

# The Combined Effects of the Gravitational Forces on the Tectonic Plates on Earth's Surface Exerted by the Moon, the Sun and the other Planets are one of the Main Reasons of the Earthquakes

Salman Mahmud

Student of BIAM Model School and College, Bogura, Bangladesh

**\*Corresponding Author:** Salman Mahmud, Student of BIAM Model School and College, Bogura, Bangladesh

**Abstract:** Earthquake is a terrible natural disaster that can cause great damage in a very short time. One of the main reasons for the earthquake is due to various types of transfer or deviation of tectonic plates known as plate tectonic theory. According to the plate tectonic theory, earthquake occurs due to accidental movement of tectonic plates or moving up or down. There are many reasons for the movement of these tectonic plates. But the combined effects of the gravitational forces exerted by the moon, the sun and the other planets on the tectonic plates on earth's surface are one of the reasons for the movement of these tectonic plates which has never been discussed yet. Here In this article I will prove this with the help of some evidence. Surrounding the sun when the distance between Earth and other planets decrease or the planets come close to Earth, the gravitational forces between Earth and the other planets increase. As a result, the speed of the tectonic plates increase than usual and most of the major earthquakes occur at this time. When the planets move away from the Earth, the gravitational forces between Earth and the other planets decrease. At this time the minor earthquakes occur. We know, low tides and high tides occur due to the combined effects of the gravitational forces exerted by the moon and the sun on earth. Similarly, earthquakes are caused by the combined effects of the gravitational forces of the sun, the moon, and the other planets on Earth. It is the main basis of this study. Here in this article, firstly I will discuss how the combined effects of the gravitational forces exerted by the moon, the sun and the other planets occur earthquakes. In this case the masses, the positions, the movement of the tectonic plates and frictions among the tectonic plates will be discussed. Secondly, by observing the positions of the planets, the sun and the moon at the time of some major earthquakes in the last 100 years and all the earthquakes in 2018, I will prove that when the other planets come close to Earth or stay one by one on the same side of the Earth or the Earth stays in between the other planets, the major earthquakes occur and other time the minor earthquakes occur.

**Keywords:** Asmamandala, exerted, gravitational forces, combined effects, one by one, on the same side, masses of the plates.

## 1. INTRODUCTION

Earthquake is one of the deadly natural disasters which creates a lot of destruction in a very short time. An earthquake is caused by a sudden slip on a fault. The tectonic plates are always slowly moving, but they get stuck at their edges due to friction. When the stress on the edge overcomes the friction, there is an earthquake that releases energy in waves that travel through the earth's crust and cause the shaking that we feel. Every year we face many damages due to earthquakes. It is not possible to get an early warning because earthquakes occur suddenly and in a very short time. The sudden movement of the tectonic plates is the main reason of an earthquake among the other reasons. Plates surface move because of the intense heat in the earth's core that causes molten rock in the mantle layer to move. It moves in a pattern called a convection cell that forms when warm material rises, cools and eventually sink down. As the cooled material sinks down, it is warmed and rise again. There are three kinds of plate tectonic boundaries: divergent, convergent and transform. But the combined effects of the gravitational forces of the moon, the sun and the other planets on earth which is very deeply responsible for the movement of the tectonic plates. When the earth, the moon, the sun and other planets come closer, the among them increase. For this reason, the plate which is heavier than the other plates, the gravitational forces are more effective on that plate. Sometimes the big earthquakes do not occur despite the other planets coming close to Earth. The main reason for this could be the firm position of the tectonic plates. But most of the time the earthquakes occur.

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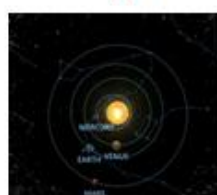
On average, magnitude 2 and smaller earthquakes occur several hundred times a day worldwide. Surrounding the sun, the planets come close to Earth for a short time and other time they stay away from Earth. For this, most of the time, the motions of the plates are effected by the low attraction forces of the planets. So, everyday a lot of earthquakes of low magnitude occur. Again, the moon, the sun and the earth come in the same straight line almost twice a month, Mercury and the Sun stay one by one on the same side of the Earth about 6 to 8 times a year. Venus and Mars rarely come close to Earth in a year. For this, very few times the motions of the tectonic plates are affected by the high attraction forces of the planets. So the major earthquakes, greater than magnitude 7, happen more than once per month. When multiple planets come very close to the Earth or stay one by one on the same side of the Earth about 1 to 2 times in a year. So the major earthquakes, greater than magnitude 8, occur about once a year. After 6 to 7 years, Mercury, Venus and Mars come together very close to Earth. The earthquakes greater than magnitude 8-9 occur in this time. This study is deeply related with the high tides and low tides. We know high tides and low tides are caused by the gravitational attraction between Earth and Moon. High tides occur in that side of the earth where the Moon stays and low tides occur in the other sides. When the earth, the moon and the sun come in a straight line, the springtides occur because this time the gravitational attractions among the earth, the moon and the sun increase. Just like this when the gravitational attractions among the earth, the moon, the sun and the other planets increase, the big earthquakes occur and when the attractions decrease the low magnitude earthquakes occur. Observing the positions of the planets during some recent big earthquakes, this matter becomes more clear. On December 26, 2004 an earthquake occurred in Indonesia. The earthquake was measured at 9.2 on the  $M_w$  scale. This time Mercury and Venus were very close to Earth and stayed one by one on the same side. Again a 8.6 magnitude earthquake (measured by the  $M_w$  scale) occurred on 28 March, 2005 in Indonesia. This time Mercury, Sun and Venus stayed one by one on the same side of the Earth. A 8.8 magnitude earthquake occurred on 7 February, 2010 in Chile. This time the Sun and Jupiter stayed one by one on the same side of the Earth. The Moon and Mars also stayed one by one on the same side of the Earth. On 23 June, 2001 a 8.4 magnitude earthquake occurred in Peru. This time Venus, Mercury and Sun stayed one by one on the same side of the Earth. On 11 April, 2012 a 8.6 magnitude earthquake occurred in Indonesia. This time Mercury, Venus and Mars were very close to the Earth. There are more examples of the earthquakes in this article. Coincidentally, the position of planets can not be matched during the earthquakes. But sometimes a big earthquake may not be occurred. For this there must be an another reason which I mentioned earlier. But normally the earthquakes will occur. We cannot get an early warning of an earthquake. That's why the damages and losses of an earthquake are much more. By observing the position of the planets, it is possible to say that in which month a major earthquake will occur. By doing more research on this topic we will get more details about earthquakes and can be able to explain everything smoothly. There are many other reasons of the earthquakes. That's why, by observing the position of the planets we will not get all the information of all the earthquakes. But very few earthquakes occur for the other reasons. The position of the planets during some major earthquakes are as follows:



