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The 2^n Geometric Space Model of the Earth's Atmosphere and the Periodic Table of Vertical Changes the Laws of Mathematical Geometry Distribution of Atmospheric Sphere

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Abstract

The atmosphere makes up of many sphere-layers. Could this sphere-layered contain new laws of physics that we have yet to discover? Here we study the spatial positional relationship of each sphere-layer of the Earth's atmosphere, hoping to find a mathematical geometric formula for the atmospheric distribution of the atmosphere as the vertical height changes. The formula can unify the internal correlation of the sphere-layered of the atmosphere. You can use this geometric space to predict and to subdivide to share the Earth's atmosphere, this article uses the 2^n methods to build the geometric space of the atmosphere. This geometric space corresponds to the sphere-layered of the Earth's atmosphere. It is found of the atmosphere satisfying the 2^n geometric space distribution and has a vertical height the periodicity of changes. This article uses 2^n geometry to establish a brief internal sphere-layered model of the earth's atmosphere and a 'periodic table' that changes with height. The 'periodic table' may reveal the interior of the sphere-layers of the atmosphere of the laws of mathematics and geometry.

Keywords: Table of Vertical Changes, Atmospheric Sphere, Atmospheric Vertical Distribution, Atmospheric Periodic Table, Atmospheric Structure, Atmospheric Vertical Structure

1. Introduction

We observe the temperature, composition, density, pressure, and motion of the atmosphere, and divide it into the troposphere, stratosphere, mesosphere, thermosphere, and dissipation based on its vertical variation with altitude. Are there internal logical between the Atmospheric sphere? Is there a geometric law in to formation their extent? Have we ever thought about why the Karman line of the earth is around 80-100 kilometers? Why is the height of the stratosphere '12—55km' instead of '22—66km'? The traditional theory holds the exosphere is the outermost sphere-layer of the atmosphere at more than 800 km from the ground. The exosphere is also the sphere-layer that gradually transitions from the atmosphere to interstellar space. It can regard as the boundary area between the earth's atmosphere and outer space. There are different opinions on the exosphere. You enter outer space at an altitude of about 80 kilometers or 100 kilometers or more - depending on which standard you use. There is very little gas here, only slightly more than a vacuum a little. For a long time, people have believed the Earth's atmosphere has this range, to form this Atmospheric sphere is a random distribution affected by the compose the atmosphere and the gravity of the Earth.

The upper atmosphere about 1,000 kilometers above the ground is mainly compose of hydrogen and helium. It calls the geocorona because it emits very weak radiation. The upper limit of the geocorona considers to be about 200,000 kilometers away from the earth because it is the solar radiation pressure that exceeds the earth point of gravity. Constantly updated research has broken through the limits of the traditional theory one after another. According to satellite detection, there is a thin plasma sphere near '22000' km. Latest study from the Russian Space Research Institute (SrI) shows the Earth's atmosphere has extended to a depth of 630,000 kilometers, like a huge ellipsoid structure, deeply surrounding the moon[1]. This research can detect the outer boundary of the Earth's atmosphere with higher precision than ever before. The Russian Space Research Institute found the scope of the geocorona exceeds 6 times previously thought. What's more, our moon moves in the earth's 'atmosphere'! This shows the original atmospheric composition and evolution theories has errors or limits and need development and innovation. Why is there a thin plasma sphere near '22000' km? Why is there still an ellipsoidal geocorona at 63,000 kilometers, and its range is more than 6 times beyond what previously thinks [1].

What theory uses to explain these problems? Is it because we have not found the laws of changes and composition of the atmosphere? This article believes the 2^n geometric distribution is consistent with to distribute the atmosphere summarized by observations, and can predict and explain the internal logical and causes of various sphere-layers of the earth's atmosphere. The vertical distribution of the atmosphere has geometric rules, which satisfies a 2^n geometric space distribution [2-8]. The 2^n geometry is a geometric space in which circle (sphere) R is the diameter, 2 times the space is tangent and expands linearly.

2. A general overview of 2^n geometry

The 2^n geometry is a geometric space formed by a circle (sphere) with a diameter of 'ø' as the starting circle (sphere). During the expansion or contraction of each 2^n, 6-8 levels of tangent circle (sphere)s form (n sphere-layers 6 or 8 periods and enter the imaginary space. This article only describes the space range from periods 8 to periods 10). The center of each circle (sphere) is on a straight line and expand and enlarged by 2 times. The 2^n geometric space can divide into two forms ($R_\oplus$ represents the radius of the earth):

One is $2^n ø$ without a starting circle (sphere), n=(0,1,2,3,4,5,6,7,8,9i). Symmetrical expansion ($ø^a$ type),

$$ø^a=R_\oplus/(2^n);$$

One is $ø(1+2^n)$ with a starting circle (sphere), n=(0,1,2,3,4,5,6,7,8,9i). Symmetrical expansion ($ø^b$ type),

$$ø^b=[\,R_\oplus/(2^n+1)].$$

$ø_0$ is the starting diameter, $ø_0$=($ø^a$ or $ø^b$).

