the third condition simply adds water (or other volatiles) again, without revealing any source of heat. There is no identified heat source within this summary; it relies on circular reasoning to explain magma generation.

The bottom line is that the three conditions *do not actually show* how magma is generated! Although many science textbooks point the reader to the theoretical heat producing conditions of radioactivity, accretion, or impact by external bodies, these are not included in the magma-generating conditions shown above. The truly theoretical modern science concept of magma fails to identify correctly a source of heat and cannot stand under experimental scrutiny.

5.3 The Lava-Friction Model

Having recognized the theoretical nature of deep-earth magma and having made the extraordinary claim that it does not exist, we must then answer the question:

Where does lava come from?

In this subchapter, we introduce and outline the Lava-Friction Model, which consists of three parts: the origin of heat (Frictional-Heat Law), the origin of the movement that creates friction (Gravitational-Friction Law), and the effects of these two laws. In support of this model, we evaluate the significance of earthquakes and Earth movements, and their correlation and connection to the origin of lava.

Skin-Friction Analogy

A simple friction-heating experiment visually demonstrates the mechanism behind the origin of both intrusive and extrusive lava.

With your hands pressed firmly together in front of you, begin rubbing your hands briskly, in a back-and-forth motion for a few seconds. Most people notice an immediate rise in temperature, and some observe bits of balled-up dirt and dead skin (skin lava) on their palms, if they rubbed hard enough. (Figure 5.3.1)

Using the skin friction analogy as an illustration of the mechanism that generates real lava, we begin to understand in a very small way, just how much heat the Earth's crust is capable of generating. Riddled with tens-of-thousands of faults, the Earth's plates experience enormous pressure, and they need only rub against each other a very small amount to produce surprisingly high temperatures capable of subsequently melting the surrounding rock. The Earthquake Friction Lava Diagram in Fig 5.3.2 shows how plate movement forms intrusive-lava at or near the earthquake focus (the initial point of rupture). The newly melted intrusive lava, although under pressure, can be buoyant compared with surrounding rock and it pushes fluidly toward the area of least resistance, which is generally toward the surface.

Correlating the relationship earthquakes and lava share confirms lava's origin on display with this simplified skin friction illustration. Establishing a connection between earthquakes and lava flows by recording seismic activity incident to lava flows or a volcanic eruption event can do this.

The Lava-Friction Model

In this subchapter, we discuss how the movement of Earth's crust can cause melting through frictional heating. To understand lava's origin, we must establish a foundation from which to view the evidence as we begin to structure a new understanding of the processes we observe. Based in part on the fact that friction generates heat, the new Lava-Friction Model is the basis for explaining the origin of lava, both its intrusive and extrusive forms. The **Lava-Friction Model** consists of three principles:

1. Lava originates from frictional heat (The Frictional-Heat Law) generated by movement within the crust.

2. Crustal movement is attributable to the solar and lunar cycle's diurnal effects. (The Gravitational-Friction law)

3. The resulting melted rock moves along paths of least resistance, including faults, subjecting the rising melted rock to further decompressional melting.

Simply stated, the concepts include; the origin of heat in the Earth's crust, the origin of the movement that creates the heat and the combined results of both of these concepts. The geosciences community has yet to comprehend just how much frictional heat transfers through the faults and has yet to consider frictional heat as a source or origin of lava-making heat for making lava. To understand lava, we must then first understand earthquakes, and the origin of the movement that causes earthquakes, including how astronomical cycles affect this movement. With this understanding, we will see that there is a definite connection between earthquakes and lava.

Do Earthquakes Cause Volcanic Activity?

According to most scientists, the "internal heat" associated with magma is the cause of earthquakes. From a USGS (United States Geological Survey) government web site, we read the answer to the following question:

"Q: Do earthquakes cause volcanoes?

"A: **No**, there are different earth processes responsible for volcanoes. Earthquakes may occur in an area before, during, and after a volcanic eruption, but they are the result of the active forces connected with the eruption, and **not the cause of the**

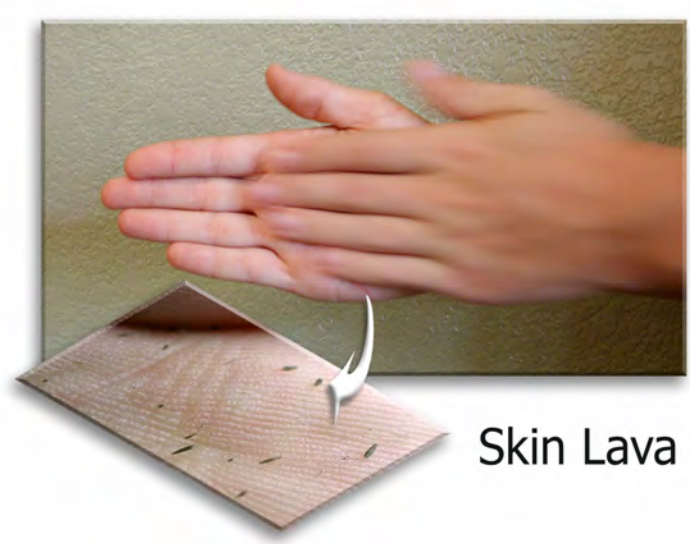


Fig 5.3.1 – Rubbing hands together briskly produces frictional heat, and sometimes "skin lava" of dead skin or dirt, seen in the inset.

volcanic activity." Note 5.3a

Commonly associated with volcanoes, volcanologists consider earthquakes a signal of impending volcanic activity on both active and dormant volcanoes. Although nearly all volcanoes and lava flows have a great deal of associated seismic activity when they are active, the sudden quaking of long-dormant volcanoes gets the scientists' attention and causes alarm in surrounding communities. This is because seismic activity is the harbinger of imminent volcanic activity. However, scientists in general have not believed that earthquakes *cause* volcanic activity.

What Do Scientists Think Causes Earthquakes?

On the USGS web site, scientists answer the question as follows:

"Earth scientists **believe** that most earthquakes are **caused by slow movements inside the Earth** that push against the Earth's brittle, relatively thin outer layer, causing the rocks to break suddenly." Note 5.3b

Scientists "believe" the slow movements inside the Earth are caused by the movements of crustal plates:

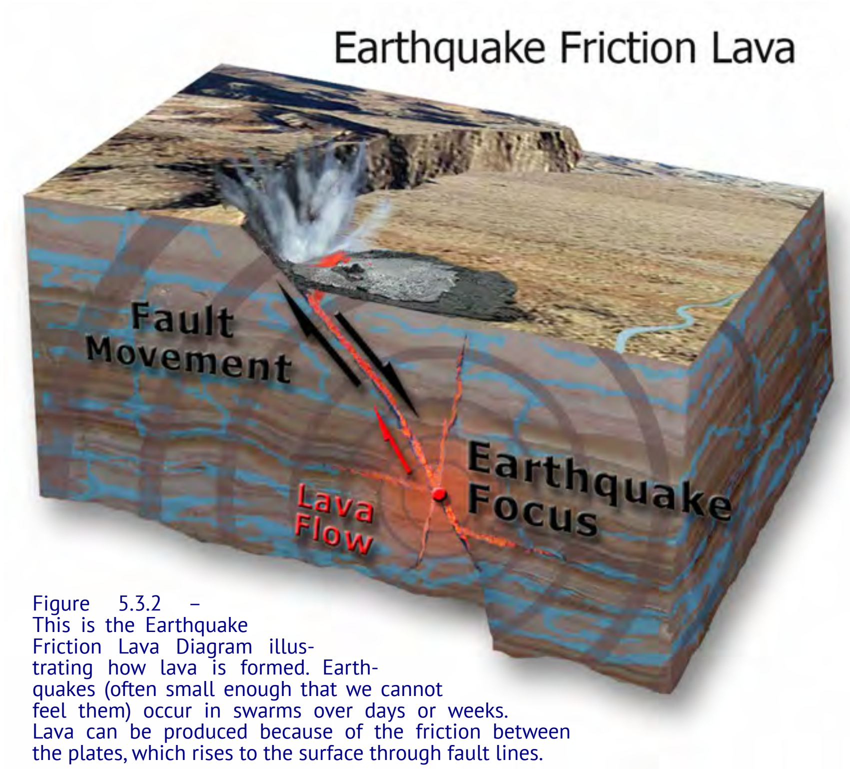


Figure 5.3.2 – This is the Earthquake Friction Lava Diagram illustrating how lava is formed. Earthquakes (often small enough that we cannot feel them) occur in swarms over days or weeks. Lava can be produced because of the friction between the plates, which rises to the surface through fault lines.

"The **plate tectonics theory** is a starting point for understanding the forces within the Earth that **cause earthquakes**." Note 5.3b

The plate tectonics theory proposes crustal movement based on convective magma, one facet of the magmaplanet model. The subject of plate movement is an important one and we will get into the subject in some detail further in the chapter, but first, we continue to explore how earthquakes and lava are connected. The following few examples provide a starting point different from the one that is widely accepted.

The Earthquake-Lava Connection

First, let us answer the question, "What do we find accompanying lava eruptions all around the world?"

