The difference is that the sun's reversals appear to follow a definite pattern. They seem to be rather predictable. Those of the Earth are not so predictable.[10] The scientists have found that the sun's magnetic reversals occur in conjunction with the 11-year sunspot cycle. These magnetic reversals ultimately give rise to a new cycle.[11]

THE ATMOSPHERE



Let us now return to our discussion of the atmosphere which surrounds this Earth.

It is said that the Earth's expanded atmosphere is composed of four main layers. Starting at the surface of the Earth is the troposphere. The next layer is the stratosphere. Within the stratosphere lies the ozone layer. The third main layer is the mesosphere; the fourth is the thermosphere. The outermost part of the thermosphere is called the exosphere.[12]

The exosphere extends outward to about 6,000 miles (9,600 km) above the surface of the Earth.[13] This places the furthest extent of the atmosphere into the region between the two main Van Allen radiation belts. This is an interesting coincidence!

THE TROPOSPHERE

The lowest layer of the atmosphere (that layer which rests upon the surface of the Earth) is called the troposphere. This lower region of the atmosphere is where almost all of the weather occurs. This particular layer, because of its higher density, also contains about 90 percent of the Earth's atmosphere, by weight.[14, also see 15]

As a benefit to all life on the face of this Earth, the troposphere currently contains about 99 percent of the water vapor found within the whole atmosphere.[16] Nevertheless, let us here take note that the current situation of atmospheric water vapor is far different than it was during that time in the early history of the Earth when the original layer of waters existed above the firmament.

AIR PRESSURE

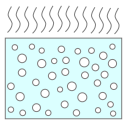
Air has weight. As a person travels to higher elevations, there is a thinner layer of air above them. This translates to less air above them. This, in turn, means that there is less weight of air above them. For this reason, as altitude is increased, the air pressure decreases at a rapid rate.

At sea level, the air pressure is commonly given a value of 14.69 pounds per square inch, absolute (1013.3 millibars). At an altitude of 10 miles (16 km) the air pressure is only about 1.47 pounds per square inch, absolute (101.3 millibars).[17] The air pressure at an altitude of ten miles (16 km) is only one-tenth that of sea-level air pressure.[18]

Within the ozone layer, at an altitude of 20 miles (32 km), the air pressure is down to about 0.147 pounds per square inch, absolute (10.13 millibars). This is only one-hundredth that of sea-level air pressure.[19] Friend, how will a reduction in air pressure effect the boiling point of water? Let us next examine this important subject.

BOILING POINT

Water begins to boil at 212 degrees Fahrenheit (100°C) at sea level, with a standard atmospheric pressure of 14.7 pounds per square inch (10,336 kgs/sq m). As altitude is steadily increased, water begins to steadily boil at a lower and lower temperature. This reduction in boiling point is a direct result of a reduction in air pressure upon the surface of the water.



Let us now examine a real-life example. In the eastern foothills of the Rocky Mountains lies the mile high city of Denver, Colorado. This city resides at an elevation of about 5,280 feet (1,609 m) above sea level.[20] In the reduced air pressure at this altitude, water boils at about 203°F (95°C), rather than at the normal sea-level standard of 212°F (100°C).[21]

GOING HIGHER

At an altitude of 10 miles (16 km), the air pressure is down to a value of about 1.5 pounds per square inch absolute (1,055 kgs/sq m). To give some idea of what happens to the boiling-point of water at this reduced air pressure, let us look at a few, readily available examples.

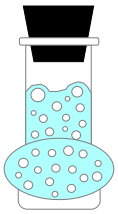
A reference source indicates that at the somewhat greater air pressure of 5 pounds per square inch absolute (3,516 kgs/sq m), which would be at an altitude somewhat lower than the above 10 mile (16 km) figure, the boiling point of water is only about 162°F (72°C). At an air pressure of one pound per square inch (703 kgs/sq m), which would occur at an altitude which is slightly above 10 miles (16 km), water boils at only 102°F (39°C).[22]

JUST ONE MOMENT

Friend, up to this point we have examined the boiling point of water up to an altitude of only 10 miles (16 km). This altitude is located in the lower stratosphere. It is still far below the floor at which the thermosphere begins. Above its floor, the thermosphere extends upward to a very great altitude indeed!

