Harmonic dynamic of the Earth (B)

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Abstract. According to the force analysis of the Earth motion process, the driving force equation of the Earth's harmonic motion is derived. The driving force distribution of the Earth's motion state is calculated. Discussed the driving force accumulation process and the formation mechanism of Earthquake: The thrust of the rock stratum to the hindered portion slowly increases with the creep between stratus and the successive compression each time it from peak point to valley point, Continuously increase the elevation and area of the compression zone. When the driving forces accumulation reaches the limit of the strength of the hindered rock stratum, sudden movement or fracture occurs, and an Earthquake formation. Earthquakes are a process of concentrated energy release. In high-temperature and high-pressure areas within 720km underground, Earthquakes cause some rocks melt to form magma, and driven by harmonic motion, enriches westward along rock fractures and enters the ocean ridges bottoms and the below of the volcano. The magma of below the volcano erupts from the Earth's surface after increasing pressure. The magma at the bottom of the ocean ridge is driven by the footpath board effect and moves upwards along the cracks, and Condensed on the surface of the sidewall, when change the gaps of the cracks along with the ocean floor undulating, the ocean floor on both sides of the ocean ridge is pushed apart from each other. This kind of process of ocean floor fluctuate spreading leads to gradual wear and tear of the ocean floor, ultimately subducting beneath land or trenches and returning to the mantle. In passive mantle convection and ocean floor fluctuate spreading, the driven force of magma flow is provide by the Earth's rotation through fluctuate processes, magma does not output power. In addition, according to the driving forces equation of Earth harmonic motion, the energy conversion equation is given. The total power of Earth's harmonic motion is calculated, and compared with the relevant measured values. It is further proved from the perspective of dynamics and energy conversion: The harmonic dynamic process of the Earth is the basic dynamical process of tectonic movement.

1 Introduction

The motion analysis shows that, under the action of the tide force, the Earth interior produces a driving force to the west with the rotation of the Earth. Driven by the driving force to the west, both the crust and mantle drift slowly, along with the temperature and the fluctuation of Earth tide. Determine the driving force distribution, driving force amplification process and total power of the harmonic motion within the Earth, it is an important link to further understand and prove the harmonic dynamic process of the Earth.

The cause of Earthquakes is an old topic, "Lie Zi • Tang Wen"（Lieyukou, 375 BC) records the Shangchao‘s people (1600BC-1046BC) thinking on this issue: There is a big oceanic trench in the east of Bohai Sea, it has no bottom. There are five mountains in the ditch, and often floating and shaking with the waves. The emperor of heaven arranged fifteen turtle-shaped the huge "ao" fishs raised their heads and put the mountains on their heads, and the five mountains were to quiet. During the Warring States Period, Qu Yuan had different views in "Chu Ci • Tianwen" (Quyuan, 278 BC; Cihai E.C., 1979), think: The "ao" fish wear a big mountain hat, how can be quiet? At the end of the twentieth century, Shandong folk there were still legends about that the "ao" fish live in the groundwater. They carry huge land on the backs. The "ao" fish turn over, caused Earthquakes. The current popular explanation is: Convection in the mantle pushes plates to collide. Regardless of interpreting the driving process of Earthquakes as “Mountain shaking with the waves” or "ao" fish turning over, or mantle convection (Yixun et al.,2006), they all are the milestone of human exploring the mechanism of tectonic movement.

It is now known that Earthquakes and continental drift was the result of the joint action of the Earth's rotation and tidal forces. (Xianwu, 2020). This process has an amplifying effect on the torque. Earthquake is only a process of rock fracture.

2 The distribution law of the driving force

In "Harmonic dynamic of the Earth" (A) Figure 01B and 3.1 Compression movement , the tensile force of the spherical shell of each unit body is f_1. $f_1 = GM\rho R^{-3}H^2(1-\cos^2\beta\sin^2\alpha)^{\frac{1}{2}}$. f_1 is decomposed into f_a and f_b. $f_b = f_1\sin\alpha$, Along the radius direction of unit body circle stratum. $f_a = f_1\cos\alpha$, along the tangent line.

If the compression movement is hindered. When the unit body N turns from the valley point a to the peak point b , since it cannot move westward relative to the lower stratum by an appropriate amount. l_2 cannot decrease with the decrease in stress, make that N is stretched. The unit body between ab will receive additional tension that from the unit body of the point a . When the unit body N turns from the peak point b to the valley point c , because there is no movement between the stratums. l_2 can not increase with the increase of stress, make that N is compressed. The unit body between bc will receive additional thrust that from the unit body of the point c . In this way, quadrants 1 and 3 become stretch zones, and quadrants 2 and 4 become compression zones. In the first quadrant, when only F_1 is studied and $\varsigma = 0$, and when the unit body N at ωt does not move relative to the datum axis, the westward pulling force T_2 caused by f_a has the opposite change course of f_a :

$$T_2 = f_a(\alpha = \frac{\pi}{2} - \omega t)\,,$$

$$= GM\rho R^{-3}H^2 \sin\omega t(1-\cos^2\beta\cos^2\omega t)^{\frac{1}{2}}, \qquad (0<\omega t\le\frac{\pi}{2}) \tag{1}$$

