4.2

OUR SHIFTING GLOBE

0:11–1:00

EARTH IN MOTION

Whenever we turn on the news and see an earthquake or a volcanic eruption, it's a constant reminder that the Earth is alive, that the Earth is in motion.

Hi, I'm David Shimabukuro, I'm a geologist, and I'm talking to you from the campus of UC Berkeley. I'm going to tell you a little bit about plate tectonics.

1:00–2:00

PLATE TECTONICS

The surface of Earth may look to be a continuous body, but it's not. It's actually broken up into dozens of rigid plates, which can move independently of each other. Some parts of these plates are continents, some parts of it are oceans. Some of these plates are really large. The Pacific plate, for example, takes up a fifth of the Earth's surface. Other plates are smaller. The Juan De Fuca plate off the northwest coast of America is about the size of Oregon and Washington combined.

Oceanic plates plays a special role in plate tectonics. They're born at an undersea volcano, a 40,000-mile-long ridge that rings the Earth. Here, the mantle rises, melts and forms oceanic crust. From here, the oceanic crust moves outward, eventually diving back down into the mantle at subduction zones.

The mid-ocean ridges and where the crust is born and the subduction zones where crust dives are the visible part of a larger circulation system, which includes the mantle. This circulation system is what drives and moves continents.

So, how fast do tectonic plates move? Well, take a look at your fingernails. Plates move at about the speed your fingernails grow. This seems almost imperceptibly slow, but given the vastness of geologic time, huge distances can be covered.

2:00–2:51

EARTHQUAKES

For example, the Atlantic Ocean. Today, you can cross it in an airline in about six or seven hours. Nature, using plate tectonics, built it in 180 million years, all at the speed that your fingernails grow.

How does plate tectonics affect us today? Well, at the boundary between some plates, they stick. Places like the San Andreas Fault in California or offshore of Japan, the plates slide past each other but get caught. Year after year, the strain builds up and builds up, until BAM!, one day the plates slide and the earthquake happens.

It's hundreds or thousands of these combined events that move continents from place to place and create the pattern we see on the globe.

2:51–3:29

PANGAEA

Let's rewind the clock. 250 million years ago, the Earth was a vastly different place. All seven continents were combined together in a supercontinent known as Pangaea. At this time, the Atlantic didn't exist.

If you were alive at that time, you could've walked from New York to North Africa or from Brazil to West Africa. An ancient ocean known as the Tethys separated different parts of this supercontinent, the northern part from the southern part. In the southern region, an area known as Gondwana, Africa, South America, Australia, and Antarctica were combined together.

3:29–4:16

GEOLOGIC TIMESCALE

Things began changing about a 180 million years ago when the North Atlantic started opening up. At this time, Gondwana started to spilt up. Australia and Antarctica went their ways. India split off. It was pulled northward by a piece of ocean crust which was subducting underneath Asia. This piece of the ocean crust pulled it northward until India collided with Asia, driving up the mighty Himalaya Mountains. At that time, the Tethys Ocean also disappeared. We know this because there's fragments of this ancient ocean caught up in the Alps and the Himalayas.

This is the making of the modern world. It took nature 250 million years all at the speed that your fingernails grow.