AWESOME stories

TECTONIC PLATES and NATURAL DISASTERS

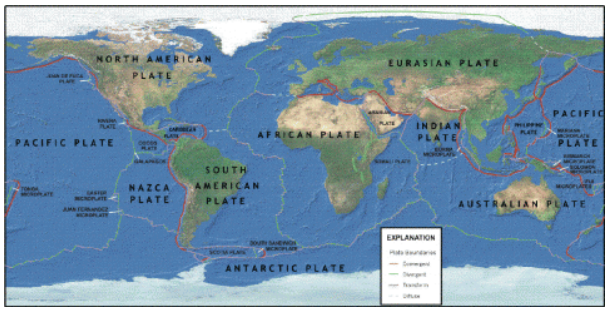

Plate tectonics is a theory which scientists use to explain the occurrence of natural disasters (such as earthquakes and volcanic eruptions). This USGS plate-tectonics map includes this description: “Division of the Earth's surface into a mosaic of moving plates, according to plate tectonic theory. Boundaries between the plates are actively spreading submarine ridges in the middle of the oceans, subduction zones in ocean trenches or mountain ranges on the continents, or margins where the plates slide past one another. Most of the world's earthquakes occur at plate boundaries.” Click on the image for a much-better view.

Before we can understand the horrific natural disaster that befell the citizens of Port Royal, in 1692, we need to know something about the composition of the Earth. How is it constructed? Are earthquakes, like the one which decimated Port Royal, predictable? The answers, and the information currently known about earthquakes, may surprise you.

What would we see if we could look inside the earth? Although no one has ever descended lower than the earth’s crust, scientists have a good idea how the planet’s interior is configured.

The crust averages 5-40 kilometers in depth. In addition to elements necessary to sustain life, it is mostly composed of alumino-silicates with feldspar and quartz the two most common minerals. On the crust’s surface, sedimentary rocks form a kind of thin veneer, but igneous rocks constitute the bulk (about 95%) of the total crust.

Earth’s largest layer - the mantle - is composed of hot, dense rock. Temperatures in this 1800-mile layer get progressively hotter (from about 1600 degrees Fahrenheit at the top to around 4000 degrees Fahrenheit at the bottom) while pressures increase commensurately (since earth’s temperatures and pressures increase with depth).

Because of the mantle’s temperature differences, its molten rock flows (just like thick soup which boils in a saucepan) with the consistency of asphalt.

Because Earth’s tectonic plates (a theory developed because of continental drift) rest on the mantle’s molten layer, those plates also move, although scientists do not exactly understand that process. Sometimes, when tectonic plates move, earthquakes occur or volcanoes erupt.

On rare occasions, a volcano erupts so violently that it literally "blows its top," resulting in a collapse. A famous example is the August 27, 1883 eruption of Krakatoa (Krakatau), in Indonesia, when a deadly tsunami ensued, a lighthouse was swept away, thousands of people died and two-thirds of the volcanic island itself disappeared into the sea.

Scientists have experimented with compressed air to recreate what might have caused the explosive activity that August day. The experiment's results are surprisingly similar to Krakatoa's after-eruption appearance.

Scientists describe the deepest part of Earth - its core - as two separate sections. The outer core is a swirling liquid composed mostly of a nickel-iron alloy. Experts think the Earth’s magnetic field is controlled by this part of the core.

Earth’s solid inner core, made mostly of iron, spins independently from the rest of the planet and is about 4,000 miles below its crust. Scientists believe pressures at that level are about 45 million pounds per square inch. That is equivalent to 3 million times the air pressure at sea level.

How the earth’s core impacts the tectonic plates (which “float” on top of it) has a lot to do with natural occurrences like earthquakes. During the heyday of Caribbean pirates, however, few people really understood how, and why, earthquakes happened. They just understood the tremendous damage that could result from such a catastrophic event.