From the "Harmonic dynamic of the Earth" (A) 3.2 geometrical movement, in the first quadrant, when $hd\omega t=1$ and the resistance is very small. If the unit body N has a radial length increment l_1 at ωt, it will move $l_1 d\omega t$ horizontally. If N does not move, it will elongate $l_1 d\omega t$ horizontally. And because within the elastic range, the ratio of the horizontal unmoved amount $\frac{1}{2}l_1 d\omega t$ of the unit body at ωt to the radial length increment l_1 is equal to the ratio of T_1 to f_b. The change process is the same as f_b, so:

$$T_1 = f_b\cdot(\frac{1}{2}l_1\omega t\cdot l_1^{-1}) = \frac{\omega t}{2}GM\rho R^{-3}H^2\sin\omega t(1-\cos^2\beta\sin^2\omega t)^{\frac{1}{2}},$$

$$(0<\omega t\le\frac{\pi}{2}) \tag{2}$$

In the second quadrant, the change process of T_2 is the same as that of f_a, and the direction is westward thrust:

$$T_2 = f_a(\alpha=\omega t),$$

$$= GM\rho R^{-3}H^2\cos\omega t(1-\cos^2\beta\sin^2\omega t)^{\frac{1}{2}}, \qquad (\frac{\pi}{2}\le\omega t<\pi) \tag{3}$$

In the second quadrant, the change process of the westward thrust T_1 produced by f_b is opposite to that of f_b:

$$T_1 = (\frac{\omega t}{2}-\frac{\pi}{4})\cdot f_b(\alpha=\omega t-\frac{\pi}{2}),$$

$$= \frac{1}{2}(\omega t-\frac{\pi}{2})GM\rho R^{-3}H^2\cos\omega t(1-\cos^2\beta\cos^2\omega t)^{\frac{1}{2}},$$

$$(\frac{\pi}{2}\le\omega t<\pi) \tag{4}$$

Therefore, under the action of the lunar or sun's tidal force, $\varsigma=0$, the driving force equation of the Earth's harmonic motion:

$$T_2 = GM\rho R^{-3}H^2\sin\omega t(1-\cos^2\beta\cos^2\omega t)^{\frac{1}{2}}, \qquad (0<\omega t\le\frac{\pi}{2})$$

Table 1 Driving force distribution of in the Earth's deep.

Symbol	Unit	A	B	C	D	I	J	K	L	N	P	W
ρ	$\times 10^3 kg/m^3$	3.4	3.6	4	5	9.3	9.7	12	12	12.5	12.7	
H	$\times 10^6 m$	6.24	6	5.77	4.87	3.5	3.47	3.2	1.39	1.27	1.25	10^{-6}
T_2	$\times 10^2 P_a$	86.0	84.2	86.5	77.0	74.0			15.1	13.1	12.9	0
T_1	$\times 10^2 P_a$	26.0	25.4	26.1	23.3	22.4			4.5	4.0	3.9	0

$\theta = \beta \to 0 \quad \omega t = 60°$ Continuous circle stratum

Table 2 Driving force distribution of the Earth's crust and mantle.

