Analysis of nuclear fusion exists inside earth

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Article

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Analysis of nuclear fusion exists inside earth

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Using the falsification method, it is proved that "There are three main sources of heat in the deep earth: (1) heat from when the planet formed and accreted, which has not yet been lost; (2) frictional heating, caused by denser core material sinking to the center of the planet; and (3) heat from the decay of radioactive elements" is a false proposition, it is inferred that the source of heat in the deep earth must have an unknown exothermic factor, and this exothermic factor is the heat from intermolecular nuclear fusion. Then, using the quantum tunneling effect of proton and the observed continental plate drift facts, it is determined that there must be nuclear fusion inside the earth. Through the diagram of temperature of planet Earth, it can be determined that the endothermic nuclear fusion reaction occurs in the core of the earth, and because the water becomes solid and cannot ionize hydrogen ions, nuclear fusion cannot occur, so as to determine that the temperature at Earth's center is the freezing point of the saline solution at the center of the earth's core.

1. Introduction

The core temperature is an important proposition in earth science, which will directly determine the establishment of earth model and the development direction of earth science. In 1997, Q. Williams proposed the hypothesis of geothermal sources. There are three main sources of heat in the deep earth: (1) heat from when the planet formed and accreted, which has not yet been lost; (2) frictional heating, caused by denser core material sinking to the center of the planet; and (3) heat from the decay of radioactive elements[1]. This hypothesis inferred that Earth's core temperature is very high, and determined the method of measuring the core temperature. In 2013, S. Anzellini et al. estimated the internal temperature of the Earth's core through experiments[2]. Subsequently, an earth model was established and computer simulations were used to calculate related values, such as the 1066A earth model[3]. However, the temperature gradient distribution near the Mohosurface in the land area calculated by this model is not continuous with the actual temperature gradient distribution of the crustal crust. Yes, this violates the law of conservation of energy. The law of conservation of energy has been repeatedly proved to be correct, so the geothermal source proposition proposed by Q. Williams is a false proposition. A heat source needs to be added In mantle—presumably from the heat released by nuclear fusion. Further through the quantum tunneling effect of proton and the plate motion observed by satellites, it can be determined that there must be nuclear fusion exists inside the Earth. On the other hand, the diagram of temperature of planet Earth can be used to determine the existence of endothermic nuclear fusion in the earth's core.

2.1. Falsification of the proposition of three sources of geothermal energy

Temperature change equation of the earth's interior is[4]:

$$\int_V \rho C \frac{\partial T}{\partial x} dV + \int_S \vec{q} \cdot \hat{n} dS - \int_V A dV = 0 \qquad (1)$$

The first term of the formula is the amount of heat absorbed per unit time by a substance in V increasing its temperature, ρ is density of matter; C is the specific heat capacity of the matter. The second term of the formula is the heat flowing out of V through S per unit time; The vector n is the outer normal unit vector of S; The third term of the formula is the heat generated by the heat source, A is the heat generated per unit volume per unit time.

The high-temperature lithosphere generated at the mid-ocean ridge moves to both sides with the expansion of the ocean floor and cools to form heat flow[5]. Radioactive heat generation can be ignored . The rocks generated at the mid-ocean ridge are from the mantle, so it can be considered that the radioactive heat generation in the mantle can also be ignored.

The inner core is thought to be made of iron and nickel separated from the outer core. Thus, in the retention process, heavy substances fall and light substances rise, thus forming a kind of chemical convection[6]. It can be concluded that the process of heavy matter deposition mainly occurs in the outer core, and the heat generated by friction during the deposition of material toward the center mainly occurs in the outer core. The frictional energy in the mantle can also be ignored. The mantle, of course, carries heat mainly by convection.

The mantle takes into account neither the heat generated by radioactive elements nor the heat generated by friction as material is deposited towards the center of the earth. So let's say that the source of heat in the mantle is negligible. According to the geothermal three sources proposition, and according to Formula (1), the heat transfer in the mantle mainly comes from the heat transfer in the core and the temperature drop of the material in the mantle. In the one-dimensional direction from the center of the earth to the surface, without considering convection, the energy transfer expression of the two approaching surfaces is approximately: $Q_2 \approx Q_1 + \rho VC\Delta t$, According to Fourier's law of heat conduction:

$$Q = -KA\frac{dT}{dr}$$

$$-K_2A_2\frac{dT}{dr} = -K_1A_1\frac{dT}{dr} + \rho VC\Delta T$$

Therefore, in the mantle where convection does not occur, two factors affecting the temperature gradient are KA and ΔT.

