The quite prevalent than is otherwise known. in

The ocean floor is comprised of many hills, mountains, valleys, volcanoes and certain forms of life, easily unimagined to the common man. The entire global ocean floor is approximately 366 million square kilometers and the entire surface area is a volcanic terrain (Fisher, 1998, p. 81). Of the entire ocean floor, there are about a million deep sea volcanoes.

Approximately 75, 000 of them rise over a kilometer above the ocean floor. The number of active volcanoes is however not determined but it is projected to be in thousands. Deep sea volcanic eruptions are quite prevalent than is otherwise known. In fact, about 4 cubic kilometers of volcanic lava is erupted annually according to estimations developed from the movement of the earth’s tectonic plates (Fisher, 1998, p. 82). Most of these eruptions are however not seen on the earth’s surface but they are often observed when ridges stretch into dry land. Oceanographers have in the past carried out research to better understand the ocean’s volcanic terrain.

However, their conclusions have not been comprehensive enough; especially with regard to the effects of deep sea volcanic eruptions on the environment. This study therefore explores the relation between deep sea volcanic activities and the environment, with specific reference to existing myths on global warming, an emphasis on marine life, general climatic conditions and topographical effects.

Background

Not all volcanoes are a menace to the environment because of their toxic gases and molten lava. The effects of volcanoes are varied and may even

result in the development of lahars. For instance, in September 1996, an undersea volcano with a magnitude of five on the Richter scale shook the Southeastern part of Iceland. A month later, a deep basin formed on the glacier. Subsequent glaciers were also observed on the same zone (Patricia, 1999, p. 201).

This indicated that melting was going on underneath the glacier and generally, the effects of deep sea volcanic activities go beyond toxic gases and molten lava. The impacts of deep sea volcanoes are therefore varied, and the predictability of a volcano erupting is as difficult as predicting an earthquake (Patricia, 1999, p. 201).

However, scientists at present use various parameters and devices to predict volcanic activity such as seismicity (which is also used to predict earthquakes and tremors) and other changes in gravity or electrical impulses. Also, key in the study of undersea volcanoes is the subsequent earthquakes and tremors that occur after eruptions. Due to the fact that volcanic activities occur close to dry land or deep into the sea; they are bound to affect aquatic life and human life respectively. Their gas emissions also affect the environment. These variables will be categorically analyzed further in the study.

Absorption of Carbon Dioxide

A group of Australian and French scientists have in the past undertaken several studies on the effects of deep sea volcanic eruptions on the environment and established that volcanic activities undersea produce large

volumes of iron which plant species known as phytoplankton use to soak up carbon dioxide when they bloom (Fogarty, 2010).

Carbon dioxide being the main greenhouse gas in the world; the studies never focused on the impact of volcanic activity on the environment and especially carbon storage in the Ocean. Deep sea volcanoes are present under deep sea ridges of the ocean floor and the above research has been based on the amount of carbon dioxide that is present in depths of four kilometers on the ocean floor. The studies are therefore shallow. Carbon is present in small volumes along the ocean floor and this prevents the growth of phytoplankton. However, science has often affirmed that large amounts of carbon often come from wind borne dust. This may be witnessed through sandstorms or iron rich sediments from the ocean which in turn triggers rampant phytoplankton growth (Fogarty, 2010). At present, research studies have pointed out that deep sea volcanoes constantly produce a significant amount of iron over constant timescales. This has also been identified as the main factor which accounts for about 5%-10% of the total carbon storage in the oceans.

Such studies have been observed in the Southern ocean but in other regions, the amount of carbon storage may go up to 30% (Fogarty, 2010). The implication here is that the iron produced in the ocean and in turn the carbon retention witnessed, can act as a buffer when factors such as sandstorm vary. However, climate change has affected the progression of iron onto the earth’s surface, after deep sea volcanic eruptions. Ocean stratification has also been observed to be another cause of low iron penetration onto the earth’s surface (Fogarty, 2010). Large amounts of Phytoplankton have been

observed at the Antarctica, meaning the region is rich in iron. However, some studies have shown that huge winds will eventually blow the iron onto the ocean surface. In turn, more phytoplankton will grow and capture more carbon dioxide from the air (Fogarty, 2010). A vast network of deep sea volcanoes therefore produce mineral rich water each year soaking up large amounts of carbon dioxide produced by man.

This has reduced the acceleration of global warming.

Landslides

Deep sea volcanoes are known to cause massive landslides because of their massive cones (International Consortium on Landslides. General Assembly, 2005, p. 257). The main cause of landslides for deep sea volcanoes is caused by the very forces that created the volcanoes in the first place. This is essentially the rise of lava. Every time lava is pushed aside, the surrounding rocks that create ground stability are shoved aside to make room for the molten rock. In turn, internal shear zones are created and this oversteps one or more sides of the cone (US Geological Surveys, 2009).

Normally, the magma that never comes out releases certain volcanic gases that are partially dissolved in the ocean, creating strong hydrothermal systems that further weaken the rock underneath the ocean floor and thereafter burning them to clay (US Geological Surveys, 2009). In addition, the thousands of layers of lava and rock debris often lead to fault lines that weaken the ocean surface. This is often accelerated by the downward pull of the cone by gravitational force. These factors are especially detrimental when the deep sea volcano is near dry land. This easily triggers a landslide

due to a weakened earth surface and also allows part of a volcanic cone to collapse under the pull of gravity into the volcano (US Geological Surveys, 2009). Certain factors have been observed to accelerate this process including; intrusion of magma into the volcanic surface, deadly earthquakes under the ocean floor, and a saturation of the volcano with large volumes of water; especially preceding an earthquake (US Geological Surveys, 2009). A Landslide caused by these volcanic activities often destroys everything that stands in its way and also initiates a flurry of activities like explosive eruptions, buried valleys, generation of lahars and a trigger of deadly waves that have even been witnessed in the recent past (like the tsunami) (US Geological Surveys, 2009).