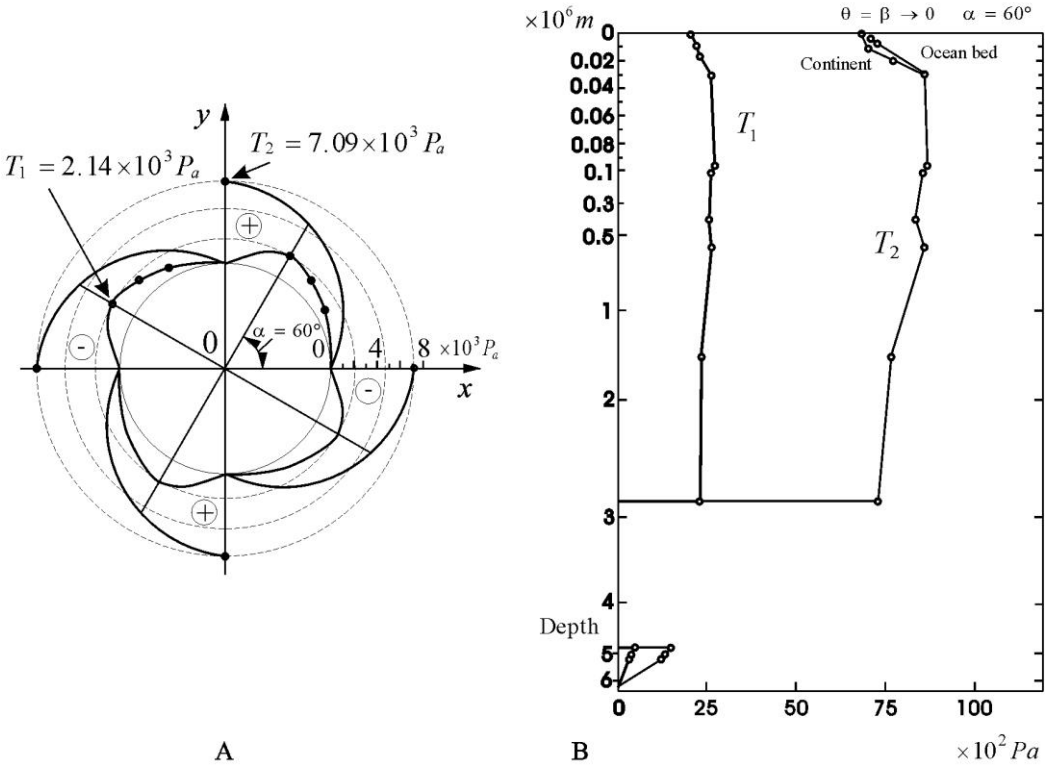
Symbol	Unit	continent A_1	B_1	C_1	D_1	I_1	Ocean A_2	B_2	D_2	I_2	W
ρ	$\times 10^3 kg/m^3$	2.6	2.7	3	3.3	3.4	2.7	2.8	3.3	3.4	
H	$\times 10^6 m$	6.37	6.36	6.35	6.337	6.27	6.365	6.36	6.337	6.27	10^{-6}
T_2	$\times 10^2 P_a$	68.5	70.9	78.6	86.1	86.8	71.0	73.5	86.1	86.8	0
T_1	$\times 10^2 P_a$	20.7	21.4	23.7	26.0	26.2	21.5	22.2	26.0	26.2	0

$\theta = \beta \to 0 \quad \omega t = 60°$ Continuous circle stratum

$$= GM\rho R^{-3}H^2 \cos\omega t(1-\cos^2\beta\sin^2\omega t)^{\frac{1}{2}}, \qquad (\frac{\pi}{2} \le \omega t < \pi)$$

$$T_1 = \frac{1}{2}\omega t GM\rho R^{-3}H^2 \sin\omega t(1-\cos^2\beta\sin^2\omega t)^{\frac{1}{2}}, \qquad (0 < \omega t \le \frac{\pi}{2})$$

$$= \frac{1}{2}(\omega t - \frac{\pi}{2})GM\rho R^{-3}H^2 \cos\omega t(1-\cos^2\beta\cos^2\omega t)^{\frac{1}{2}}, \qquad (\frac{\pi}{2} \le \omega t < \pi) \qquad (5)$$



A: Driving force changes with angle of rotation near the equator at 10km under land.

B: Driving force distribution of continuous circle stratum in the Earth's interior near the equator.

Figure 01: Driving force distribution inside the Earth.

For the meaning of the symbols, see above and "Harmonic dynamic of the Earth" (A). The driving force distribution of the 3rd and 4th quadrants, with the 1st and 2nd quadrants, are symmetry relative to the Earth axis. In addition, T_2 caused by the lunar tidal force and T_2 caused by the sun can to superimposed. So is T_1.

3 Driving force distribution inside the Earth

Substitute the values of $G = 6.67\times10^{-11} N\cdot m^2\cdot kg^{-2}$, $M = 7.35\times10^{22} kg$, $R = 3.84\times10^8 m$ and H, ρ into equation (5), it can to determine the driving force distribution of the crust, mantle and deep portion of the Earth under the influence of the lunar tidal force, see Table 1 and Table 2. The change of driving force with angle of rotation at 10km below land and the distribution of driving force along the depth are shown in Figures 01A and B. These figures does not include the effect of solar tidal force.

4. Movement mechanism of the Earth's interior

The interlaminar movement of unit body is mainly completed by creep process. Creep refers to the phenomenon slowly plastic deformation of the materials under the long-term action of constant temperature and constant stress with the extension of time. Creep can occur at low temperature and below the yield limit of the material, and accelerate with the increase of temperature and stress. During the rotation of the Earth, the material inside the Earth generates interstratum driving forces T_1 and T_2 under the action of tidal force. The wide distribution and long-term existence of T_1 and T_2 in the interior of the Earth cause the unit body to creep under the action of temperature and cause relative movement between the stratum. T_1 and T_2 are alternating forces, which are positive in quadrants 1 and 3, and negative in quadrants 2, 4. The unit body undergoes periodic deformation under the action of T_1 and T_2, but the direction of its driving force is always westward. From the perspective of atomic and molecular theory, Regardless of whether it is a silicon-magnesium stratum or a silicon-aluminum stratum, under the action of T_1 and T_2, the relative position of the molecules changes back and forth with the solid tide. At the same time, T_1 and T_2 make the molecules deviate in one direction in the process of reciprocating position, resulting in a westward movement. The difference from the creep process under static load is that this is a shear creep process under the directional action of alternating loads.