What would be the reduced air pressure at this extreme altitude? Truly, what would be the boiling point of water at these very high altitudes? Friend, at these altitudes, the air pressure is so reduced that the average person would tend to compare it to a vacuum, rather than a pressure![23]

VACUUM BOILING



Water can be caused to boil without applying any external heat at all. This is accomplished simply by reducing the pressure within the boiling vessel. As pressure is steadily reduced, a point is reached at which water will boil at ordinary room temperature.[24 and 25]

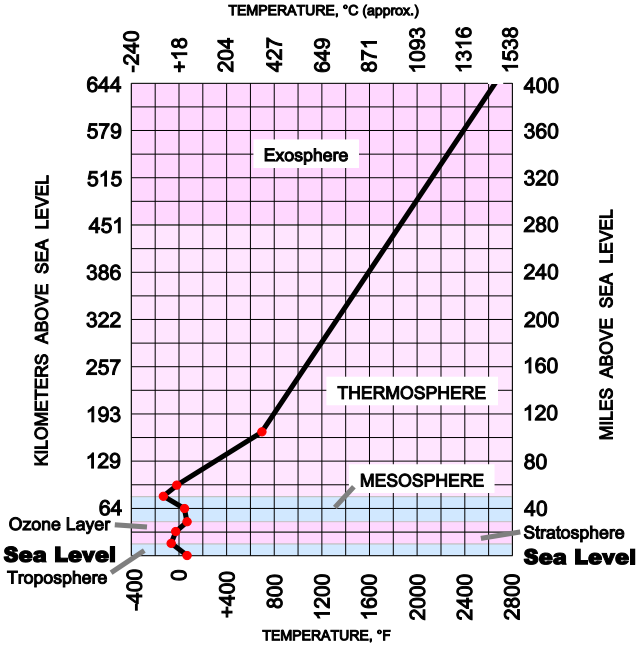
Friend, let us continue on this line of thought. As the internal pressure is reduced further in a vessel, a point will be reached at which water is freezing and boiling at the same time.[26] In such a case, the water is converting straight from the solid state, into the gaseous state.[27] In this case, there appears to be no intermediate state where water is in its liquid form. In such a case, we may say that the water is subliming.

THE THERMOSPHERE

Returning to our examination of atmospheric layers, the next layer above the mesosphere is called the thermosphere. The floor of the thermosphere begins at approximately 50 miles (80 km) above sea level. This atmospheric layer then extends upward to about 375 miles (600 km).[28] Within the lower portion of the thermosphere is the region commonly called the ionosphere.

At the lower boundary of the thermosphere is the mesopause. At the mesopause, the average temperature drops to roughly minus 112 degrees Fahrenheit (-80°C).[29]

REFERENCE CHART

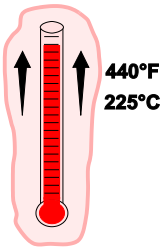


The reference chart, shown to the left, indicates the air temperature at various altitudes above sea level. This chart also indicates (what mankind has classed as) the main layers in the atmosphere. Later in this chapter will be shown the true nature and also the true causes of these supposedly separate atmospheric layers.

The information to produce this chart was obtained from a number of different sources. Because the conditions within the atmosphere are so changeable, the findings of each source may be different. Therefore, this chart may have slight differences from other charts at your disposal.

THE UPPER REACHES

Let us now examine one factor which appears to greatly effect atmospheric conditions (and may also effect the atmospheric information, as noted between the various reference sources). As an example of that great changeableness within the atmosphere at different times of the day, let us simply look at that layer called the thermosphere.



Minimum Temperature

Let us first look at the upper boundary of the thermosphere. Here is located what is commonly called the thermopause. In this region (one source claims), the temperature drops to a minimum of about 440 degrees Fahrenheit (225°C) during the night, when solar activity is lowest.[30]

During the daytime (the source claims) at periods of maximum solar activity, the temperature in the thermopause soars to a searing 2,690 degrees Fahrenheit (1,475°C).[31] This is far more than enough temperature to instantaneously boil water! There is one thing to note here. As learned in Chapter 17, this high temperature is still far below that required for the thermal decomposition of water vapor. Therefore, any water vapor in this region may tend to remain as simple, superheated steam (if other forces were not affecting the situation[32]).

