

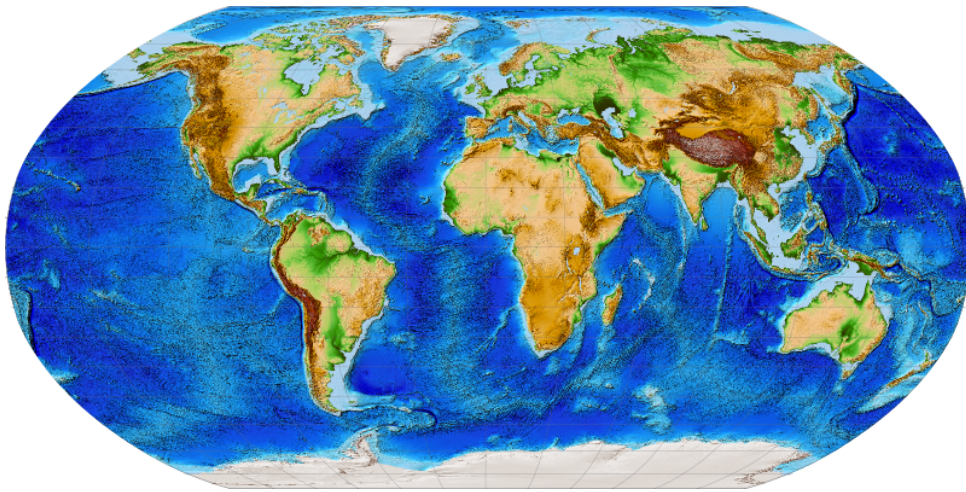
Driving Force of Tectonic Plate

Proposal

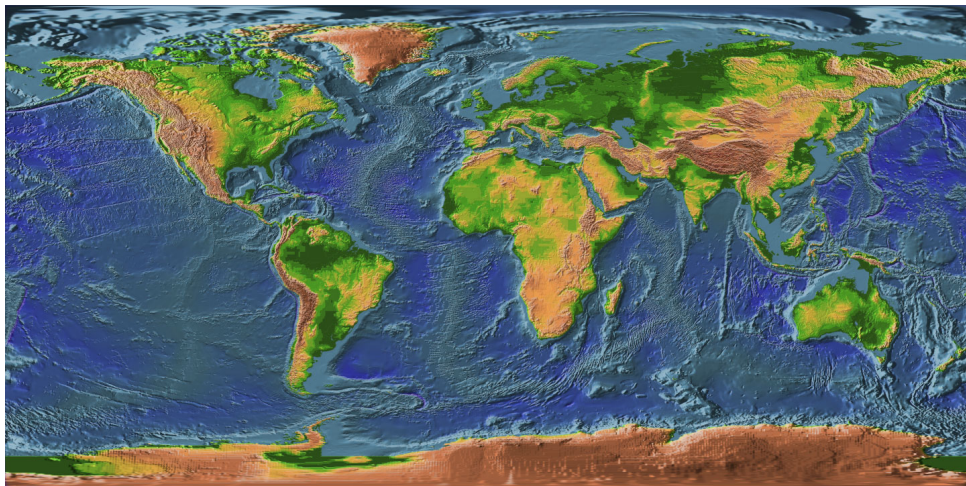
地球板塊驅動力提案

Cres Huang

Do you see wave pattern in these topographic maps? Doesn't the frequency of global earthquakes also make you wonder the Earth's crust is as soft and restless as ocean and atmosphere?



Color shaded-relief image of Earth from ETOPO1 Ice Surface



Topographic Map Earth

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Please send your correspondence to:
cres@mail.org

Abstract

Despite our progress, predicting the hazardous activities of lithosphere has been a long endeavor. The issue is, Earth's gravity is the inward force of keeping all things tight to maintain its spherical shape. Force of tectonic motion has to fight against the persisting gravity to push the crust from ocean floor to the top of mountain ranges. However, gravity can not be a pulling force, or tidal drag, of seismic activities. It is no attraction force has been shown by falling body experiments.

I don't believe the mantle convection can be the driving force. Instead, it is driven by gravity and centrifugal forces. Hot mantle can not rise without the gravity or centrifugal force to provide ascending buoyancy. And, cool mantle will not sink without the gravity. It is the same principle of hot air does not rise and cold air does not sink in zero gravity. Gravity force makes denser elements sink and lighter ones rise. On the other hand, centrifugal force works in opposite manner. It creates perpendicular antigravity force away from the axle.

