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Earth's interior is working this way-answering the 10th problem proposed by “Science” journal*

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Abstract: Materials all over the world are doing opening-closing movement. The thermal (heat energy) derived upward movement of material can be defined as opening, while the potential gravity of derived downward sinking movement be defined as closing. Opening-closing movement obtains the synchronized unity between vertical and horizontal opening-closing and the properties of interdependence, mutual opposition and transformation. So that, under the control and regulate of rotating movement it transforms all Earth material, tectonics and energy etc. from the state of disorder to be ordered, and finally built up the dynamically stable equilibrium system of opening-closing-rotating tectonics. Therefore, the unceasingly cyclic evolution of formation, destruction and renovation of the dynamically stable equilibrium system is the only basis and effective method for the research on the working of the Earth's interior. For that, we have delineated 8 vertically opening-closing tectonic cycles and the Earth crust spherical opening-closing tectonic cycle. And preliminary established the 4-dimensional working system of the Earth. The establishment of the dynamically stable equilibrium system is fulfilled in accordance with the 4 long term standing natural laws, such as, the gravity or mass balancing criteria, the minimum internal energy principle in crystallization, geometric preferred orientation growth principle and principle of horizontal material homogeneity. Among them gravity balancing is the leading law. Nearly at about 4.0 Ga mantle lithosphere was formed as a lid covering the hot Earth and preliminarily built up the stable opening-closing-rotating tectonic system which made the Earth entering the evolution stage of dynamically stable equilibrium system. After that, each important geological event (lose balance) is not thing but poking a hole or tearing a fissure to destruct the balance of the Earth. The rotating movement and opening-closing movement will soon restore it to a new balance and thus formed an opening-closing cycle. Till now Earth has passed 5 megacycles. Plate tectonics studied the regularity of how did the lithospheric mantle be poked and how did it be restored only for the youngest 4 cycles and then summing up as a theory. Therefore, it is restricted both in time and space and is unworthy to be titled as “global tectonics”. Earth is a living body, the working system in which including inner structure and its function is rather perfect, including: opening-closing movement, rotating movement and the lose balance movement to compose the movement system; Geo-fluids functioning as “blood”, Earth nucleus is the “heart” for storing and supplying “blood” and the mantle plumes connecting “bloods” comprised the “blood” system. Taking gravity balance as a criteria, the Earth's dynamic equilibrium system is composed of: 4 gravity balance surfaces, 4 opening-closing transforming zones and the 2 mass balance lines on the surface of the sphere. Because the transformation of opening and closing has the function of spontaneous forming and self-adjusting, therefore, the interdependence, mutual opposition and transformation of opening and closing are the major dynamic mechanism and major motivation for the working system of the Earth's interior. The essence of the change is the transformation of thermal energy to potential energy. The driving mechanism of the transformation is the destruction of opening-closing equilibrium by lose balance movement. The internal cause is the supercritical explosion induced by high temperature and pressure fluid and the external cause is mainly impact process.

Keywords: global tectonics, opening-closing tectonics, plate tectonics, working of Earth's interior, heat energy, potential energy

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Процессы во внутреннем объеме Земли дают ответ на десятую проблему, предложенную журналом «Наука»*