Let us now examine the cause for this heating in the upper part of the thermosphere. This great heating occurs because the oxygen contained therein readily absorbs a portion of the ultraviolet energy emitted by the sun, and becomes excited.[33] Within this region of the atmosphere, very unusual reactions also occur between the excited atoms and molecules of oxygen and nitrogen.[34]

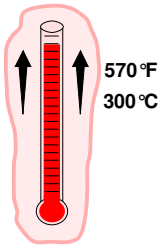
FURTHER CONSIDERATION

Friend, once again, let us consider all the evidence that has been presented. Then let us answer the following questions. What would happen to any water, if it were suddenly released into the extremely low-pressure, high-temperature thermosphere? What would happen to a great volume of water vapor, if it were trapped in this superheated upper region of the atmosphere? While we are still thinking on these matters, let us now consider one more point.

In this discussion, the main portion of the thermosphere is not the only place in the atmosphere to consider as the location for the ancient water canopy (those waters above the waters) which encircled this Earth at the time of Creation (and still do, to a degree). Let us now consider another potential location for this great canopy of protective water vapor which formerly encircled this Earth.

The next outer portion of the atmosphere which envelops the main thermosphere (and is often considered as a part of it) is called the exosphere. This outer layer operates at an even higher temperature, and with even a lower air pressure than does the main thermosphere.

THE EXOSPHERE



Minimum Temperature

The temperature in the exosphere is claimed to average about 1,300 degrees Fahrenheit (700°C). When sunspot activity is at its lowest, it is claimed that the temperature in this region of the outermost atmosphere averages about 570 degrees Fahrenheit (300°C).[35]

On the other hand, it is said that during periods of maximum sunspot activity, the temperature in the exosphere soars to about 3,090 degrees Fahrenheit (1,700°C).[36] (Note: This temperature is still too low to thermally split water.)

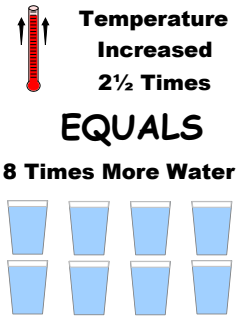
Friend, there is an extreme amount of heat potential in the exosphere! What would be the true effect of all this great heat potential upon any water vapor which may become trapped in this layer? Truly, what happens to water content as temperatures increase so radically?

A SIMPLE FACT

Friend, it should be noted that the higher the air temperature, the greater the amount of water vapor which may be held in suspension before reaching the saturation point. This will allow for a greater volume of water in the air before any precipitation occurs.[37]

AN EXAMPLE

At an air temperature of 40 degrees Fahrenheit (4.4°C), a 1000 pound (454 kg) portion of moist air can hold up to a maximum of 5 pounds (2 kg) of water vapor. At 100 degrees Fahrenheit (37.8°C), the amount of water vapor held in this 1000 pound (454 kg) portion of moist air increases dramatically. At this temperature, a maximum of 40 pounds (18 kg) of vapor is held in the air.[38]



In the example above, the air temperature was multiplied only 2.5 times, yet the water content of the air sample was increased by 8 times.

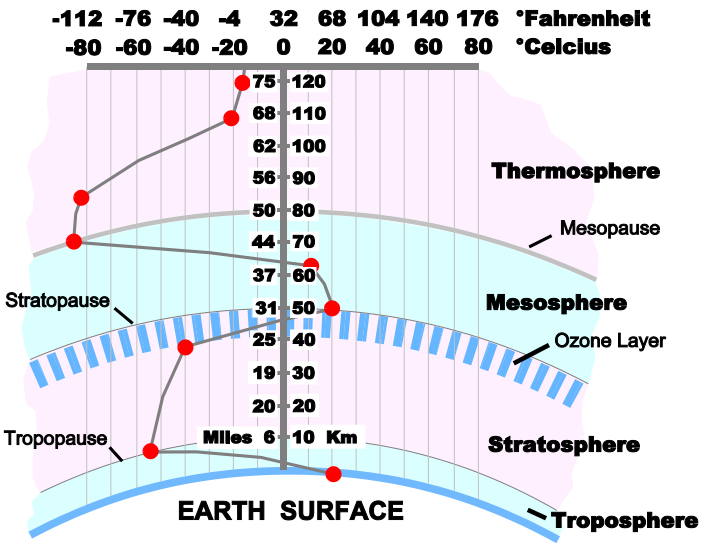
In the thermosphere, the minimum air temperature is said to be about 440 degrees Fahrenheit (225°C), and the upper temperature about 2,690 degrees Fahrenheit (1,475°C), all at a greatly reduced air pressure. A great quantity of superheated water vapor could easily be held in suspension before the saturation or precipitation point was reached.