Based on the temperature distribution table of the Earth's interior drawn by the 1066A Earth Model[3]: At the earth radius of 6201km and the surface depth of 170km, the subterrestrial lithospheric temperature is 1480K; At the earth radius of 6251km and the surface depth of 120km, the subterrestrial lithospheric temperature is 1226K. At the earth radius of 6301km and the surface depth of 70km, the subterrestrial lithospheric temperature is 1035K.

The average arithmetic of the temperature gradient for 120-170 km below ground is:

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$$-\frac{\Delta T}{\Delta r}=\frac{\Delta T}{\Delta z}=\frac{1480-1226}{170-120}\approx 5.08K/km$$

The average arithmetic of the temperature gradient for 70-120 km below ground is:

$$-\frac{\Delta T}{\Delta r}=\frac{\Delta T}{\Delta z}=\frac{1226-1035}{120-70}\approx 3.82K/km$$

Field observed that the propagation velocity of seismic wave in the earth's crust and laboratory simulation of deep earth temperature and pressure environment determination of ordinary rocks such as granite and gabbro (basalt) speed range, while the mohorovicic interface under seismic wave velocity and the density of the surface is relatively rare rock (such as a blunt peridotite, peridotite, gabbro) laboratory measurements is good[7]. It can be considered that the average chemical composition of the material above the Mohosurface is similar to that of basalt, and that of the material below the Mohosurface is similar to that of olivine. Therefore, no convection occurs near the Mohosurface. If it does occur, it will lead to the exchange of basalt components and olivine components, and the Moho will not exist. According to the above analysis, when there is no convection near the Mohosurface in the mantle, the change of mantle temperature gradient is related to KA and ΔT. If the change of density and specific heat capacity is ignored, and the temperature of unit object falling is regarded as a constant value.

$$\Delta Q/Q\approx\Delta V/V$$

$$\Delta Q\approx\frac{\Delta V}{V}\cdot Q=\frac{\Delta V}{V}\cdot KA\frac{dT}{dr}\approx\rho VC\Delta T$$

$$-K_2A_2\frac{dT}{dr}=-K_1A_1\frac{dT}{dr}(1+\frac{\Delta V}{V})$$

Calculating at an interval of 50 kilometers, it can be get:

$$-K_1A_1\frac{dT}{dr}\approx -K_2A_2\frac{dT}{dr}(1+0.024)$$

The average temperature gradient of 70-120 km is lower than the average temperature gradient of 120-176 km. At the same time, the increase of temperature gradient is less affected by the decrease of temperature. Therefore, the change of temperature gradient in the mantle near the Moho surface is mainly influenced greatly by KA, and the temperature gradient becomes smaller and smaller as it approaches the Mohosurface. Taking the depth as the consideration object, there is a surface ξ, and the depth of the land Mohosurface is set to be 33 km. It is found at [33, ξ], $dT/dz<3.82$ K/km, In other words, the temperature gradient on the mantle side of the Mohosurface is less than 3.82K/km.

In the crust, assuming that the lithosphere is uniform, the thermal conductivity K of the crust lithosphere is constant, and the temperature is a function of depth[5]:

$$T=[q^*z+D^2A(0)(1-e^{-z/D})]/K \qquad (2)$$

In this formula: $D^2A(0)(1-e^{-z/D})/K$ is due to the decay of radioactive elements caused by temperature changes.

$$\frac{dT}{dz}=\frac{q^*}{K}+\frac{1}{K}DA(0)e^{-Z/D}>\frac{q^*}{K}$$

Among them: q* Is taken as the land mean surface heat flux, 33.5 mW/m^2 is taken as the mean value[8], K is taken as the thermal conductivity of the rock above the Mohosurface, and the thermal conductivity of the basalt is taken as the value of 2.18 W/(mK) at room temperature, then the temperature gradient on the side of the Moho outer surface near the crust can be obtained:

$$-\frac{dT}{dr}=\frac{dT}{dz}>\frac{q^*}{K}=\frac{33.5}{2.18}=15.37K/km$$

The internal and external temperature gradients of the Mohosurface are shown in fig.1:

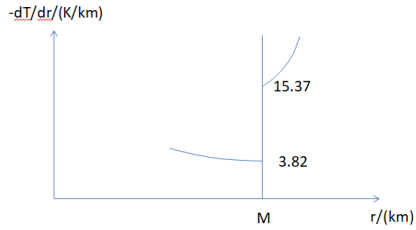

Fig.1. Schematic diagram of the temperature gradient near Mohosurface

Since K and A are the same at the same interface, according to Fourier's law of heat conduction: $Q=-KAdT/dr$. If the temperature gradient is proportional to the input and output energy, then the average energy of heat conduction of the Mohosurface near the mantle is:

$$q_{mantle}<\frac{3.82}{15.37}\times 33.5\approx 8.32mW/m^2$$

The heat input from the Moho near the mantle is less than 8.32 mW/m^2, and the heat output from the Moho near the crust is 33.5 mW/m^2. That conclusion is against the conservation of energy. Therefore, the proposition of three sources of geothermal energy is a false proposition.

In the event of a conservation of energy violation in the calculation, it is generally assumed that there is a neglected energy presence. The same can be inferred from the mantle has been not aware of a heat source, which is characterized by:(1) Not The heat of friction as radioactive elements decay and deposit material into the earth's core;(2) To rule out the energy of Earth's formation and early accumulation;(3) The amount of energy released is the same as the amount of heat produced by the decay of radioactive elements(The average amount of heat from the decay of terrestrial radioactive elements reaching the earth's surface is 59.2-33.5 = 25.7 mW/m^2);(4) To keep the earth's core solid[2]. It can be speculated that the unknown heat source in the earth comes from nuclear fusion.

2.2 Analyze whether nuclear fusion occurs in the earth from the perspective of quantum tunneling effect

In 1929, Atkinson and Houtermans theoretically calculated the possibility of hydrogen atoms fusing into helium at a high temperature of tens of millions of degrees[9]. Therefore, it is generally believed that nuclear fusion can only occur when it reaches tens of millions of degrees. Because the internal temperature of the earth is only a few thousand degrees Celsius, it can be considered that there is no nuclear fusion inside the earth. On the other hand, in 1926, British astronomer Eddington believed that the energy of stars could only come from nuclear reactions, while physicists at the time believed that nuclear fusion could only occur when the temperature reached tens of billions of degrees. Later, it was explained that the nuclear fusion inside the star was achieved by the quantum tunneling effect. In the nuclear fusion chain reaction inside the sun, hydrogen ions in the form of protons play a very key factor in the nuclear fusion reaction[10-12], and there are also proton forms of hydrogen ions on the earth. As we all know, the hydrogen ion concentration index of the aqueous solution can be expressed by the PH value. Under certain conditions, the PH value is a constant, it shows that the concentration of hydrogen ions in the water is stable at a certain

ratio. The hydrogen ions ionized in water can be regarded as protons, which is no different from the hydrogen ions involved in nuclear fusion reactions in the sun. Therefore, the hydrogen ions inside the earth can also undergo quantum tunneling effect and undergo nuclear fusion reactions with the nuclei of other elements, instead of simply judging whether there is nuclear fusion in the earth based on temperature and pressure. In other words, because there is a lot of water on the earth that ionizes hydrogen ions , nuclear fusion can occur inside the earth.

