

What on earth is happening in the earth?

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Hi, I am you from the future. Right now, I'm a graduate student at the University of Tokyo and engaging in science. That means I don't just study but also conduct research to pursue new discoveries about the world. Today, I want to explain what I do in detail and why it's so fascinating.

These days, I am researching what is happening inside the earth. Especially, I focus on plate boundaries. You might already know about plate tectonics, the idea that the earth is covered with big puzzle-like pieces called "plates" that slowly move around. Because there are several plates, there are also boundaries between them. These areas are very important because that is the source of big events like volcanoes, earthquakes and so on. But here is something that makes this research even more exciting: Why does plate tectonics only happen on the earth? We know a lot about the planets in our solar system, but plate tectonics has not been confirmed outside of the earth. If this can be clarified, we can examine the possibility of plate tectonics occurring on exoplanets.

Since we cannot look inside the earth interior directly, I run experiments in the lab that recreate similar conditions. First, I prepare a rock sample. Then I heat and press it using machines to mimic the high temperatures and high pressures found deep underground. After that, I observe the sample under a microscope to see how it changes.

You have probably heard that Hawaii island is slowly moving closer to Japan. That's due to plate motion, but it's very slow, just a few centimeters per year! If I waited for real movement to happen, I would be an old man before I got any results. So instead, I use the sample made of very small particles. Smaller grains deform faster, letting me simulate plate boundary conditions as if I were pressing the fast-forwarding button. This helps me understand what is happening to the earth right now.

I know you are probably enjoying math and physics these days. But I work in a slightly different field, "earth science". I still use physics and math in my work, but I would like to tell you why I first became interested in the earth.

You know, I was once fascinated by space. It seemed so mysterious, so limitless. I used to dream about aliens and distant galaxies. But how about the earth? Compared to your house or your school, the earth seems incredibly large, but when you think of it in the context of the universe, it might not feel so special. However, consider this: the earth's radius is about 6,400 km, yet the deepest humans have ever drilled is only around 12 km. That means we know almost nothing about the planet we live on every day.

Even though we cannot see it directly, we have learned so much about the earth's interior using things like electricity, magnetism, and even seismic waves. It's like putting together a giant invisible puzzle. That process of discovery, turning clues into knowledge, is what pulled me into research.

Also, being Japan, a country where earthquakes are common, I feel even more motivated. Understanding plate tectonics isn't just about curiosity, it can help us predict natural disasters and protect people's lives. That's another reason why I chose this path.

Finally, let me give you three pieces of advice I have learned on this journey. In the beginning, "Go explore and ask questions". Of course, studying for school is very important. But science starts with curiosity. Look at the sky. Watch how plants and climate change in different places. Travel when you can. Let your mind wander and wonder. Every "Why?" could lead you somewhere amazing.

Second, "Find something you can truly be absorbed in". To be a scientist, you need both patience and focus. If you choose a research topic that truly interests you, you will naturally find yourself thinking about it all the time. But concentration is a different thing. Ideas might pop up at random times, and you'll need to catch them. Whether it is science, a club, a hobby, or anything else, I hope you will make it a habit to find something you can throw yourself into.

Last, "Let's value the connection with others". You might be able to study school subjects on your own, but research is different. Through discussions with various people, your understanding can deepen, and you can gain new perspectives. Sometimes, knowledge from completely different fields can unexpectedly connect with my own ideas. That is why it is important not only to interact with people who share your interests, but also to connect with as many different people as possible.

One day, you will become an adventurer working to solve the mysteries that remain within the earth, as a scientist. But in a way, researchers are just like kids, because they live by

following their curiosity. I hope you will always cherish your sense of “Why?” as you go through life.

The image was created by ChatGPT-4o. This essay was revised using it and reviewed for grammar and clarity.