(a)



(b)



(c)



(d)

## **2. SEARCH METHOD**

In this study, I have presented the relation between earthquakes and the position of the planets. I have observed the position of the earth, the moon, the sun and the other planets at the time of some major earthquakes occurred in the last 100 years. In this purpose I used a search engine, Wikipedia ([www.wikipedia.org](http://www.wikipedia.org)) to get the accurate details of the earthquakes. To get the accurate positions of the planets, sun and moon, I used another website ([www.solarsystemscope.com](http://www.solarsystemscope.com)) which is based on up-to-date orbital parameters published by NASA. I also observed the positions of the planets, sun and moon for a year (2018) to get the perfect details and demonstrate that when the planets come close to Earth the number of earthquakes increase.

## **3. HOW THE EARTHQUAKES OCCUR FOR THE COMBINED EFFECTS OF THE GRAVITATIONAL FORCES ON THE TECTONIC PLATES ON EARTH'S SURFACE EXERTED BY THE MOON, THE SUN, AND OTHER PLANETS**

Crustal plate is a scientific theory by which the asmamandala is able to move towards each other, some thin, rigid piece of a combination of the earth's crust or the surface of the earth is described. The idea was first introduced in 1912 by the German meteorologist Alfred Wagner's coronation theory (Continental Drift). Plate tectonics is the latest invention and research of science, it is no longer a mere theory but a science-based phenomenon, which is responsible for earthquake caused by earth. Tectonic plates are always slowly moving. They move approximately 2 cm per year. When the gravitational attractions among earth, moon, sun and other planets increase, the motions of the plates also increase. So collisions occur among the tectonic plates. Sometimes the plates come upstairs or the distance between them increase. In 1687, Newton invented the law of universal gravitation. The law states that every point mass attracts every other point mass by a force acting along the line intersecting the two points. The force is proportional to the product of the two masses, and inversely proportional to the square of the distance between them. The equation for universal gravitation thus takes the

form:

$$F = Gm_1 \mu_2 / r^2$$

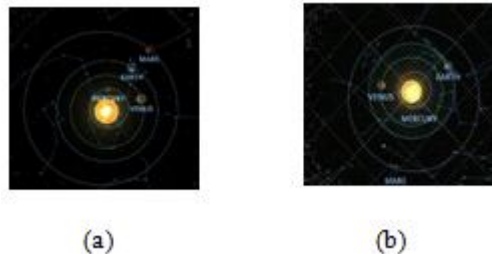
Where F is the gravitational force acting between two objects,  $m_1$  and  $m_2$  are the masses of the objects, r is the distance between the centers of the masses and G is the gravitational constant. Considering from this we can say that there are attractions among he tectonic plates, moon, sun and other planets. We know there are 8 planets in the Solar System. The gravitational attractions between the tectonic plates, moon, sun and other planets depend on their masses and the distances between them. The masses and the distances between earth, moon, sun and other planets are as follows:

Name	Mass(Kg)	Distance from earth (km)
Sun	$1.989 \times 10^{30}$	149,600,000
Moon	$7.347 \times 10^{22}$	384,400
Earth	$5.972 \times 10^{24}$	----
Mercury	$3.301 \times 10^{23}$	91,691,000
Venus	$4.867 \times 10^{24}$	41,400,000
Mars	$6.39 \times 10^{23}$	78,340,000
Jupiter	$1.898 \times 10^{27}$	628,730,000
Saturn	$5.683 \times 10^{26}$	1,275,000,000
Uranus	$8.681 \times 10^{25}$	2,273,950,000
Neptune	$1.024 \times 10^{26}$	4,351,400,000

By calculating from this list we can see that the gravitational attraction between earth and sun is always bigger than the attraction between earth and other planets. But the big earth quakes do not occur only for the attraction between earth and sun. The following example is very important for understanding this issue. Suppose, two persons are trying to move a car with the help of two ropes from the same side. But it is possible to move the car by applying 5000 Newton force. The first person can apply 4500 N force and the second person can apply only 500 N force. If the first person tries to move the car, he won't be able to do that because he can apply 4500 N force which is less than 5000 N force. If the second person tries he also won't be able to do that because he can apply only 500 N force. But if they try together, they will be able to move the car because they can apply 5000 N force

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together. Though the attraction between earth and sun is much, it is not enough to occur a big earthquake. When the attractions of the sun, the moon, and the other planets work on the earth together, the big earthquakes occur. This theory is deeply related with the spring tides. When the earth, the moon and the sun come in a straight line the spring tides occur because this time the gravitational attractions among them increase than usual. Similarly, when the other planets come close to Earth or stay one by one on the same side of the Earth or the Earth stays in between them, the gravitational attraction between them increase. So the motions of the tectonic plates increase too.