"Last October [2002] about 1,000 Italians fled their homes after Mount Etna, the famous volcano on the island of Sicily, rumbled to life. Shooting molten rock more than 500 meters into the air, Etna sent streams of lava rushing down its northeastern and southern flanks. **The eruption was accompanied by hundreds of earthquakes measuring up to 4.3 on the Richter scale**." Note 5.3c

Fig 5.3.3 – Lava flow along a fault line in Hawaii. Courtesy of USGS

Where there are eruptions, there are earthquakes, and despite the USGS statement that scientists believe that most earthquakes are caused by "slow movements [of magma] inside the Earth," can researchers demonstrate that 'theoretical magma' is the cause of the earthquakes? When an earthquake occurs, we often know only because seismic activity recorded on seismometers provides a visual record. What is actually being recorded are vibrations, or 'sound,' but researchers noted:

"**Seismic investigations have shown** that the rising magma **produces little noise and appears to move rather smoothly**, without encountering major obstacles." Note 5.3c p63

On the one hand, slow movements of magma inside Earth are said to cause earthquakes, but on the other, rising magma produces little noise and moves smoothly enough not to register on seismic instruments, or if so, very little. This is a significant, yet contradictory statement, especially as we examine, which came ***first*** as recorded in the following description of Mauna Loa, a Hawaiian eruption:

"Following the flank eruption of 1935, Mauna Loa was in repose for more than 4 years. During 1939 and early 1940, however, **an increasing**

Fig 5.3.4 – Fault in a road-cut near Kingman, Arizona, USA.

number of earthquakes indicated that the quiet would soon come to an end. At 11 P.M. on April 7, 1940, volcanic tremor began recording on the seismographs at the Volcano Observatory, and at 11:30 people in Kona saw the orange glow of eruption at the summit of the mountains." Note 5.3d

The Mauna Loa earthquakes provide a clear example where seismic activity preceded eruptions. However, one example does not solve the Earthquake-Lava question:

Does magma cause earthquakes
or do earthquakes cause lava?

The Earthquake Swarm-Lava Evidence

We examined a large study of earthquakes and volcanic eruptions to answer this question. Of course, not all earthquakes produce eruptions because they are usually of short duration. Earthquake 'swarms' typically last for days at a time and usually accompany eruptions. Because of new technology, John Benoit and Steve McNutt of the University of Alaska, Fairbanks Geophysical Institute, were able to examine and analyze hundreds of earthquake swarms and correlate them with volcanic eruptions over a 10 year period. We found this to be the most extensive study of its kind anywhere, to date. The study included over 600 earthquake swarms recorded worldwide, which took place from 1979 to1989. In Fig 5.3.5, the Earthquake Swarm-Volcanic Eruption Diagram shows the results of their study. They separated activities into three types of swarms. Type 1 swarms (the most common) are those that ***preceded*** eruptive activity; Type 2 swarms ***accompany*** the eruptive activity; and Type 3 swarms were ***not associated with eruptive activity***. Type 3 swarms accounted for 39% of the record but apparently, the seismic activity did not have enough time to produce an amount of lava needed for an eruptive event, or it occurred too deep for the lava to work its way to the surface. On average, Type 3 swarms lasted for only 3.5 days, while Type 1 swarms lasted up to 9 days, almost three times as long.

The Earthquake Swarm-Volcanic Eruption Diagram in Fig 5.3.5 demonstrates the specific relationship between swarms and eruptions. Notice the timing of type 1 & type 2 swarms relative to the time of the eruptions. Note 5.3e

Every swarm that accompanied a volcanic eruption preceded the eruption, or occurred during the eruption. **No earthquake swarms started immediately after volcanic eruptions.**

Another significant relationship can be seen in Type 1b swarms. The greatest number of swarms was of this type, and it is the only type where earthquakes occur ***right before*** the eruption. This study puts us one step closer to verifying that earthquakes are the cause of lava eruptions. Note 5.3f

As time passes and with the recording of a greater number of volcanic eruptions and with ever-greater seismic data, the information continues to support the Earthquake-Lava Connection. In addition, further studies of temperature conditions and temperature changes within faults and fault systems produce data supporting the frictional heating-earthquake relationship. If magma caused the earthquakes, heat from deformation and intruding magma would appear *before* the earthquake, not after. At present, it seems there is little firsthand knowledge about heat and heat production in faults.

How Much Does Science Know About Frictional Heat Generated by Faults?

If modern geology recognized the possibility that earthquakes were causing, or at least contributing to volcanic eruptions of molten extrusive lava, one would think there should be extensive studies on the matter, and with such studies would come the knowledge of just how much frictional heat actively moving faults generate. Additionally, the more the geologists' know about frictional heat from seismic activity, the less inclined they would be to dismiss it. Surprisingly little detail exists when researching those who published journal articles discussing frictional heating via faulting. It seemed almost as though there was a 'don't go there' attitude;—as if they were saying we 'already know the heat comes from magma' so why look elsewhere? However, our search did uncover this 1998 article in the journal of *Science*:

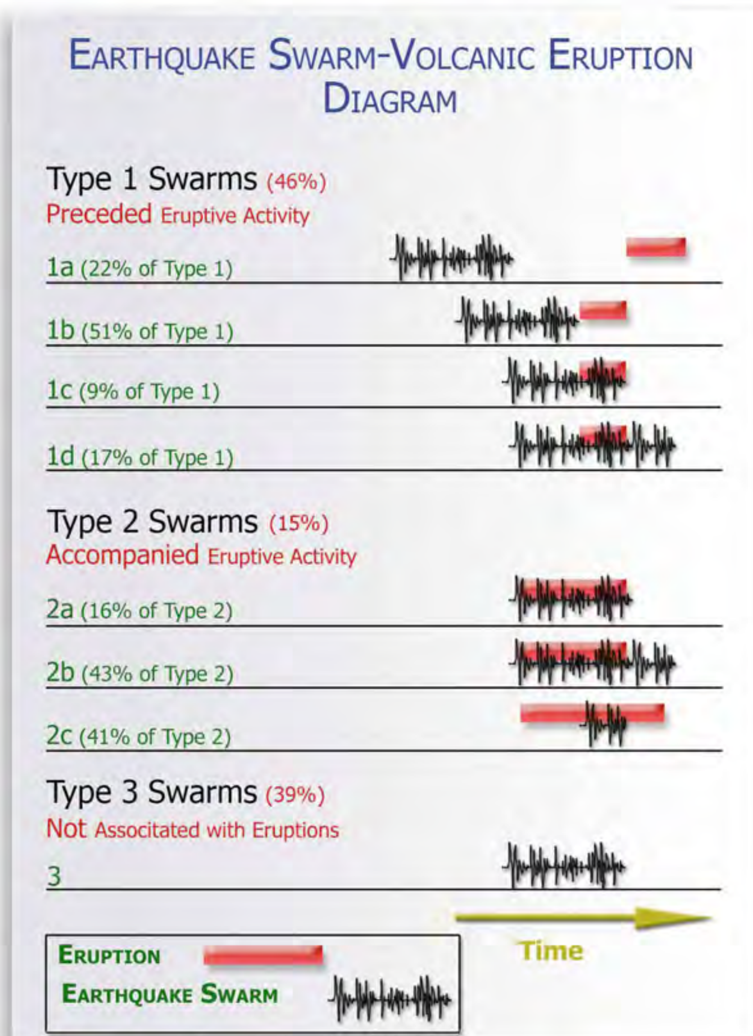


Fig 5.3.5 – Earthquake Swarm-Volcanic Eruption Diagram showing over 600 earthquake swarms occurring during or to volcanic eruptions. Adapted from Benoit and McNutt.

"The **possibility** of frictional melting during faulting has been **suggested** by several investigators." Note 5.3g

Perhaps at that time, it stretched the imagination too far to suggest the possibility that friction might be the cause of melting because few actual measurements of heat generated in faults had been taken. As other experts in the field note in the following quote, they simply do not know:

"The problem of heat generation on fault surfaces has yet to be satisfactorily resolved. It appears likely from the above discussion that different faults may exhibit different behavior in this respect, perhaps because of different degrees of lubrication related to pore-fluid pressure. As numerical modeling techniques improve, **and more heat flow data are collected from the vicinity of large faults**, the question may be answered. **However, for now there is no simple solution as to how much frictional heat is generated by faults**." Note 5.3h

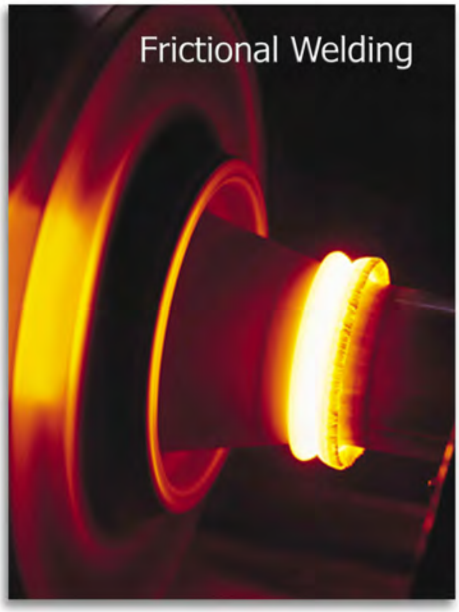


Fig 5.3.6 – Modern 'frictional welding' welds dissimilar metals with frictional heating in a fraction of a second. Courtesy of American Frictional Welding, Inc.