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Резюме: Материал Земли находится в непрерывном пульсирующем движении «открытия-закрытия». Тепловая энергия, являющаяся производной восходящего потока материала, может быть определена как движение открытия, в то же время гравитационная, потенциально нисходящая энергия и соответствующее ей движение будет определяться как закрытие. В тектонических процессах движение открытия-закрытия получает синхронизированное единство по вертикали и горизонтали, обусловленную взаимозависимость, взаимное противостояние и трансформацию энергии и движения. Оно контролирует и регулирует вращение Земли, обеспечивает трансформацию земного материала, тектонические и энергетические процессы и, наконец, создает динамически устойчивую и сбалансированную систему, которую можно определить как «открытие-закрытие-вращение». Следствием работы этой системы является непрерывная циклическая эволюция формирования, разрушения и обновления тектонических структур Земли. Устойчивая, динамически сбалансированная система является единственной основой эффективного метода исследования глубинных процессов внутри Земли. На ее основе было определено восемь вертикальных тектонических циклов открытия-закрытия, один цикл открытия-закрытия для земной коры, который носит соответственно сферический характер, и предварительно установлена четырехмерная рабочая система Земли. Исходя из существования стабильной сбалансированной системы, можно сделать заключение о том, что тектонические процессы подчиняются четырем долговременным естественным законам, таким как закон гравитации, обеспечивающий баланс масс, принцип минимальной внутренней энергии при кристаллизации вещества, принцип роста в геометрически предпочтительной ориентации и принцип однородного горизонтального распределения материала. Из них гравитационный баланс является ведущим законом. За 40 млн лет была сформирована мантийная литосфера как оболочка, покрывающая горячую Землю. В процессе ее становления и была сформирована устойчивая тектоническая система открытия-закрытия-вращения. После этого каждое важное геологическое событие можно рассматривать как нарушение равновесия и брешь для последующего разрушения баланса Земли. Однако вращательное и вертикальное пульсирующие движения открытия-закрытия вскоре вновь восстанавливают баланс, завершающий очередной тектонический цикл. К настоящему времени Земля прошла пять таких мегациклов. Тектоника плит при этом изучала и теоретически обосновывала только отдельный процесс нарушения равновесия и его восстановления, следовательно, она вряд ли может именоваться как «глобальная тектоника». Земля может рассматриваться как живое тело, рабочая система которого – это ее внутренняя структура с достаточно совершенной функцией, включающей движения открытия, закрытия, вращения и потерю равновесия. Функцию флюидного режима Земли можно уподобить «крови», а ядро Земли – «сердцу» для хранения и последующей передачи «крови» через мантийные потоки. Если принять гравитационный баланс в качестве критерия земного динамического равновесия, то всю систему Земли можно разделить на: четыре поверхности гравитационного баланса, четыре зоны трансформации открытия-закрытия и две линейные сферические поверхности баланса масс. Вследствие того, что пульсация открытия-закрытия обеспечивает саморегуляцию и самоорганизацию системы, противостояние и трансформация вещества, вызванные этим процессом, могут рассматриваться как основной механизм глубинной динамики земных недр. Суть изменений заключается в преобразовании тепловой энергии в потенциальную. Движущий механизм трансформации имеет двоякую причину, обусловленную внутренней энергией сверхкритического взрыва, вызванного высокой температурой и давлением глубинных недр, и внешней, связанной с множеством импактных процессов.

Ключевые слова: глобальная тектоника, пульсационная тектоника открытия-закрытия, тектоника плит, механизм глубинной динамики, тепловая энергия, потенциальная энергия

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Introduction

In the year 2005, the famous journal “Science” had proposed the 125 frontier scientific problems remained to be solved by mankind, among them, the 10th is how does the Earth’s interior work? And in the authorization explain of the project it is emphasized that the research on plate tectonics should be deepened and its complicated dynamic mechanism should be find out according to plate tectonics model [1]. Plate tectonics is really a great innovation, but it shows somehow limitation both in time-space and forming mechanism. Therefore in extracting the essence of plate tectonics it is better to jump out of the plate tectonics and study this problem in a higher level. Opening and closing proposed by J. Tuzo Wilson in 1968 is the essence of plate tectonics [2]. In 1982 Ma Xingyuan taking the opening and closing as the guiding idea in the compilation of “Geotectonic map of China and adjacent regions with illustration” [3] and further advanced the opening-closing tectonics [4–6]. We hold that opening and closing movement cooperates with rotating movement forming dynamically stable equilibrium of opening-closing-rotating tectonic system and the destruction of equilibrium system and rapidly be restored is an effective and basic way of researching on the working of the Earth’s interior.

The definition of opening-closing movement and its two characteristics

All materials in the Earth (the larger one as the Earth, the tiny one as molecule, atom, proton and particle) are doing opening-closing movement. For Earth material (geological body) horizontally divergent movement is referred as opening, the convergent movement is referred as closing; vertically centrifugal movement is referred as opening, centripetal movement is referred as closing. To sum up, opening-closing tectonics can be expressed as that the expansion of the Earth is opening, the contraction of the Earth is closing. From the view point of driving mechanism, we take heat (thermal energy) as the subject driving force let material floating up to define