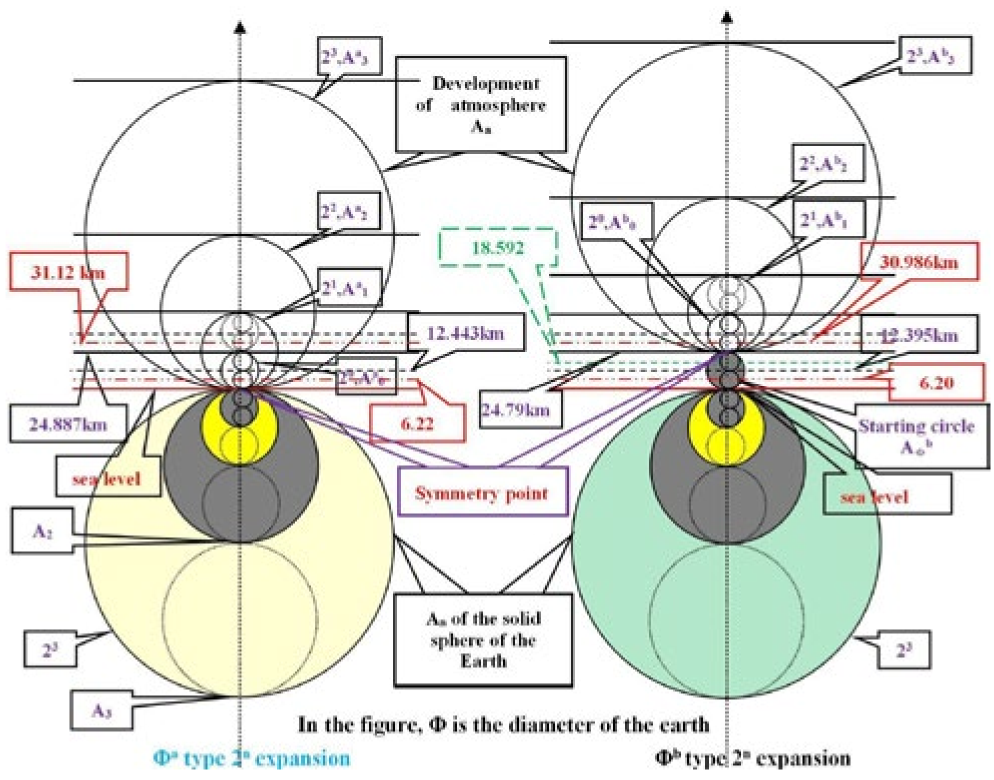

Figure 1: Is an enlarged view of the $A^y_0 \sim A^y_3$ starting circle (sphere) of the 2^n geometric space of the earth (saw Supplementary Information FIG 5, 9, 11, 12, 13, 14). There are two types of starting circle (sphere)s. Among them, the 2^n expansions of Φ^a are a 2^n symmetrical without the 'starting circle (sphere)' [5]. It can also be considered as: the 'starting circle (sphere)' is embedded in a symmetrical mirror image'. The starting point of type a symmetrical expansion is the symmetry point. The distance from the starting point of each 'n' match to the intersection of the symmetry axis and the far end of the starting point is denoted as ${}^{Z}R^a_n$ (the diameter of A^a_n equal to:

$${}^{Z}R^a_n=2^n\Phi^a$$

The inner and outer boundaries of the ring formed by the trajectory of each n A^a_n rotating around the center of the earth correspond to a boundary of the atmosphere (saw Supplementary Information FIG 7).

The Φ^b type 2^n extension is a 2^n symmetrical structure with an independent 'starting circle (sphere)'.Therefore, the starting point of the b-type symmetrical expansion is the point tangent to the starting circle (sphere). Therefore, starting from the symmetry point, the distance

${}^{Z}R^b_n$ between the arrow from the starting point to the symmetry axis and the A^b_n corresponding to each n value is equal to

$${}^{Z}R^b_n=2^n{}_{\Phi}{}^{b}+\Phi^b.$$

From the perspective of the starting circle (sphere), taking the center of the starting circle (sphere) as the 'axis of demarcation', the two sides of the symmetry axis indicate the way of symmetry. Which is a broken way, half of which is the 'negative number object attribute' or the 'positive imaginary number object properties', half is 'Negative imaginary number object properties'[8].

3. The specific application of the 2^n geometric methods and mathematicaldeduction [5-8].

First, we divide the diameter of the earth (6371 km) by 2^8 to get 24.789km, which calls the base diameter a. Use Φa to represent the base diameter:

$$\Phi^a \approx 24.88671875 \text{ km, or } \approx 24.8867 \text{ km}$$

Then we divide the diameter of the earth (6371 km) by 2^8+1 to get 24.789km, which calls the base diameter b. Use Φ^b to represent the base diameter:

$$\Phi_b \approx 24.78988327 \text{ km}$$

We use R^y_n to represent the height of the atmosphere from the horizontal plane, and n represents the number of sphere-layers (period). The superscript ^{y} of Φ represents the type, $^{y=(a\ ,\text{or } b)}$. The Φ^y Represents the starting quantum unit:

$$\Phi^b= 6371/ (2^8+1) \approx 24.789 \text{ km;}$$

R_n means: the distance to the sea level (the range of the circle (sphere) and the diameter of the dividing lines); ${}^{Z}R^y$ means: the distance from the main sequence to the sea level (the range of the circle (sphere) and the diameter of the dividing lines);

$${}^{Z}R^a =2^n\Phi^a \text{ or } {}^{Z}R^b =\Phi^b+2^n\Phi^b = (1+2^n)\ \Phi^b$$

${}^{B}R^y$ means: the distance from the main sequence to the sea level (the range of the circle (sphere) and the diameter of the dividing line);

${}^{B}R^a_n= 3/2\times2^n\Phi^a$ or ${}^{B}R^b =\Phi^b+3/2\times2^n\Phi^b=\Phi^b\ (1+3/2\times2^n)$.

${}^{E}R^y$ (child sequence, referred to as sub-sequence). It is the average value of the 'sum value' of the main sequence and the companionship main sequence. ${}^{E}R^y$ is the product of the combination of the main sequence and the companionship main sequence to form families. It belongs to the offspring: 'sub-sequence' to Distance from the sea level (diameter of circle (sphere) sphere-layer and dividing lines):

$${}^{E}R^a = (2^{n-1}\Phi^a+3/2\times2^{n-1}\Phi^a)/2=5/2\times2^{n-1}\Phi^a \text{ or } {}^{E}R^b = \Phi^b+5/2\times2^{n-1}\Phi^b$$

${}^{F}R^y_n$ (anti-starting point circular sub-sequence), with ${}^{Z}R^y_{10i}$ as the starting point, returning to the sea level; ${}^{F}R^y$ has the opposite symmetry Forward of the main sequence. This article only studies the case of n<=10*i*.

${}^{F}R^a_n=2^{10-n}\Phi^a-2^{10-n}\Phi^a/2^3=7/8\text{x}^{10-n}\Phi^a$ or ${}^{F}R^b_n=(1+2^{10-n}\text{x}7/8)\Phi^b$,

${}^{F}R^a_0=2^{10-0}\Phi^a7/8=22298.5\text{km}$ or ${}^{F}R^b_o=(1+2^{10-0}\text{x}7/8)\Phi^b=22236.5\text{km}$.

4. Results

The 2^n Geometric Space of the Earth's Atmosphere and the Geometric Principle Diagram of Structural Space of Mathematical Logic.

Due to the issues with paper size and graphic proportions, this paper expands the n= (0/1/2--8) in sections.

FIG 2 is an expanded view of the principle of structure of Φ^b with n= (0,1,2,3,4,5,6,7). From the FIG, we can easily saw: the structure of the atmosphere derived from the geometry of 2^n at n= (-1,0,1,2), it is consistent with the observations, and the error is small. After n > 2, the errors of other theoretical values and observations gradually increase, there is controversy. Saw the periodic table below.