In the exosphere, with its average temperature of about 1,300 degrees Fahrenheit (700°C), and an even lower air pressure, an even greater volume of water vapor could readily be held in suspension without precipitating. And so it was from the early days of Creation!

UNIQUE CHARACTERISTICS

During Creation, God did some very interesting things with the Earth's atmosphere. An example is the temperature patterns within the various regions of this atmosphere (see diagram below). At first, these patterns may appear somewhat confusing, but truly, they are relatively easy to understand. The causative factors need only to be clearly understood. The truth is, the science of man complicates things more than is necessary! The truth of God simplifies things greatly!

SIMPLE OBSERVATIONS



From the surface of the Earth, upwards, to the top of the troposphere, the temperature becomes less with increasing altitude. In the next outer layer, the stratosphere, the temperature becomes greater with increasing altitude.[39]

In the ozone layer, the temperature increases very rapidly with increased altitude. The next outer layer, the mesosphere, has a lowering of temperature with increasing altitude. In the thermosphere, once again, the temperature rapidly increases with an increase in altitude.[40]

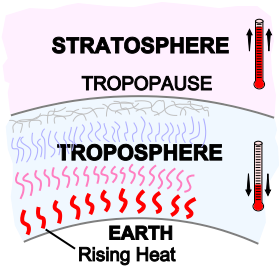
SIMPLE CAUSES

The temperature pattern in the troposphere is caused by heat radiating upward from the surface of the Earth. As the warm air mass rises, it expands. This expansion has a cooling effect upon the rising air mass.

The air mass continues rising, and cooling, within the troposphere. It continues to rise until it is no longer warmer than the air mass which surrounds it. This change in surrounding temperature appears to come at what is called the tropopause.

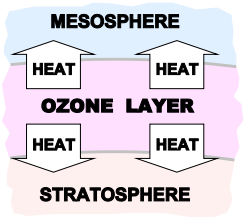
At the tropopause, the temperature pattern reverses direction. The air above this region becomes warmer again. Basically, at the location of the tropopause occurs a temperature inversion.

THE BARRIER



The temperature inversion at the tropopause prevents vast quantities of moist air from escaping out of the troposphere. It works to bar moisture from entering the upper reaches of the atmosphere, and possibly beyond. The tropopause is a barrier to the important substances so necessary on the surface of this Earth. The tropopause helps maintain the livable environment for all the plants, animals, and humans on the surface of the Earth.

LOWER HEATER



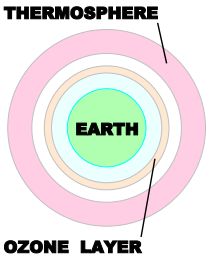
The ozone layer in the upper portion of the stratosphere is heated by the absorption of ultraviolet radiation from the sun. This layer is about the same general temperature as the surface of the Earth. The heat from the ozone layer is radiated both toward the Earth and upward, toward the mesosphere. The downward radiation increases the temperature of the stratosphere.[41 and 42]

For the above reason, as one continues upward through the stratosphere, the temperature steadily increases as the relatively warm ozone layer is approached. On the other hand, as altitude is increased through the mesosphere (and away from the warmed ozone layer), there is a steady decrease in air temperature.