opening, taking gravity (potential energy) as the subject driving force to let material sink down defined as closing. Therefore opening closing is a highly comprehensive concept with broad connotation and denotation. Thus opening closing becomes the link connecting all geological movements (such as the formation of sedimentation, magmatism, mineral deposits etc., and their deformation, displacement, metamorphism, various geochemical movement, geophysical movement, the formation of living things and evolution on the Earth). There are 2 characteristics for opening and closing. 1. The horizontal and vertical opening and closing are of synchronous unity, that is, vertical opening, horizontal must also be opening; strong vertical opening must accompanied by strong horizontal opening and *vice versa*. As a result of opening closing movement integrates the horizontal movement with vertical movement, the deep-seated structure integrates with shallow structures to form an unity. 2. Opening and closing are characteristic of interdependence, mutual opposition, and mutual transformation. Transforming from mainly opening to mainly closing is a very complicated process, in which interchange of materials is frequent, tectonic movement is intensive, Therefore to find out the temporal-spatial niche of the transformation zone is of great theoretical and practical significance.

Rotating movement and opening closing rotating tectonic system

Rotating movement operates in the Earth from beginning to the end and playing an important role. The opening closing movement in the early Earth is disordered without preferred orientation and fixed tectonic style. Rotating movement managed all materials in the Earth and all tectonics are brought into the rotating movement. Opening closing movement cooperates each other with rotating movement. It follows the principle of gravity isostasy. Earth materials are uniformly distributed according to gravity and adjust the gravity isostasy plane to a level that the mass on top of and below the plane are equal. The principle of minimal



inner energy in crystallization, the principle of geometric preferred orientation (vertical to geo-center) growth as the criteria of transversal material homogenization. The 4 natural laws make the material and movement of the Earth transferred from disordered state to a state of ordered stable and sustained motion. We call it dynamically stable equilibrium of opening closing rotating tectonic system. Judging from this, opening closing is the major movement form of all materials (geologic body) in the Earth. It is the intrinsic character of all materials in the Earth. It fulfills all time and space of the Earth; the rotating movement plays the role of management and adjustment which is the prerequisite for the formation and sustained stable motion of the Earth.

The general framework of the working system of Earth interior

During the sustained stable working of Earth it can be destroyed by geological events of different order which is known as destruction movement (lose balance). Once the equilibrium be destroyed rotating movement will soon be regulated with opening closing to reach a new equilibrium. For instance, soon after the equilibrium destructed by impact meteorite the mantle material would surge up immediately until reached the new equilibrium. Thus, it makes the working of Earth's interior show the characteristics of uninterrupted development combining with development in stages. Therefore, in constructing the working system of the Earth's interior, time is a factor must be considered. Judging from this, the evolution of Earth can be divided into 4 stages, namely, nuclear Earth, proto-Earth, nuclear mantle Earth and modern Earth together with 8 opening closing cycles, namely, the cycle of Earth nucleus accreting the cosmozoan ejected by outburst of supernova, the cycle of lower mantle rapid accumulating impact material, the cycle of upper mantle rapid accumulating impact material, the cycle of Archeozoic, the cycle of early Proterozoic, the cycle of Middle Proterozoic, the cycle of late Proterozoic and the cycle of Phanerozoic. Thereby, the general

framework of 4 dimensional working system of the Earth's interior is formed (Fig. 1).

It is clear from Fig. 1 that Earth is a life entity, it is the only planet in the universe that plenty of living things are found. It is because of the Earth has a fine and complete set layering texture which is comprised of not only core, mantle, crust but also hydrosphere, biosphere and atmosphere (including the ozone layer). Earth living things are in synchronous growth with Earth's spheres. The cyclic movement of opening-closing transformation under the management and adjustment of rotating movement plays a decisive role in the formation of the Earth's sphere.

The internal structure of Earth's working system

Earth can be analogized as a life entity, the internal structure and function of its working system are rather complete, including the motion system composed of opening closing movement rotating movement and lose balance movement. The geo-fluid playing the role of "blood", and the Earth core playing the role of "heart" storing and manufacturing the "blood", they composed the "blood" system. Taking gravity isostasy as criteria, the Earth's equilibrium system is composed of the 4 gravity isostatic planes, the 4 opening closing transformation zones and the 2 mass balance lines nearing the equator and the meridian respectively on the Earth's surface.