Despite the geologists' admission that they ***do not know*** how much frictional heat faults generate, some claim that faults do not produce heat sufficient to create lava:

"The presence of faults, however, accounts **only** for the ability of magma to reach the surface; **it does not explain why the magma [intrusive lava] is produced in the first place**." Note 5.3i

From the *Science* article previously cited, researchers recognized significant heat generation during a seismic event in Bolivia, in 1994:

"The amount of nonradiated energy produced during the Bolivian rupture was comparable to, **or larger than, the thermal energy of the 1980 Mount St. Helens eruption** and was sufficient to have melted a layer as thick as 31 centimeters." Note 5.3j

The enormous 1980 Mount St. Helens eruption, compared by some to an atomic blast, generated an immense quantity of heat energy, so why is it that questions remain unasked about how heat impacts melting during earthquake events? Is this an important factor or not? Here is the response from the same journal article:

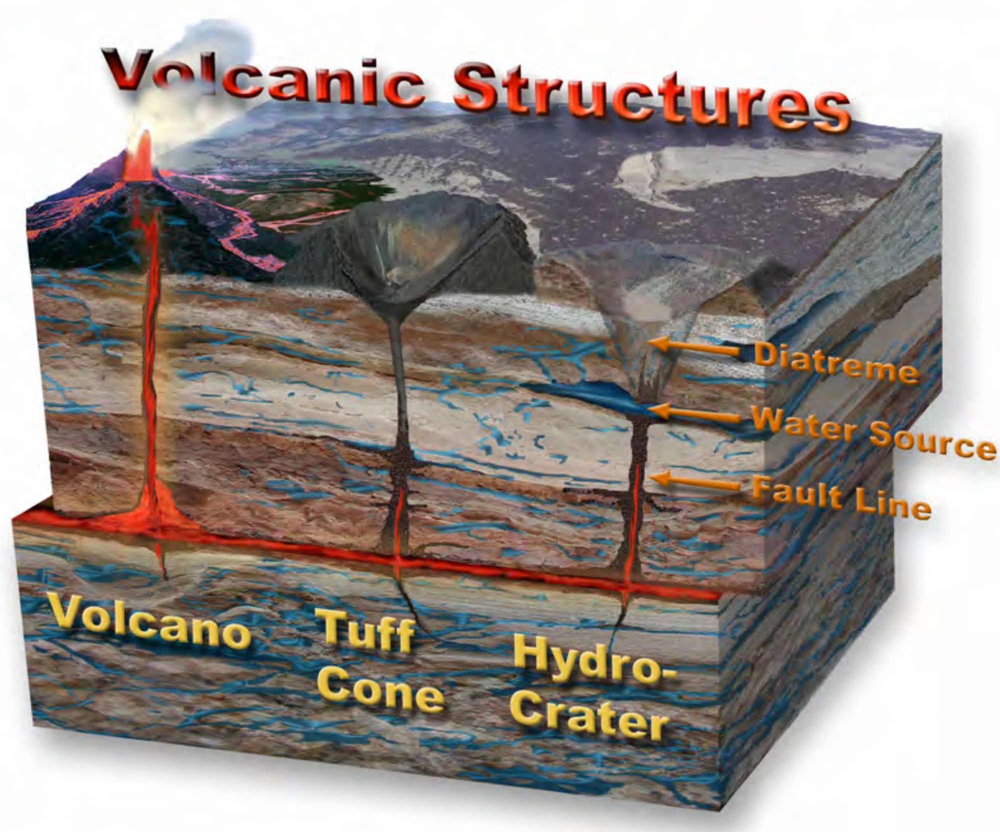
"These studies indicate that frictional melting **can occur** if the stresses involved in faulting are sufficiently high. **Despite these studies, frictional melting is not generally regarded as an important process during earthquake faulting because of uncertainties in the stress levels…**" Note 5.3j

Amazingly, these scientists observed an astonishing amount of heat generated in the fault area of the Bolivian quake where the melted thickness was only 3.7 mm:

"If the thermal penetration depth, Delta d = 3.7 mm, is used, the local temperature rise is of the order of **52,000 Celsius**." Note 5.3j p840

It only requires 1,700°C (3,100°F) to melt silicate rocks, including quartz, and the researchers determined that this earth-

Fig 5.3.7 – This diagram illustrates different types of Volcanic Structures resulting from frictional heating. The most recognizable structure, volcanoes are not the only example. Tuff cones and hydrocraters remain less known due to a lack of viewable eruptions in modern times. Large earthquakes in the past caused massive steam explosions, which formed the various craters, and mountains.



quake had generated more than 30 times that amount of heat!

In another research article, published in 2005, one investigator explained:

"Melt lubrication can explain the scaled energy of large earthquakes being 10 to 100 times more than that of small earthquakes." Note 5.3k

He noted that by rotating granite under pressure, kinetic friction increased in direct proportion to temperature until it reached a critical value corresponding with the melt temperature of feldspar (~1150°C), an important constituent of granite. If this critical temperature:

"…is exceeded in natural slip systems, which will depend on rock type, **this can result in the generation of friction melt**." Note 5.3k

Geologists generally regard faults as conduits through which magma reaches the surface, but they are reluctant to think of them as the source of heat able to produce lava. When lava does flow from faults, they recite the sci-bi that the fault simply provided the avenue for 'magma' to escape. Earthquakes occur frequently without an occurrence of lava, leading some investigators to make the assertion that there is no melting from fault movement. However, volcanic eruptions are rarely, if at all, the result of large-scaled, single earthquakes, but rather are the result of *earthquake swarms, often lasting a week or more at a time.* Quick releases of energy under pressure produce bursts of high temperatures and some amount of residual heat, but it is the prolonged and relentless movement of the crust that stores energy and produces the frictional heat sufficient to melt rock.

The Frictional-Heat Law

Having considered the evidence for the origin of the Earth's internal heat, we can now recognize a new natural law identified with the Lava-Friction Model:

The Frictional-Heat Law

Frictional heating produces lava from pressure and movement in fault planes.

There are many variables contributing to the production of lava and nearly all of them connect either directly or indirectly to heat generated from friction.

Earthquakes are often an indicator of Earth movement, but not always. Over the past several years, scientists discovered a *new kind of earthquake* heretofore unknown—**silent earthquakes.** Slow-moving shifts in the Earth's crust remained undetected until only recently:

"In early November 2000 the Big Island of Hawaii experienced its largest earthquake in more than a decade. Some 2,000 cubic kilometers of the southern slope of Kilauea volcano lurched toward the ocean, releasing the energy of a magnitude 5.7 shock. Part of that motion took place under an area where thousands of people stop every day to catch a glimpse of one of the island's most spectacular lava flows. Yet when the earthquake struck, no one noticed—not even seismologists.

"How could such a notable event be overlooked? **As it turns out, quaking is not an intrinsic part of all earthquakes.** The event on Kilauea was one of the first unambiguous records of a so-called **silent earthquake, a type of massive earth movement unknown to science until just a few years ago**." Note 5.31

Investigators observed that over a period of 36 hours, the ground shifted 10 centimeters, detected because of newer, more sensitive instruments. The discovery of these massive, silent Earth movements ensures that scientists must re-examine "long-held doctrines about all earthquakes:"

"If future study reveals silent earthquakes to be a common feature of most large faults**, then scientists will be forced to revisit long-held doctrines about all earthquakes**. The observation of many different speeds of fault slip poses a real challenge to theorists trying to explain the faulting process with fundamental physical laws, for example**. It is now believed that the number and sizes of observed earthquakes can be explained with a fairly simple friction law**." Note 5.31 p91

The connection between earthquakes, friction, and lava is clearer because slow, silent earthquakes, which result in massive, albeit quiet Earth movements, generate incredible heat by friction. That quiet movement is the result of the gravitational influence exerted by other astronomical bodies.

Earthtide—An Origin of Earthquakes and Lava

At the beginning of this subchapter, we used the analogy of rubbing our hands together to illustrate the effects of friction. Imagine that experience extrapolated for 24 hours a day, 7 days a week. The Earth experiences a phenomenon very much like that, a scenario called **Earthtide**:

Earthtide: The daily tidal movement of the Earth's crust.

Almost everyone understands something of the constant cycle of tidal motion that affects the oceans, resulting in high and low tides twice daily, and it is well established that the Moon drives these ocean-tidal events. A much lesser known fact though, is that there are tidal movements in solid ground too. From the *Glossary of Geology* (2005):

"…Earth tides have a fluctuation of between **seven and fifteen centimeters**" Bib 173 p200

This means the ground under your feet travels up and down from three to six inches every day! The same force that causes the ebb and flow of ocean's tides triggers *Earthtide*, but we cannot feel this movement because it happens so slowly. It is detectable using advanced scientific instruments and satellite technology. Three to six inches may not sound like a lot, but when we consider that there are thousands of feet of solid rock beneath our feet, and that it moves up and down every day, we can begin to appreciate the magnitude of this geological fact. Few people, including many scientists, know about Earthtide. Science organizations, like NASA recognize Earthtide, but seem to minimize its effects and its contribution to the production of lava and earthquakes:

"Earth has solid ground tides too, but they amount to less than 20 centimeters (about 8 inches)." Note 5.3m

Over time, stress builds in the crust of the Earth because

"It is now believed that the number and sizes of observed earthquakes can be explained with a fairly simple **friction law**."

Peter Cervelli

of the constant, daily up-and-down movement caused by the gravitational influence of the moon, accumulating until released in an earthquake. Frictional heating also happens, but the amount of heat generated depends on the magnitude of the seismic activity and the pressure present at the movement location; increased pressure equals increased heat. Therefore, we can expect higher temperatures as the depth of the seismic event increases. Later in this chapter, we will see physical evidence for this phenomenon.