2.3 Factual basis for nuclear fusion in the earth

If it is considered that there is nuclear fusion in the earth, geothermal sources can be divided into two categories, one is the heat generated by the earth's nuclear fusion, and the other is the heat transferred by non-nuclear fusion. The heat transferred by non-nuclear fusion can include the residual heat of the earth, the heat generated by nuclear fission, or the heat radiated by the sun to the earth, etc. According to the 0th law of thermodynamics, the following conclusions can be drawn, when the external conditions do not change, the system that has reached a thermal equilibrium state, the internal temperature is uniformly distributed. The earth model calculated by simulation, such as the 1066A earth model[2], believes that that the temperature in the horizontal direction is the same. The relationship between heat and exercise is that as long as there is a temperature difference, exercise can occur. There must be a temperature difference to convert heat energy into motion[13]. Therefore, the residual heat of the earth and the heat transferred from the inside of the earth cannot cause the movement of continental plates. In other respects, Wegener believes that the two possible causes of continental drift are: the tidal force generated by the moon and the polar drift force (pohlflucht), but geophysicist Ha Jeffries pointed out that continental drift requires huge power, far surpasses the tidal force and polar drift force proposed by Wegener. Plate structure is only a kinematic theory, as long as the driving force problem is not solved, then it is just a thinking hypothesis[14]. The problem of the driving mechanism of plate movement is still an unresolved issue[15]. Logically, there is a relational expression, if a→b, then not(b)→not(a), the inverse proposition is: not(c)→not(d), then d→c. The problem of the driving mechanism of plate motion cannot be found without considering nuclear fusion, that is, continental drift cannot be generated without considering nuclear fusion. The movement of the plates can be observed through satellites[16]. According to this logical inverse proposition, it can be determined that there must be nuclear fusion in the earth.

It is impossible to determine the driving mechanism of plate motion without considering nuclear fusion. So, can nuclear fusion solve the problem of driving mechanism of plate motion? Because the earth's nuclear fusion is caused by hydrogen ions from water through the quantum tunneling effect, exothermic nuclear fusion reactions can occur where there is water in the mantle. If the distribution of water in the mantle is uniform, then the energy distribution in the horizontal direction is uniform, and plate movement is impossible. Again, use the logical relationship: not(c)→not(d), then d→c, because through the satellite Observing plate movement, it can be concluded that the distribution of water in the mantle must be uneven. Due to the uneven distribution of water, the uneven heat generation in the region of the mantle results in uneven temperature in the horizontal direction. This creates a temperature difference in the horizontal direction in the mantle, which drives the movement of the plates. In other words, nuclear fusion can solve the problem of the driving mechanism of plate movement. The conclusion that there must be nuclear fusion in the earth derived from the plate motion is verified.

2.4 Link between nuclear fusion and the temperature of the Earth

According to the Stefan-Boltzmann law, there is a simple linear relationship between the energy radiated by an object and the temperature of the surface of the object. Nuclear fusion reactions are related to energy, so nuclear fusion reactions can affect changes in the temperature of the earth's surface. The research can be given priority to nuclear fusion at the Earth's core.

According to the binding energy curve[17], nuclear fusion reactions with atomic numbers smaller than iron release heat, while nuclear fusion reactions with atomic numbers larger than iron absorb heat. The surface of the core contains a large amount of iron and nickel, indicating that the nuclear fusion reaction in the core is mainly endothermic reaction. So the core is solid because of endothermic reactions that degrade the surrounding environment. In the core of the earth endothermic fusion of materials is a continuous increase in the process, the absorption of heat is also increasing, resulting in a continuous degradation of the surrounding environment. If the core's temperature drops below the freezing point temperature of saline solution at Earth's center, and the temperature at this time is recorded as T_a , the saline solution becomes solid and cannot ionize hydrogen ions, so the nuclear fusion reaction cannot proceed. This causes a relative increase in the number of fusion molecules that release