See Alignments to State and Common Core standards for this story online at:

http://www.awesomestories.com/asset/AcademicAlignment/TECTONIC-PLATES-and-NATURAL-DISASTERS-Pirates-of-the-Caribbean

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http://www.awesomestories.com/asset/AcademicActivities/TECTONIC-PLATES-and-NATURAL-DISASTERS-Pirates-of-the-Caribbean

Media Stream

Feldspar - Part of the Earth's Crust

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Quartz - Part of the Earth's Crust

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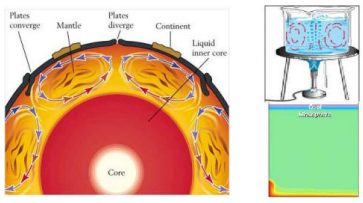

Earth's Mantle - Molten Rock Flow Pattern

Image online, courtesy Kent State University.
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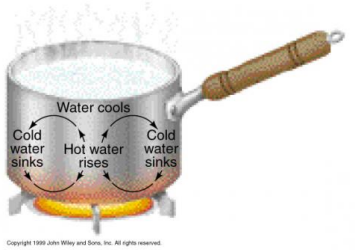

Convection Currents and the Earth's Mantle

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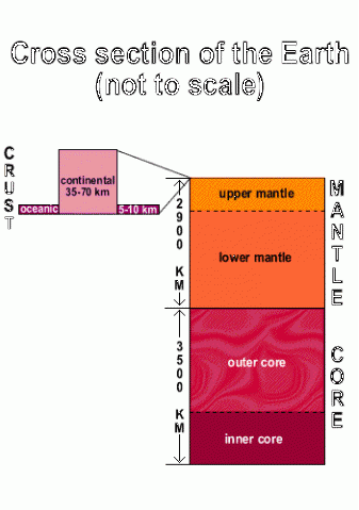

Cross Section of Planet Earth

Image online, courtesy Southern California Earthquake Center.

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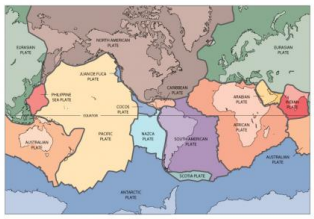

Earth's Tectonic Plates

Image online, courtesy USGS.

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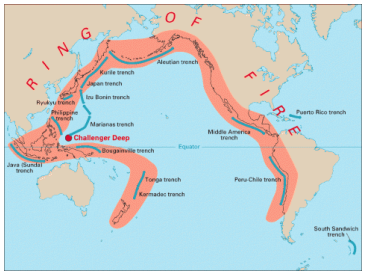

Earth's Plates - Movement

Image online, coutesy USGS.

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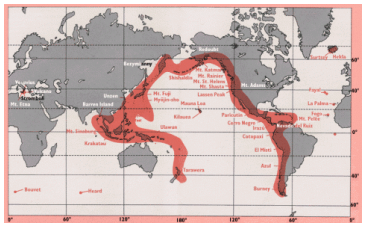

Ring of Fire - Distribution of Volcanoes

Image online, courtesy USGS (U.S. Geological Survey).

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Krakatau, Indonesia - Before August 26, 1883

Image online, courtesy USGS (U.S. Geological Survey).

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Krakatoa, Indonesia - Seen from Space

Image online, courtesy NASA.

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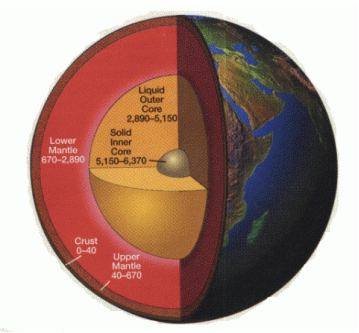

Cross Section of Planet Earth

Image online, courtesy USGS.

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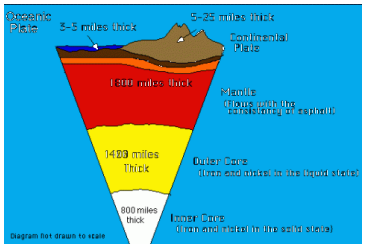

Earth's Mantle - Chart of Layers

Image online, courtesy USGS.