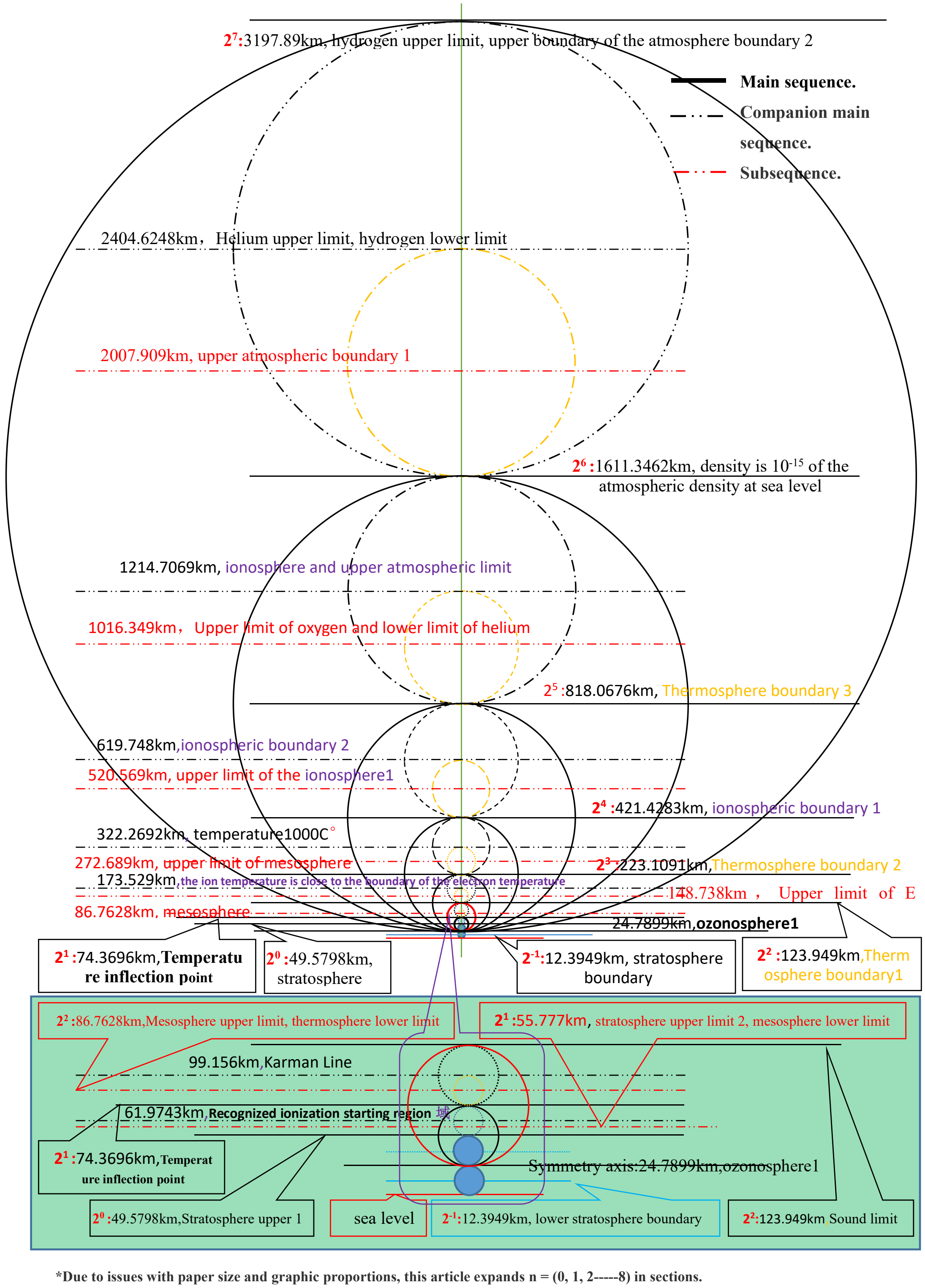

Figure 2: A geometric "diagram" of the corresponding n values of $^{Z}ø^{b}_{n}$ and $^{B}ø^{b}_{n}$ and $^{E}ø^{b}_{n}$ and $^{F}ø^{b}_{n}$ derived from the 2^n rule, resulting in theoretical derivation of the $2^0 \sim 2^7$ circles (sphere). The bottom red line represents the sea level, the blue line represents the stratospheric boundary, and the green part is a magnification of the red circle (sphere). Starting from the sea level, a 2^n expanded geometric distribution map make with $ø^b$ as the starting circle (sphere).

Figure 3: Is an expanded view of the geometric principle of mathematical logic with n= (0,1,2,3,4,5) of Φ^b.

