

Научно-исследовательская работа

Иностранный язык

How do Earthquakes Appear?

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Introduction

Earthquakes are a very mysterious phenomena that have been investigated for many years. They cause a lot of damage to the nature and humankind, still scientists all over the world struggle to research them and learn to predict at least the deadliest earthquakes.

The aim of the research is to discuss if it is possible to predict earthquakes.

The tasks of the research are:

1. to study how earthquakes appear;
2. to learn more interesting facts about earthquakes;
3. to learn what aftershocks are.

Main Part

What is an earthquake?

An earthquake is the very literal name of the phenomena of the surface of earth shaking due to seismic activity happening beneath the crust! These seismic waves, created by the Earth's lithosphere (upper crust and mantle), cause the various tectonic plates that make up the upper-most part of the Earth to shudder which, in turn make the ground we stand on begin to shake violently. There are various different levels for earthquakes and various different circumstances they require to occur, but overall earthquakes are known for being massive destructive forces that have wreaked havoc upon countless countries, islands, cities, and even the moon!

Earthquakes are phenomena that are important to study in order to help prevent the disastrous fallout they can create. But how do earthquakes happen in detail? And what is more there to learn about them?

What causes earthquakes?

To answer that, we need to look at what's going on beneath the Earth's surface! The Earth is made up of four main layers: crust, mantle, outer core, and inner core. Together, the crust and mantle form the Earth's lithosphere, act as a solid outer shell. This shell isn't one continuous smooth surface, though, like an eggshell; it's more akin to an enormous rocky jigsaw puzzle in which some pieces span entire countries and continents. Below the lithosphere is the outer core, a hot metallic liquid made up of mostly nickel and iron. And at the center

of the Earth, nearly 2000 miles below the surface, lies the inner core, a dense, molten ball of compacted iron, the temperature of which is believed to be around 9,000 ° Fahrenheit.

So, how do earthquakes occur? It's all about how those different parts of the lithosphere interact with one another. Known as tectonic plates, these huge pieces of rock are constantly changing positions due to movement in the mantle below and the planet's steady rotation. The constant motion of tectonic plates can cause cracks, known as faults, in the Earth's crust. Earthquakes occur when the crust moves suddenly on or near one of these fault lines.

Earthquakes step by step:

Elastic Strain: The first stage of an earthquake is the gradual build-up of elastic strain along a fault-line between two tectonic plates, which occurs over thousands of years. When both sides of the fault move, the elastic strain builds up in the rocks slowly, compressing the rock particles together.

Dilatancy: Stage two occurs when the rocks in the Earth are packed together as closely as possible. The rocks must then expand by way of cracking to increase the amount of space they occupy. This process is called dilatancy. As small cracks form, the water inside the pores of the rocks is forced out and air is let in. As a result, the rocks become stronger. The process allows the rocks to hold even more elastic strain, which makes the eventual quake much more forceful.

Influx of Water: Stage three occurs when the water that has seeped out of the rocks is forced back in because of surrounding pressure, similar to the way water fills a hole in sand. As the water is forced back in, the rock loses its strength. The rocks are significantly strained by this. The influx of water keeps more cracks from forming, which causes the rocks to stop expanding. The water later eventually serves as a lubricant when the elastic strain that has been building up over time is released.

Earthquake: Stage four is the actual earthquake. Because the rocks can no longer resist the elastic strain, a sudden fault rupture occurs. The stored energy in the rocks is now forced out and released in the form of heat and seismic waves. Seismic waves are large waves of energy that flow outward through the Earth's crust, like ripples in a pond. The waves cause a sudden, often violent shaking of the ground.

Aftershocks: Stage five is the final stage during which a sudden drop in stress causes small aftershocks, which are smaller earthquakes or ruptures. The

aftershocks release the remaining elastic strain and are in reality the earth's mantle trying to realign itself after the small fault or crack that caused the initial quake. Aftershocks are often unpredictable and can occur years after the initial earthquake. Depending on the size of the main earthquake, the size and frequency of aftershocks can be significant. Eventually, the strain decreases and allows normal conditions under the surface to return. These aftershocks will never be as extreme as the earthquake which caused them, but can still be quite devastating if left unexpected.

How long do earthquakes last?

Most earthquakes typically last for a few seconds, usually 10-30 seconds. It is assumed that a larger earthquake than we have ever experienced may last minutes at a time, but for the most part earthquakes typically last about half a minute or less! This may feel like a lifetime if you find yourself caught in the center of one, but know that it will soon end faster than you expect! After the earthquake, the ground may still tremor slightly with aftershocks for a few more hours, days, or years even.

Conclusion

Working on the research we learnt that earthquakes are very mysterious phenomena. Now scientists try to predict earthquakes but it is very difficult. So earthquakes bring us a lot of victims and destruction.

Sources of Information

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