Among the working system of the Earth's interior geo-fluid is the most active factor which is equivalent to the "blood" of the Earth and is existed in all spheres of the Earth. It plays a leading role in the lose balance movement. Especially, the explosion of supercritical fluid is the direct origin for the happening of numerous great geologic events (lose balance). Earth core is the heart of the Earth which not only stores large amount of heat energy (hot fluid) but also is the basis for production of new thermal energy. The surplus potential energy in the Earth (including the exogenic strain energy to the Earth) can be transferred into the Earth's core and transformed to be thermal



Geochron / Ma			Earth evolution		Opening closing cycle and its brief		
Phanerozoic		250	Present Earth	Opening-Closing-Rotating Equilibrium Tectonic System Evolution	Phanerozoic cycle: Present plate tectonics and intracontinent evolution. Several times opening closing until 250 Ma formation of Pangea		
Proterozoic		540			Late Proterozoic cycle: Maily Rodinea super continent breakup to Gondwana continental block aggregate. From 850–800 Ma another global unstable stage 635 Ma Edicaran Fauna appeared; 635–511 Ma Gondwana peak aggregate stage. Biotic explosion in Cambrian		
		850			Mid Proterozoic cycle: Breakup of Columbia super continent forming global rift (opening), than Rodinea super continent aggregate and Neoproterozoicsnowball event causing δ 13C abrupt change		
		1780			Early Proterozoic cycle: After snowball event 2250 Ma magmatic explosion (opening), 2060–1780 organic sediments and graphite formation (closing) Global plate tectonics began		
		2420			Archeozoic cycle: Tonalite, komatiite, tholeiite mafic association developed with BIF sed (opening), later the most important is Neo-Archeozoic super event (closing)		
Archeozoic		4030	Nuclear Mantle Earth	Opening-Closing-Rotating Equilibrium Tectonic System Formation	Uper mantle slow accumulation: Jack Moutain era-geologic dark era. According to Lunar information: 42 Ba impact process (opening), lithospheric mantle can be the shrinking crust		
Jack Mount Era		4404			Lower mantle rapid accumulation: Strong Earth core formed absorptive force increased. In 60 Ma it absorbed large amount impact materials the mass of which is 60 % that of the Earth (opening). Due to temperature increase important geochemical differentiation b happened. The transition layeris shrinking crustsimilar to Lunar crust, with K, REE and P composition (closing). Composition of Lower Crust equivalent to Lgroup. molecules		
Hadean	Latey Stage				4460	Earth core direct accretion cycle: Early stage expansion accretion, enlargement (opening) with large amount heavy elements heavy material, there are opening-closing movements but are disordered. Later shrinking adjustment strengthened (closing), the composition equivalent to M group molecules. A.N. Halliday measured the forming age of the core 4470 Ma. D'' is likely the outercrust by shrinkage	
	Chaos ERA						
	Early Stage						
		4567					

Fig. 1. The sketch of the general framework for the working system of the Earth's interior

Рис. 1. Генеральная схема работающей глубинной системы земных недр

energy. In addition, there are considerable amount of radioactive elements in the outer

core, their decay produces large amount of thermal energy. Core-mantle boundary is a



density discontinuous boundary. Under high pressure and temperature conditions the material in outer core would have mass transfer with the overlying rocks originating various geophysical and geochemical reactions forming large high density, high temperature, high pressure, ultra-low velocity zone. The density, temperature, pressure of the ultra-low velocity zone material are larger than that of the surrounding and would have led to expansion inducing the explosion of the supercritical fluids and surging up in the form of diapir, expanding horizontally along some weak layers and finally forming the dendritic plume. It connects all the surrounding sporadically distributed fluids and makes up the “blood system” of the Earth. Gravity balance settled the material foundation for the sustained stable working system of the Earth (Fig. 2). Gravity balance plane is the “anchor”. It plays a leading role during the formation of the opening closing rotating tectonic system and restore the destroyed tectonic system to reach a stable state. Great geological event (lose balance) is the arch-criminal who destroyed the balanced system. However, it is also the hero

for sending new energy into the system to keep sustained working of the Earth. The induced great geological events have their external and internal causes. The external causes mainly are impact effects; the most common internal cause is the super critical fluid explosion induced by high temperature and pressure. In the stage of proto-Earth the Earth has basically been finalized, therefore, the gravity balance plane of the proto-Earth – the core-mantle boundary is keeping to be the important transformation zone of opening closing tectonics, and it is the important source of great geological events (lose balance movement).