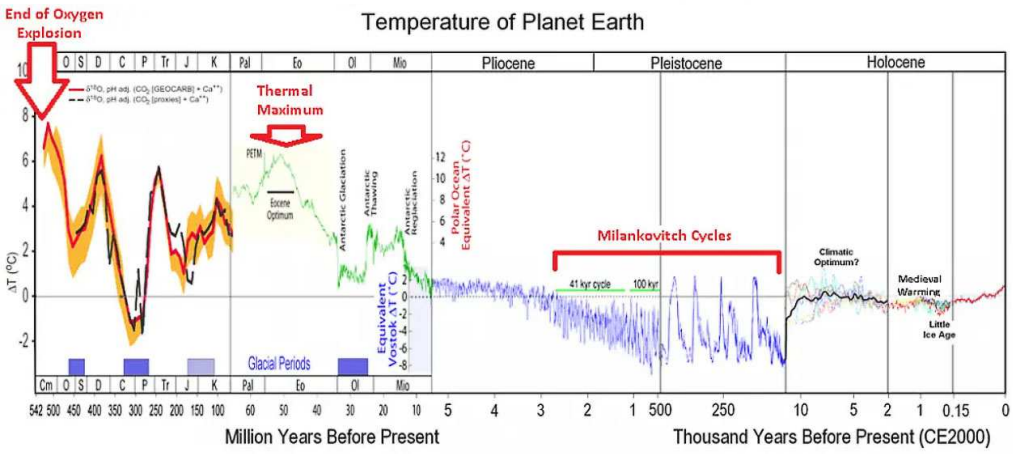

Fig. 2 Diagram of Temperature of Planet Earth

heat, and the surface temperature begins to rise. As the fusion reaction continues, the atomic number is larger than the number of iron and nickel atoms, and the ground nuclear fusion activity becomes stronger again, which leads to the decrease of the average surface temperature. When the temperature of a larger area inside the local core drops to T_a, another part of the core stops the fusion reaction due to its low temperature, resulting in a relative increase in the number of fusion reaction molecules releasing heat again, and the surface temperature begins to rise. This causes the average surface temperature to oscillate.

Refer to the temperature of Planet Earth[18] as shown in Fig. 2. It can be observed from Figure 2 that from 10 million years ago to the present, the earth's temperature has been continuously fluctuating slightly. This is due to the fact that the temperature at the core of the earth's core has dropped to T_a, and the nuclear fusion reaction in some areas has ceased to absorb heat, resulting in the earth's core. The total amount of heat absorbed by the fusion reaction fluctuates over time, rather than always increasing. The radius of the area where the center of the earth's core drops to the temperature T_a becomes larger and larger, and then the amplitude of the oscillation of the surface temperature over time becomes larger and larger, so the radius of the area where the center of the earth's core drops to the temperature T_a should be related to the amplitude of the surface temperature.

3. Discussion

Due to the endothermic nuclear fusion reaction in the earth's core, the temperature of the earth's core decreases and becomes solid, so the temperature of the earth's core is lower than the maximum temperature of the mantle. The heat in the core cannot be transferred to the mantle, so there is no residual heat of the earth. The main source of geothermal heat is nuclear fusion and nuclear fission. In terms of magnitude, the mantle heat can be regarded as the total amount of geothermal heat. In August 1981, the United Nations New Energy Conference declared that the geothermal resource is $5*10^{20}$ calories. According to the mass-energy equation, $7.34*10^{-4}$ kilograms of matter per second on the earth are completely converted into energy. The sun converts $4.25*10^{9}$ kilograms of matter into energy per second, which is 10^{-20} compared to the total weight of the sun, is the recognized probability of nuclear fusion in the sun. Similarly, $7.34*10^{-4}$ kilograms is 10^{-28} compared to the total mass of the earth, which is the probability of nuclear fusion in the earth.

Since water is essential in nuclear fusion reactions, the polymerization reaction of hydrogen ions and hydrogen atoms can also occur in the core of the earth. This reaction is an exothermic reaction. The nucleus is solid. Only under endothermic conditions, the temperature of the earth's core is reduced to a sufficiently low level that the earth's core can become solid due to the temperature.

The insufficient of the article is that it discusses the nuclear fusion reaction between the mantle and the earth's core, but does not discuss whether nuclear fusion reaction occurs in the earth's crust, because there is insufficient evidence to prove that nuclear fusion reaction occurs in the earth's crust.

Another insufficient of the article is that it discusses the effect of the endothermic nuclear fusion reaction of the earth's core on the surface temperature of the earth, but not the effect of the exothermic nuclear fusion reaction of the mantle on the earth's temperature. This is because of the performance of the endothermic nuclear fusion reaction of the earth's core. It is to make the earth's temperature drop. This factor is single, and the factors of the exothermic reaction that make the earth's temperature rise are various, such as solar radiation, nuclear fission exotherm, and even the total amount of water involved in the reaction. It is difficult to analyze the influence of the exothermic reaction of the mantle on the surface temperature from this perspective.

Conclusion

Through the falsification of the propositions of existing geothermal sources, the tunneling effect of hydrogen ions produced by water ionization, and the continental drift observed by satellites, it is concluded that there is exothermic nuclear fusion in the mantle. The fact that it is a solid confirms the conclusion that endothermic nuclear fusion occurs in the core, and at the same time draws the conclusion that the temperature of the center of the earth is the freezing point of saline solution at the core.

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