5 Driving force accumulation process

It can be seen from the geometric movement relationship of the unit body circle stratum. When the unit body passes through the valley point, the radial height must falling to a certain height. Therefore, when one portion of the circle stratum of the unit body is hindered and the rest is movable, the unit body section in the second quadrant can be simplified to the rod shown in ck in figure 02A. The c end of the rod is considered to be hinged to the lower stratum, and the k end pushes the hindered portion. First consider the rod as a rigid body for force analysis.

In the second quadrant, when the unit body does not move, in the elastic range, the change course of dynamic tension F_{br} of along the radius of the Earth slice caused by the decrease of f_b is opposite to that of f_b. That is, the increase in F_{br} is equal to the decrease in f_b relative to the value at point $\pi/2$:

$$F_{br} = f_b(\alpha = \frac{\pi}{2}) - f_b(\alpha = \omega t)$$

$$F_{br} = \frac{1}{2}QH^2 \sin\frac{\pi}{2}(1-\cos^2\beta\sin^2\frac{\pi}{2})^{\frac{1}{2}} - \frac{1}{2}QH^2 \sin\omega t(1-\cos^2\beta\sin^2\omega t)^{\frac{1}{2}},$$

$$F_{br} = GM\rho R^{-3}H^2\left[\sin\beta - \sin\omega t(1-\cos^2\beta\sin^2\omega t)^{\frac{1}{2}}\right],$$

$$(\frac{\pi}{2} \le \omega t < \pi) \qquad (6)$$

Where: G, the gravitational constant. M, the mass of the moon. ρ, the density of the unit body. R, distance from the moon to the center of the Earth. H, distance from the unit body to the center of the Earth. $Q = 2GM\rho R^{-3}$. The external forces on the rod ck include tensile force F_{br}, resistance P_k, and support reaction force. From relation of the balance of torque:

$$P_K(c) = \sum F_{br}(c), \qquad (7)$$

$P_k(c)$ is the torque of p_k for c, that is, the product of p_k and Jc. $\sum F_{br}(c)$ is the torque F_{br} to c.

The length of the rod ck varies with the running angle of the hindered portion, the maximum is $\frac{1}{4}$ of The perimeter of the hindered circle stratum, and the minimum is zero. The radial thickness of the rod ck can be from several meters to hundreds of kilometers.

Suppose there is a circle stratum was hindered, the rod ck has a radial thickness $10km$ and an axial thickness $10km$, which is located near the land surface, $\beta = 30^\circ$. When the hindered portion is at running angle of 135°, calculate the thrust P that it bears. According to (7) formula, we can get:

$$P_K(c) = P_k(H\cos\beta\cos^{-1}45^\circ - H\cos\beta)\sin 45^\circ,$$

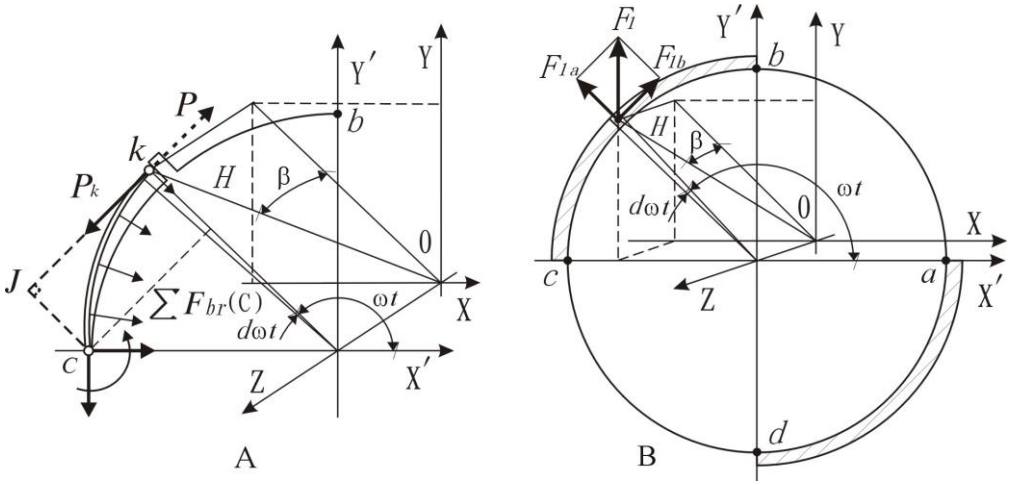
$$= \int_{\frac{3\pi}{4}}^{\pi} H\cos\beta\cdot F_{br}\cdot H\cos\beta\cdot\sin(\pi-\omega t)\cdot 10\cdot 10\cdot d(\omega t),$$

$$P \approx 3\times 10^{18}(N), \qquad (8)$$

If the shear area of the hindered portion is $1000\,(km^2)$, then the shear stress caused by this thrust:

$$\tau = 3\times 10^9(N/m^2) = 3\times 10^3(MP_a), \qquad (9)$$

Much greater than about granite 8-20 Mpa of the shear strength. In fact, the rod ck is not a rigid body, but an elastic body. Therefore, the thrust force P_k increases slowly with the interstratum creep and successive compression when the rod ck



A: Driving force amplification process. B: Energy consumption of the Earth's slice.