THE UPPER HEATER

As altitude is steadily increased upward through the thermosphere, the temperature also steadily increases. This temperature increase is a result of the reaction between oxygen atoms and extreme ultraviolet radiation from the sun. This reaction takes place above an altitude of approximately 60 miles (97 km). It causes extreme heating of the upper thermosphere.[43]

JUST THREE



Let us now greatly reduce the complexity of our atmosphere, and those real causes of atmospheric heating. In considering the heat flow within the atmosphere, there truly are only three main source-regions of heat to consider. The first source is the radiating surface of the Earth itself. The other two sources of atmospheric heating are the ozone layer and the thermosphere. These two atmospheric layers radiate their absorbed heat both upwards and downwards.

MASS MOTION

The atmosphere is not a static environment, but is ever changing, moment by moment. The regions called the tropopause, stratopause, mesopause, and thermopause, are constantly varying in altitude. The density of the atmosphere is also ceaselessly changing. This variability is a result of many factors, one of which is the changeable nature of the bombarding energy from the sun.[44]

THE OZONE LAYER

Located at an altitude of about 16 miles (25 km) above the surface of the Earth resides the ozone layer.[45] Ozone is a form of oxygen in which three atoms of oxygen make up a molecule, rather than two atoms per molecule as in normal oxygen gas.[46]

Liquid ozone is a strongly magnetic substance.[47] It displays powerful paramagnetic properties. The alignment of magnetic fields within this paramagnetic material would tend to cause it to be drawn into the strongest part of the Earth's magnetic field.[48] In other words, the ozone layer may be located in that portion of the atmosphere which exhibits the highest magnetic flux density.

PARAMAGNETIC PARTNERS

It appears that the only other common gases found in Earth's atmosphere (besides oxygen and ozone) which display paramagnetic properties are nitric oxide (NO) and nitrogen dioxide (NO_2).[49]

Nitric oxide can be oxidized in the air. It is then converted into nitrogen dioxide. Nitrogen dioxide can photodissociate in sunlight to form nitric oxide and reactive oxygen. The reactive oxygen is able to then convert into ozone.[50]

It appears that the nitric oxide to nitrogen dioxide, then back again to nitric oxide process (noted above) is a type of continuous cycle. It continues unabated in the upper atmosphere.

A LOOK BACK

On the second day of Creation, the ozone layer and the thermosphere were not being heated by the sun. The sun had not yet been created. It was not created until the fourth day of Creation.

On the second and third days of Creation, without the incoming radiation from the sun, the ozone layer and the thermosphere did not act as barriers to the upward travel of warm or hot air masses within the atmosphere.[51] During the first three days of Creation, the 'gate' was left wide open. In such a state, all excess heat and gas could readily escape into the deep cold of outer space. In this manner, the environment was being rid of excess heat and gas in preparation for living things.

After God Almighty created the sun, the interaction of the sun's energy with the layers of the ozone and thermosphere caused them to begin acting like gates and barriers to radiation of various frequencies.[52] These layers were created to meter the flow of both incoming and outbound radiation, and to help automatically control the environment of Earth.

Let us now slow down our pace. Let us pause, and look to that magnificent One who created all of these wonderful things which we are examining. Let us truly stand in awe of Him!

TRUE WISDOM

The Word of God asks: *"Who hath measured the waters in the hollow of his hand, and meted out heaven with the span, and comprehended the dust of the earth in a measure, and weighed the mountains in scales, and the hills in a balance? Who hath directed the Spirit of the LORD, or being his counsellor hath taught him?*

"With whom took he counsel, and who instructed him, and taught him in the path of judgment, and taught him knowledge, and showed to him the way of understanding?

"Behold, the nations are as a drop of a bucket, and are counted as the small dust of the balance: behold, he taketh up the isles as a very little thing. And Lebanon is not sufficient to burn, nor the beasts thereof sufficient for a burnt offering.

"All nations before him are as nothing; and they are counted to him less than nothing, and vanity. To whom then will ye liken God? Or what likeness will ye compare unto him?

"The workman melteth a graven image, and the goldsmith spreadeth it over with gold, and casteth silver chains. He that is so impoverished that he hath no oblation chooseth a tree that will not rot; he seeketh unto him a cunning workman to prepare a graven image, that shall not be moved.