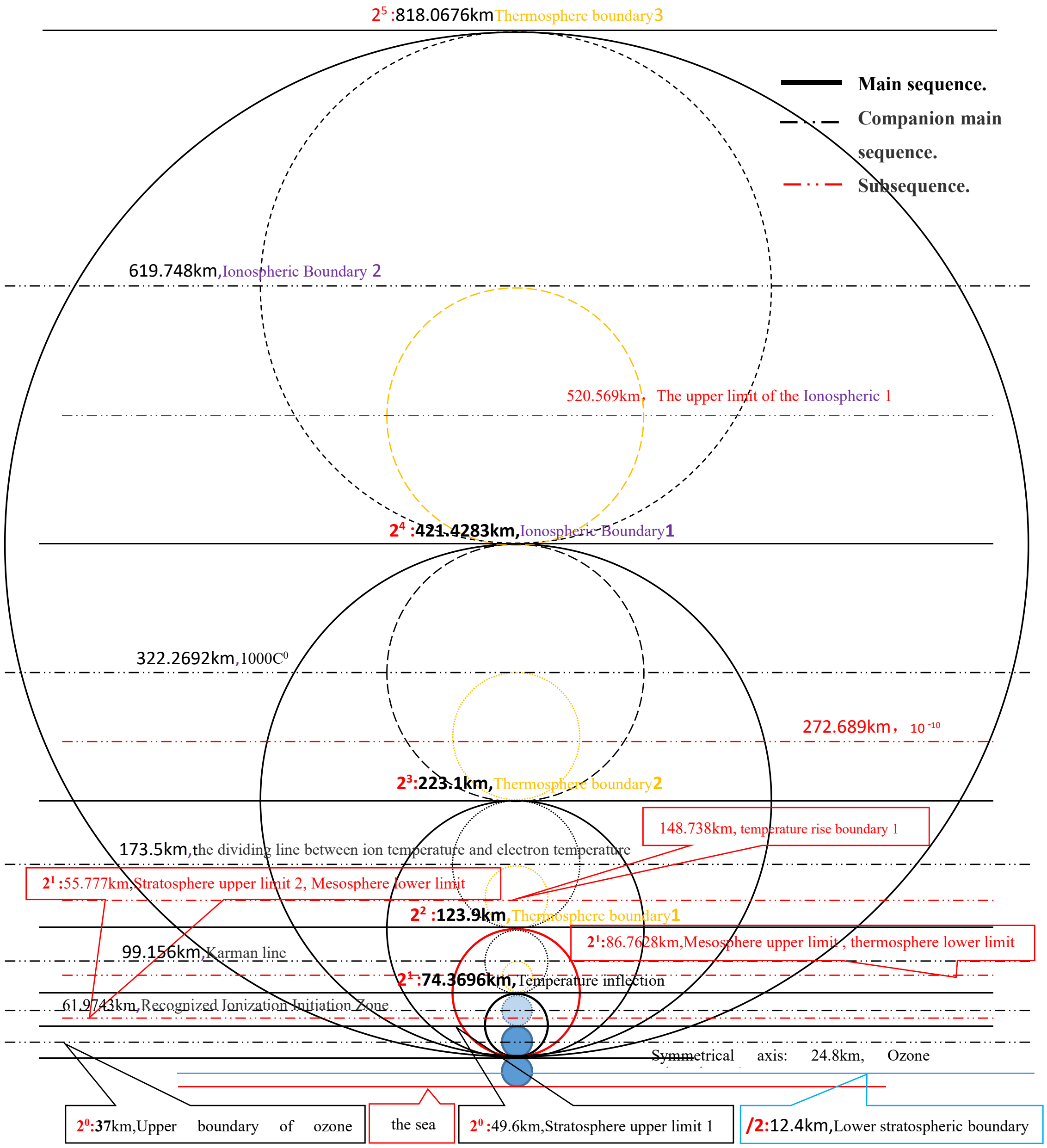

Figure 3: It is obvious the stratosphere form by two different laws, so the temperature and material composition are different. The lower part divides and down by the center of the starting circle (sphere), and the lower part is also the troposphere. The upper part is the isothermal zone of the stratosphere. The formation laws of the stratosphere at 24.789-49.5789 km come from the properties of the 0-sphere-layer symmetrical circle (sphere) system. To form of stratospheric position 24.789 ~ 49.5789 km comes from the attribute of the 0-level symmetrical circle system. The 0-sphere-layer symmetrical circle is stratified from the inner and outer parts of the circle center, and the position from the center to the lower symmetrical point is the position of the ozone sphere-layer region. The position from the upper part of the 0-sphere-layer symmetry circle (sphere) center to the outer symmetry point on the circumference is the position of thermal inversion sphere-layer.

In the stratosphere by 2^n change rule, in 37 km and 24.79 km and down, naturally divided into two levels of inverse temperature sphere-layer, isothermal sphere-layer, and the error is very small.

Figure 4: Is the distribution map of the Earth's atmosphere when n=9*i*.

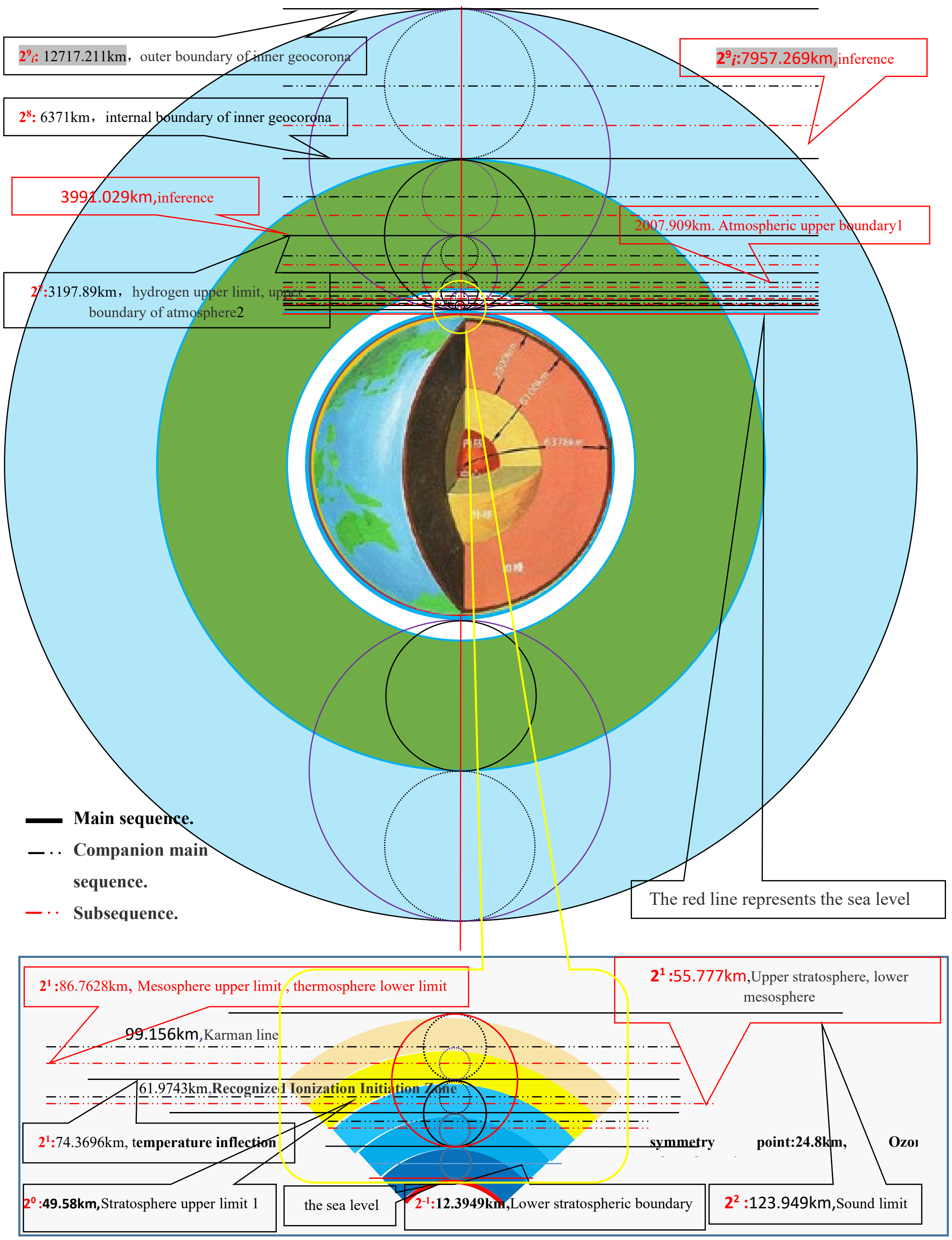

Figure 4: The 2^7~2^8~$2^9 i$ circle (sphere) theory derived from 2^n rules. The 2^7~2^8 are the real number field; $2^9 i$ are the imaginary field, is the imaginary end and the "reverse inverse" starting sphere-layer.

Figure 5 is an expanded space of the atmospheric sphere with n=(0,1, -- -10i), where the '*i*' of the numerical subscript represent the properties of the digital region.