"Earth has solid ground tides too, but they amount to less than 20 centimeters (about 8 inches)."

NASA

Lunar Earthquake-Eruption Cycle Evidence

If the Moon's orbit affects the movement of the Earth's crust, then evidence of the connection between the Earth's diurnal (daily) rotation, the lunar cycle, and earthquakes should exist. We see evidence of this association at the most active volcano in the world, which is in Hawaii. In 1988, scientists announced in the *Journal of Geophysical Research*:

"Between 1967 and 1983, four earthquake **swarms** occurred on Kilauea Volcano, Hawaii, with durations ranging from 68 to 156 hours. Plots of the number of events per hour **show a remarkable modulation having diurnal and semidiurnal periodicities**…tidal influences appear to be **the best explanation for the modulation of the activity**." Note 5.3n

The April 2003 issue of *Scientific American* included an article on another of the most active and impressive volcanoes in the world, Mt. Etna. This volcano, an active participant in world history by destroying human settlements over many centuries, is located on the island of Sicily, in Italy. Here is what researchers had to say about the discharge of steam from Etna:

"Besides lava flows, Etna produces an almost constant, **rhythmic discharge of steam**, ash and molten rock." Note 5.3o

Could there be a cycle hidden in Etna's volcanic activity connected to the Earth's rotation period or to the orbit of the Moon?

"In February 2000, violent eruptions at Etna's southeast crater were occurring at **12- or 24-hour intervals**." Note 5.3o

This is strong evidence of a cyclical gravitational component affecting directly lava flows and earthquakes. The cycles of earthquakes and lava eruptions baffle researchers because they think within the magmaplanet paradigm. Etna's eruptive cycles are not mere 'coincidence' because similar cycles show up elsewhere, such as at Merapi, a volcano in Java. From the book, *Volcanic Seismology*, the author records the following observation respecting the October 1986 eruption of Merapi:

"Before the building of the lava dome, **a significant periodicity at 24 and 12 h in the occurrence of the shocks was noted**. This phenomenon was greatly reduced with the accumulation of outcoming magma [lava]." Note 5.3p

The Magmaplanet theory does not account for 'cycles' and indeed, it cannot because no mechanism exists to account for the cyclical movement of matter deep in the Earth, especially when the movement presumably happens very slowly—only centimeters *per year*. This is why earthquake cycles remain a mysterious puzzle for many researchers. In 2002, a husband-and-wife research team set out to find the connection between the Moon and volcanic activity:

"If predicting eruptions is a confusing puzzle, volcano hunters Steve and Donna O'Meara believe that they may have identified a key piece. The husband-and-wife team are investigating **a connection that some volcano watchers have noted since early times**, but **none has adequately studied—the role of the moon in affecting volcanic activity**…

"The team's task was to determine when the greatest peaks in eruption activity occurred, and what connection the increased activity might have with the moon's gravitational pull. Following the patterns they had seen in the past, the O'Mearas predicted that during the volcano's ongoing eruptions, there would be peaks in volcanic activity at perigee and at full moon. In this case, events bore out that hypothesis and **in fact the greatest spike in volcanic activity occurred at a point in time just between full moon and perigee**." Note 5.3q

The team discovered a ***factual,*** *direct link* between the position of the Earth and the position of the Moon, related to volcanic activity. One would think that with this earthquake-eruption cycle evidence, science should take a hard look at the so-called 'cause' of volcanic eruptions. The evidence of predictable periodicity continues to mount, especially with the discovery of "silent earthquakes":

"…the discovery of **silent earthquakes** is forcing scientists to reconsider various aspects of fault motion…One **curious** feature of these silent earthquakes is that **they happen at regular intervals**—so regular, in fact, that scientists are now predicting their occurrence successfully." Note 5.3r

Recent discoveries of Earthtide and silent earthquakes mark just the beginning of new discoveries that help us better understand the gravitational influence of celestial bodies and their effects on Earth movements.

The Earth Breathing Evidence

Is the Earth breathing? In a geological sense—yes:

"Now, some suspect that **Earth is also 'breathing,'** compressing its crust and extending it once each year. This **cycle** is most evident in Japan, geophysicists told the meeting, where it may be responsible for that country's **'earthquake season.'** Elsewhere, it may lead some volcanoes to erupt **almost solely between September and December**." Note 5.3s

Fig 5.3.8 – This Mt. Etna volcanic eruption plume over the island of Sicily, Italy, comes to us courtesy of a NASA satellite. Contrary to what modern geology teaches, there are cycles in volcanic activity, like 12 and 24-hour event intervals present on Mt. Etna.

This article, *Earth's Breathing Lessons*, from the journal, *Science*, demonstrates just how strong the periodic correlation can be. In the case of Pavlof, an Alaskan volcano, there is a ***99% correlation***:

"GPS and strainmeters aren't the only things that seem to pick up planetary breathing. McNutt reported identifying four volcanoes—Pavlof in Alaska, Oshima and Miyake-jima in Japan, and Villarica in Chile—**that have a strong preference for erupting between September and December a preference significant at better than the 99% level in the case of Pavlof**." Note 5.3s

Because geophysicists, stuck in a magma paradigm, think earthquakes come from magma, they seem reluctant to consider the earthquake-gravitational connection, making it difficult for them to be receptive to the significance of cyclical occurrences:

"**Geophysicists have traditionally shied away from making such connections**. 'In the past, we've tended to dismiss things without an obvious physical mechanism,' says volcano seismologist David Hill of the U.S. Geological Survey in Menlo Park, California. **But** after California's 1992 Landers earthquake reached out hundreds of kilometers to trigger quakes by some still mysterious means, Hill, for one, **became more receptive**. At the meeting, he says, **'I was struck that there may be something' to Earth breathing and eruptions or earthquakes**." Note 5.3s

The Earth is not the only celestial body on which we know quakes occur. Apollo astronauts left four seismometers on the Moon, which registered around 12,500 'moonquakes' or seismic events during the 1970's. What evidence is there of a gravitational connection with the Moon?

Moonquake Tidal Evidence

Geologists rely on the magma theory to explain the origin of quakes on Earth, supposing that slow moving magma inside the Earth causes those earthquakes. The force behind the movement is the supposed upwelling magmatic currents. The Moon also has quakes, but, unlike the Earth, geologists think that the Moon has little or no remaining internal heat:

"The Moon, a body much smaller than the Earth, **lost its internal heat relatively early in its history**. As a result, **it ceased to be an internally active planet about a billion years or more ago**." Bib 133 p193

There are no volcanoes or active lava flows on the Moon—but there are moonquakes, therefore, if the Moon has no internal heated magma to cause quaking, why do they exist? From the book, *Melting the Earth,* the author states that the Moon is "dead" inside, and that "tidal forces exerted by the Earth" cause cycles of moonquakes:

"When the Apollo 12 seismometers detected the first moonquakes in November 1969, scientists got a direct confirmation that **the Moon is 'dead' inside, harboring no volcanic energy**. Moonquakes, it was found, originate about 600 to 800 km (375 to 500 mi) below the surface, are highly localized, and **occur at intervals of about fourteen days. Apparently they are triggered by the tidal forces exerted by the Earth**." Bib 136

These researchers said that tidal forces "apparently" cause deep moonquakes. Thousands of moonquakes recorded over several years, prove without a doubt that deep moonquakes happen, and they must be the result of tidal forces because they happen on *predictable cycles*. From the Fourth Lunar Science Conference:

"Comparison has revealed that many of the long-period lunar seismic signals match each other in nearly every detail throughout the entire wavetrain. Forty-one sets of matching events have been identified thus far. Matching signals of each set are generated by **repetitive moonquakes which occur at monthly intervals at one of forty-one moonquake hypocenters**…

"Each hypocenter is active for only a few days per month at a characteristic phase of **the tidal cycle**. The number of moonquakes observed in an active period ranges from none to four. Approximately equal numbers of hypocenters are active at nearly opposite phases of the **monthly tidal cycle**, thus accounting for **the observed semi-monthly peaks in moonquake activity**." Note 5.3t

The researchers described other tidal cycles connected with the lunar orbit, stating that the "dominant source of energy released as moonquakes" consists of "*tidal energy*":

"This long-term decrease in activity appears to correspond to the 6-year variation in tidal stress which results from variations in the relative phase relationships among several of the **lunar orbital parameters**. **The strong correlation between moonquake occurrence times and energy release and lunar tidal amplitudes and periodicities suggests that tidal energy is an important, if not dominant source of the energy released as moonquakes**." Note 5.3t p2522

Therefore, the Moon's quakes, which are similar to the quakes on our Earth, are not caused by magma inside the Moon but by "tidal energy" caused by the celestial dance of the Moon and Earth.

Perhaps you may be wondering why moonquakes do not

What causes lava and the heat in the crust?
Answer: the daily Earthtide.

