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Why the Earth Quakes

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Abstract

The electrons spread over nuclei, the Earth rotates on its axis and completes its revolution around the Sun, and the Solar System goes around the Galaxy center, with speeds in between 1.700. And 800.000 km/h, but we have no perception of these movements.

Instead we can measure and feel, every day the Earth vibrate under our feet and here we assume that the cause of the astronomic and local phenomena is the same.

The Earth is our home but we have not yet completely discovered the secrets it hides under its 100 km of crust and we do not know and cannot predict why, where and when it starts to quake.

Our vision of gravity, derived from the analysis of the nuclear structure and used to understand the phenomena underlying the motion of the Earth and of the Galaxy, can be applied to explain why the Earth quakes.

We hope that this new idea could be used, in future studies, by geologists and seismologists to predict where and when the next disruptive earthquake will occur.

Keywords: Earthquakes; Geodynamics; Earth secular changes; Gravity; Neutrino

Introduction

Everyday somewhere around the world dozens of Earthquakes occur, most of them being so small, we cannot even perceive: some are large and some are great and depending on where they occur, they can cause very significant damage.

If a large earthquake strikes in a densely populated area, the damage that it will create will be significant, and will be watched by people all around the world. People know Earthquakes only from their effects and not from their causes; it is therefore important to understand the driving forces behind Earthquakes and hopefully find a way for seismic prediction.

The state of the art is well described by Zerva in a report of Drexel University [1] in which Earthquakes are associated to the evolution of the early Earth, the drift of the continents from an original supercontinent called Pangaea and the formation of the tectonic plates in continuous movement.

The continental drift and plate tectonic theory, now widely accepted, had serious oppositions when Alfred Wegener proposed it in 1912 and the idea of the local formation of fragmented continents separated by oceans was prevailing till the mid of the 1900' as described by Naomi Oreskes [2].

The motion of tectonic plates has been attributed to convection of magma in the mantle while the local rise of continent may be explained with the secular cooling and shrinking of the Earth.

The association of plate tectonics and Earthquakes is due to the observation that the majority of Earthquakes occur along the boundaries of these tectonic plates and earthquake then may be caused by the sudden slip along a fault.

Mellors et al. [3], Lemarchand and Grasso [4] associate the volcanic activity to Earthquakes because about 90% of the world's Earthquakes occur along the Ring of Fire, that surrounds the Pacific basin, where a large number of volcanic eruptions and about 90% of the world's Earthquakes occur.

The general opinion is however that volcanic activity and Earthquakes are the result of the reactivity of the crust to perturbations, whether faults or ruptures are present or not.

The sophisticated and complex monitoring networks distributed on continents and in the oceans, the continuous satellite measurements of the level of the crust and of the seas and recording gravity and magnetic field variations over extended time periods and regions do not explain the mechanism of a quake generation and the information available is insufficient for predicting large Earthquakes.

Earthquakes are caused by three main reasons, all related to gravity: plate tectonic movement, volcanism and localized causes as cave collapses.

In what follows we present a different theory of gravitation that provides an alternative view of the Earth evolution from the formation of large tectonic zones, opening of oceans and continent emersion and explains the crust vulnerability, the growth of small local fractures that make the Earth quake.

Gravitation

Donati have presented the new theory of gravitation in previous papers [5-7] in which gravity is described not as an attracting force but as an exchange of particles emitted by material bodies.

The radiation emitted from the surface of hot bodies follows Plank's law with frequency distribution curves at different temperatures.

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The lower temperature measured in the universe is 2,725°C, that is the Cosmic Microwave Background: it follows Planck theory and fits a blackbody spectrum having a maximum at a wavelength λ= 0,106305 cm that is to say we have particles in the void space having energies of 1,8677 E-15 erg or 1,17 E-03 eV and equivalent mass of 2,078 E-36 g.

There is only one particle/wave, the neutrino ν, that cannot be easily detected because it can cross everybody and the entire Earth without interaction: we assume the neutrino similar to another particle, the graviton that is supposed to be responsible of gravity.

For such an elusive particle we give a temperature of 2,0362°K and estimate a wavelength **λ** of 0,14232 cm, an energy of 1,39557E-15 erg or 8,71 E-04 ev and an equivalent mass μ = 1,55277 E-36 g.

We know however that the emission of radiation from the surface of bodies is a small portion of the energy emitted from the whole body that makes atoms vibrate or move and makes up the internal energy of the body. If the surface of the body is an adiabatic one, only the neutrino radiation can escape given that no perpetual motion exists [8].

No information is available, at this point about de flux Fo of neutrino emitted per second and per gram of matter but we know that it should be a constant in order to agree with Galileo experiment: two bodies different in shape and material fall the same way.

When a flux of neutrino comes for example, from the Sun M_1 to our Earth M_2, it impinges on the cross section of the nucleons of the Earth. Sums up with the nucleon emitted flux in all directions and gives rise to the attractive pull with an unconventional momentum balance.

The neutrino flux around the mass appears shaped similarly to the deformed space of Albert Einstein, with the difference that we have substituted a model with physical phenomena, with real matter and momentum balance involved.

The neutrino flux per unit surface at distance R from the sun is:

$$F = Fo\ M_1/(4\ \pi\ R^2) \quad (1)$$

We can therefore write the Newton universal gravitational law in terms of nuclear parameters as follows:

$$Fg = (Fo\ \mu c r_n^{\ 2}/4\ m_n)\ M_1\ M_2/R^2 = G\ M_1 M_2/R^2 \quad (2)$$

Where c is the speed of light, r_n and m_n are the nucleon radius and mass and G =6,668E-08 is the Gauss constant ($cm^3\ s^{-2}\ g^{-1}$).