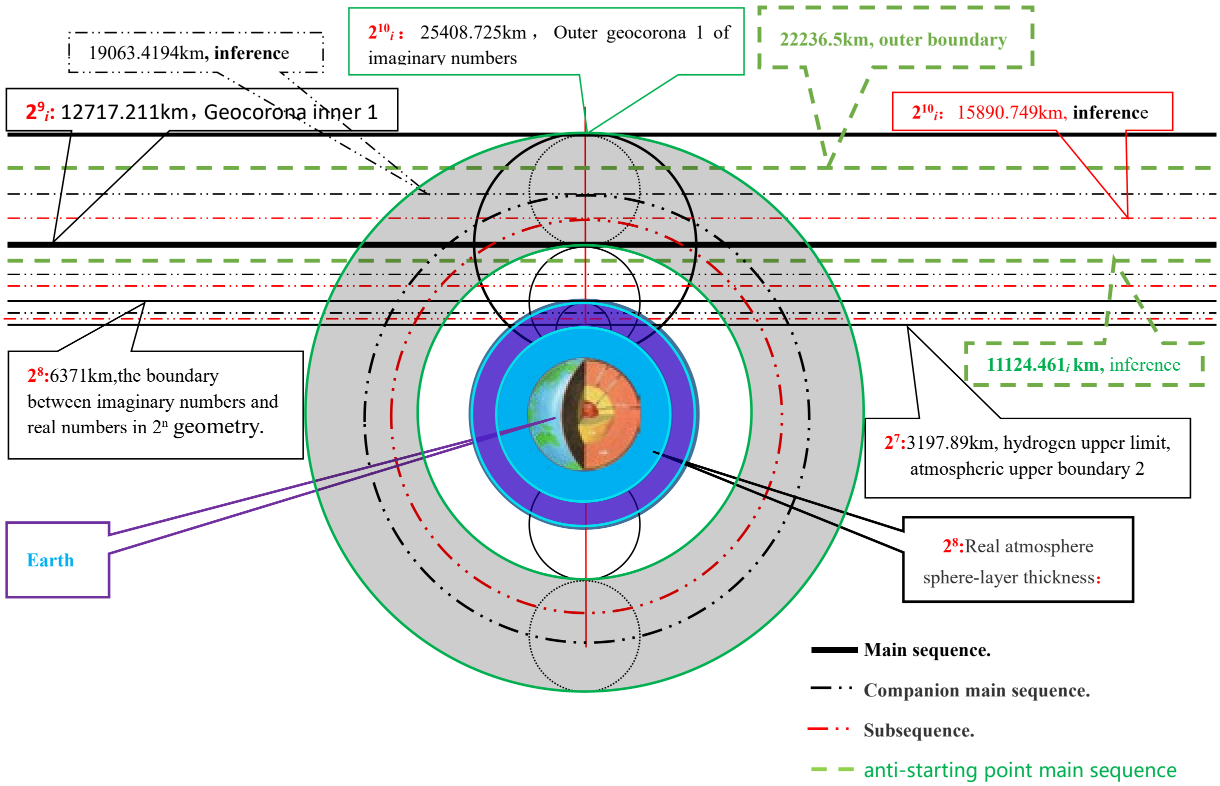

Figure 5: The imaginary of limit value [1, 2, 3] derived from $3^n ø$ where n=(7) i am the 'inverse starting point' sphere-layer, and the $2^9 i \sim 2^{10} i$ imaginary circle (sphere) theory derived from 2^n in $3^n ø$ imaginary limit value. The $2^9 i \sim 2^{10} i$ forms a imaginary number halo sphere-layer(Geocorona) 12717.211km ～ 25408.725km in the outermost sphere-layer of the earth. It is also imaginary number inversion or inversion ending at $3^7 i$ [2-8].

Inner atmosphere (this article refers to the atmosphere from 0km to 3197.89km above the sea level as: inner atmosphere).

The outer atmosphere (this paper refers to the atmosphere from 3197.89km to 6371km from the sea level as the outer atmosphere).

Inner geocorona (this paper refers to the atmosphere from 6371km to 12717.211km from the sea level as: inner geocorona).

External atmospheric imaginary state halo (this article refers to the atmosphere from 12717.2km to 25408.725km from the sea level as: external geocorona).

Figure 6 is the construction principle diagram of øa for 2^n with n=(0,1,2,3,4,5).