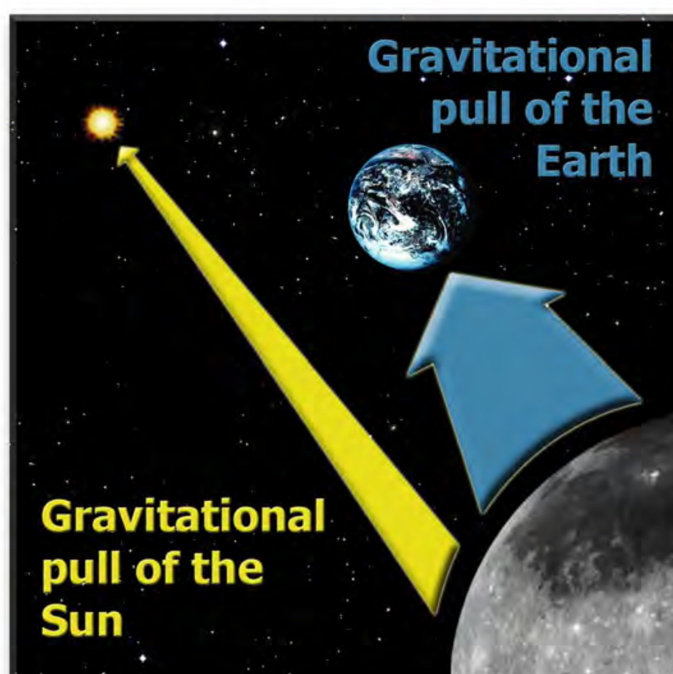


Fig 5.3.9 - The gravitational tug of Earth and Sun, not magma, causes 'moonquakes' on the Moon.

cause lunar volcanoes. Compared with the Earth, moonquakes are surprisingly infrequent based on seismic data gathered from seismometers placed on the Moon by Apollo astronauts between 1969 and 1972. Of four types of moonquakes, only the shallow quakes, within 20-30 kilometers of the surface appeared significant. The seismometers counted 28 of them over a five-year period, from 1972 to 1977, with the largest registering 5.5 on the Richter scale, according to NASA. While incomplete, the count, limited to the areas where Apollo missions allowed instrument placement, demonstrated the significantly less frequent number of moonquakes as compared with Earthquakes, which occur at the rate of ***several million each year***, according to the USGS. Such reduced seismic energy apparently does not elicit visible volcanology on the Moon today. One reason for this is that the Moon's more solid geological interior is different from the Earth's more liquid interior. In addition, the Earth rotates once every day on its axis whereas the same side of the Moon always faces the Earth. These and more lunar topics will be explained in subchapter 7.13, the Hydromoon Evidence.

The Solar-Cycle Evidence

Although we have repeated this many times, recall the modern geology belief of earthquake origins:

"Earth scientists **believe** that most earthquakes are **caused by slow movements inside the Earth** that push against the Earth's brittle, relatively thin outer layer, causing the rocks to break suddenly." Note 5.3u

What causes the slow movements inside the Earth? Presumably, magma, a substance investigators have never actually seen. From a scientific journal article in *Nature*, we read of earthquake researchers' difficulties understanding what really triggers earthquakes:

"The mechanism responsible for the triggering of earthquakes **remains one of the least-understood aspects of the earthquake process**." Note 5.3v

There is a discrepancy between what the geological community *believes* generally (that magma causes earthquakes) and what hands-on earthquake research shows. A major difference is due to the cycles that are associated with earthquakes. Not only do lunar cycles exist, annual solar cycles exist too. The same scientists that authored this article found an *annual cycle* in the earthquakes they studied:

"The magnitude-7.3 Landers, California earthquake of 28 June 1992 was followed for several weeks by triggered seismic activity over a large area, encompassing much of the western United States. Here we show that this triggered seismicity marked **the beginning of a five-year trend**, consisting of an elevated microearthquake rate that was modulated by an **annual cycle**, decaying with time. **The annual cycle is mainly associated with several hydrothermal or volcanic regions** where short-term triggering was also observed." Note 5.3v

Monthly and yearly cycles that affect earthquakes make no sense within the magmaplanet paradigm; the magma model cannot account for them. Deep earthquakes and other evidences demonstrate that there is no molten liquid moving in daily cycles. Knowledge of the Gravitational-Friction Law, the association of earthquakes with the daily, monthly (lunar), and yearly (solar) cycles makes it possible to better understand the whole picture.

Other astronomically related factors affect earthquake movement. One of those factors is the annual snowmelt that occurs in the spring and summer:

"'Its been known for 20 years that we have **more inland earthquakes in spring and summer**,' says geologist Kosuke Keki of the National Astronomical Observatory in Iwate, Japan." Note 5.3w

Melted snow water lubricates fault systems, which makes them susceptible to slippage. The weight loss that occurs with snowmelt also contributes to movement. The *Nature* article continues:

"'It's just like taking a weight off a spring,' says Heki.

"In snowy areas, powerful earthquakes were **three times more likely to occur in spring and summer** than in autumn or winter, he found." Note 5.3w

Here again we have evidence of cyclical events that affect earthquake activity.

Rock-burst Tidal Evidence

Evidence connecting quakes on the Moon and volcanic eruptions on the Earth with the Earth-Moon orbital system are now more evident with acceptance gaining some ground. The cyclical, violent eruptions of the Merapi volcano in Java, Indonesia, one of the most active volcanoes in the world, provides us with new evidence about cyclical, silent earthquakes that are undeniably tied to the tidal forces of the Earth-Moon dance. And the evidence does not stop with these 'coincidences.' If lava actually comes from frictional heating, which originates from earthquakes caused by Earthtide, which lunar and solar cycles affect, we should see evidence everywhere we look.

One place this evidence appears is in subterraneous mines. The constant threat of injury or death to a miner comes in many forms: bad air, ceiling collapse, explosion, and fire to name a few. Another threat of injury happens when solid rock suddenly bursts, hurtling missiles of rock shrapnel, caused by tidal flexure:

"There is a problem of predicting the impulsive, rapidly changing stressed state of the Earth crust. In some cases **these changes are accompanied by earthquakes**. **Numerous observations have shown that rock bursts** (for instance, in the mines at the Khibiny Massif) **correlate with lunar-solar tides**. Rock bursts often bring considerable threat to life and property and sometimes cause fatal accidents." Note 5.3x

The Russian geologists who studied these events, correlated the *earthquakes and rock bursts with lunar-solar tides*.

Juan de Fuca Ridge Tidal Evidence

Off the northwest coast of the United States lies the Juan de Fuca Ridge (Fig 5.3.10), an intensely studied area of seismic activity. An article published in the October 15, 2001 *Geophysical Research Letters* included evidence of daily low tidal triggering, related ocean tides, and micro-quakes with seasonal periodicity:

"**Earthquakes occur more frequently** near low tides, especially the lowest spring tides, when the extensional stresses are at maximum in all directions." Note 5.3y

This evidence adds further proof correlating earthquakes and tides with solar and lunar cycles. Apparently the evidence had been overlooked in the past but is now clear because of improved technology and measurements.

Large Earthquake Tidal Evidence

Having identified direct evidence confirming the association between micro-earthquakes and tides, we ask, "Are large earthquakes also affected by tides?" A 1995 study involving 988 globally distributed earthquakes with a magnitude of 6.0 or greater as reported in the *Geophysical Journal International*, appeared to be the first in which science incorporated the effects of ocean tide loading at the depth of the hypocenter into the research. In this comprehensive report, the researchers noted:

"The highest population of normal-fault-type earthquakes appears at the time of maximum extensional stress, implying that a decrease in the confining pressure **due to the earth tide is responsible for triggering earthquake occurrence**." Note 5.3z

The researchers also noted in the same study that:

"Indeed, there are **many studies that have reported a positive correlation between the earth tide and earthquake occurrence as well as correlation with volcanic eruptions**." Note 5.3z

Next, we examine the correlation between earthquakes, Earthtide, and geysers.

Geyser Tidal Evidence

Fig 5.3.11 depicts famous Old Faithful Geyser at Yellowstone National Park in Wyoming, USA. Truly an amazing place, Yellowstone is the most geologically active location in the continental US with more than double the geysers anywhere else in the world, including twice that of a geyser park in Russia, and more than ten times the geysers at the number three spot, Geyser Park Rotorua, New Zealand.

For decades, scientists observed the mechanics of Yellowstone's erupting geysers. Most geysers fill empty cavities before an eruption can take place, but often forgotten (and certainly not well understood) is the heating of the water. In the book, *The Geysers of Yellowstone* we find:

"Once the plumbing system is full, the geyser is nearly ready for an eruption. **Often forgotten but extremely important is the heating that must occur along with the filling**. Only if there is an adequate store of heat within the rocks lining the plumbing system can an eruption last for more than a few seconds. (If you want to keep a pot of water boiling on your stove, you have to keep the fire turned on. The hot rocks of the plumbing system serve the same purpose.)" Bib 134 p5-6

If magma causes the heating then it should behave somewhat like a stove, slow and constant. However, this is not how it seems to work.