Figure 02: Driving force amplification, and the energy consumption of the Earth.

passes through the compression zone after hindered. This is a process of successive accumulation of driving force.

When the driving force accumulates to the limit of the strength of the hindered rock stratum and suddenly moves or breaks, it produce an Earthquake. The rock stratum on the west side of the hindered portion is under tension force, and there is also a process of driving force accumulation. The existence of the process of driving force accumulation provides the huge thrust required for Earthquakes and triggering Earthquakes, making Earthquakes possible.

6 Energy conversion of harmonic motion of the Earth

It can be seen from the driving force distribution process that when the circle stratum of the Earth's slice is operating in a state of immobile, two convex areas shown in Figure 02B will be formed in the 1, 4 quadrants. Then, per a piece of the Earth's slice, the rotation energy E_i consumed for the moon every 1 year:

$$E_i = 2\int_{\frac{\pi}{2}}^{\pi} F_1 \cdot H\cos\beta\cos(\pi-\alpha)\cdot 2\pi\cdot 354\cdot 1\cdot\delta\cos\beta\cdot H\cdot\cos\beta\cdot d\alpha\ ,$$

$$= 4446\,GM\rho R^{-3}H^3\delta\cos^4\beta\ , \qquad (10)$$

Where: Tidal force $F_1 = 2GM\rho R^{-3}H\cos\beta\cos\alpha$, $F_1\cdot H\cos\beta\cos(\pi-\alpha)$ is to convert the tidal force bear by the convex area of $1\cdot\delta\cos\beta\cdot H\cdot\cos\beta\cdot d\alpha$ volume into a resistance torque. δ the maximum extension quantity of the solid portion of the Earth's slice in the radial direction near the equator, First calculate S_{10} from (continent $A_1 - I + L$),

and then divide S_{10} by π. Substituting the value of $H = 6.37 \times 10^6 m$, $\rho = 2.65 \times 10^3 kg \cdot m^{-3}$, $R = 3.84 \times 10^8 m$, $G = 6.67 \times 10^{-11} N \cdot m^2 \cdot kg^{-2}$, $\delta = (0.937 - 0.708 + 0.016)\pi^{-1} = 0.078(m)$, $1 = 1m$, $M = 7.35 \times 10^{22} kg$ into the above formula, the value of E_i can be determined:

$$E_i = 2.06 \times 10^{13} \cos^4 \beta \quad (J \cdot year^{-1}), \tag{11}$$

Rotational energy E consumed by the Earth each year:

$$E = \sum_{i=1}^{k} E_i, \qquad (i = 1, 2, 3, \ldots\ldots k) \tag{12}$$

i the $1, 2, 3, \ldots\ldots k$ th slice of the Earth from the South Pole to the North Pole.

First calculate E_i separately according to $\beta = 0^o, 30^o, 60^o, 90^o$, and then add the values of the two hemispheres. The rotation energy E_g consumed in the mantle, Crust and Inner core by the Earth's harmonic dynamic process every year:

$E_g = 1.34 \times 10^{20} J$,

This value is less than the heat loss rate $1 \times 10^{21} J \cdot year^{-1}$ on the Earth's surface (Wyllie, 1978), and much larger than the energy $1 \times 10^{19} J$ released by the global Earthquake each year (Allen, 1976).