The centrifugal force creates a clear divide of atmospheric and ocean circulations around the equator. Despite the different viscosities of air, ocean, mantle, and crust. The underlying fluid dynamic is likely to be the same. I would say Earth is also a centrifuge. The force of driving the atmospheric and ocean circulation has the same effect on mantle and crust. I believe it is the centrifugal force making the Earth an oblate spheroid. The uneven centrifugal force combined with the gravity compression made the main driving force of waving mantle along with crust, water and air.

Among the antigravity forces, the centrifugal force might have been understated. This preliminary is only an open proposal for further study of complex issue of lithosphere motion. I expect it will improve our foresight of predicting earthquake and volcano eruption, atop of other knowledge.

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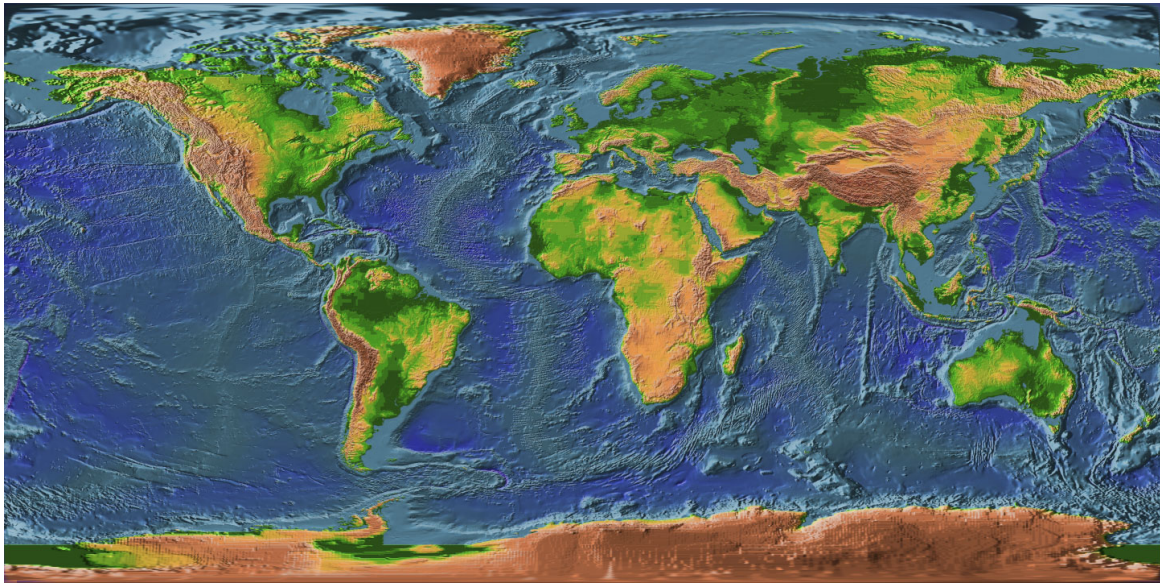
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1 Introduction

Do you see a wave pattern in topographic map, Figure 1 and 2? Doesn't the frequency of global earthquakes also make you wonder the Earth's crust is as soft and restless as ocean and atmosphere?



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Figure 1: Topographic Map Earth - the World maps
<http://mapsof.net/map/topographic-map-earth>



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Figure 2: Color shaded-relief image of Earth from ETOPO1 Ice Surface, NGDC
<http://www.ngdc.noaa.gov/mgg/global/global.html>

Despite our progress, predicting the hazardous activities of lithosphere has been a long endeavor. Currently, three categories of driven forces of plate motion are advocated:

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- Gravity
 - Mantle dynamics
 - 15 • Earth rotation

Earth's gravity is the inward force of keeping all things tight to maintain its spherical shape. Force of tectonic motion has to fight against the persisting gravity to push the crust from the ocean floor to the top of mountain ranges. However, gravity can not be a pulling force, or tidal drag, of seismic activities. It is no a force of attraction[2]. Hammer and
20 feather drop performed by David Scott in his Apollo 15 missions and all other falling body experiments have showed; the uniform acceleration of falling body regardless of mass, composition, shape, size, surface, and distance. However, there is one important fact that has been overlooked:

Gravitational acceleration is independent of its mass, shape, size, surface, and distance.