**Figure1.** The position of the Earth, Moon, Sun, Mercury, Venus and Mars in the solar system at different times

In the first picture we can see the position of Mercury, Venus and Mars is very close to Earth. The position of the Earth is also in between Mars and Mercury. So the gravitational attractions among them will increase a lot and the big earthquakes will occur. In the second picture we can see the planets are away from Earth. This time the low magnitude earthquakes will occur. We know, the planets of the solar system do not stay on the same plane. So, the planets cannot come in a straight line. But sometimes the Earth stay in between the other planets, they stay one by one on the same side of the Earth or come close. This time the gravitational attractions among them are much more than the attractions of other times. This exactly happens at the time of spring tides. In this case earthquake generally depends on two things:

1. The areas or the masses of the tectonic plates.
2. The positions of the tectonic plates on earth's surface.

### The Areas of the Masses of the Tectonic Plates

We know, the gravitational attraction is proportional to the product of the two masses, and inversely proportional to the square of the distance between them. For a position of the planets in solar system, the distances between the tectonic plates and other planets are same but the masses of the tectonic plates are difference. So the gravitational attractions between the tectonic plates and other planets will be difference according to the masses of the tectonic plates. The mass of a tectonic plate is as much as its area. The world is composed of three kinds of tectonic plates.

1. Major plates (a major plate is any plate with an area greater than 20 million km<sup>2</sup>. Such as, Pacific plate, north American plate, Eurasian plate etc.)
2. Minor plates.(a minor plate is any plate with an area less than 20 million km<sup>2</sup> but greater than 1 million km<sup>2</sup>. Such as, somali plate, nazca plate, Philippine sea plate etc.)
3. Microplates.



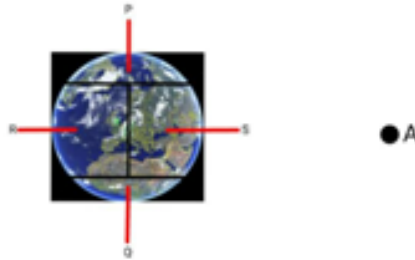
**Figure2.** A map showing some of the world's major and minor tectonic plates

### **The Position of the Tectonic Plates**

The positions of the tectonic plates generally refers to two things:

1. The positions of the tectonic plates at the time of the earthquakes.
2. The position of any tectonic plate in between the other tectonic plates.

When the other planets come close to Earth and on which side they stay, the chance of a big earthquake on that side is much more than the other sides.



**Figure3.** *The combined attractions of the moon, the sun and the other planets is being effective on earth from the point A.*

Here the speed of the tectonic plates of the area P and Q will be towards the point A. The tectonic plates of the area of S will rise upwards. The plates of the area R will go downwards. For this gravitational forces, the speed directions of the tectonic plates will never change but the motions will increase or decrease. The frictions among the tectonic plates are one of the important things for the earthquakes. The tectonic plates can easily move, where the frictions among them are less. Some other important issues related to earthquake are as follows:

1. Sometimes the bigger earthquakes do not occur in spite of the other planets coming close to Earth. The reasons for this could be the firm positions of the tectonic plates and the less frictions among them. But most of the time the earthquakes will occur.
2. When the other planets come close to Earth and on which side they stay, the tectonic plates come upwards in that side and in the opposite side the plates go downwards. For this the earthquake as well as tsunami occurs.
3. Most of the earthquakes occur on where the tectonic plates can easily move.
4. It is not possible to say when and where the earthquakes will occur. But by observing the positions of the planets, it is possible to say in which month most of the earthquakes will occur (specially the bigger earthquakes).
5. Surrounding the sun the Earth and other planets can stay in a specific position for a moment. That's why an earthquake lasts for a few seconds.
6. Plates surface move in a pattern called a convection cell. This time the motions of the tectonic plates are affected by the combined effects of the gravitational forces exerted by the sun, the moon and the other planets.

#### **4. THE OBSERVATION OF THE POSITIONS OF THE EARTH, THE MOON, THE SUN AND THE OTHER PLANETS AT THE TIME OF SOME BIGGER EARTHQUAKES OCCURRED IN LAST 100 YEARS**

We know, the planets of the solar system do not stay on the same plane. This difference is not so important because the distances between the Earth and other planets is much more. Uranus and Neptune are so far from the Earth. So the attractions of the Uranus and the Neptune are not so important for an earthquake. In this article the photographs of the position of the Earth, the Moon, the Sun and the other planets are based on up-to-date orbital parameters published by NASA. In the photographs it seems that Earth, Moon, Sun and other planets stay on a same plane. For this when the other planets stay one by one on the same side of the Earth, it seems that the Earth and other planets are staying in a straight line. But in reality, it is not possible. The positions of the Earth, the Moon, the Sun and other planets at the time of some major earthquakes are as follows:

**04 April, 1905**

The **1905 Kangra earthquake** occurred in the Kangra and the Kangra region of the Punjab Province (modern day Himachal Pradesh) in India on 4 April 1905. The earthquake measured 7.8 on the surface wave magnitude scale and killed more than 20,000 people. Apart from this, most buildings in the towns of Kangra, Mcleodganj and Dharamshala were destroyed.



**Figure4.** The position of the inner planets, sun and moon on 4 April, 1905.

Here we can see the position of the Earth is in between Venus and Mars. We can also see the Earth, Moon and Sun are in a straight line.

**02 March, 1933**

The **1933 Sanriku earthquake** (*Shōwa Sanriku Jishin*) occurred on the Sanriku coast of the Tohoku region of Honshu Japan on March 2 with a moment magnitude of 8.4. The associated tsunami caused widespread damage.



**Figure5.** The position of the inner planets, moon and sun on 02 March, 1933

In the picture we can see the position of the Earth is in between Mars and Sun. If we imagine them on a same plane it seems that Mars, Earth and Sun are in a straight line.

**10 November, 1938**

On 10 November, 1938 an earthquake occurred in Shumagin Islands, Alaska, United states. It was a 8.2 magnitude earthquake.



**Figure6.** The position of the inner planets, moon and sun on 10 November, 1938

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In the picture we can see on 10 November, 1938 Venus and Mercury stayed one by one on the same side of the Earth. We can also see the Earth was in between Venus and Moon and the Venus was very close to Earth.