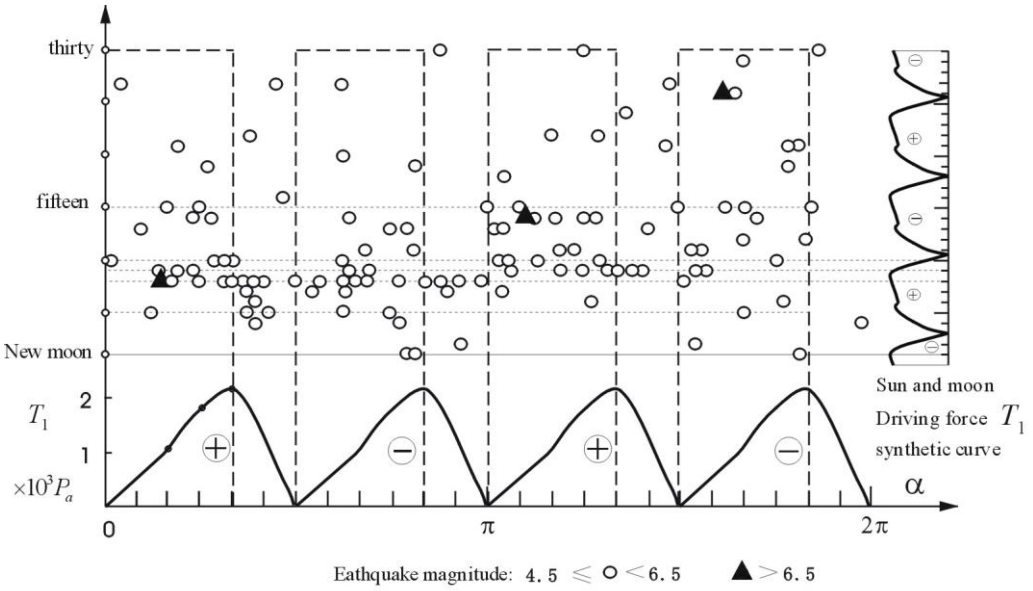
7 Ocean Floor Fluctuate Spreading and Passive Mantle Convection

The evolution of the Earth is a comprehensive dynamic process in which multiple the kind of dynamic mechanisms coexist. After rain, when we step on the unfixed concrete slab on the sidewalk, water under the slab will gush out from the gaps on the side of the slab. When plate like objects fluctuate, such as ice relative to water, strata relative to groundwater, rock layers relative to oil, lithospheric plates relative to magmaand so on, similar phenomena also occur. The author refers to this phenomenon as " footpath board effect" or "crevice effect".

One cycle of the passive mantle convection can be divided into 4 move processe:

（1） Earthquake to create Magma

The author proposes this hypothes is according to the fact that the temperature of the metal specimen will increase during pulling or forging. Speculation: In high-temperature and high-pressure areas within 720km underground, during earthquakes, fracture of the rock and the high-speed friction also increases the temperature more, part of the rock melts, forming magma. Earthquakes are concentrated release processes of energy. These energy ultimately dissipates into space or is stored inside the Earth in the form of thermal energy. Both internal and external friction of materials can generate heat, and rocks are no



The running angle of the epicenter regarding the moon when the Earthquake occurred: ωt , it is 0 at $\pi/2$ before the point facing the moon. The figure shows the 120 Earthquakes that occurred in China from March 21, 2008 to January 4, 2009.

Figure 03: The relationship between the distribution of driving force in the Earth's interior and the time of Earthquake.

exception. From the physical effects of earthquakes, heat is the main way to release Strain Energy. The rocks at the earthquake source form cracks in areas that can quickly dissipate heat. Areas that cannot dissipate heat quickly temperature rise or form magma.

The thermal energy generated by tectonic earthquakes comes from the friction of molecules. To understand the process of frictional heat generation, you can search online for "Friction Welding Video".

（2） Magma diffusion movement

The magma generated from Earthquake generation, driven by harmonic motion, moving along rock fissures, and enters Magma sac, the bottoms of the ocean ridges and the below the volcano.

（3） Magma enters the crust

The magma beneath the volcano erupts from the seabed or land surface after increasing pressure. The magma at the bottom of the ocean ridge, driven by the footpath board effect, moves upward along the cracks and condenses on the sidewall surface. When the gaps of the cracks change with the rotation of the Earth, the ocean floors on both sides of the ocean ridge are pushed apart from each other.

Take one Earth Slice near the equator. Assuming a solid tide height of 0.5 meters, 10 kilometers Cracks depth of the ocean ridge, and there is only elastic deformation between the unit body layers without relative displacement. So, under the

influence of changes in slice curvature, the gap the ocean ridge cracks reaches the maximum calculated value of 1.57 m at the highest point of the solid tide.

In fact, the unit body **circle** layer is affected by gravity, and the ocean ridge fissure is usually in a closed state. Magma must reach enough pressure, to enter into the fissure when it loosens.

The ocean ridge cracks, seismic cracks and magma pockets along the depth direction relax at the Peak Point of the solid tide, and magma enters. At the valley point, magma is squeezed out. The opposite is true for the fissure and magma sac of along the horizontal direction. In the rotation of the earth, the cubage change of the fissure and magma sac drives the change of the position of the magma.

（4） Magma returns to the mantle

This kind of process of ocean floor fluctuate spreading leads to gradual wear and tear of the ocean floor, ultimately subducting beneath land or trenches and returning to the mantle. The magma of solidifies in the crust, or the ocean floor of returns to the mantle, needs to encounter a heat source or be melted by another earthquake in order to participate in a new cycle.

It is not difficult to see that passive mantle convection involves mass exchange between the mantle and the crust. So, not all underground substances participating in convection can enter the next cycle.

The ocean floor fluctuate spreading and the driving forces of passive mantle convection proses all are provided by the Earth's wave motion processes. The magma does not need to drive plate movement.