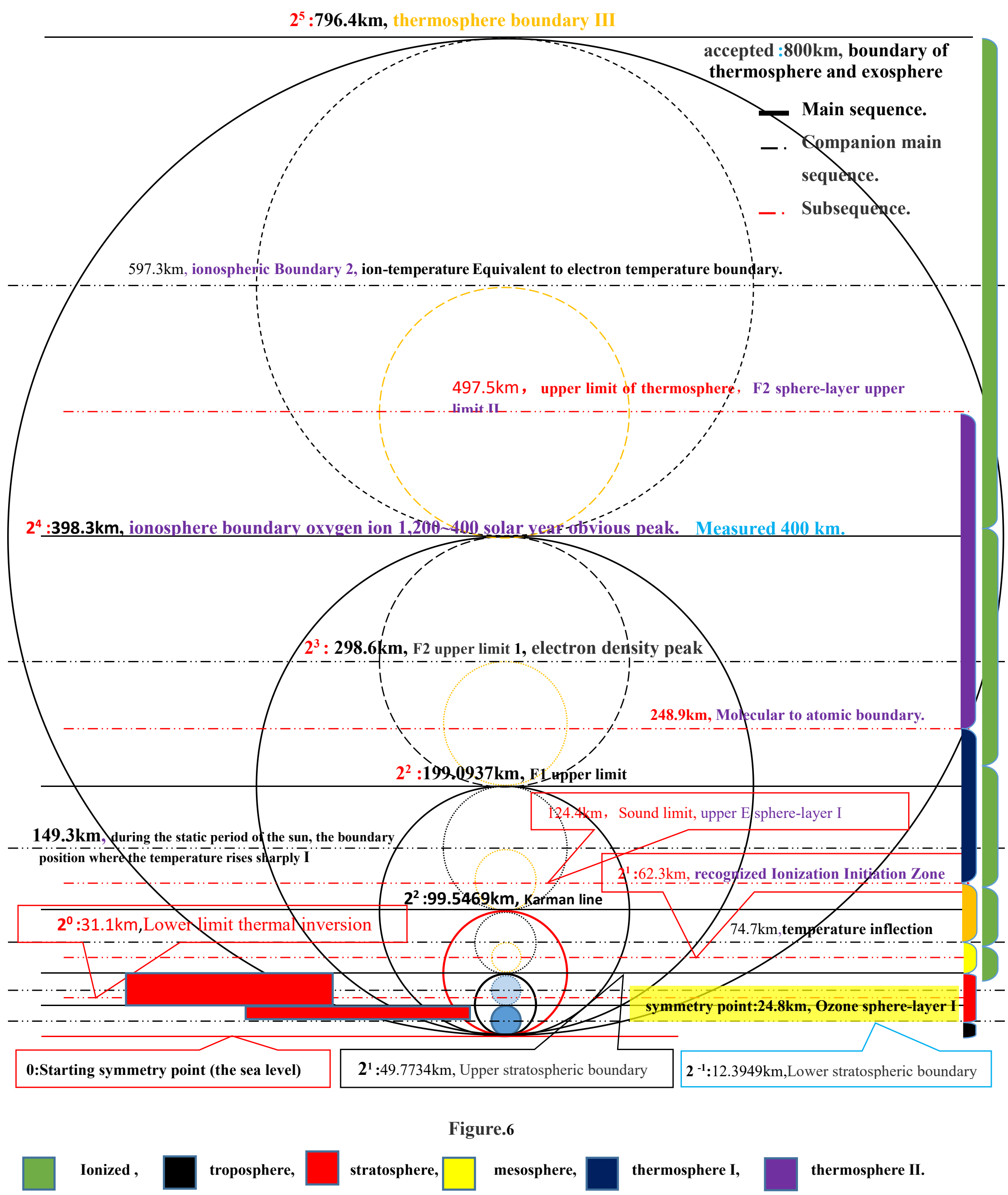

Figure 6: Shows the observation values and theoretical values. The boundary or changing position of each circle (sphere) is the value of the sequence corresponding to a symmetrical circle (sphere) in a 2^n geometric space. Each symmetrical point is the peak of the atmospheric sphere-layer structure, or the position of temperature, density, and other changes. The actual observation error is relatively small, and the entire system rotates around the center of the Earth, forming a spherical sphere-layer corresponding to the Earth's atmospheric sphere-layer.

4.1. A Periodic Table of the Mathematical Geometry of the Position of the Earth's Atmosphere.

Øᵇ - Type Mathematical Periodic Table.

Table 1: Shows the corresponding n values expanded by **$^{Z}ø^{b}_{n}$, $^{B}ø^{b}_{n}$, $^{E}ø^{b}_{n}$, and $^{F}ø^{b}_{n}$.**
The shaded part is the imaginary number sphere sphere-layer. When n=9 it enters the Imaginary state, so the mark i below 9i indicate the imaginary state **. To represent the imaginary state of the thin atmosphere of 9i 10i at the real number level [2-4].

The geometric relations in this table correspond to **FIG 1, FIG 2, FIG 3, FIG 4, FIG 5, FIG 6**.
The hierarchical position of red and green background is important positions, and the position of gray background is the halo position deduced in this paper.

n	0	1	2	3	4	5	6	7	8	9_i	10_i	theory
Theory $^{Z}ø^{b}_{n}$	49.58	74.4	123.9	223.1	421.4	818.0	1611.3	3197.9	6371	12717.2	25409.6	main sequence
Observe	50	--	120	--	--	800	1600	3000	6300-6400	inner	outside	
State	Ozone sphere-layer3		④	Sound limit①	inference	exosphere inner		10^{-15}	exosphere outside 2	③		inference (geocorona)
Deviation	-0.42	--	+3.9	Need confirmation		+18	+11.3	+197.9	71-29	Imaginary geocorona (Halo state)		
Theory $^{B}ø^{b}_{n}$	62.0	99.2	173.5	322.3	619.7	1215	2404.6	4784.4	9544*i**	19063.4*i**		Companion main sequence
Observe	60	100	175	300	600	1200	2400	---	---	----	----	
State	⑥	Karman	*5	1000C⁰	*6	Aurora limit	limits helium			inference		
Deviation	+2	+0.8	+1.5	+22.3	-19.7	+15	+4.6		Need to confirm			
Theory $^{E}ø^{b}_{n}$	55.78	86.8②	148.7	272.7	520.6*7	1016.4	2008.0	3991.2	7957.6*i**	15890.3*i**	----	Subsequence
Observe	55	85	150	270	500	1000	2000	---	---	---	----	
State	Stratosphere	Mesosphere	*4	10^{-10}	⑤	*O* lower limit	exosphere outside1		inference			
Deviation	+0.78	+1.8	+1.3	+2.7	+20.6	+16.4	+8		Need to confirm			

① Molecular diffusion and photolysis and ionization are dominant above the height of 120km. Although the atmosphere still moves, it is very weak, and the atmosphere is in a diffusion equilibrium state. ②From the ground to an altitude of about 86km (according to standard atmospheric rules), the turbulent mixing effect exceeds the separation effect of molecular diffusion and gravity field on light and heavy gases. The result of sufficient mixing is to maintain the proportion of various components in dry air unchanged.③Imaginary number and real number boundary.④temperature inflection. ⑤ thermosphere Upper limit 1. ⑥Irradiation dissociation. *Is greater than 6317 and enters virtual state. **Ionospheric boundary 2, the dividing line between ion temperature and electron temperature. *4 During the solar static period, the temperature rises sharply 1. *5 During the static solar phase, where the temperature rises sharply 2. *6 During the static period of the sun, the temperature rises sharply to the critical point of constant temperature. *7 During the solar activity period, the temperature rises sharply and becomes the critical point of constant temperature.

Table 2: Shows the average values of $(^{Z}ø^{b}_{n})^{-1} + (^{B}ø^{b}_{n-1})^{-1}$. Currently, we only saw a thin ionosphere near 22000 on Earth, and there are no ionospheric peaks or peak deviations found in other locations. This is because the ionosphere is a product of imaginary space and differs from the real state, and the derivation method needs an adjustment coefficient.

n	(+2	+1)$_i$	-0	(±1	±2	±3	±4	±5	±6	±7	±8)
theory $(^{Z}ø^{b}_{n})^{-1}$	25409.6	12717.2	6371	3197.9	1611.3	818.0	421.4	223.1	123.9	74.4	49.58
Observe								210	120		50
state								F1	F1-E1		D1
theory $(^{B}ø^{b}_{n})^{-1}$	38102	19063.4	9544	4784.4	2404.6	1215	619.7	322.3	173.5	99.2	62.0
Observe							600	300	180	100	60
state							*e* Density peak	F2peak	F1 peak	E sphere-layer	D2

**** There is no difference between 8 and 8_i in arithmetic, Its just the difference property, the others are the same。**

The green $0_i \sim 8_i$ represent to represent the imaginary state of the thin atmosphere at the real number field.

n_i	+0	-1_i	-2	3_i	+4	-5_i	-6	7_i	+8	$(-9_i$	$-10_i)_i$ **	
theory$(^{F}R^{b}n)_i$	22236.5	11130.6	**5577.7**	**2801.3**	**1413.0**	**718.9**	**371.8**	**198.3**	**111.6**	**68.17**	**46.5**	**sequence ionization**
observes	22000				?				110			
state	Geocorona boundary 2				inference				**Es peak value**			
deviation	**+236.5**				**needs to confirm**				**1.6**			

Table 3: is the hierarchical division of the inner atmosphere of øᵇ. The øᵃ there is 'starting Circle' without (sphere), so there is 'starting Circle' without (sphere) øᵃ hierarchical division table.