### 31 March, 1901

The 1901 Black Sea earthquake (also known in the Bulgaria as Balchik earthquake) was a 7.2 magnitude earthquake, the most powerful earthquake ever recorded in the Black Sea. The earthquake epicenter was located in the east of cape shabla-kaliakra, 30 km off northeast coast of Bulgaria. The main shock occurred at a depth of 15 km and generated a 4-5mhigh tsunami that devastated the coastal areas of Romania and Bulgaria. In Romania, the earthquake was felt not only throughout northern Dobruja but also in Oltenia and Muntenia, and even in southern Moldova.



**Figure7.** The position of the Earth, moon, sun and inner planets on 31 march, 1901

In the above picture we can see on 31 March, 1901 the Sun and Venus stayed one by one on the same side of the Earth. In the same time the Moon and Mars also stayed one by one on the same side of the Earth and Mercury was close to earth.

### 23 July, 1943

The 1943 **Central Java earthquake** occurred on July 23 at 14:53:10 UTC with a moment magnitude of 7.0 near java, which was under Japanese occupation.



**Figure8.** The position of the inner planets, moon, sun and Jupiter on 23 July, 1943

In the above picture we can see on 23 July, 1943 the sun, Mercury and Jupiter Stayed one by one on the same side of the Earth and Venus was very close to Earth.

### 04 August, 1946

In this day an earthquake occurred in Dominican Republic. It was a 8.0 magnitude earthquake.



**Figure9.** The position of the inner planets, moon and sun on 4 August, 1946

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In the above picture we can see, on that day the Venus and Mars stayed one by one on the same side of the Earth and Mercury was very close to Earth.

**09 March, 1957**

The **1957 Andreanof Islands earthquake** took place on March 9 with a moment magnitude of 8.6 and a maximum Mercalli intensity of VIII (*Severe*). It occurred south of the Andreanof Islands group, which is part of the Aleutian Islands arc. The event occurred along the Aleutian Trench, the convergent plate boundary that separates the Pacific Plate and the North American Plates near Alaska. A basin wide tsunami followed, with effects felt in Alaska and Hawaii. Total losses were around \$5 million.



**Figure10.** *The position of the sun, moon and inner planets on 09 March 1957*

Here in the picture we can see, on that day the Sun, Mercury and Venus stayed one by one on the same side of the Earth.

**24 January, 1965**

The **1965 Ceram Sea earthquake** occurred on January 24 at 00:11 UTC with a moment magnitude of 8.2 and its epicenter was located just off the southwestern coast of Sanana Island in eastern Indonesia. The event occurred at a depth of 28 kilometers under the Ceram Sea, and a tsunami was generated which caused damage in Sanana, Buru, and Mangole. During the tsunami three consecutive run-ups were reported in Seram Island, and a four-meter run-up was reported at Buru Island.



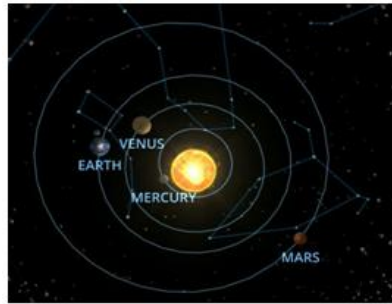
**Figure11.** *The position of the sun, moon and inner planets on 24 January, 1965*

In the above picture we can see on that day the Mercury and Venus stayed one by one on the same side of the Earth and the Mars was very close to Earth.

**12 March, 1966**

The **1966 Hualien earthquake** occurred on March 13 at 00:31 local time of Taiwan. The epicenter was located in the offshore area between Yonaguni Island, Japan and Hualien, Taiwan.





**Figure12.** *The position of the sun, moon and inner planets on 12 March, 1966*

Here we can see on that day the Mercury, Sun and Mars Almost stayed one by one on the same side of the Earth and the Venus was close to Earth.

### 16 May, 1968

The **1968 Tokachi earthquake** (1968 *Sen-kyūhyaku-rokujūhachi-nen Tokachi-oki Jishin*) occurred on May 16 at 0:49 UTC (09:49 local time) in the area offshore Aomori and Hokkaido. The magnitude of this earthquake was put at  $M_w 8.3$ . The intensity of the earthquake reached shindo 5 in Aomori, Aomori and Hakodate, Hokkaido.



**Figure13.** *The position of the sun, moon and inner planets on 16 May, 1968*

We can see on that day the Sun and Mars almost stayed one by one on the same side of the Earth and the Earth was in between Moon and Mercury.

### 19 September, 1985

The **1985 Mexico City earthquake** struck in the early morning of 19 September at 07:17:50 (CST) with a moment magnitude of 8.0 and a Mercalli intensity of IX (*Violent*). The event caused serious damage to the Greater Mexico City area and the deaths of at least 5,000 people. The sequence of events included a foreshock of magnitude 5.2 that occurred the prior May, the main shock on 19 September, and two large aftershocks. The first of these occurred on 20 September with a magnitude of 7.5 and the second occurred seven months later on 30 April 1986 with a magnitude of 7.0. They were located off the coast along the Middle America Trench, more than 350 kilometers (220 mi) away, but the city suffered major damage due to its large magnitude and the ancient lakebed that Mexico City sits on. The event caused between three and four billion USD in damage as 412 buildings collapsed and another 3,124 were seriously damaged in the city.



**Figure14.** *The position of the sun, moon and inner planets on 19 September, 1985*

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We can see on this day the Sun and Mercury stayed one by one on the same side of the Earth.

### 23 June, 2001

The **2001 southern Peru earthquake** occurred at 20:33:15 UTC (15:33:15 local time) on June 23 with a moment magnitude of 8.4 and a maximum Mercalli intensity of VIII (*Severe*). The quake affected the Peruvian regions of Arequipa, Moquegua and Tacna. It was the most devastating earthquake in Peru since the catastrophic 1970 Ancash earthquake and globally the largest earthquake since the 1965 Rat Islands earthquake.



**Figure15.** *The position of the moon, sun and inner planets on 23 June, 2001*

Here we can see the Earth is in between Mercury and Mars and the Venus is very close to Earth.