"Have ye not known? Have ye not heard? Hath it not been told you from the beginning? Have ye not understood from the foundations of the earth? It is he that sitteth upon the circle of the earth, and the inhabitants thereof are as grasshoppers; that stretcheth out the heavens as a curtain, and spreadeth them out as a tent to dwell in: that bringeth the princes to nothing; he maketh the judges of the earth as vanity. Yea, they shall not be planted; yea, they shall not be sown: yea, their stock shall not take root in the earth: and he shall also blow upon them, and they shall wither, and the whirlwind shall take them away as stubble.

"To whom then will ye liken me, or shall I be equal? saith the Holy One. Lift up your eyes on high, and behold who hath created these things, that bringeth out their host by number: he calleth them all by names by the greatness of his might, for that he is strong in power; not one faileth.

"Why sayest thou, O Jacob, and speakest, O Israel, 'My way is hid from the LORD, and my judgment is passed over from my God?'

"Hast thou not known? Hast thou not heard, that the everlasting God, the LORD, the Creator of the ends of the earth, fainteth not, neither is weary? There is no searching of his understanding.

"He giveth power to the faint; and to them that have no might he increaseth strength. Even the youths shall faint and be weary, and the young men shall utterly fall: but they that wait upon the LORD shall renew their strength; they shall mount up with wings as eagles; they shall run, and not be weary; and they shall walk, and not faint."[53]

PARTING QUESTIONS

Friend, this Lord God Almighty whom we are herein speaking of, is He the same God which you worship? Do you worship Him in spirit and in truth? Do you honor Him by willingly walking in obedience to that strait and narrow way which He has ordained?[54] Have you fully sacrificed the vanities of this Earth,[55] and given your whole life as a living sacrifice in service to God?[56 and 57] Do you take up your cross daily, and then do that work which the Master has ordained?[58] Truly, are you walking in the footsteps of the Master?

Friend, may you be found abiding in Christ, and in willing obedience to God the Father, at the glorious return of the Son of God. May your total being be completely prepared for that day, and wanting in nothing that pertains to eternal life. May you turn your eyes to the Master, that He may keep you in that true way which is pleasing to the Father.

Friend, so ends another Chapter in this FIRST EDITION of

Listen To The Earth, Volume One, THE CREATION, by **David E. Sakrisson and Friends**

in 34 Chapters, plus README, Preview, Start, and End files

with References following each Chapter

REFERENCES

1. *The Holy Bible*, Book of Job, chapter 5, verses 8-9.

2. *The Holy Bible*, Book of Romans, chapter 1, verse 20.

3. See: *The 1998 Grolier Multimedia Encyclopedia*, "Mesosphere."

4. See: *Van Nostrand's Scientific Encyclopedia*, 8th Edition, 1995, volume 1, page 267, "Atmosphere (Earth)."

5. *The 1998 Grolier Multimedia Encyclopedia*, "Geophysics."

6. *The 1998 Grolier Multimedia Encyclopedia*, "Magnetic Storms."

7. Let us look, for a moment, to another natural phenomenon which can cause major instability of the magnetosphere, and therefore disrupt communications. The noted radio astronomer Gerrit L. Verschuur wrote a book in 1996 called *Impact!: The Threat of Comets and Asteroids*. Page 185 of this book implies that the first sign of an imminent impact by a deadly asteroid or comet may be a nationwide power outage during which all of our computers are ruined. These celestial impactors cause extreme instability in the magnetosphere as they impart their powerful influence upon it.

8. *The 1998 Grolier Multimedia Encyclopedia*, "Magnetic Storm."

9. See: *Physical Geology*, Longwell/Flint/Sanders, 1969, pages 131 and 133. Let us add one further note on Earth's magnetic reversals. An article in the September 25, 2001, issue of the *Proceedings of the National Academy of Sciences of the United States of America* (called "Deep-Earth reactor: Nuclear fission, helium, and the geomagnetic field," by D.F. Hollenbach and J.M. Herndon, on page 11085) indicates that Earth's magnetic reversals are caused by intermittent and/or variable nuclear-fission chain-reactions which are occurring deep within the Earth. Nevertheless, the writer of this book believes that there are other causes for magnetic reversals. (Please see note 10, below.)