The analysis of the movement process of Earth's interior

Plume, governing the blood system, is the principal style of upward movement mainly by thermal energy. With extremely high temperature and pressure, carrying part of solid material up to the crust level it induced the supercritical explosion producing huge horizontal tension and causing ocean floor spreading and passive continental drift. Because of the interrupted continuously happened explosion the distance

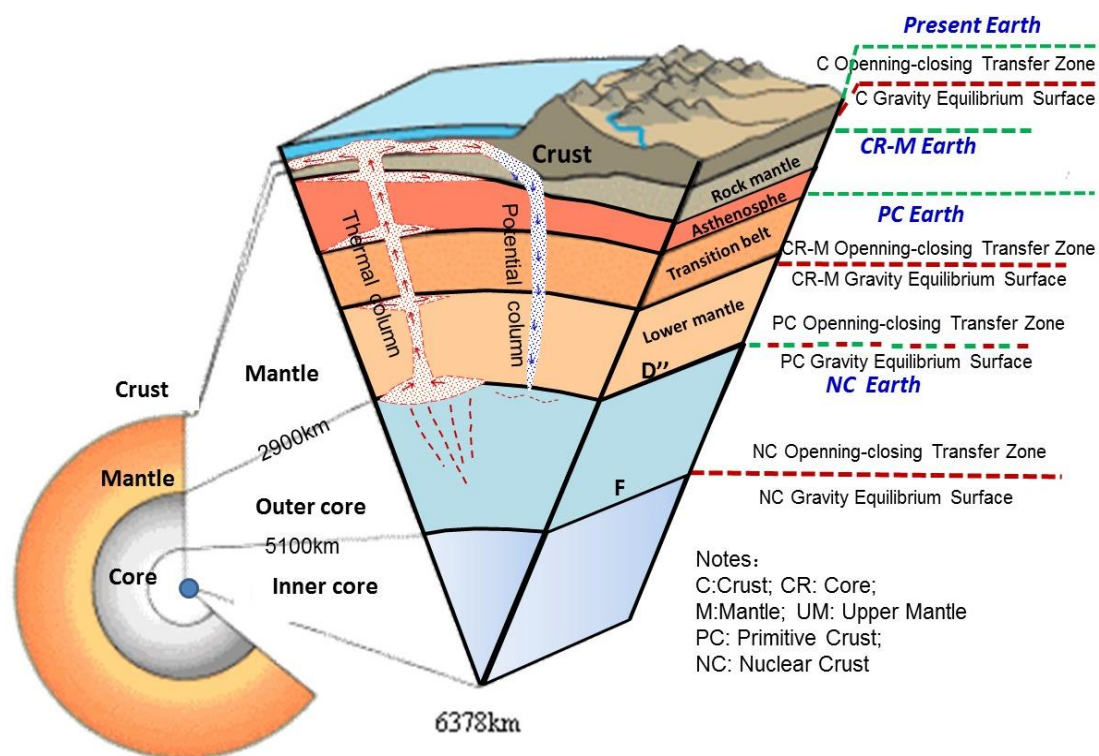


Fig. 2. The schematic diagram of the inner structure of the Earth's working system (illustration see text)
Рис. 2. Блок-диаграмма, демонстрирующая работающую систему глубинных земных недр



of the expansion can be very large. In addition, continent can also actively drifts along the Moho. Sometimes, the continental crust can be separated or fallen into the ocean. All of these show the characteristics of tension indicating opening is the dominant. In contrary, compression happened at the convergence between continent and ocean. Along with the strengthening of compression the advantage of closing is being larger and larger and becomes predominant. According to the viewpoint of plate tectonics the subduction zone is formed by horizontal pushing and vertical pulling due to gravity. In fact, except very few subduction there is not deep subduction zone, and the so called mantle convection is also not found., and this is the fatal weakness for the plate tectonics. If we consider from the view point of energy, probably can find out a new way in solving the problem. In the introduction of the book "Gravitation and tectonic movement" edited by Ma Xinyuan, he proposed 4 kinds of force are important in Earth's interior i.e. attractive force, thermal force, rotating force and solid elasticity force. Among them the attractive force and solid elasticity force are eternal. In the description of the relationship between them, thermal force and gravity are the most important. He points out that in the evolution of whole globe, potential energy let all materials in the Earth concentrate to its center. The Earth itself is the product of cohesive force. The thermal energy drives the material move upwards by diffusion. Thermal force mainly reflects the energy of the particle movement. Not related to the mass. However the temperature is its exterior syndrome. Therefore, the nature of thermal force is the motive force of a particle. Viewing from the relation between attractive force and thermal force, the attractive force can transform to be thermal force and electro-magnetic force (the heat radiation), but the reversal transformation has not been found.