### 03 November, 2002

The **2002 Denali earthquake** occurred at 22:12:41 UTC (1:12 PM Local Time) November 3 with an epicenter 66 km ESE of Denali National Park, Alaska, United States. This 7.9  $M_w$  earthquake was the largest recorded in the United States in 37 years (after the 1965 Rat Islands earthquake). The shock was the strongest ever recorded in the interior of Alaska. Due to the remote location, there were no fatalities and only a few injuries.



**Figure16.** *The position of the moon, sun and inner planets on 3 November, 2002*

In the picture we can see on that day the Moon, Venus, Sun and Mercury stayed one by one on the same side of the Earth.

### 26 December, 2004

The **2004 Indian Ocean earthquake** occurred at 00:58:53 UTC on 26 December, with an epicenter off the west coast of northern Sumatra. It was an undersea mega thrust earthquake that registered a magnitude of 9.1–9.3  $M_w$ , reaching a Mercalli intensity up to IX in certain areas. The earthquake was caused by a rupture along the fault between the Burma Plate and the Indian Plate.



**Figure17.** *The position of the moon, sun and inner planets On 26 December, 2004.*

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In the above picture we can see on that day the Mercury and Venus stayed one by one on the same side of the Earth and also the Moon, Sun and Earth was in a straight line.

### 28 March, 2005

The **2005 Nias–Simeulue earthquake** occurred on 28 March off the west coast of northern Sumatra, Indonesia. At least 915 people were killed, mostly on the island of Nias. The event caused panic in the region, which had already been devastated by the massive tsunami triggered by the 2004 Indian Ocean earthquake, but this earthquake generated a relatively small tsunami that caused limited damage. It was the third most powerful earthquake since 1965 in Indonesia.



**Figure18.** *The position of the moon, sun and inner planets on 28 March, 2005*

We can see on that day the Mercury, Sun and Venus stayed one by one on the same side of the Earth.

### 15 November, 2006

The **2006 Kuril Islands earthquake** occurred on November 15 at 8:14:16 pm JST with a  $M_w$  magnitude of 8.3 and a maximum Mercalli intensity of IV (*Light*). This mega thrust earthquake was the largest event in the central Kuril Islands since 1915 and generated a small tsunami that affected the northern Japanese coast. The tsunami crossed the Pacific Ocean and damaged the harbor at Crescent City, California. Post-tsunami surveys indicate that the local tsunami in the central Kuril Islands reached run up of 15 meters (49 ft) or more.



**Figure19.** *The position of the moon, sun and inner planets on 15 November, 2006*

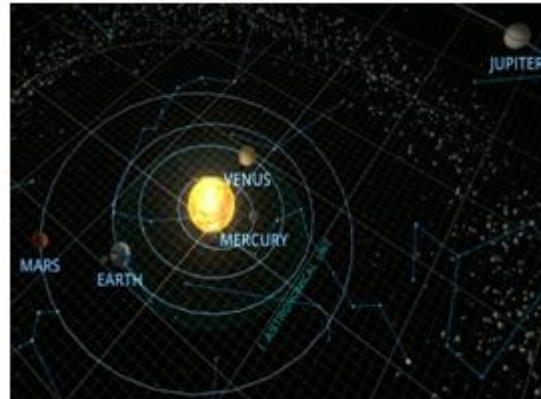
Here we can see, on that day the Sun, Venus and Jupiter stayed one by one on the same side of the Earth.

### 27 February, 2010

The **2010 Chile earthquake** (Spanish: *Terremoto del 27F*) occurred off the coast of central Chile on Saturday, 27 February at 03:34 local time (06:34 UTC), having a magnitude of 8.8 on the moment magnitude scale, with intense shaking lasting for about three minutes. It was felt strongly in six Chilean regions (from Valparaíso in the north to Araucanía in the south), that together make up about 80 percent of the country's population. According to the United States Geological Survey (USGS) the cities experiencing the strongest shaking—VIII (*Severe*) on the Mercalli intensity scale

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(MM)—were Concepción, Arauco and Coronel. According to Chile's Seismological Service Concepción experienced the strongest shaking at MM IX (*Violent*). The earthquake was felt in the capital Santiago at MM VII (*Very strong*) or MM VIII. Tremors were felt in many Argentine cities, including Buenos Aires, Córdoba, Mendoza and La Rioja. Tremors were felt as far north as the city of Ica in southern Peru (approx. 2,400 km (1,500 mi) away).



**Figure 20.** The position of the sun, moon, Jupiter and inner planets on 27 February, 2010

In the above picture we can see, on that day the Sun and Jupiter stayed one by one on the same side of the Earth and the Mars was very close to Earth.

### 11 April, 2012

The **2012 Indian Ocean earthquakes** were magnitude 8.6 and 8.2  $M_w$  undersea earthquakes that struck near the Indonesian province of Aceh on 11 April at 15:38 local time. Initially, authorities feared that the initial earthquake would cause a tsunami and warnings were issued across the Indian Ocean; however, these warnings were subsequently cancelled. These were unusually strong intraplate earthquakes and the largest strike-slip earthquake ever recorded.



**Figure 21.** The position of the moon, sun and inner planets on 11 April, 2012

Here we can see, on that day the Mars, Venus and Mercury was very close to Earth.

### 24 May, 2013

The **2013 Okhotsk Sea earthquake** occurred with a moment magnitude of 8.3 at 15:44:49 local time (05:44:49 UTC) on 24 May. It had an epicenter in the Sea of Okhotsk and affected primarily (but not only) Asian Russia, especially the Kamchatka Peninsula where the shaking lasted for five minutes. Due to its great depth (609 km), it was not particularly intense at the surface, but was felt over a very large area. Such a deep-focus earthquake could be felt not only in areas surrounding the Okhotsk Sea but also in places as far as Tokyo (JMA 1) (about 2,374 km away), Nanjing (more than 4,000 km away), Atyrau (MM V) (about 7,196 km away), and Moscow (about 7,370 km away). The shaking prompted almost 900 residents to leave their homes in Moscow.



**Figure22.** *The position of the moon sun and inner planets on 24 May, 2013*

In the above picture we can see, on that day the Mercury and Venus stayed one by one on the same side of the Earth.