The fluctuate of the ocean floor fluctuate spreading is different from the Wave during Harmonic Motion of the Earth. The former has a greater thrust on the ocean floor at the ridge, and gradually decreases as it moves away from the ridge, as the Ocean Floor is an Elastic Body. Harmonic Dynamic processes along with Passive mantle convection process, drives the movement and renewal of the ocean floor.

The traditional mantle convection hypothesis suggests that the thermal energy of magma comes from the decay of radioactive materials. However, volcanic rocks have lower levels of radioactivity. For example, basalt has lower radioactivity than stones such as marble. This maybe becomes an obstacle to the development of hypotheses towards theory.

The move of the conversion fault is a crucial link that cannot be avoided in the calculation of ocean floor movement.

The movement traces of transform faults indicate that seafloor spreading is not a single dynamic process.

At the beginning of ocean floor cracking, whether it is the upward rock-flow pushing the ocean floor open or the Fluctuate Spreading process pushing the ocean floor open, the direction of ocean floor expansion should be perpendicular to the axis of the ocean ridge. When the ocean floor is disturbed by the wave-motion process of harmonic motion, with each closure and reconstruction of the magma outlet, the expansion direction will gradually shift towards the wave move direction, ultimately forming a stepped oceanic ridge of transformation faults.

Therefore, for the calculation of ocean floor motion, only two parts of velocity need to be calculated: one is the harmonic motion velocity of the mid ocean ridge, and the other is the fluctuate expansion velocity of the ocean floor. Then, add the

two vectors together. In fact, the calculation of the harmonic motion velocity of the mid ocean ridge has been completed in "Harmonic Dynamic of the Earth" (A).The Velocity of Ocean Floor Fluctuate Spreading is determined based on the isochronous map of the ocean floor. According to Figure 3C of "Harmonic Dynamics of the Earth" (A), it can be seen that 33km underground is the depth with the highest rate of drift velocity change. At this depth, the heat generated by rock friction increases sharply, and creep accelerates. Magma in rock fractures is more prone to move. When magma generated by an earthquake rises along cracks to the Moho Surface and lacks sufficient power to up move, it will move horizontally along the Moho Surface, forming a horizontal channel and moving along the channel to the bottom of the volcano, Under the ocean ridge, or magma chamber. When there is sufficient power to spray, it will penetrate the overlying rock layers and rush out of the land surface or ocean floor.

The Moho Surface is the main horizontal movement surface of magma in passive mantle convection.

The passive mantle convection hypothesis provides new insights into the genesis and convection pathways of magma. It not only solves the problem of plate driving force and the movement of magma ascending channels, but also matches the fact that the magma emitted by volcanic eruptions does not have abnormally high radioactivity.

8 Analysis and discuss of calculation results

Can the following the derivation results be widely supported by observational data? Welcome to share your opinion!

Figure 01B shows that the depths of $5km$ below the ocean floor and 10km, $33km$, $100km$ and $700km$ below the land are the depths where the driving force T_1 and T_2 change drastically. It is also the position where the drift velocity difference between the Rock formations is large. From the presence of Earthquakes at depth $720km$, it can be seen that the rock formation can still move quickly at this depth.

Obviously, the instantaneous rapid sliding between rock stratums will generate a lot of heat and even form magma. Analyzing to from the chain of volcanic islands in the Pacific Ocean, a little magma that is ejected from the surface every year should come from these high-speed sliding surfaces under the crust. The depth continues to increase, and the temperature of the rock stratum has risen enough to eliminate the interstratum stress through creep, neither Earthquake nor magma can be generated. In the upper portion of the Earth's outer core, the heat dissipation rate of the material is not enough to transfer all the heat generated by the harmonic motion. As the heat constantly accumulate, the substance in the Earth's outer core assumes a liquid state.

Driven by the harmonic motion of the Earth,the solid body stratum of the Earth moves slowly westward all the time. It can be seen from Figure 02A that when this movement is hindered, driving force accumulation occurs. The rock formation on the east side of the future epicenter is compressed, and the west side is stretched. An Earthquake occurs when the driving force has accumulated enough to force the rock formation at hindered portion to break. The storage of water in the reservoir hinders the normal movement of rock formations and can also cause Earthquakes. this can monitor the compression deformation of the crust east of the reservoir area and timely release of water to trigger Earthquakes.

Destructive Earthquakes are usually shallow Earthquakes. Therefore, the area of crustal deformation before the Earthquake can be monitored by laser ranging system, GPS or gravity measurement. The measurement results of ITRF can also be used for analysis. In addition, the quality of the rock formation in the compression zone moves up relatively, the tension zone is the opposite. This changing will affect the altitude of the satellite. Therefore, the height of the satellite orbit can be monitored to determine the area of the compression zone and the tension zone. According to the principle of harmonic motion of the Earth, the area of the deformed area is positively related to the magnitude of future Earthquakes. The midpoint of the junction of the tension zone and the compression zone is the future epicenter. Based on this, the future epicenter and Earthquake risk level can be accurater determined. Because rocks need to be compressed for a long distance to form destructive earthquakes. And the 10-kilometer-thick rock stratum can move only a few hundred microns per day relative to the lower stratum. Therefore, it takes hundreds of years or even longer to produce destructive earthquakes.