10. It appears that there are certain major events in the history of the Earth which readily cause reversals in the Earth's magnetic field. These reversals appear to be recorded in the rocks at the locations of sea-floor spreading. The cause of these reversals may be explored in more detail in *Listen to the Earth, Volume Three, The Days of Peleg*.

11. *Encyclopedia of Science and Technology*, James Trefil, 2001, page 466, "Sun."

12. *Microsoft Encarta 98 Encyclopedia*, "Atmosphere."

13. *Microsoft Encarta 98 Encyclopedia*, "Atmosphere."

14. *The 1998 Grolier Multimedia Encyclopedia*, "Troposphere."

15. It appears that the second main atmospheric layer, the stratosphere, contains possibly a little more than 9 percent of the atmosphere's air, by weight. The troposphere (with its 90 percent of the atmosphere's air, by weight) and the stratosphere, together, contain more than 99 percent of the atmosphere's total air, by weight. According to a book called *The Blue Planet* (by Skinner/Porter/Botkin, 2nd Edition, 1999, on page 280): 99 percent of the atmosphere's air lies below an altitude of about 20 miles (32 km) above sea level. This altitude lies within the stratosphere.

16. *The 1998 Grolier Multimedia Encyclopedia*, "Troposphere."

17. See: *Van Nostrand's Scientific Encyclopedia*, 8th Edition, 1995, volume 1, page 269, Table 1.

18. *The 1998 Grolier Multimedia Encyclopedia*, "Air."

19. *The 1998 Grolier Multimedia Encyclopedia*, "Air."

20. *Rand McNally Road Atlas*, 1997 Edition, page 17, "Colorado."

21. *Conceptual Physics*, Paul G. Hewitt, 6th Edition, 1989, page 294.

22. *Combustion Engineering*, Glenn R. Fryling, Revised Edition, 1967, page C-6.

23. *The Blue Planet*, Skinner/Porter/Botkin, 2nd Edition, 1999, page 280. Only about one-percent of the weight of the atmosphere lies above an altitude of about 20 miles (about 32 km) . At this altitude, the air pressure would be only about 0.147 pounds per square inch (103.3557 kgs/sq m), depending on which reference source is used.

24. *Conceptual Physics*, Paul G. Hewitt, 6th Edition, 1989, page 295.

25. Friend, this is the basic principle by which the process called cavitation occurs. That is why water cannot be 'sucked' upward in a lift of more than about 33 feet (10 m). If it is attempted to 'suck' the water higher, the greatly reduced pressure at the top of the water-column will allow the water at the surface to boil at ambient temperature. The sudden flash-boiling which occurs causes the surface water to instantaneously attempt to expand out greatly in volume, as it converts into its vapor state. The sudden expansion causes an instantaneous pressure spike, which blasts the water column downward in the suction-pipe. The downward travel of the water column creates an even greater vacuum within the suction-pipe. This causes the water at the upper surface to continue flash-boiling, and driving the column downward. This reaction continues until a point is finally reached at which the lessening size and inertia of the downward moving water column cannot sustain a high enough vacuum at the upper surface of the water column to support flash-boiling at ambient temperature. Until this point is reached, all capability of producing lift upon the water column is lost.

    The mechanics of cavitation are the same, whether it be occurring in a water pumping system above ground level, or on the low-pressure surface of a ship's propeller at sea level, or on the low-pressure surface of submarine's propeller far below sea level. Within any system, no matter what the working fluid (water, oil, gasoline, or any other liquid), whenever the pressure is reduced to a point which allows boiling to occur at ambient temperature, cavitation will occur within that system. Hopefully this tidbit of information will help those who design systems which operate on, or include, suction.

26. *Conceptual Physics*, Paul G. Hewitt, 6th Edition, 1989, page 295.

