

Evidence of Living Earth:
Active Volcano in Japan and Hawaii

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Who can believe our firm land is moving or our firm land is floating although we have built our houses or roads on its rigid surface? This question does not seem to make any sense for our lives, since almost nobody realizes that the land is moving; however, it is a fact. Between the 1950s and 1960s, geologists spent a great deal of time figuring out the mystery of the initial stages of the earth. Finally, they found out one revolutionary theory, which is now called plate tectonics. According to Microsoft Encarta Online Encyclopedia 2000, plate tectonics is the “theory(s) that the outer shell of the earth is made up of thin, rigid plates that move relative to each other.” After theory was found out, almost every mystery about the earth has been explained successfully such as “earthquakes and volcanic eruptions as well as mountain building and the formation of the oceans and continents”(Coney 1). This theory has also proved that our earth has been actively living from the ancient time to recently. If the earth were personified, it would have blood and a body metabolism (replacing the old with new), which can be called **magma** and **volcanism** respectively.

*Encyclopedia Britannica defines **magma** as “molten or partially molten rock from which igneous rocks form. **Magma** migrates either at (a) depth or to the Earth’s surface and is ejected as **lava**.” It is known that due to the high pressure and temperature of the inner parts of earth, rocks are melted like water and move anywhere under the plate. When magma is cooled by the air or ocean, it changes its molten shape to rock or plate. Moreover, Microsoft Encarta Online Encyclopedia 2000 explains about the relationship between magma and **volcanism**. It says, “molten rock that has not yet erupted is called **magma**”(Hawthorn 1).*

*In addition, it is better to understand what **lava** is, before digging inside the topic. Basically, **magma** and **lava** are all part of the same cluster. **Magma** is inside of the earth, and **lava** is outside of the earth. “When **lava** comes to the (earth’s) surface, it is red-hot, reaching temperatures as high as 1200C/2200F. Some **lava** can be as thick and viscous as toothpaste, while other **lava** can be as thin and fluid as warm syrup and flow rapidly*

down the sides of volcano” (Hawthorn I).

When do we realize that we are living on an active earth? The answer might be that we realize this only when people face dreadful geological activities such as volcanic eruptions or earthquakes. Usually, the earth gives us much favor and peacefulness, but sometimes it shows its violent side. Nevertheless, this violent aspect - volcanic activity – can be illustrated dramatically in Hawaiian volcano (Mt. Kilauea) and Japanese volcano (Mt. Usu): geological, physical, and dangerous similarities and differences.

First of all, geologically, Hawaii and Japan can both be described as floating on the most violent zone, which are sometimes described as hot-spots, so both countries have a lot of volcanoes and earthquakes. However, following the plate tectonics theory, these countries are not in the same situations. Hawaii is on the middle part of the plate, and Japan is on the end of the plate. Plate tectonics explains that the earth’s surface, which is called a plate, is moving constantly. Somewhere on the earth, the new plates come into the outer parts, and the old plates go under the inner parts. Hawaii is one of the examples of the newborn place, and Japan is also one of the examples of the place where the plates sink down. Therefore, both of them have very energetic geological activity such as volcanoes and earthquakes. For instance, the Time magazine reports that “in Japan 86 active volcanoes are packed onto an archipelago smaller than California”(Kluger). These geological differences cause the different types of eruptions.

Adjoining the geological aspect, their eruption styles -- physical aspects -- are different, even though Hawaiian and Japanese volcanic eruptions are both very aggressive. In Hawaii, Mt. Kilauea is “the world’s largest active volcano mass, (which is) located on southeastern Hawaii Island”(Britannica). Moreover, Kilauea (elevation above sea level is 1277m/4190ft) is close to Mt. Mauna Loa, which is also the most well known active volcano in the world. The Hawaiian

Volcano observatory explains the Hawaiian meaning of Kilauea: “the Hawaiian name ‘Kilauea’ means ‘spewing’ or ‘much spreading’ apparently in reference to the **lava flows** that it erupts.” On the other hand, Mt. Usu is the one of the most recently erupted active volcano, in Japan. The size of the mountain is not so high (elevation above sea level is 731m/2398ft), but it erupts very violently and creates a **lava dome** silently. The name Usu has two meanings. One came from native Japanese, who were called Ainu and lived in the northern part of Japan, and the other came from Japanese Buddhism. Ainu’s meaning was the place which was flat but raised from the other part, and they began to call it “USU”. The other meaning was that old people believed that Mt. Usu had some kind of power of Buddha, and Ainu’s sound “USU” was very close to the name of Buddha’s pedestal. Anyhow, the origin of the name implies that both volcanoes have different characteristics. Kilauea erupts non-explosively, and it blows up liquid lava. Because of the middle part of the plate, a volcano blows up fresh magma, so it is very fluid. However, Usu erupts explosively, and it blows up lots of gas and ash and makes a **lava dome** near or under the mountain. This is because the construction of the lava is different between Kilauea and Usu. The differences of the eruption style involve high risk of the eruption.

Lava flow describing as hot honey syrup flows very smoothly. Although volcano’s slope is 5 degree, lava flows very widely in slow speed (Hawthorn). Therefore, **lava flow** volcanoes can not be high. On the other hand, **Lava dome** is when magma goes up from the inside to the surface of the earth, and if magma does not have fluidity, magma cools almost near the surface, a top of the volcano, or inside the earth. When, magma and lava touch the cold, they change their form to rock. It is easy to imagine the system of **lava dome** this way: when the toothpaste is left without closing its cap, the toothpaste is hardened only around the tip by air or some factor of solidifications, but inside of the toothpaste is still soft and smooth. **Lava dome** is exactly same. However, usually magma moving can not stop from the inside due to the living earth’s function, so new fresh magma pushes soiled top. Then, sometime these kinds of tip of magma appear top of the mountain or suddenly appear from the ground. This tip is called **lava dome**. Thus, **lava dome** volcano rises its feet pretty abruptly.

Technically, eruptions bring about many harmful effects such as killing the people and breaking the human constructions easily. However, depending on the eruption style, both volcanoes lead to different styles of danger. At Kilauea, because of the non-explosive eruption, the volcano creates a stream of lava. This soft lava is really like a liquid, so it can flow anywhere easily. According to the Encyclopedia Britannica, "...in 1983, Kilauea produced a river of flowing lava that reached the sea 30 miles (48 km) south of volcano." On the other hand, at Mt. Usu, because of the explosive eruption, people who live near the volcano face the ash falling and pyroclastic flows which are "mixtures of hot ash, rock fragments, and gas"(Tilling). Due to lots of ash and gas by the explosive eruptions, the pyroclastic flows are "especially deadly because of their high temperatures of 850C/1600F or higher and fast speeds of 250km/h/160mph or greater"(Tilling). Although lava flowing is slower than pyroclastic flows, people can not run away from them.

Finally, volcanic eruptions seem to tell us that controlling nature is impossible, but these scientific observations and studies give us the opportunity to predict about volcanoes. Mt. Kilauea and Mt. Usu are the best examples for the volcanological study because both of them erupt periodically, so it is easy to gather scientific data. And then, comparing the data between them, we can recognize when the eruption will be, and we can respect the earth well. Sometimes, the eruption seems to be a judgment from the earth to human beings. By worshipping the earth, we can gain a lot of knowledge about the earth from Kilauea and Mt. Usu.

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