One can easily compute ($\mu c r_n^{\ 2}/4\ m_n$) = 1.E-28 ($cm^3 s^{-1} \upsilon^{-1}$) and Fo = 6,668E+20 is the neutrino flux per gram per second ($\upsilon\ g^{-1} s^{-1}$).

This strictly relates gravitation to intrinsic properties of matter and is not surprising because gravity is a property of matter and more specifically of nuclei.

This result can be obtained starting directly from the analysis of the nuclides that constitute our universe and whose shape is not a casual one.

Enrico Fermi in his theory of beta decay assumed the following nuclear dynamic transformations of protons p, neutron n and electrons/positrons β :

β⁻ emission $n \xleftrightarrow{k1} p + \beta^- + \nu$ (3)

β⁺ emission $p \xleftrightarrow{k2} n + \beta^+ + \nu$ (4)

Orbital electron capture $p + \beta \xleftrightarrow{k3} n + \nu$ (5)

If we assume that these reactions are valid for all nuclides and make a regression to fit the parameters k to the proton and neutron distribution of unstable and stable existing nuclides we find:

k_1= 0.0009625 k_2=4.71554E-06 k_3=0.00105382

If we use these constants to compute the rate of emitted neutrino, we discover that it is almost constant for all nuclides with a mean value of **Fo**= 6.668E+20 neutrino per gram per second and this value does not significantly change from light to heavy nuclides [7].

This is surprising and we can apply this concept to every phenomena on the Earth and in the sky: the annual delay of the Earth in its trip around the Sun can be explained [9] and light regains its ether [10].

Earthquakes and Gravitation

The new view of gravity suggests us to revise the idea of the migration of continents in favor of the oldest hypothesis that sees the continents generated in their present position.

We imagine that the Earth had a period when it was completely covered by water: the evidence comes from the presence of oil and fossils whenever in the oceans and on the earth with shells and fishes in the rocks of the mountains and mountains completely made up by see corals.

We do not know how was the shape of the crust at the time, but, if the Earth was flat, without deep see trenches and high mountains, and the water present in the oceans were the actual 1,338 $10^9\ km^3$, the sea level would have been positioned at 2.6 km over the crust surface.

To explain what we have in mind, we figure out the Earth like a soccer ball inflated with air, in which air escapes and the elastic surface wrinkles.

In the case of the Earth, the crust is rigid and, subject to the pull of gravity, it brakes in pieces and here and there (the two main oceans) moves toward the gravity center with water filling the formed cavities, pressing the other side and slowly leaving the continent surface dry.

Gravity and water gravitational pressure will therefore work together to slowly stretch the ocean floor and to build the oceanic trenches, to store water and to rise the continents, provided there is some material leaving and generating a void space like the air escaping from our hypothetical soccer ball.

With the new role of gravity the Earth loses about 1,95E+20 g/y (1,95E+11 t/y) with a virtual contraction of the Earth radius of about 7 cm every year.

This is hard to be measured because of the small size compared to the earth radius and due to the rigidity of the Earth crust; nevertheless it introduces a new physical mechanism to explain the early Earth evolution and the formation of tectonic plates that support the continents and the oceans.

Excluding additional phenomena like asteroids and dust capture thermal radiation and atmospheric losses, we are allowed to imagine an Earth twice the actual mass 20 Million years ago and figure a reduction to one half in the next 20 Million years.

The volume and the surface may have changed slowly during the formation and deepening of the oceans or in a rapid catastrophic way for braking of the crust bridges and the formation of the mountains, the explosions of volcanoes and the crust braking by asteroids.

The loss of mass together with gravity attraction and water isostatic

pressure, contrasted by the liquid or semi-liquid magma pressure, appear to be cause of the formation of the oceans with the deepening, stretching and thinning of the ocean crust and it's breaking at the central ridges.

We can imagine however that not all the lost mass has been used to give space to the oceans and consider also depressions, continental lakes, underground waters, cavities and the unknown structure of the interior of the Earth and therefore enlarge the time scale that, on the bases of the volume of the oceans divided by the volume lost, would be an excessively short 40 millennia time, compared to the 145-190 million years ago suggested for the start of the opening of the oceans.

Gravity attracts the crust, pressurizes ocean water columns to the center of Earth and in its action consumes the matter under the soil creating cavities and unstable bridges that are the main cause of the continuous fault activity with slow movements and sudden brakes, with the everyday perception of Earthquakes all over the world.

We are living over a crust that presents or has accumulated voids underneath and the instability on the surface and underneath the mantle gives rise to feeble surface vibrations and deep destructive Earthquakes.

Conclusion

This short note shows how the Earth, we are living on, still hides many of its secrets: we can measure with great precision every centimeter of its surface but, when we imagine to drill the crust more than 100 km deep, things lose focus and clarity.

On the other hand the crust is not so quiet and our life suffers from time to time terrifying catastrophes that scientists are striving to understand and possibly to predict.

Our new view of gravity provides an additional explanation on the evolution of the Earth and on the formation of fractures in the crust, generating everyday vibration in all continents and under the oceans.

This mechanism may now be incorporated by the experts in geological sciences and seismology in their future investigations.

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