25 The paradox is, ***attracting acceleration is dependent on composition, shape, size, surface, and distance.*** Therefore,

gravity is not a force of attraction.

Certainly, gravity as any force, is dependent of mass, however, gravitational acceleration is not. Shape, size, and surface are functions of mass and distance, gravitational acceleration
30 would have to be independent of mass and distance, isn't it?

We know there were variables in the Moon. Such as radiations, charge particles, temperature, magnetic fields. Also Scott's body mass and motion, radio transmissions, static electricities on his gloves, spacesuit, hammer, feather, and unknown variables. None of the above had altered the fall in any significance. The only significant force acted upon hammer
35 and the feather is gravity.

Galileo's ingenious inclined planes showed the gravitational acceleration is dependent on time, times-squared law, not distance. It would remain uniform regardless of the distance to the center of the Earth. All other falling body experiments clearly shown the independence of gravitational acceleration and its mass and distribution of its mass, *i.e.* shape,
40 size, surface, and distance.

On the other hand, the easiest attraction force most, if not all, of us have played is the magnets. Soft magnetic putty shown by YouTube user Steve Bartlett is an excellent slow motion of magnetic attraction. It has clearly showed that the magnetic attraction is dependent of mass, size, shape, surface and distance. Nevertheless, unless there is perfectly balanced
45 count-acting force, it is impossible to keep all attracting objects to maintain their relative positions at distance. Nevertheless, gravity does provide the buoyancy force on different densities.

I don't believe the mantle convection can be the driving force. Instead, it is driven by gravity and centrifugal forces. Hot mantle can not raise without the gravity or centrifugal
50 force to provide ascending buoyancy. And, cool mantle will not sink without the gravity. It is the same principle of hot air does not raise and cold air does not sink in zero gravity. Here is scree shots of the video from NASA StationLIFE: Let's Get Physical[5] showing flames in gravity and micro gravity, Figure 3 and 4.

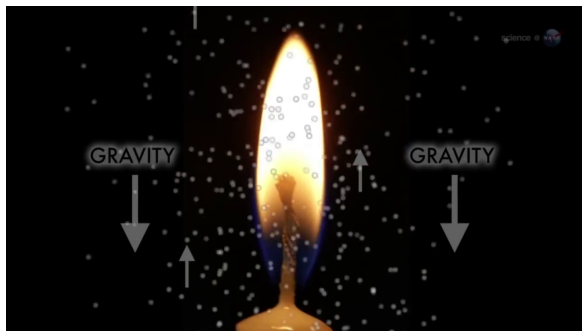


Figure 3: Flame in Gravity

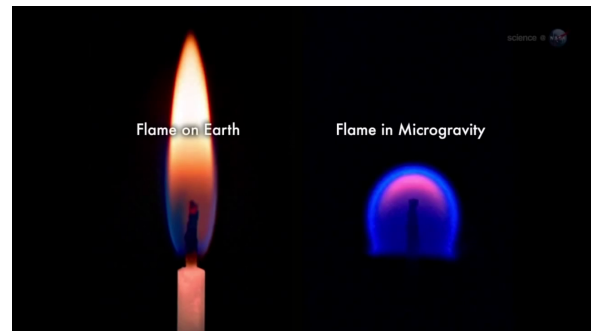


Figure 4: Flame in Gravity and Micro Gravity

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On the other hand, the centrifugal force persistently counteracts the gravity. It a clear divide of atmospheric and ocean circulations around the equator. Air is thinner liquid and solid viscous liquid. It is easy to observe air and water waves. However, looking at the frequency of earthquake worldwide, isn't Earth's crust waving all the time? Despite the
60 different viscosities of air, ocean, mantel, and crust. The underlying fluid dynamic is likely be the same. I would say Earth is also a centrifuge. The force of driving the atmospheric and ocean circulation has the same effect on mental and crust. I believe it is the centrifugal force making the Earth oblate spheroid. The uneven bulging force combined with the gravity compression made the main driving force of waving mantle along with crust, water and air.
65 Other factors could also stress the lithosphere. For example,

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- Expansion and contraction of crust in cold and hot zones created by energy from the sun.
 - Solar particles and momentum. The added mass and energy could impact the crust. Like external force kneading Earth dough, the magnitude could be larger than we think by far. Further study is recommended.
 - Landscape alteration by natural and human activities.
 - And, lastly, meteor impact can be a devastating effect. But, the good news out of the worst, it would give us clear early warning.