Recently, the inertia force of rotation and thermal force are commonly used to illustrate tectonic movement, however, gravity are rather few in use. This situation is

insufficient in correct understanding of the formation and development of the Earth. It is because of people take gravity as a kind of conservation force, i.e, a kind of force in equilibrium state [7]. In fact, under the equilibrium state, once certain amount of local anomaly occurred, it is likely to trigger the happening of tectonic movement. Therefore, we hold that as in concurrence with the above mentioned ocean floor spreading, the convergence between ocean and continent is the concentrating zone of compressive stress. The potential energy storing in the object is known as strain energy or deformation energy. Among them, the strain energy in the form of strain is always the dynamic origin of earthquake. This kind of earthquake are shallow with layer-like distribution, While the strain energy in the form of stress will superimpose onto the potential energy in the original material forming a more larger potential energy than the before one and is different from that of the surroundings. So that it has an intensive downward (low potential energy) movement trend. Once the condition is satisfied it moved downwards, during the movement it always induced the explosion of high temperature high pressure supercritical fluids causing earthquake. This kind of earthquake are deep with zonal distribution. If the strain energy is large enough, This anomalous potential energy can drive down straight into the core-mantle boundary and under high temperature and high pressure conditions. It would be melted transforming to thermal energy. At present, on many of the regional and global seismic sequence analysis maps, in the mantle beneath the convergence between ocean and continent the existence of columnar anomalous high speed bodies are found in different depth with various scale [8]. In some of the comprehensive geological profile and block diagram [9] the above mentioned high speed bodies are found. Some of the geologists take it as favorite evidence for the deep subduction of oceanic crust or even continental crust [10]. It is evident that the smaller density material of continental crust is unable to subduct



beneath the mantle with higher density. However, if analyzing from the viewpoint of energy under certain conditions this kind of anomalous potential energy can be moved downwards and is one of the basic forms of “closing”. Connecting with the previously mentioned the analysis of hot mantle sample, just right to construct a circle from thermal energy transformed to strain energy, which imposed on the original potential energy forming anomalous potential energy and then from anomalous potential energy to thermal energy i.e. performed an “opening closing” cycle. Therefore, some geologically large scale opening closing cycle, in fact is the result of mutual transformation between thermal and potential energy (Fig. 2). Besides the mentioned first order opening closing cycle, we take the north China craton as an example to analyze the uplift of asthenosphere and the detachment of lithosphere forming the 2nd order opening closing tectonic cycle and the 2nd order tectonics, promoting the formation of 3rd order opening closing tectonics, such as, intracontinental orogenic belt and continental rift etc. [4].

The above mentioned is just a generalized summary on the working system of the Earth's interior. For further study can be the comprehensive study of geological, geophysical, geochemical and geobiological researches according to the 4 large Earth stages or 8 opening closing cycles. The 4 Earth stages and 8 opening closing cycles are continuously developed with various peculiarities and effects. Generally speaking, the first 3 cycles are the formation of dynamic equilibrium system, and the later 5 are the evolution of the dynamic equilibrium system. During the nuclear Earth cycle and proto Earth cycle in the early stage the Earth was in melting state when it adjusts according to the gravity balance criteria a global movement of material happened and evenly distributed according to the gravity. The former becomes the core of the Earth, and the later makes the Earth basically solidified and finalized. Because proto-Earth was solidified and the surrounding temperature was low the upper mantle cycle of core-mantle Earth

can only have partial exchange of material through the hot fluids to reach gravity balance. But upper mantle cycle is an important supplement in the Earth evolution. The formation of mantle lithosphere makes the internal function of Earth to be further improved. It was formed like a lid covering the hot Earth beginning a stably developed era. The present Earth crust is only 1% in thickness of the Earth. Its quality is only 0.1 % of the Earth. However it lasts 4 billion years and surpassed 5 opening closing tectonic cycles. Through conscientious working it made the Earth more and more scientifically adaptable. The hydrosphere and biosphere appeared and the appearance of new atmosphere containing CO² which made the Earth entering a more high rank development stage. In the deep and shallow parts of the Earth material exchange is underway the D'' layer, the transition layer and the mantle lithosphere are the three thermal boundary layers.