At 11:37 P.M. on the night of August 17, 1959, a large 7.5 earthquake rocked Yellowstone. The earthquake and the tremors following it caused hundreds of geysers to erupt:

"One of the greatest and longest-lasting **reminders of the quake** was its effect on the geysers and hot springs. On the night of the tremors and within the next few days, **hundreds of geysers erupted**, including many hot springs that had not previously been known as geysers." Bib 134 p14

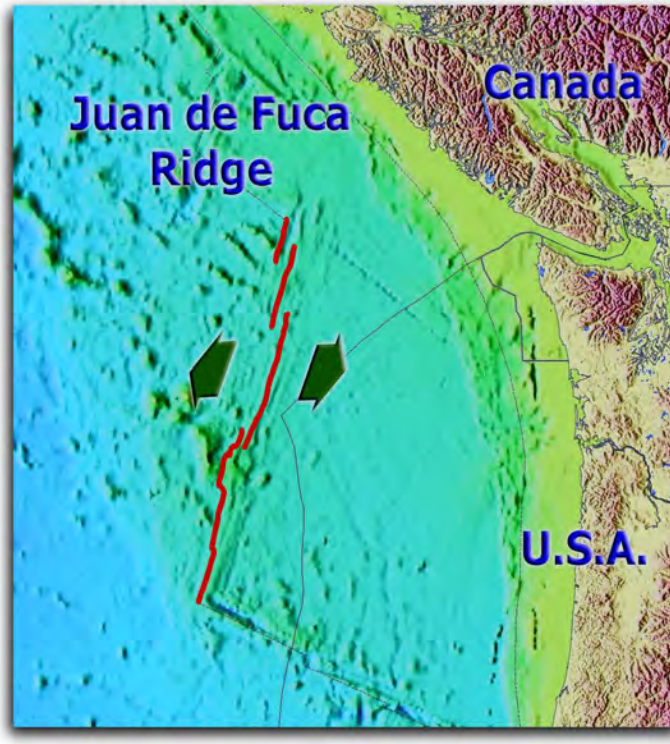


Fig 5.3.10 – This is the Juan de Fuca Ridge off the northwest coast of the US, where spring tidal movements trigger earthquakes which occur more frequently at low tide.

This was not the only year when large earthquakes caused or changed geyser eruption patterns in the area. In the years 1975, 1983 and 1994, earthquakes released pressure and tension in the area's faults affecting geyser activity. No doubt, the seismic activity generated heat in the faults. Moreover, the frictional heat from Yellowstone's earthquakes affects the area's hydrothermal waters. Surely, scientists should study this heat source more thoroughly. When the 1959 earthquake occurred in the Yellowstone area, causing hundreds of geysers to erupt, what caused the eruptions?

"Exactly what caused these eruptions is **difficult to say**…" Bib 134 p15

Fig 5.3.11 – Old Faithful Geyser in Yellowstone National Park, USA.

Small earthquakes are not rare at Yellowstone; they are, in fact, quite common:

"**Every year, in the Yellowstone Plateau, up to 2,000 tremors are recorded** by seismographs. Mostly far too small to be felt by people, these quakes are **normal events**." Bib 134 p17

Why is it so "difficult to say" what causes eruptions?—Modern geology is simply not aware of the Gravitational-Friction Law.

With the Lava-Friction Model, geologists can now begin to unravel the "mysteries" that previously had no identifiable "cause." Consider the eruption behavior of Geyser Hill in Yellowstone:

"Most, if not all, of the hot springs on Geyser Hill are connected with the other members of the group. Exchange of function is extremely common. There are also **two mys-**

teries that have only recently been discovered, **neither of which has a clearly identified cause**. **One is a tendency for several of the geysers to exhibit diurnal behavior** – in general, short intervals by day and substantially longer intervals at night. Superimposed upon this is a weekly cycle known informally as the 'Geyser Hill Wave,' which causes **fairly regular weekly increases and decreases in the intervals of many geysers in the group**. It takes a great deal of observational experience to become familiar with these changes, but understanding them makes the activity on Geyser Hill anticipatable if not **outright predictable**." Bib 134 p30

Here again is evidence that links geysers to earthquakes, that geysers have daily and weekly cycles that make their activity sometimes "outright predictable." Curiously, the 'predictability' makes geysers more mysterious to the experts. Adding to the mystery, scientists do not think geyser water heating is on a cycle, yet there it is, in a predictable pattern.

It appears that the geyser's tidal cycles, which directly link to earthquake activity, remain almost unnoticed in the geological community. The data do not fit within the magma model, where scientists suppose that a large pocket of molten magma resides beneath the Yellowstone crust. Perhaps investigators are not aware that the gravitational forces of the Sun and Moon trigger earthquakes, and that when these gravitational forces are at their peak, or at their minimum, stress changes within the crust become even more evident, which demonstrates how observable cycles connect the earthquakes:

"It is well known that strains associated with solid body tides influence geophysical phenomena (Melchior 1966), such as moonquakes (Latham et al. 1971), volcanic activity (Wood 1917), tilt (Rinehart and Stepp 1973), and geyser activity (Rinehart 1972a). While most tidal effect studies have concentrated on the semidiurnal and diurnal components, the effects of the longer components, **fortnightly, semiannual, and 4.4 and 18.6 years, appear to be major agents in bringing about change**.

"Observations indicate that individual geysers correspond differently to the various tidal components. The performance of Riverside Geyser in Yellowstone National Park, U.S.A. is influenced by the fortnightly and semiannual components, an increase in variation in gravity causing the geyser to erupt more frequently. The high correlation between eruption interval and the variation in earth tidal forces during May and early June 1967, and again from late July through August occurs when the fortnightly component associated with the new moon and full moon is especially evident…

"The strong response of the Calistoga, California, geyser to the **4.4 year tidal component…** high tidal forces again shortening the interval.

"The **18.6-year tidal component can influence dramatically the action of a geyser**. The interval between eruptions of the large and spectacular Grand Geyser, Yellowstone National Park, has varied seasonally over some 4 decades of observations. During times of high tidal force, around 1930, 1955, and 1970, it erupted 2 to 3 times daily, only to become almost dormant during the years 1943 and 1960 when the tidal force was the lowest. Two other large geysers in Yellowstone, Beehive and Giant seem to respond similarly to Grand." Note 5.3aa

Fig 5.3.12 – Aurum Geyser in Yellowstone National Park, USA. Courtesy Jim Peaco

The 4.4 and an 18.6-year lunar nodal cycle appears in other natural occurring phenomena that also correlates with Sun-Moon-planet orbits. Rinehart's 1976 paper includes excellent graphs that illustrate the 4.4 and 18.6-year cycle of both geyser eruption and the Moon. The researchers then list 19 such scientific studies with positive correlations between Earthtide, earthquakes, moonquakes, volcanic activity, and geyser activity.

The Gravitational-Friction Law

The Frictional-Heat Law identified the ***origin of heat***, explaining how lava comes from heat generated by friction. The Gravitational-Friction Law identifies the ***origin of movement*** that creates friction.

The Gravitational-Friction Law

Frictional heating in the crust of celestial bodies is caused by the gravitational pull and release of the crust by other celestial bodies.

The constant daily movement of the crust is a result of Earthtide. This has huge implications. The Gravitational-Friction Law illustrated in Fig 5.3.13 shows how friction between plates generates the lava for volcanoes. The daily upward and downward movement of miles of crust causes the buildup of tremendous stress. With the alignment of the Sun and Moon during the full or new Moon phases, the movement is greatest, and when the Sun or Moon is at either its closest or furthest point from the Earth, the movement can be even greater, possibly triggering a release of accumulated stress energy in the form of a large earthquake. Earthtide provides evidence of how increased pressure and frictional grinding can produce heat in the crust.

Is it coincidence that at the end of 2004, Mt. St. Helens, the Hawaiian Volcanoes, Mt. Etna, and others began erupting more than usual, and then on December 26, 2004, a 9.1 earthquake, the largest in decades, struck the west coast of Sumatra triggering a series of devastating tsunamis? There are cycles throughout Nature, and they connect earthquakes and volcanic activity with astronomical cycles. We will discuss additional evidence of astronomical cycles in the Weather Model chapter, where we also discuss the worldwide eruptions and earthquakes that occurred toward the end of 2004, as well as the subsequent increase in hurricane activity the following year, in 2005. Were these events also coincidental? Once we understand the connection between the astronomical cycles, earthquakes, and frictional heating, we can begin to predict, at least generally when and where these events might take place. If we know the origin of movement, then we can understand why movement occurs and we can begin to predict the results of that movement also.

Earth Movement by Water

Is there a liquid other than magma that could cause earthquakes and the ground movement beneath our feet? From an article in *Nature*, we read:

"Geologists knew that the use of rocks to store water (aquifers) could cause ground movement, but not to this extent. '**It's the magnitude of the deformation that's so overwhelming**,' says John Shaw, who studies the geology of the Los Angeles basin at Harvard University in Cambridge, Massachusetts…

"The largest area of moving ground – measuring some 800 square kilometers of greater Los Angeles – is **rising and falling by as much as 11 centimeters each year**, Bawden's group reports…

"Bawden began to suspect that the movement was due to thirsty people **rather than tectonic plates** when he noticed certain GPS sensors in the array moving **far more than a fault can in a year**." Note 5.3ab

The cycle noted by Bawden shows up in many other areas where GPS systems have allowed scientists to record similar observations. With this, we can see that water has a known effect on crustal movement because of cyclical wet and dry conditions.

Another example of how water can affect movement within the crust of the Earth comes from research data at the world's deep boreholes where researchers produced earthquakes by pumping water into them. In 1997 at the German KTB borehole, one of the deepest holes ever drilled, there were almost 400 micro-earthquakes induced at an average depth of 8.8 km when scientists injected water into the borehole. Note 5.3ac

Not only have relatively small amounts of water been shown to induce seismicity in boreholes, scientists frequently observe Earth movements that are associated with water. Naturally, the next question to ask would be; "are there events that happen in connection with the *displacement of huge amounts of water*?" The mechanism that facilitates the movement of large amounts of water, both on the surface and within the crust certainly exists. What is this mechanism? On the Earth's surface water, it is the ocean's ***tides***, but what of the subsurface. Shouldn't we expect the movement of so much water to affect the entire area in which it moves?