2 Centrifugal Force

Among the antigravity forces, the centrifugal force of spiraling motion might have been understated. This spiral momentum is shown in many phenomena we observe. It is the intrinsic acceleration from atomic level to celestial bodies. Below is an estimate of spiral velocity of the Earth in space: Isn't it funny that we don't feel the Earth is tumbling in hypersonic speed? Unlike linear motion, rotation is constant acceleration even at fixed speed of revolution. The issues are:

1. Centrifugal-centripetal acceleration is unceasing stress on crust. Centrifugal, in particular, is the force of tearing it apart.
2. Equator is spinning in supersonic speed, however, pole regions are next to zero by the rotation of Earth alone. Landmass closer to the equator is under stronger centrifugal force.
3. Higher elevation, or region further away from the rotation axis, is under stronger centrifugal force.
4. The inconsistent composition. Higher density structure is under stronger tear.

Centrifugal is the force persistently counteracts the gravity. It tug-of-wars with gravity by pulling the structure apart. It is also enforced by the orbital motion of the Earth. The region orbiting further away from the Sun would be under stronger centrifugal force. On top of

that, there is orbital motion of the Solar System, and possibly Milky Way and beyond. The combined spiral rotation could cause Coriolis effect[1].

From toys to high-g training, this outward force of centrifuge is proven and widely applied in our technology. Considering we can easily create centrifugal g-force many times stronger than gravity. Isn't it able to push crust from bottom of the ocean to the top of Himalaya, with ease? Gravity force makes denser elements sink and lighter ones raise. On the other hand, centrifugal force applies stronger outward force on denser elements. It is also proportional to the distance from the axle, and creates uneven stress on spherical body from equator to poles.

Nonetheless, I believe it is the centrifugal force making the Earth oblate spheroid. The uneven bulging force combined with the gravity compression made the main internal driving force of waving mantle along with crust, water and air; under the reservation of external force of Solar Particles.

3 Jelly Ball Earth

Gas is thin fluid, fluid is thick gas, and solid is just rigid fluid. Crust is viscous fluid riding on the fluidity of mantle. Wouldn't Earth wave like a spinning chunky jelly ball? The issue is inconsistent viscosity and composition driven by uneven centrifugal-centripetal force. It causes the mismatched stress from region to region. Under this constant and uneven stress, the result is cracking and snapping, since it is unable to wave smoothly like liquid. However, the detectable quake is quit frequent. Compositions and viscosities of particle, air, water, mantel, and crust are different, but I believe the underlaying fundamental wave behavior is uniform.

It also makes it lake of regularity and hard to predict. To make it worse, an occurrence alters the landscape and redistribute the centrifugal force, hence, the predictability of next occurrence. However, one thing is certain, there is always aftershock. Isn't it one of the wave behavior?

Basically, it is waving westward away from the equator in decelerating rate. Northern hemisphere waves northwestward, and southern hemisphere southwestward. It seems that there is a band of lower landmass along the Equator. I suspect the stronger centrifugal force

in equatorial area is clearing the area, Google Earth[3] screen shots Figure 5 and 6.