n	**2^{0}**	**2^{-1}**	**2^{-2}**	**2^{-3}**	**2^{-4}**	**2^{-5}**	**2^{-6}**	**2^{-7}**	**2^{-8}**
Theory $ø_0$	**24.7898**	**12.395**	**6.1975**	**3.0978**	**1.549**	**0.775**	**0.387**	**0.194**	**0.097**
observes $ø_0$	**25**	**11-12-13**	**6**	**2**			**1-2 friction sphere-layer**		
state	**ozonosphere**	**tropopause**	**troposphere**	**bottom troposphere**			**Ekmansphere-layer**		**ground plane**
deviation	**0.21**	**0.395**	**0.1975**	**1.0978**					

øᵃ-type mathematical table

Table 4; Expand the matching n values of $^{Z}ø^{a}_{n}$, $^{B}ø^{a}_{n}$, $^{E}ø^{a}_{n}$ and $^{F}ø^{a}_{n}$.The shaded part is the imaginary number sphere. When n=9 it enters the imaginary state, the subscript 'i' of $9i$ represents the imaginary state **. Mapping of the imaginary state of the thin atmosphere 9i ~ $11i$ at the real number field [4].

The geometric this table corresponds to: Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, and Figure 6.

The hierarchical position of the red background and green background are important positions, and the position of the gray background is the halo state (geocorona) position derived in this article.

n	0	1	2	3	4	5	6	7	8	9_i	10_i	**remark**
									0	1_i	2_i	
Theory $^{Z}ø^{a}_{n}$	24.9	49.8	99.5	199.1	398.2	796.4	1592.8	3185.5	6371	12742	25484	**main sequence**
observes	25	50	100	200	400	800	1600	3000*8	6300-6400	inner	outside	
state	ozonosphere 1	ozonosphere 3	Karman	T_e sharp rise	*	**exosphere inner**	*10^{-15}	exosphere outside2	⑥	inference（geocorona）		
deviation	+0.1	0.2	+0.5	0.9	-1.8	-3.6	-7.2	+185.5	71-29			
Theory $^{B}ø^{a}_{n}$	37.3	74.7	149.3	298.6	597.3	1194.6	2389.1	4778.3	9556.5_i⑥	19113_i⑥		**Companion main sequence**
observe	35	--	150	300	600	1200	2400	----	---	-----	----	
state	**ozonosphere** 2	②	*4	e highest density	**	**Aurora limit**	Lower He		inference			
deviation	+2.3	--	+0.7	-1.4	-2.7	- 5.4	-10.9		need to confirm			
Theory $^{E}ø^{a}_{n}$	31.1	62.3	124.4	248.9	497.8	995.5	1991	3981.9	7963.8_i⑥	15928_i⑥	---	Subsequence boundary
observes	30	60	120	250	500	1000	2000	---	---	---		
state	ozonosphere 1	③	Sound limit①	***	④	O limit	⑤		inference			
deviation	+1.1	+2.3	+4.4	-1.1	-2.2	-4.5	-9		Need to confirm			

***Oxygen ion ionization boundary 1; there is an obvious peak between 200 and 400 solar activity years. **Ionospheric boundary 2; the boundary between ion temperature and electron temperature. ***The dividing line between molecules and atoms. *4 Solar static and dynamic temperature decomposition lines. *8 Inner Van Allen Radiation Belts. ①Molecular diffusion and photolysis and ionization are dominant above the height of 120km. Although the atmosphere still moves, it is very weak, and the atmosphere is in a diffusion equilibrium state. ②temperature inflection. ③Irradiation dissociation. ④Thermosphere upper limit boundary 1. ⑤exosphere outer boundary 1. ⑥i > 6317 enter virtual state.**

Table 5: Shows the average values of $({}^{Z}ø^{a}_{n})^{-1}$ and $({}^{B}ø^{a}_{n-1})^{-1}$. It is saw in practice there is a thin ionosphere near 22000. The existence of a thin ionosphere near 1400 km is to inference of this paper.

n	[	+0	-1i	-2	3i	+4	-5i	-6	7i	+8	(-9i	-10i	)i]	
theory $({}^{F}R^{a}_{n})\ i$		**22298.**	**11149.3**	**5574.7**	**2787.3**	**1393.7**	**696.9**	**348.4**	**174.2**	**87.1**	**43.6**	**21.8**		**ionization**
observes		22000	----	---	---	-?	---	---	---	90-85	---	--		
state		⑩	----	⑨		inference		⑨		D peak value		⑨		
deviation		+298				Need to confirm				2.9				
n		10i	9i	8	7	6	5	4	3	2	1	0		

⑨The negative number state is the opposite of the property of the real number state. The real number state is a space area where the density of matter gradually increases from both sides to the middle, which is the most concentrated area. The negative number state is a space area where the density is smallest from the middle area and gradually increases toward both sides [2]. ⑩ The outer boundary of the geocorona.

Summarizing Table 1-5, we can see the 2^n geometric changes and the derived 2^n geometric circle (sphere) positions are consistent with the actual changes in the atmosphere. The deviations are large or small. From the geometric position changes in the table, we can saw the changes in our earth's atmosphere follow mathematical and geometric laws. To distribute our Earth's atmospheric sphere is not random, just like the laws of microscopic material changes do not meet the physical laws of small objects and macroscopic objects (objects or macroscopic systems) around us. A enough large and systematic atmospheric sphere like the Earth's atmosphere has different physical laws from small objects on the ground.

5. Comparison and Discussion

This article divides the atmosphere into three parts according to 2^n space and spatial expansion logic:

1. the earth's surface atmosphere: The starting circle (sphere) part is the determining factor of the bottom sphere of the atmosphere. The starting circle (sphere) is divided into two parts from the center of the circle (sphere), one part corresponds to the troposphere and the other part corresponds to the stratosphere. The tangent point (symmetry point) between the starting circle (sphere) and the symmetry circle (sphere) 24.789～24.887km above is the temperature inversion sphere-layer of the stratosphere.
2. Negative number state of real number range: This article classifies the stratosphere to the exosphere (3000 —4000km) as the 'inner atmosphere'. The 'inner atmosphere' extends from the stratosphere to 25—4000km.
3. Imaginary state (halo state or geocorona): this article classifies the atmosphere beyond the radius of the earth (6371km) as a halo atmosphere, referred to as 'halo sphere-layer'about 4000~25000.

5.1. Comparison of Observation Results and Deduced Results.

Comparison of upper tropospheric results.

The average height of the troposphere we saw and summarized is 10～12km. We analyzed the position of the $ø^b$ internal sequence $ø^b/2=12.395$, and theoretically predicted troposphere height is close to the average height of 12km.