The Ring of Fire Evidence

The 'Ring of Fire' makes up a semi-circular region of plate boundary bordering the Pacific Ocean; it is the most seismically active region in the world. It is extraordinarily active volcanically and is the location where almost half of the world's volcanoes sit. Fig 5.3.14 illustrates the intensity of the area. Red triangles represent volcanoes and black dots represent earthquakes. It is easy to see the geographic relationship between them. It is also notable that a great deal of volcanic and seismic activity occurs along the northern and eastern edge of the Pacific Plate where considerable friction occurs.

"Only about 10 percent of the world's earthquakes occur along the oceanic-ridge system, and they contribute only about 5 percent of the total seismic energy of earthquakes around the world. In contrast, **earthquakes occurring where plate boundaries converge, such as at the trenches, contribute more than 90 percent** of the world's release of seismic energy from shallow earthquakes, as well as most of the energy from intermediate and deep-focus earthquakes." Note 5.3ad

Where plate boundaries converge, a great amount of friction is present. It is here that frequent and massive earthquakes occur and as a result, significant lava production by frictional heating manifests. In Fig 5.3.14, the black lines that appear to delineate the plate boundary are in fact closely packed black dots, markers of measurable seismic events. Notice that earthquakes and volcanoes correlate well with plate boundaries, obvious evidence that frictional heating occurs there. But what of the mechanism that moves the plates? Could it be associated with the same mechanism that causes the tides?

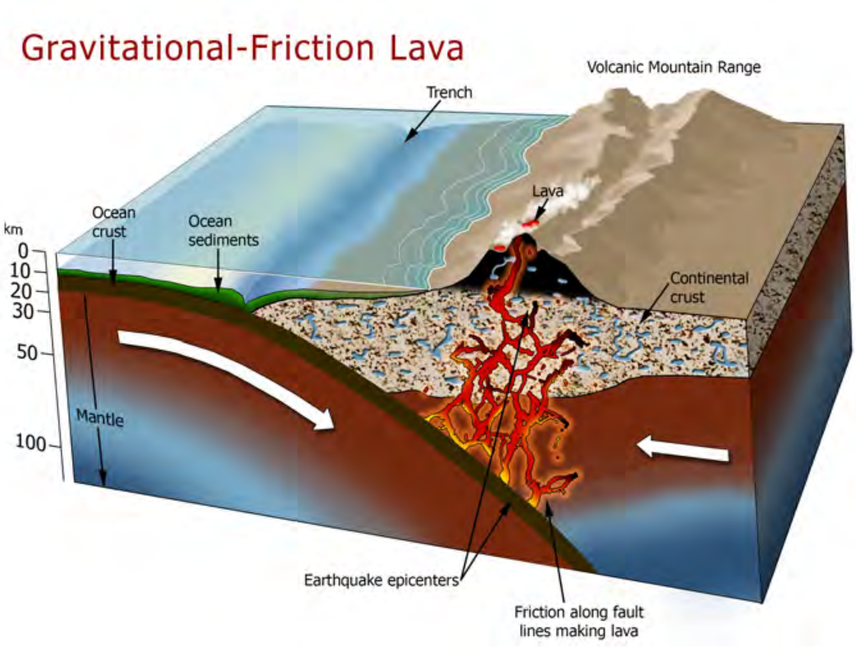


Fig 5.3.13 – This diagram illustrates lava formation resulting from friction between continental plates, not from magma deep inside the Earth. Although magma has long been theorized as the source of lava, researchers are beginning to recognize that Earth's tidal forces cause frictional heating, and that heating is producing lava beneath volcanic centers.

Intraplate Earthquake Volcanic Evidence

On March 25, 1998, one of the world's largest earthquakes shook the ocean bottom between Antarctica and Australia. The quake 'befuddled' researchers because it violated the "usual rules" (theories) of modern geology:

"'It's really kind of a befuddling earthquake **because it seems to violate a lot of the usual rules**', says Douglas A. Wins, a seismologist at Washington University in St. Louis. Most giant earthquakes occur in distinct seismic zones, where two of Earth's surface plates scrape against each other. The March quake, however, struck

Fig 5.3.14 - The 'Ring of Fire' is a ring of earthquakes and volcanoes along Pacific Ocean plate boundaries. The lines are actually thickly clustered black dots, which are major earthquakes, the red triangles are volcanoes, both occurring where most of the friction takes place—along the plate boundaries, marked out by the lines of seismicity. It is there where the greatest daily rubbing of the daily Earthtide takes place.

within the Antarctic plate nearly 350 kilometers from the nearest border with another plate, says Wiens. Seismologists call these sorts of events intraplate earthquakes.

"The researchers raise a number of possible theories to explain the quake, but **'none of the ideas are really that attractive,'** says Wiens." Note 5.3ae

We can see in Fig 5.3.14 that most earthquakes occur along fault lines where plate boundaries meet. The usual assumption is that magma oozes through cracks at the point where these zones or plates meet. However, there is no satisfactory explanation for ***intra-plate*** earthquakes, nor is there an explanation for mid-plate *volcanic* activity. The following is the sci-bi that attempts to explain how magma normally reaches the surface at plate boundaries:

"Because hot magma is lighter than the cooler, overlying rocks, it rises through buoyancy, welling up through great cracks or rifts that are produced in the ridges by the unremitting forces that pull apart the plates." Note 5.3af

What if there were no 'great cracks' or rifts like those found along plate ridges? How then would magma rise to the surface? One such example where mid-plate magma supposedly exists is the Yellowstone National Park caldera in the North-Western United States. Located high in the mountains and hundreds of miles from any plate boundary, the Yellowstone continental crust is relatively thick, roughly six times thicker than oceanic crust and there is no known 'great crack or rift' providing a path for the theoretical rise of magma to the surface. Other than the presence of heat, what evidence does science have that magma is burning its way through to the surface, or that a giant magma plume exists? They have none.

One has to stretch the imagination to see how or why magma would rise through miles of continental crust. With the Lava-Friction Model and the Frictional-Heat Law, the answer is quite simple. There is an abundance of intersecting and converging faults at Yellowstone that experience continual grumbling, even though it is far from plate boundaries. Of course, there are faults everywhere around the world, but what makes those at Yellowstone unique is the high degree of seismicity on *converging* and intersecting faults. Frequent *stress* build up results in numerous, small, continuously occurring earthquakes, which generate enormous frictional heat in the surrounding area, which in turn heats underground water fueling the geysers and other geothermal features. Constant tidal movement within the crust builds up stress along faults, and sometimes releases that stress in a large earthquake, creating even more heat through friction, which results in a rise in both magnitude and multitude of the spectacular displays around Yellowstone Park.

Fig 5.3.15 - Yellowstone National Park, USA boasts of intersecting faults that produced heat by earthquakes in the middle of the North America Plate.

Frictional Heat Realization in Taiwan

On September 21, 1999, 2,400 people died in the 7.6 Chi-Chi earthquake, the largest in over a century in Taiwan. This quake is significant for a number of reasons that we will refer to later on. Taiwanese researchers who studied the quake reported an interesting observation in the journal, *Geophysical Research Letters*. Instead of crediting magma as the heat source associated with this massive earthquake, they described frictional heating:

"Even though the trapped water in the interconnected fractures was small, **once vaporized by frictional heat during the earthquake** it could cause a very large amount of pressure. When the pressure exceeded the lithostatic pressure or strength of rock, the huge rock eruption occurred." Note 5.3ag

There is no such thing as coincidence—we just don't comprehend the purpose yet.

The reoccurring theme is that friction can and does generate significant heat. Importantly, frictional heat occurs to some degree during ***every*** seismic event, and there are hundreds of seismic events every day, around the Earth. Hopefully, we are beginning to understand where intrusive and extrusive lava originate without looking to magma.

Denying the Earthquake Origin Evidence

Thus far, we have presented the following thirteen independent scientific evidences of the **Lava-Friction Model** and the **Gravitational-Friction Law**:

1. **Earthtide**
2. **Earthquake-Eruption Cycle Evidence**
3. **Earth Breathing Evidence**
4. **Moonquake Tidal Evidence**
5. **Solar Cycle Evidence**
6. **Rock-burst Tidal Evidence**
7. **Juan De Fuca Ridge Tidal Evidence**
8. **Large Earthquake Tidal Evidence**
9. **Geyser Tidal Evidence**
10. **Earth Movement by Water**
11. **The Ring of Fire Evidence**
12. **Intraplate Earthquake Volcanic Evidence**
13. **Frictional Heat Realization in Taiwan**

Each of these evidences demonstrates that astronomical cycles affect and are associated with earthquake behavior. This means that we might be able to calculate where or when earthquake events are likely to occur using lunar or solar orbital calculations. When the Sun and Moon align and the Earth is at perigee (closest point to the Sun in its orbit), substantially higher gravitational stresses affect the Earth's water tide and Earthtide, more than is present when the Moon is not aligned with the Earth and Sun, or when Earth is at apogee (furthest from the Sun). We can use these actual evidences to apply a prediction-observation learning process and thus utilize the Universal Scientific Method to validate the Lava-Friction Model.