The Earth crust is closely linked with the evolution of mankind and natural world and is clearly influenced by various external agencies. Especially the horizontal movement is widespread and intensive, the present gravity balance plane of the Earth can not adjust the Earth crust to an equilibrium state. Although we have constructed the Earth crust gravity balance plane, but the thickness of the crust is too small so it is in vain. Therefore on the basis of the 8 opening closing tectonic cycles it is necessary to set up a crustal (spherical) opening closing tectonic system which comprehends the structural features induced by deep structures showing on the Earth crust and structural features on the crust caused by various endogenic and exogenic processes. The cases are very complicated. But still are the formation of various leveled opening-closing tectonics be adjusted by the coordination of rotating movement with opening closing movements taking the tie line connecting the Equator and Arctic-Antarctic as a mass balance line. The preferred orientations are longitude and latitude, secondly, northeast-southwest or southeast-northwest in



direction. By means of adjustment to reach the limit let the Earth crust be well balanced. On the characteristics of crustal movement JS Lee had early advanced an incisive summary, he established the longitudinal structural system, latitudinal structural system, northwest structural system, the Cathaysian, Neocathaysian structural systems and the epsilon typed structural system etc. [11]. When we analyzed the linear structures shown on the Wind and Cloud map of Eurasian continent we also delineated the super giant longitudinal circum-Pacific linear tectonic belt and the super giant latitudinal paleo-Tethyan linear tectonic belt. All of these are global tectonics [12]. Ma Zongjin named them girdle tectonics [13]. Within Eurasian continent had also delineated the giant Ural-Oman longitudinal linear tectonic system and the giant Irkutsk-Hengduan mountains longitudinal linear tectonic system. And taking the two tectonic belt as boundary the geological bodies as European tectonic domain, West Asian tectonic domain and East Asian tectonic domain are delineated [12]. Recently the tectonic domain has been renamed as tectonic group and had further discussed the tectonic features in various levels among them [14]. From the analyzes of global tectonics there is one more the youngest super latitudinal tectonic belt trending 300 along the south latitude. It is possibly the ocean-continent boundary trending along the southern border of South America, South Africa and Australian continents. Li Dewei in his paper (2016) had also advanced his scientific conjecture that in southern hemisphere the east-west trending giant mid-ocean ridge represents the modern Tethyan ocean, it connects with the Atlantic Ocean, Indian Ocean and the east branch of Pacific Ocean and constitutes the embryo of super ocean in the south hemisphere [15]. This is highly attracted by us.

Thus, the Earth is generally of spherically layered, block body, mantle plume texture, i.e., vertically it delineates layers, horizontally the layer is inhomogeneous and divided into blocks. Among them the crust

level block is divided into oceanic and continental. Mantle plume is the supporting column linking the layers and blocks, linking the shallow with depth. They are the material record of the working of Earth's interior since 4.6 billion years ago. According to some researchers the Earth is still in its mature stage, the path of the working of Earth's interior is still very long time to go!

A discussion on the dynamic mechanism of the working of Earth's interior

The working of Earth shows the rule of uninterrupted development combined with development in stages. It may be the common truth for all planets. Therefore the discussion on its dynamic mechanism is of great theoretical significance. We considered that under the control of Earth's rotating movement the opening and closing are interdependence, mutual opposite, mutual transforming which is the motive power for the working of the Earth's interior.; because the transformation of opening and closing is spontaneous (for there is a saying : things turn into their opposites when they reach the extreme) and having the function of automatically adjusting. In addition, the energy input by external force is also operated through the mechanism of opening closing transform. Therefore under the control of Earth's rotating movement the interdependence, mutual opposite and mutual transform of opening and closing is the basic dynamic mechanism and major motivation for the working system of the Earth's interior, and is the guarantee for the sustained stable working of the Earth. Of course, the external factors should not be neglected. For example, rotating in galaxy the sun has certain effects, such as, the change of gravitation force (G). At the point of galaxy center the G value is 6.67×10^{-8} cgs, while afar from the planets it turns out to be 7.0×10^{-8} cgs, the variation amplitude is about 5%. G value can affect the change of radius of the Earth, correspondently, the Earth's surface area can have a change up to 10 % in amplitude. Hence it will induce the Earth to enter a new epoch of gravity-thermal force equilibrium



and causing the periodic expansion and contraction [7]. In addition, impact process is the major source of Earth's material in the formation of equilibrium stable opening-

closing-rotating system; in dynamically stable opening-closing-rotating tectonic evolution stage it is the major cause for the happening of great geological events.

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