The reasons for some more earthquakes without the pictures are as follows:

**On 19 April, 1902** a 7.5 magnitude earthquake occurred in Quetzaltenango, Guatemala. In this day the Sun, Mercury and Mars stayed one by one on the same side of the Earth and the Venus was very close to Earth.

**On 19 November, 1906** a 7.6 magnitude earthquake occurred in Australia. In this day Venus and mercury stayed one by one on the same side of the Earth.

**On 27 January, 1931a** 7.6 magnitude earthquake occurred in Burma. In this day the position of the Mercury, Venus and Mars was very close to Earth.

**On 22 June, 1932a** 7.0 magnitude earthquake occurred in Jalisco, Mexico. In this day Venus, Sun and Mercury stayed one by one on the same side of the Earth.

**On 01 April, 1946** a 7.3 magnitude earthquake occurred in Unimak Island, Alaska, United States. In this day the position of the Earth was in between Venus and Jupiter, and also the Moon, Mercury and Sun stayed one by one on the same side of the Earth.

**On 18 March, 1953** a 7.2 magnitude earthquake occurred in Turkey. In this day the Moon, Venus and Mars stayed one by one on the same side of the Earth. And the Earth, Mercury and Venus was almost in a straight line.

**On 6 may, 1953** Is 7.6 magnitude earthquake occurred in near Concepcion, Chile. In this day Venus and Mercury stayed one by one on the same side of the Earth.

**On 24 October, 1956** a 7.3 magnitude earthquake occurred in west of Masachapa, Nicaragua. In this day the Earth was in between Mars and Venus and the Sun and Mercury also stayed one by one on the same side of the Earth.

**On 20 November, 1960a** 7.8 magnitude earthquake occurred in Northern Peru. In this day Venus and Jupiter stayed one by one on the same side of the Earth and Mars was very close to Earth.

**On 01 April 1968** a 7.5 magnitude earthquake occurred in Japan. In this day Mercury and Venus stayed one by one on the same side of the Earth.

**On 31 July, 1970** a 8.0 magnitude earthquake occurred in Colombia. In this day the Sun and Mars stayed one by one on the same side of the Earth and Venus and Mercury was very close to Earth.

**On 03 October, 1974** a 8.1 magnitude earthquake occurred in Near Lima, Peru. In this day the Sun and Mars stayed one by one on the same side of the Earth and the Earth was almost in between Moon and Mercury.

**On 06 March, 1988** a 7.8 magnitude earthquake occurred in Gulf of Alaska, United States. In this day Venus and Jupiter stayed one by one on the same side of the Earth.

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**On 16 July, 1990** a 7.9 magnitude earthquake occurred in Philippines. In this day the Sun and Jupiter stayed one by one on the same side of the Earth.

**On 03 March, 1985** a 7.8 magnitude earthquake occurred in Chile. In this day Venus and Mars stayed one by one on the same side of the Earth.

**On 08 April, 1985** a 7.5 magnitude earthquake occurred in Chile. In this day Venus, Mercury and Sun stayed one by one on the same side of the Earth.

**On 12 July, 1993** a 7.7 magnitude earthquake occurred in Japan. In this day Mercury and the Sun stayed one by one on the same side of the Earth.

**On 08 November, 1997** a 7.4 magnitude earthquake occurred in Tibet. In this day Venus and Mars stayed one by one on the same side of the Earth.

The positions of the earth, the moon, the sun and the other planets are shown above at the time of some big earthquakes. So, it is clear that there is a close connection between earthquakes and the positions of the planets, sun and moon.

### 5. THE OBSERVATION OF THE POSITIONS OF THE PLANETS AT THE TIME OF THE EARTHQUAKES OCCURRED IN 2018 (BY MONTH)

Surrounding the sun, sometimes the other planets come close to Earth and the other times they stay away. For this, sometimes the number and the magnitude of the earthquakes increase and sometime the number of earthquakes decrease. The observation of the positions of the planets at the time of the earthquakes in 2018 are as follows:

#### January

M <sub>w</sub>	Number of Earthquakes	Dates	Country	Reasons
8.0-8.9	0	-----	-----	In this month, the combined effects of the gravitational forces of the other planets was not so much effective on Earth.
7.0-7.9	3	10	Honduras	On 10th January the Sun and Venus stayed one by one on the same side of the Earth. Again Moon, Mars and Jupiter also stayed one by one on the same side of the Earth.
		14	Peru	On 14th January one thing has changed. In this day Moon and Mercury stayed one by one on the same side of the Earth.
		23	United States	The combined effects of the gravitational forces of the Sun Mercury and Venus was effective on Earth from the same side.

Besides 8 earthquakes of magnitude 6.0 to 6.9 and 1194 earthquakes of magnitude 4.0 to 5.9 occurred in this month. In total, 1205 earthquakes occurred in this month.

#### February

In this month, the combined effects of the gravitational forces of the other planets on Earth was less effective than the month January. For this 9 earthquakes of magnitude 6.0 to 6.9 but 1067 earthquakes of magnitude 4.0 to 5.9 occurred in this month. In total, 1078 earthquakes occurred in this month which is less (127) than January.

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**March**

In this month, Mercury and Venus stayed one by one on the same side of the Earth but there was no earthquake of magnitude 7.0 to 7.9. The reasons may be the firm position of the tectonic plates. But some earthquakes of magnitude 6.0 to 6.9 occurred in this month. From 24 to 29 March Mercury and the Sun stayed one by one on the same side of the Earth. So from 24 to 29 March, 5 earthquakes of magnitude 6.0 to 6.9 occurred. In this month 8 earthquakes of magnitude 6.0 to 6.9 and 1086 earthquakes of magnitude 4.0 to 4.9 occurred. In total 1094 earthquakes occurred in this month which is close to February.