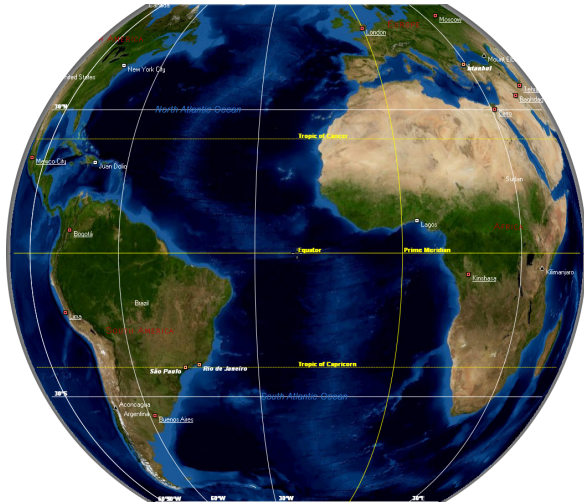


Figure 5: Amazon-Congo

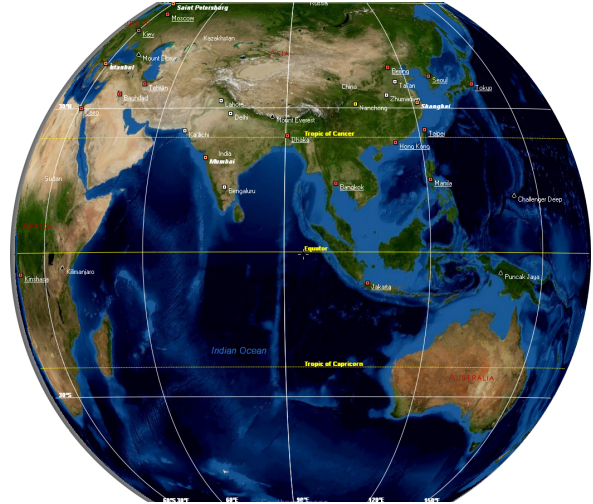
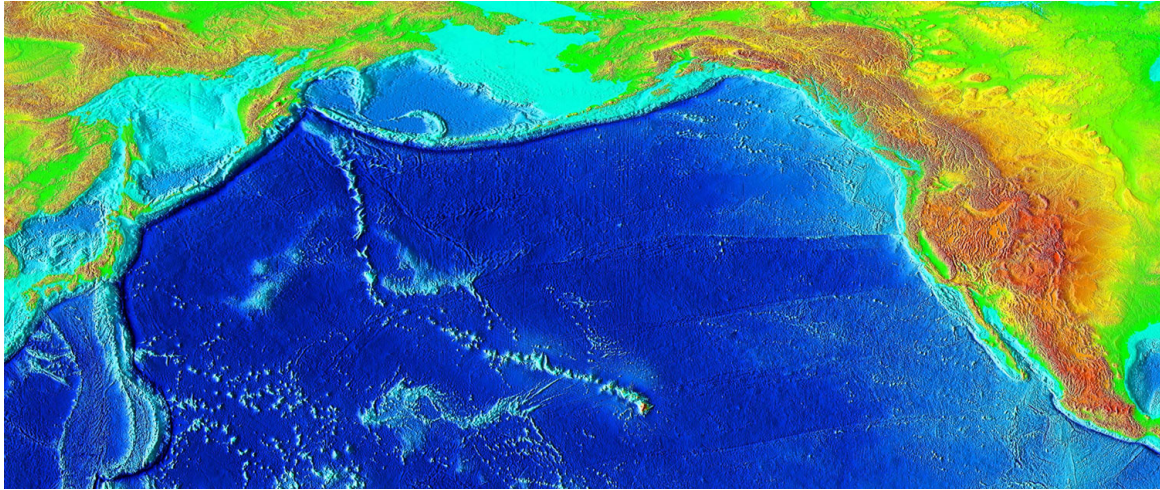


Figure 6: Tropical Islands

It runs along Amazon Basin, Congo Basin, Malaysia and Indonesia. The east part of
125 Congo Basin is a torn land; The area of tropical Pacific Ocean is shattered with islands; And,
there are Caribbean Islands in the vicinity. The question, is the landmass thinning away
from the Equator? We know the centrifugal-centripetal acceleration of the Earth exists. It
has to go somewhere. Isn't this the sign of centrifugal force at work?

4 Hula Hawaii

130 Here is another interesting topographic map, Figure 7. It shows Pacific Plate is moving
northwestward. The question, is Pacific Plate moving in steady path, or waving along?
Wouldn't Hawaii be a long flat island if it moves steadily? Instead, it is a long trail of
over and underwater mountains. It has peaks and valleys, much like waves. Is Pacific Plate
surfing on mantle wave? Nevertheless, is there any surfer can resist Hawaiian waves?



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Figure 7: Hawaii Hotspot
<https://en.wikipedia.org/>

5 Summary

Monitoring the trembler of the ground provides warning. However, it could be too late. I believe it is possible to advance our early prediction to a comfortable level; if we can obtain the variations of centrifugal force before it is strong enough to cause trembler. The good news is centrifugal and wave force are consistent and easier to predict; and well understood by science. The difficult is the composition of the crust perplexes the distribution of force. My question is, could The Gravity Recovery And Climate Experiment (GRACE, and GRACE Follow-On[4]) be helpful?

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This preliminary is only an open proposal for further study from the view of mantle/crust waves. A look of the impact of Solar particles is also recommended. It is beyond my reach for such experiment from here on. Your advice and criticism are truly appreciated. Please do so if you had discovered it's worthiness of spreading.

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