27. As a side note which relates to our study, let us consider an article from the May 27, 2002 issue of *U.S. News & World Report* ("Fire and Ice; Gas trapped in a frigid solid could fuel the world for centuries. The challenge is unlocking it.", by Thomas Hayden, on page 60). About 1,000 to 1,200 yards (915 to 1,097 m) below the ground in northern Canada exist vast quantities of methane hydrate, which is a frozen compound of water and methane gas. In their attempt to extract the very valuable methane gas from the frozen ground, the research scientists drilled a shaft downward through six different layers in the hydrate formation. The shaft was sealed above and below each of the hydrate layers. The air was then pumped out of the shaft to create a partial vacuum, which was hoped to liberate the natural gas out of the frozen mass. As part of the test, warm water was circulated through the lowest level (the sixth layer) of the shaft, raising its temperature to about 120°F (49°C).

    Because of the small scale of this experiment, it was not expected to produce much methane. Nevertheless, as a standard gas-field precaution, the drilling team installed a "flame stack" at the well to burn off any unexpected flows of natural gas. It appears that these special vacuum-boiling experiments were far more successful than expected, for the flame stack sent brilliant columns of burning methane upward into the Arctic sky.

28. *The 1998 Grolier Multimedia Encyclopedia*, "Thermosphere."

29. *The 1998 Grolier Multimedia Encyclopedia*, "Thermosphere."

30. *The 1998 Grolier Multimedia Encyclopedia*, "Thermosphere."

31. *The 1998 Grolier Multimedia Encyclopedia*, "Thermosphere."

32. Space radiation does its best to decompose water vapor in this region of the atmosphere.

33. *The 1998 Grolier Multimedia Encyclopedia*, "Thermosphere."

34. *The 1998 Grolier Multimedia Encyclopedia*, "Airglow." Unfortunately, this source article does not explain what these unusual reactions are between the excited atoms and molecules of oxygen and nitrogen. However, these reactions are explained further in the section called Paramagnetic Partners, on page 286 of this Chapter.

35. *The 1998 Grolier Multimedia Encyclopedia*, "Atmosphere."

36. *The 1998 Grolier Multimedia Encyclopedia*, "Atmosphere."

37. *Microsoft Encarta 98 Encyclopedia*, "Humidity."

38. *Microsoft Encarta 98 Encyclopedia*, "Humidity."

39. See: *Microsoft Encarta 98 Encyclopedia*, "Meteorology."

40. See: *Microsoft Encarta 98 Encyclopedia*, "Meteorology."

41. *The 1998 Grolier Multimedia Encyclopedia*, "Air" and "Stratosphere."

42. *Microsoft Encarta 98 Encyclopedia*, "Atmosphere" and "Stratosphere."

43. *The 1998 Grolier Multimedia Encyclopedia*, "Atmosphere."

44. See: *Van Nostrand's Scientific Encyclopedia*, 8th Edition, 1995, volume 1, pages 267-276+, "Atmosphere (Earth)."

45. *The 1998 Grolier Multimedia Encyclopedia*, "Atmosphere."

46. *The 1998 Grolier Multimedia Encyclopedia*, "Ozone."

47. *Microsoft Encarta 98 Encyclopedia*, "Ozone."

48. See: *The 1998 Grolier Multimedia Encyclopedia*, "Magnetism."

49. *Van Nostrand's Scientific Encyclopedia*, 8th Edition, 1995, pages 2345-2346, "Paramagnetism."

50. *The 1998 Grolier Multimedia Encyclopedia*, "Photochemistry."

51. Before the sun came into existence, the ozone layer and thermosphere were not greatly heated, as they are now. Since they were not heated, a temperature inversion was not created in these region or altitudes in the atmosphere. Therefore, a temperature inversion was not in operation at that time to act as a barrier to rising air masses from lower in the atmosphere.

52. As the sun came into being, the interaction of its powerful radiation with the ozone layer and the thermosphere caused temperature inversions to be created at these two levels in the atmosphere. These inversions prevented the further rising of air masses from below.

53. *The Holy Bible*, Book of Isaiah, chapter 40, verses 12-31.

54. See: *The Holy Bible*, Book of Matthew, chapter 7, verses 13-14.

55. See: *The Holy Bible*, Book of I John, chapter 2, verses 15-17.

56. See: *The Holy Bible*, Book of Romans, chapter 12, verses 1-2.

57. See: *The Holy Bible*, Book of Galatians, chapter 6, verse 14.

58. See: *The Holy Bible*, Book of Luke, chapter 14, verses 25-35.