**April**

In this month, the combined effects of the gravitational forces of the other planets on Earth was not so much effective. That's why no earthquake of 7.0 to 8.9 occurred in this month. From 1 to 12 April Mercury and the Sun stayed one by one on the same side of the Earth and 13 to 19 April Moon and Mercury stayed one by one on the same side of the Earth. For this from 1 to 19 April 7 earthquakes of magnitude 6.0 to 6.9 occurred. Besides, 1007 earthquakes of magnitude 4.0 to 5.9 occurred in this month. In total, 1014 earthquakes occurred which is less than the other months.

**May**

In this month, the combined effects of the gravitational forces of the other planets on Earth was not so much effective like April. From 1st April the Mars started to come close to Earth. Besides, Venus also started to come close to Earth. However, from 1 to 12 may the Earth was almost in between the Sun and Jupiter. At this time 5 earthquakes of magnitude 6.0 to 6.9 occurred where 6 earthquakes of magnitude 6.0 to 6.9 occurred throughout the month. Besides, 1070 earthquakes of magnitude 4.0 to 5.9 occurred.

In total, 1076 earthquakes occurred which is almost close to April.

**June**

This month, Mars came much closer to Earth. But the distance between Venus and Mars was a bit more. On 21 June a earthquake of magnitude 6.0 to 6.9 occurred. At this time the position of the Earth was in between Mars and Venus. But the combined effects of the gravitational forces of the other planets on Earth was very low. For this there was no big earthquake in this month. Besides. 1055 earthquakes of magnitude 4.0 to 5.9 occurred. In total, 1056 earthquakes occurred in this month which is very close to April and May.

**July**

From the beginning of this month, the position of the Earth was in between Mercury and Mars. Besides, Mercury and Venus came very close to Earth. For this the combined effects of the gravitational forces of Mercury, Venus and Mars increased slowly on Earth. For this, 10 earthquakes of magnitude 6.0 to 6.9 occurred in this month. But there was a chance of an earthquake of magnitude 7 to 7.9. Besides, 1086 earthquakes of magnitude 4.0 to 5.9 occurred. In total, 1096 earthquakes occurred in this month.

**August**

M <sub>w</sub>	Number of Earthquakes	Dates	Country	Reasons
8.0-8.9	1	19	Fiji	In this day the Earth was almost in between Mars and Mercury. The combined effects of the gravitational forces of the Sun and Mercury was effective on Earth almost from the same side. Besides, Venus was very close to Earth.
7.0-7.9	3	21	Venezuela	On 21st August, the position of the Earth was in

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		24	Peru	between Mercury and Mars. On 24 August, Moon and Mars stayed one by one on the same side of the Earth.
		29	New Caledonia	on 29th August, Venus was very close to Earth.

In this month Mercury, Venus and Mars was very close to Earth. For this most of the big earthquakes occurred in this month. Besides, 19 earthquakes of magnitude 6.0 to 6.9 occurred. In the above list we can see, the biggest earthquake of this year (2018) occurred on 19th August. On this same date 4 earthquakes of magnitude 6.0 to 6.9 occurred. Besides, 1553 earthquakes of magnitude 4.0 to 5.9 occurred in this month. In total, 1576 earthquakes occurred which is greater than all the months.

**September**

M <sub>w</sub>	Numbers of Earthquakes	Dates	Country	Reasons
8.0-8.9	-----	---	-----	In this month, there was a chance of an earthquake of magnitude 8.0 to 8.9. But it didn't happened. The reason maybe the firm position of the tectonic plates.
7.0-7.9	2	28	Indonesia	On 28th September, the Sun and Mercury stayed one by one on the same side of the Earth. Besides, the position of the Earth was in between Moon and Venus.
		6	Fiji	In this day Mars and Venus was very close to Earth.

In this month, the position of Mars and Venus was very close to Earth. Besides, from 17 to 29 September Sun and Mercury stayed one by one on the same side of the Earth. For this 10 earthquakes of magnitude 6.0 to 6.9 and 1367 earthquakes of magnitude 4.0 to 4.9 occurred in this month. In total, 1379 earthquakes occurred.

**October**

In this month Venus was very close to Earth. From 9 to 12 October Moon and Venus stayed one by one on the same side of Earth. For this, on 10th October a 7 magnitude earthquake occurred. Besides, on this same date 4 earthquakes of magnitude 6.0 to 6.9 occurred. From 18 to 20 October Venus and Mercury stayed one by one on the same side of Earth. Again, from 21 to 27 October Venus and Sun stayed one by one on the same side of Earth. For this reason, in this month 13 earthquakes of magnitude 6.0 to 6.9 occurred. 1143 earthquakes of magnitude 4.0 to 5.9 occurred. In total, 1157 earthquakes occurred in this month.

**November**

In this month, from 27 to 30 November Mercury, Sun and Jupiter stayed one by one on the same side of Earth. For this, on 30th November a 7 magnitude earthquake occurred. In this month, Moon and Venus stayed one by one on the same side of Earth for some days and Venus was very close to Earth. So 13 earthquakes of magnitude 6.0 to 6.9 and 1143 earthquakes of magnitude 4.0 to 4.9 occurred. In total, 1157 earthquakes occurred in this month.



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### December

M <sub>w</sub>	Number of Earthquakes	Dates	Country	Reasons
7.0-7.9	4	5	New Caledonia	In this month Venus was very close to Earth. Besides, Mercury, Venus and Jupiter Stayed one by one on the same side of the Earth.
		11	South Georgia and South sandwich Islands.	
		20	Russia	
		29	Philippines	

In this month 10 earthquakes of magnitude 6.0 to 6.9 and 1409 earthquakes of magnitude 4.0 to 5.9 occurred. In total, 1423 earthquakes occurred.

From the above observation we can see that when the combined effects of the gravitational forces exerted by the moon, the Sun and the other planets on Earth increase the number and magnitude of the earthquakes also increase. As we can see in January, February, August, September, October November and December. Again, When the gravitational forces among the planets decrease the number and magnitude of the earthquakes also decrease. As we can see in March, April, May, June and July.