In addition, such landslides may cause varying degrees of topographical effects; ranging from development of hills and closed depressions, created by accumulated debris. Sometimes, the deposits left by these volcanoes create tributaries and later cause flooding, either through the misdirection of tributaries or subsequent forming of lakes and other smaller water bodies (US Geological Surveys, 2009). After eruptions, a large part of the volcano’s cone is usually displaced and this triggers the landslides which decrease the pressure on the magmatic and hydrothermal systems and in turn cause varying degrees of explosions, ranging from small to large steam explosions (US Geological Surveys, 2009).

Rising Temperatures and Melting Ice Caps

Contrary to popular opinion that melting ice and rising temperatures are solely as a result of global warming, deep sea volcanic activities have been identified as another cause of this observation. In fact, scientists have

reported that recent volcanic activity under the Arctic Ocean floor have resulted in a large spew of fragmented lava into the sea. Such eruptions have been observed in Gukkel ridge which records one of the most massive eruptions that even buried Pompeii. This took place in 1999, from an underwater volcano located at the tip of green land near Siberia (Ajstrata, 2008). Scientists have pondered whether there is a relation between subsequent earthquakes and volcanic explosions (School Specialty Publishing, 2006).

Further explorations under the ocean rubbished reports that earthquakes were caused by slow spews of fragmented lava because they discovered that there were huge explosions taking place in the ocean (Ajstrata, 2008). In understanding the melting of ice at the arctic, it should be understood that the Arctic Ocean resembles a closed system which has very limited outlets (Ajstrata, 2008). The natural basin and its characteristics emphasize the belief that volcanic eruptions are the cause of the melting ice because there isn’t much room for the heat generated out of the deep sea volcanic activities to circulate out of the basin. Ice and glaciers have therefore melted over the centuries. These discoveries have led to many questions being asked about the real causes of ice melting. Interestingly, the arctic surface has recently had very thin surfaces of ice and either by sheer coincidence or not, the ocean floor underneath is home to some of the most active volcanoes on the ocean floor (Ajstrata, 2008).

Evidence at the arctic therefore attests that volcanic activity is one of the primary reasons why ice is quickly melting on the global surface. With regard to the thickness of ice underwater, it is often observed that bout 90% of

icebergs is underwater. Interestingly, areas that have thick ice resemble inverted mountains but areas of thin ice resemble valleys (Ajstrata, 2008). Evidently, if we were to analyze the effects of deep sea volcanoes, it makes perfect sense that the zone resembling a valley gets heated up fast because it takes less time for the heat to reach the ice and similarly, it would take a long time for the heat to reach the thick ice because of the stumbling inverted mountain-like barrier (Ajstrata, 2008).

Marine Life

There is enough evidence to prove that deep water volcanoes improve the aquatic life undersea. For instance, an active volcano at Guam has recently caught the attention of scientists because despite its regular spewing of lava, it remains home to numerous aquatic lives, including ocean critters, shrimps, limpets, crabs and barnacles (Rosaly, 2005, p. 20). The volcano is now high enough to resemble a 12 storey building and with recent observations, there has been a growing population of aquatic animals living at the volcano’s dome.

The development of a positive relationship between an increase in volcanic activity and the growing population of animals around the volcano is therefore inevitable. Some scientists even point out that some of these animals found at the volcanic tip are completely new species. Interestingly, these animals are well adapted to their environment which is essentially toxic, in relation to other marine environments. Normal marine life wouldn’t survive there either (Ajstrata, 2008). It is therefore inevitable to conclude that the surrounding marine life is nourished by the deep sea volcanic activity.

Scientifically, this phenomenon has been explained by the slow deposits of bacterial filaments over surrounding rocks that provide a good source of food for the surrounding marine life (Ajstrata, 2008). Some shrimps have even been observed to have adapted to the volcanic environment by developing pruning claws to extract food from the rocks. Another animal species known as the Lohili shrimps has perfectly adapted to its environment by grazing on the bacterial filaments through the developments of garden like shears. These species however graze as a primary source of obtaining food but as they develop into adult life, they develop their claws to become predators (Ajstrata, 2008). In this regard, the shrimps become predators and feed on dead animals like fish and squids which were jumped up by the volcano (Ajstrata, 2008). These underwater volcanoes have therefore provided better ground for understanding volcanic activities than volcanic mountains on land would.

Conclusion

Deep sea volcanoes have a huge impact on the environment. Virtually, marine life is largely dictated by volcanic activities that go on in deep waters.

This is in reference to an evident change of aquatic life conditions especially in light of toxic gases released in the deep waters. These volcanic activities also rival existing facts about global warming because their activities have been noted to increase world temperatures and result in ice and glaciers melting. In the same regard, landslides and earthquakes have been attributed to a destabilization of the earth’s surface by volcanic activities. However, we cannot pass a blanket judgment that deep sea volcanoes only have detrimental effects because this study identifies that it helps reduce

green gas emissions through carbon dioxide reduction. Conclusively this study identifies that the effects of deep sea volcanic activities have been largely underrated and more research needs to be done to quantify its effects.

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