What Was the Early Earth Like?

The early Earth was a very hot and violent place, with lots of volcanoes, lava, and no oxygen to breathe. The surface was constantly changing, and there were no plants, animals, or oceans at first. Over time, the planet cooled down, water appeared, and the first simple life forms began to develop.

0:08 *Simple black and white, two-dimensional drawing of a man entering a time machine. The number 4 and a half billion appears onscreen. The man exits the time machine and begins walking.*	Imagine you're in a time machine and you've traveled back 4 and a half billion years and what you're doing is you're taking a stroll on the early Earth. Now what would it be like and would you be having fun? Well, the answer is I don't think you'd be having much fun.
0:28 *The figure begins to enter a series of inhospitable environments and suffers the consequences: 1) burning feet on molten lava 2) coughing in a low-oxygen atmosphere 3) ducking meteors and asteroids falling to Earth 4) throwing up and losing hair due to high levels of radiation.*	First you'd be walking on molten lava, not nice, secondly, you couldn't breathe because there's no oxygen you'd be asphyxiating, and thirdly you'd be ducking asteroids and meteorites that are crashing into the early Earth lots and lots of them, and fourth you'd probably be throwing up because of very high levels of radiation and if you stay there too long your hair would start falling out too.
1:00 *View from space of early Earth with bands of molten lava followed by a clip of volcanos erupting with a dark ashy sky.*	In fact, the early Earth got so hot it melted and that is really important because if it hadn't melted, today's Earth would be very different from the way it was. And because it melted it formed a series of layers, and they give it its structure today.
1:22 *View of earth from space which is split showing the various layers of the earth. The image of the half of the earth is replaced by circular view of the various layers of the earth..*	In fact, the early Earth got so hot it melted and that is really important because if it hadn't melted, today's Earth would be very different from the way it was. And because it melted it formed a series of layers, and they give it its structure today. Let's look at the four main layers and the first is at the center. It's the core, it's metallic nickel and iron, above all iron, sank to the center of the earth. Lighter stuff, lighter rocks float above the core and form a layer that's called the mantle. Now the mantle you can think of as a sort of hot sludge of rocks. These rocks are so hot, they're sort of semi molten, they're actually moving around in convection currents inside the mantle. And then at the very top you have a layer called the crust. Very light rocks such as basils and granites reach the top, they cool, they form this thin layer of the crust that's where we live. But the crust is pushed around by those convection currents from underneath.

2:10 *Aerial view of the ground on earth.*	This looks weird to us simply because we don't live long enough to see that the Earth is in fact changing all the time
2:17 *Various images of maps. The last map shows how the east side of South America fits into the west side of Africa.*	Some scholars began to notice this as early as the 16th century when they studied the first world maps that were ever produced. Some of them noticed odd things like the fact that West Africa seems to fit well into Brazil. I mean look at a modern map and you'll see the same thing.
2:42 *Painting of old Germany followed by an image of Alfred Wegener sitting at a desk.*	In the early 20th century, a German meteorologist called Alfred Wegener found lots of evidence to suggest that the continents had in fact once been connected.
2:53 *Areial views of landscapes in West Africa and Brazil. Followed by a black and white globe showing the continents moving and forming Pangaea with the number of years ago at the bottom.*	For example, he found very similar geological strata in West Africa and in Brazil and during World War I he wrote a book arguing that once all the continents on Earth had been united in a single super continent that he called Pangaea, after the Greek goddess Gia for the earth.
3:12 *Various black and white images of Wegener in snowy sceneries.*	Wegener came up with heaps of evidence to show that the continents seemed once to have been linked. What he couldn't do was explain how the continents moved around the earth.
3:25 *Photograph of a WWII submarine followed by images of ships using sonar to map the ocean floor.*	During World War II, sonar technologies were developed to track submarines and after World War II some geologists used that technology to try to map the ocean floor, and when they started doing this, they found something that really surprised them. Through many of the Earth's oceans they found huge chains of volcanoes.
3:53 *Textbook image of how oceanic volcanos form with tectonic plate movement followed by a black and white globe rotating then zooming into the Atlantic Ocean where two plates are shifting apart. The textbook image of how oceanic volcanoes are made shows a*	And what's happening is that lava is coming up from the mantle, it's rising up, its forming mountains, and it's pushing apart the old oceanic crust. In the center of the Atlantic Ocean for example, there's a huge chain of these mountains and what they're doing is they're pushing the Atlantic apart. They soon realized that elsewhere in the Earth crust was going back into the mantle which balanced what was happening in the Atlantic.

tectonic plate being pushed under and adjacent plate.	
4:17 *Additional textbook image of tectonic plate movement with labels of mounts in Oregon followed by an animated video of a tectonic plate diving under an adjacent plate.*	Now to understand this, you need to think of two basic types of crust. There's continental crust, which is the land that we walk on, and then there's oceanic crust, the land beneath the oceans. Now once you've got that, think of two bits of crust colliding, continental and oceanic, what's going to happen is that the heavier oceanic crust is going to dive beneath the continental crust. Now think of this, it's grinding against the continental crust, it's creating huge friction, and lots of heat, and it melts part of the continental crust and punches up whole mountain chains. These are the basic ideas of the modern theory of plate tectonics.
5:10 *Two videos of mountains.*	And the theory of plate tectonics is the fundamental idea of modern geology and earth sciences. It explains all the fundamental features of our earth and also how the continents move. It explains what Wegener couldn't explain.