Make use of to the principle of Harmonic Motion of the Earth, It is helpful to increase the probability of correctly predicting earthquakes. However, similar to weather forecasting, earthquake prediction also requires a long period of exploration and practice by humans.

Earth slice is perpendicular to the continent surface at the equator and parallel to the surface at the poles. The speed difference between the center and the edge of polar regions of Earth slice, creates the spiral structure of the continents or ocean floor in the polar regions. Earthquakes are difficult to occur in the South and North Pole, because the amount of harmonic motion there is very small. From the analysis of the principle of Harmonic Motion of the Earth, magnitude of a destructive Earthquake is positively correlated with the intensity of rock stratum and the stress accumulated.

From the video analysis at the time of the earthquake, the rupture of the rock at the source will produce a violent reciprocating motion and spread outward in a spherical wave.

When the rock formation breaks, the relative sliding between the crystal grains will cause vibrations of various frequencies. The piezoelectric effect will also change the The underground current of the Earth, local electric and magnetic fields. Heat generated by tensile, compressive, fracture, shock, and sliding processes can melt rocks into magma, final alter the heat-flow across land-surfaces.

Using seismic tomography, it is possible, to captured the process of magma formation and migration.

As early as the middle of the last century, Earth scientists have known about the physical properties of the deep Earth. In addition, Howell and Jacobs et al calculated all elastic constants based on the distribution of seismic wave velocity and density (Wyllie, 1978).

As Wyllie said, all hypotheses concerning the mantle and the core can only be accepted by the geological community if they are consistent with these facts.

Figure 3 uses 120 Earthquakes of magnitude 4.5 and above that occurred in China from March 21, 2008 to January 4, 2009, to give the relationship between the driving force distribution of the Earth's interior and the time of the Earthquake. According to the principle of harmonic motion, the magnitude of tidal force only affects the rate of driving force accumulation, and Earthquakes only occur when the driving force is accumulated to the strength limit of the hindered rock

formation. As long as the process of driving force accumulation does not stop, regardless of the rate, the conditions for Earthquake occurrence may be met at any time. However, it can still be seen from The figure that 80% of Earthquakes occur between the first to the fifteenth day of lunar monthly. There are 88 Earthquakes throughout 2008 between the fifth and fifteenth of the lunar monthly. The eighth, ninth and tenth days are 19, 14 and 10 times respectively. Correspond to the Latter Half of the epicenter thrust force. In Figure 03, from the point of maximum value of driving force at 330° running angle of the Earth on the driving force distribution curve, to the minimum value at 360° running angle. Of the 120 Earthquakes of magnitude 4.5 and higher in China in 2008, only three occurred within this time. This time is from 2 hours before the moon rises until the moon rises. The driving force distribution has an obvious corresponding relationship with the time of Earthquake. In-depth discussion of this relationship will help to find out regularity of Earthquakes.

9 conclusion

The analysis and calculation of the Driving Force accumulation process show that: Earth's Harmonic Dynamic process can make the hindered portion of the Earth's Crust produce thrust force reaches the limit of rock shear strength.

The calculation result of energy conversion shows that the rotation energy consumed by the earth's harmonic dynamic process in the mantle, crust and inner core every year $1.34\times10^{20}J$. This value is smaller than the heat loss rate $1\times10^{21}J\cdot year^{-1}$ on the Earth's surface and much larger than the energy $1\times10^{19}J$ released by the global Earthquake every year.

The calculation results of driving force amplification, driving force distribution and energy conversion of the Earth's harmonic motion, as well as the comparison with the actual measured values, further prove:

1. Due to the combined action of tidal force and the rotation of the Earth, a driving force to the west is generated inside the Earth.
2. The harmonic motion of the Earth is a dynamic process that converts the rotation energy of the Earth into the energy required for tectonic movement, and is the basic driving force for physical evolution of the Earth.
3. The energy of an Earthquake comes from the rotation energy of the Earth.
4. The thermal energy released by earthquakes is one source of energy for rocks to form magma.
5. The huge thrust required by the Earthquake is produced by the Earth's harmonic dynamic process.

10 Data availability

All the data in this paper are from references or maps, and are only used to prove the harmonic dynamic process of the earth. Other uses are not considered temporarily.

11 Author's contribution

The author has discovered the Friction Harmonic Dynamic proces, and Energy Conversion Calculation of along the Latitude Line Movement of the Crustal is completed.

12 Competition for interests

The author states that this study has no conflict of interest with anyone.

13 Disclaimer

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