5.2. Comparison of the Range of the Stratosphere.

Ozone reaches its maximum value at 20～25km or 20~30. We know: The diameters of the starting circle (sphere)s $ø^a$ and $ø^b$ are both ≈ 25km. The diameter of the starting circle (sphere) is just close to the height range of the maximum value of the ozone sphere-layer. ${}^{E}ø^{a}_{0}=31$ is close to another max 30.Starting from an altitude of 25km to 36km, as the vertical height increases, the temperature gradually increases. At the stratosphere, the temperature can be close to 273.15K, which calls the temperature inversion sphere-layer.

We know:

$ø^a 2^0 \approx 24.8867$km and $ø^b 2^0 \approx 24.78988$km. Just close to the lower limit of the temperature inversion sphere-layer of 25km, deviation 0.1133～0.21km.

$ø^a 3/21 \approx 37.33$km and $ø^b 3/2 \approx 37.18$km. Just close to the upper limit of the temperature inversion sphere-layer of 36km, deviation 1.33～1.18km.

We know:

$ø^a 3/21 \approx 37.33$km and $ø^b 3/2 \approx 37.18$km. Just close to the upper limit of the ozone sphere-layer, deviation 2.18～2.33km.

The stratosphere is the sphere-layer of the atmosphere above the troposphere to about 50km (upper limit 1) to 55km (upper limit 2) above the ground.

Upper limit of 50km in the stratosphere 1: 50km is the same as in Table 1, when n=0,
$^{Z}ø^{b}_{0}$ = 49.58km, deviation ≈ 0.42km;

The upper limit of 55km in the stratosphere 2: 55km is the same as in Table 1. When n=0,

$^{E}ø^{b}_{0}$ ≈ 55.78km, deviation ≈ 0.78km.

The positions of the two boundaries the stratosphere deviate slightly from the positions gained from $^{Z}ø^{b}$n and $^{E}ø^{b}_{n}$.

5.3. Comparison of the Results for the Range Of Mesosphere.

The mesosphere is a sphere-layer above the stratopause, with the top about 80km to 85km above the ground.

The upper limit of 85km in the middle sphere-layer is close to the value when n=1 in Table 1, $^{E}ø^{b}_{1}$ ≈ 86.8km, deviation≈1.8k.

Above an altitude of 60km, atmospheric molecules begin to dissociate under sunlight. The position of the dissociation sphere-layer is in Table 1. When n=0, $^{E}ø^{b}_{1}$ = 62.0km, and the illumination decomposition deviation position at the same saw the height of 60km is only ≈ 2km.

5.4. The Results Of Thermosphere Range Are Compared.

Thermosphere (also known as the warm sphere-layer) is a sphere-layer above the mesosphere about 500 to 800km above the Earth's surface.

Upper limit of thermosphere 1, about 500; the upper limit of thermosphere 2, about 800km.

Upper limit 500km, in Table 1, when n=4,

$^{E}ø^{b}_{4}$= 520.6km,deviation≈20.6km。

$^{E}ø^{a}_{4}$= 497.8km, deviation≈2.2km。

The upper limit is 800km, in Table 1, when n=5,

$^{Z}ø^{b}_{5}$ = 818.0km , deviation≈18km.

$^{Z}ø^{a}_{5}$ = 796.4km , deviation≈3.6km.

5.5. Comparison of results for exosphere extent

It is generally consider the exosphere above 800km is the exosphere. Appear of the aurora at 1200km, it is consider to be an upper limit of the atmosphere. According to 80 to 1000km, nitrogen and oxygen are dominant, and oxygen becomes dominant around 1000km.

It becomes dominated by oxygen around 1000km, which is shown in Table 1. When n = 5,
$^{E}ø^{b}_{5}$ = 1016.3km, deviation≈16.3km.
$^{E}ø^{a}_{5}$ = 995.5km, deviation≈4.5km

There is an aurora appearing at 1200km, which is shown in Table 1, when n=5

$^{BØb}_{5}$ = 1215km, deviation≈15km.
$^{B}ø^{a}_{5}$ =1194.6km, deviation≈5.4km

Continuing up to around 2400km, helium is the main component. Show in Table 1. When n=6

$^{B}ø^{b}_{6}$ = 2404.6km, deviation≈4.6km.
$^{B}ø^{a}_{6}$=2389.1km, deviation≈10.9km

Further above 3000km, it is similar to interstellar matter. It is considered that it has entered interstellar space. However, the sounding rocket still found a thin atmosphere at an altitude of 3000km. Shown in Table 1, when n=7

$^{Z}ø^{b}_{7}$ = 3197.8km, deviation≈197.8km.

$^{B}ø^{a}_{7}$ = 4778.3km, inference (needs to confirm by observation).

The upper limit of the atmosphere may extend to about 6,400 kilometers above the ground. This is in table 1 when n=8

$^{Z}ø(^{a\ orb})_{8}$ = 6370.8km, deviation≈29.2km.

5.6. Comparison of Results for the Extent of the Geocorona

The geocorona is the outermost bright region of Earth's atmosphere. Sounding rocket data shows there is a thin sphere-layer of ionized gas outside the Earth's atmosphere that can extend to an altitude of 22,000km.

There is a thin sphere-layer of ionized gas extending 22000km, which is shown in Table 1, when n=2

$(^{F}R^{b}_{n})_{i}$=22236.07km, deviation≈ 236.07km.

$(^{F}R^{b}_{n})_{i}$ = 22298.0 km, deviation≈ 298km.

A latest study by the Russian Space Research Institute (SrI) shows that the earths atmosphere has extended to a depth of 630,000 kilometers, like a huge ellipsoid structure, deeply surrounding the moon. This illustrates the previous impact on the earth. The cognitive theory of the atmosphere needs to be developed. This theory recognizes 2^{n} geometric space: it becomes the end position at 25409.6 ～ 25484km [4-5]. The subsequent distribution will enter the imaginary state and follow other mathematical laws. We know from actual observations that when vertically stratifying the atmosphere, there will be intervals such as 8~17, 25~36, 50~55, 80~85, 200~300. How is this interval formed? Woolen cloth? We can see from the table that these intervals form by two different starting methods, $ø^{a}$ and $ø^{b}$, which shows that our earths atmosphere control by two different ‘distribution’ rules.

6. Summary and Prospect

People have drawn vertical distribution maps of the Earth's atmosphere through observation results, and everyone is accustomed to using the laws of ground physics to study the reasons and internal laws of these atmospheric stratifications. In this paper, the 2^n geometric space theory is physicalized, and the vertical distribution of the atmosphere is studied and analyzed with this new geometric space physicalization method. The structure of the atmospheric sphere is derived with 2^n geometric space, and the mathematical space table of the Earth's atmospheric sphere model is established. The 2^n geometric space and atmospheric sphere location are a coincidence? Or is it a real law of physics? Although 2^n geometric space is in good agreement with the observation, it still has deviation that we need to improve and develop.

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