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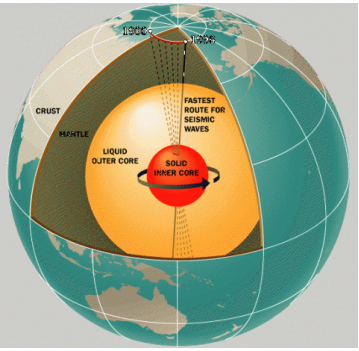

Earth's Sold Inner Core - Spins

Image online, courtesy USGS.

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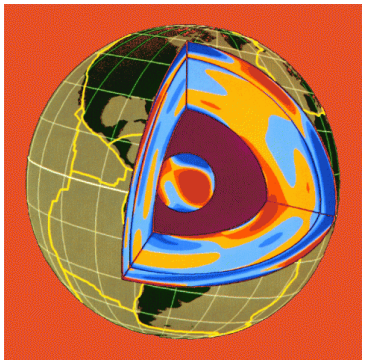

Planet Earth - Inner Core

Image online, courtesy Harvard University.

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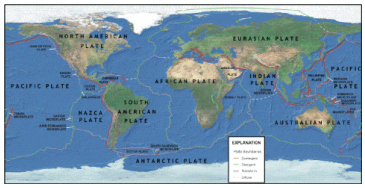

TECTONIC PLATES and NATURAL DISASTERS

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Krakatoa - Deadly Tsunami

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Written by:
Colin Heber-Percy
Michael Olmert
Lyall B. Watson

Director:
Sam Miller

Producers:
Alan Eyres
Greg Smith

Starring:
Rupert Penry-Jones
Olivia Williams
Kevin McMonagle

Originally aired on BBC One - May 7, 2006
Passages from Captain Lindeman's ship's log, online courtesy The Discovery Channel.
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Planet Earth - Caves and Crystals

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Plate Tectonics - Mountain Formation

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Continental Drift and Plate Tectonics - Background

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Earth's Interior - A Theory

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Continental Drift - What is It?

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Last Days of Krakatoa

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Written by:
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Director:
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Producers:
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Greg Smith

Starring:
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Olivia Williams
Kevin McMonagle

Originally aired on BBC One - May 7, 2006
Excerpts from Johanna Beyerinck's 19th-century account, quoted by Rupert Furneaux in *Krakatoa*, published in 1964, at page 63. Online, courtesy Google Books.
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Krakatoa - Ash Fall

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Krakatoa - Loudest Sound in Recorded History

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Written by:
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Excerpts from Johanna Beyerinck's 19th-century account, quoted by Rupert Furneaux in *Krakatoa*, published in 1964, at page 107. Online, courtesy Google Books.

Quoted passages from Simon Winchester's book, *Krakatoa: The Day the World Exploded*, page 234. Online, courtesy Amazon.com
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Krakatoa - Loss of the Fourth Point Lighthouse

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Kevin McMonagle

Originally aired on BBC One - May 7, 2006
Quoted passages from Simon Winchester, *Krakatoa: The Day the World Exploded.*
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Krakatoa - Fatal Pyroclastic Surge

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Lyall B. Watson

Director:
Sam Miller

Producers:
Alan Eyres
Greg Smith

Starring:
Rupert Penry-Jones
Olivia Williams
Kevin McMonagle

Originally aired on BBC One - May 7, 2006
Excerpts from Johanna Beyerinck's 19th-century account, quoted by Rupert Furneaux in *Krakatoa*, published in 1964, online, courtesy Google Books. In order, above, the three different pages begin at the following pages:
1st passage, pages 106-107
2nd passage, page 129
3rd passage, page 130
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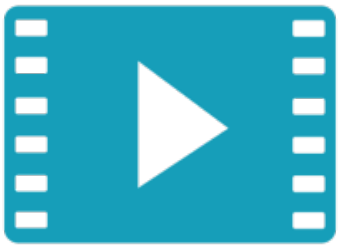

Krakatoa - After the Disaster

Written by:
Colin Heber-Percy
Michael Olmert
Lyall B. Watson

Director:
Sam Miller

Producers:
Alan Eyres
Greg Smith

Starring:
Rupert Penry-Jones
Olivia Williams
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