When the combined effects of the gravitational forces of the other planets on Earth increase the number of the earthquakes of magnitude 6.0 to 6.9 also increase. How the number of the earthquakes (magnitude 6.0-6.9) increases for the combined effects of the gravitational forces of the other planets on Earth are as follows:

Number of the Earthquakes ( 6.0 to 6.9 magnitude)	The combined effects of the gravitational forces exerted by the moon, sun and the other planets on Earth
1-7	Normal
8-12	Little much
13-20	Much
21-25+	Very Much

## 6. DISCUSSIONS AND RESULTS

It is never possible to get an early warning of an earthquake. By observing the positions of the earth, the moon, the sun and other planets, we can correctly explain the reasons of the earthquakes. We can also say in which month the bigger earthquakes will occur. But we can never specifically say when and where the earthquakes will occur. Again, the earthquakes occur suddenly and last for a few seconds. But there is no doubt that the combined effects of the gravitational forces on the tectonic plates on earth's surface exerted by the moon, the sun and the other planets are one of the main causes of the earthquakes. Here in this article I have shown the positions of the earth, the moon, the sun and other planets at the time of some bigger earthquakes. Here we can see, sometimes Mercury and Venus stayed one by one on the same side of the Earth, sometimes the Earth was in between Mars and Venus, sometimes Mercury, Venus and Saturn came close to Earth, sometimes Jupiter, Mars and Venus came close to Earth. It cannot happen coincidentally. It cannot be so coincidentally during almost all the earthquakes. There is a very important thing of this study. For not understanding it properly, everyone can misunderstand this study. The thing is that when the other planets come close to Earth the bigger earthquakes occur. The other planets stay close to Earth for some days. But the earthquakes do not occur for all the times. There are some reasonable reasons behind this. The surface of the earth at the equator moves at a speed of 460 m/s and earth's average orbital speed is about 30 kilometers per second. The Moon orbits Earth at a speed of 3,683 kilometers per hour. The other planets also rotate the sun at the fixed speed. For this the earth, the moon, the sun and other planets can stay in a position for a moment. For the rotation of the Earth on its own axis, the combined effects of the gravitational forces exerted by the moon, the sun, and other planets on a specific tectonic plate increase or decrease. For this, the motion of that tectonic plate increase or decrease. On average, magnitude two and smaller earthquakes occur several hundred times a day worldwide. When the combined effects of the gravitational forces exerted by the moon, the sun and the other planets on the tectonic plates increase the number of earthquakes also increase. The combined effects of the gravitational forces of the other planets on earth are more effective on that

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side where the other planets stay. In this case, the masses of the tectonic plates are very important. For the rotation of the Earth on its own axis, the tectonic plates cannot stay in a specific position for a long time. The earth rotates once every 23 hours, 56 minutes and 4.09053 seconds. For this the tectonic plates come in a specific position in every 24 hours. For this, there may be an another bigger earthquake in the same place after 24 hours. There is an another important thing of this study. We know, the planets orbit the sun along the elliptical paths. The distance between the Earth and other planets depends not only on the size of their orbits but also on where they are in their orbits relative to each other. For this, sometimes the big earthquakes do not occur despite the other planets coming close to Earth. The position of the tectonic plates is another important thing. sometimes the bigger earthquakes do not occur for the firm position of the tectonic plates despite the other planets coming close to Earth. On the other hand some tectonic plates can easily move. There may occur a tsunami where the tectonic plates come upwards. The earthquakes occur frequently where the tectonic plates can easily move. The tectonic plates of the island states can easily move. For this Japan, Indonesia, Peru etc. are most affected countries by the earthquakes. So the earthquakes, tsunami, volcanic eruption and landslide can easily occur in these countries. That's why the combined effects of the gravitational forces of the other planets on earth and the position of the tectonic plates are important for an earthquake. From this above discussion it is clear that we can never say when an earthquake will occur. But we can easily say by observing the position of the planets in which month the big earthquakes will occur. Through some more research on this topic we will get more information about earthquake. The magnitude of an earthquake depends on the combined effects of the gravitational forces among the planets. Here is the list how the magnitude of the earthquake is affected by the gravitational forces among the planets.

Serial No.	The position of the earth, the moon, the sun and the other planets	The magnitude of the earthquakes (in Richter scale)
1	When the Moon and Sun or Sun, Mercury/ Venus Mars/ Jupiter/ Saturn Stay one by one on the same side of the Earth.	5.5-7.5
2	When the Sun and any other two planets or any two planets stay one by one on the same side of the Earth or come close .	6.5-9.0
3	When the Sun and any other three planets or any three planets stay one by one on the same side of the Earth or come close.	7.0-10

I think this research will help in earthquake engineering. With the help of this is study we will be able to explain all the reasons of the earthquakes.

### 7. CONCLUSIONS

In this article I observed the position of the earth, the moon, the sun and other planets at the time of the earthquakes, specially at the time of some bigger earthquakes. There is a close connection between the position of the planets and the earthquakes. The conclusions of this study are summarized as follows:

- 1.The Moon rotates around the Earth and the Earth and other planets rotate around the Sun. Surrounding the Sun sometimes the other planets come close to Earth. This time the combined effects of the gravitational forces of the other planets on Earth increase. For this the motions of the tectonic plates also increase and earthquakes occur.
- 2.Sometimes the bigger earthquakes do not occur despite the other planets coming close to Earth. The main reason of this could be the firm position of the tectonic plates on earth's surface. But most of the time the earthquakes occur. Most of the earthquakes occur on where the tectonic plates can easily move. Such as Indonesia, Peru, Japan etc.
- 3.We cannot get an early warning of an earthquake. Because the earthquakes occur suddenly and last for a few seconds. But by observing the position of the planets it is possible to say that in which month the bigger earthquakes will occur. But it is not possible to specify the place where the earthquake will occur. By this research we can correctly explain the exact reasons of the earthquakes.

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## AUTHOR'S BIOGRAPHY



**Salman Mahmud**, is still a student of BIAM Model school and College, Bugura, Bangladesh. His core research interest is in modern physics. But he is interested in all the sectors of science.

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