No one should think the evidences presented here are all-inclusive nor are they representative of all the facts that support the Lava-Friction Model. There are many more examples available and many yet to find for those willing to look.

What is so significant about these facts? By examining this evidence, it *should be apparent* that both earthquakes and moonquakes connect directly the tidal effects of the Earth and Moon, and that there is evidence correlating seismic and geothermal activity with orbital periodicities and other cycles. On the other hand, magma has no cycles and as such, at least from the geologist's tectonic-magma point of view, ***there should be no cycles in earthquake activity***.

From the USGS' frequently asked questions website, we learn what geologists think about earthquakes and how they associate them with cycles:

"Q: Are there more earthquakes in the morning/in the evening/at a certain time of the month?

A: Earthquakes are **equally as likely to occur at any time of the day or month or year**. The factors that vary between the time of **day, month, or year do not affect the forces in the earth that cause earthquakes**." Note 5.3ah

"Q: Can the position of the moon or the planets affect seismicity?

A: **No significant correlations have been identified** between the **rate of earthquake occurrence and the semi-diurnal tides** when using large earthquake catalogs." Note 5.3ah

Although empirical evidence is available to everyone, if it does not fit the current magma model paradigm, modern science seems to reject it. Why is this so?

The Unequivocal Io Evidence

We have considered evidence of lava's origins by examining 13 events that happen on the Moon and the Earth. If it happens in these places, it should occur in other places as well, and we should be able to see evidence of it happening. An additional 14th evidence now discussed here seperately, is the Unequivocal Io Evidence of earthquake origin. We find this lava evidence as we look across the solar system to see one of the finest examples of the Lava-Friction Model at work. This incredible place, *the most active volcanic celestial body in our solar system*—is Jupiter's moon, Io (see Figs 5.3.16-18). Io is the innermost moon of Jupiter's four Galilean moons and has the greatest and most extensive volcanic activity known in the solar system. What is the secret as to why this volcanic activity is so remarkable on Io?

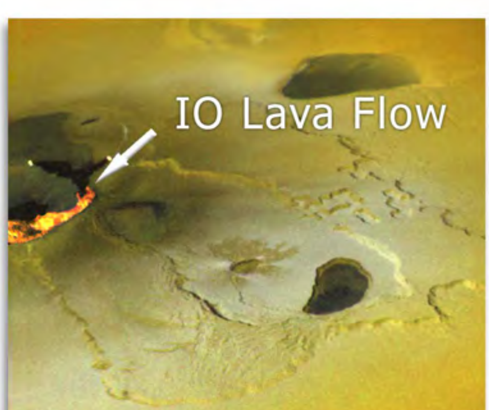


Fig 5.3.16 – Actual lava flows on the surface of Io, one of Jupiter's four largest moons. The lava comes not from magma, but from the Gravitational Earthquake Friction Mechanism. Courtesy of NASA.

100-meter tidal bulges!

As NASA states it:

"Solid tidal bulges on Io are about **100m high**, taller than a 40-story building!" Note 5.3ai

The surface of Io is rising and falling 100 meters—the equivalent of an entire football field—every day, which is about 42 hours on Io. Fig 5.3.17 illustrates the forces at work on Io, which can come from many directions depending on the positions of Jupiter and the other Galilean moons. Scientists know that tidal frictional-heating occurs every day on this Jovian moon because they can see it happening. From where did the force come that causes such surface movement?

The following quote about Io comes from one of NASA's educational web sites. Note the *cause* of Io's 100-meter tidal bulge:

"Here the **gravity of Jupiter** and large moon Ganymede (with help from moons Europa and Callisto) play tug-o'-war, with Io playing the part of the rope! **Io bulges on two sides like a football**." Note 5.3aj

The events that play out on Io provide an excellent example of the **Gravitational-Friction Law** at work. Lava production there is not from theoretical magma; it is a direct result of frictional heating. Tidal forces exerted by other celestial bodies cause that heating. Researchers note the effects of gravitational tidal bending on Io (see Fig 5.3.18):

"At this time, **Jupiter and all three of the other large moons pull on the same side of Io**. Its orbit bends to pull it closer to Jupiter. Io is again squished like a football." Note 5.3aj

What effect does 'squishing' have?

"All this bending causes heat to build up inside Io. Io gets so hot inside that some of the material inside melts and boils and tries to escape any way it can. So it blows holes in the surface! **That's what volcanoes are**. Some on Io have shot their hot gas plume 300 kilometers (about 200 miles) into space!" Note 5.3aj

How much heat does Io actually release? It may be the most active volcanic body in the Solar System, but how much melting is actually happening on Io's surface? Researchers studying data from the Galileo spacecraft reported in 2004:

"Io may be giving off **so much total heat**, the best explanation would be that **virtually the whole sphere is covered with lava spewed so recently it is still cooling**, new calculations suggest." Note 5.3ak

In summary, the **Frictional Heat Law** provides us with the ***origin of heat***, and the **Gravitational-Friction Law** provides us with the mechanism, or the ***origin of movement*** within the Earth's crust that drives the frictional heat engine. We also considered the ***results*** of these two Laws, including 13 verifiable evidences. These three concepts make up the **Lava-Friction Model**, a model that explains where lava really comes from on Earth, and as a further 14th witness, Jupiter's moon, Io provides unequivocal evidence of the Lava-Friction model.

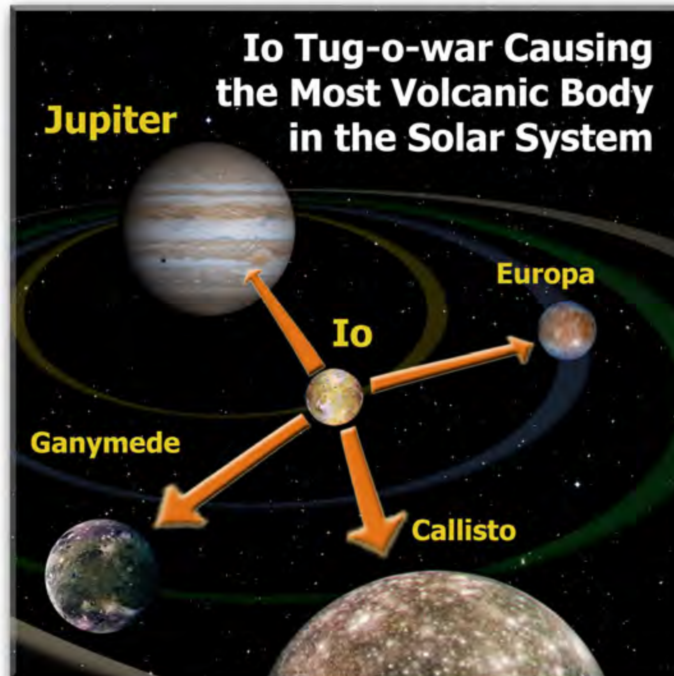


Fig 5.3.17 – Gravitational tidal forces act on Jupiter's moon Io, pulling it like a football, causing the greatest amount of volcanism in the Solar system.

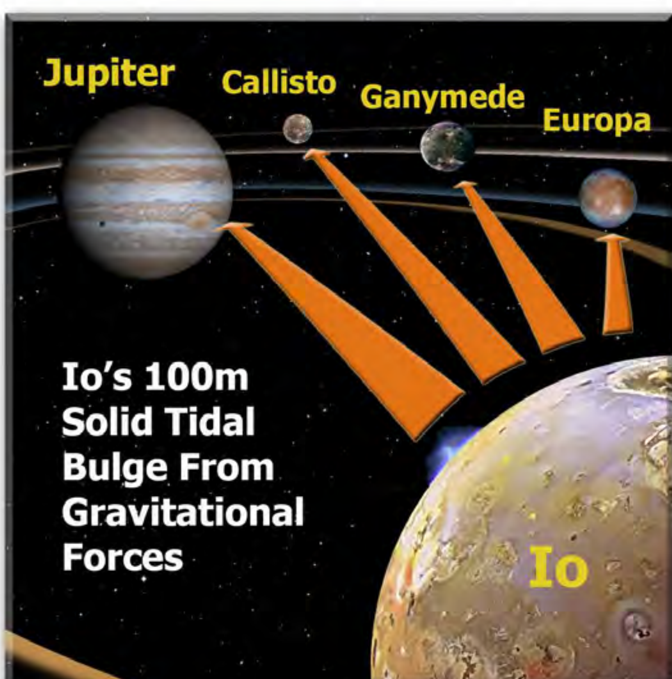


Fig 5.3.18 – Jupiter's moon Io experiences a 100-meter tidal bulge (vertical crustal movement) each day during its daily rotation and orbit around Jupiter. This is direct, empirical evidence of how the Lava-Friction Model works.

5.4 Magma Theory Defies Heat Flow Physics

In the previous subchapter, we demonstrated lava's origin through frictional heating within the crust as defined by the Frictional-Heat Law. In this subchapter, we turn our attention to the scientific evidence regarding the flow of heat through Earth's crust. An examination of the heat gradient from the surface toward the center of the Earth casts further doubt on the existence of magma. As we will show, this evidence, which was originally purported to prove the magma theory, actually refutes it. The observed facts show that the heat-flow of a *theoretical magmaplanet* does not follow the simple laws of heat flow physics.

Thermal History of Earth – A Problem of 'Enormous Difficulty'

Have you ever wondered where the thousands of degrees of heat comes from that keeps rocks melted? O. M. Phillips, a