Earth Changes

The earth's surface is changing all of the time. Some changes happen rapidly, while others take place over many years. The Earth is made up of rock and is always changing. Here's a quick review of rocks and how they are formed.

What is a Rock?

A rock is a solid made up of a bunch of different minerals. Scientists generally classify rocks by how they were made or formed. There are three major types of rocks; metamorphic, igneous, and sedimentary.

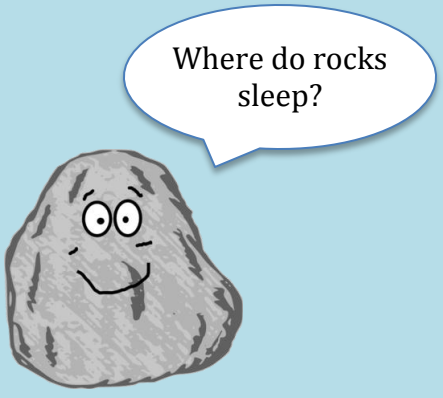
Igneous Rocks

Igneous means made from fire or heat. Igneous rocks are formed by volcanos. When a volcano erupts, it spews out hot molten rock called magma or lava. Eventually the magma will cool down and harden. When the magma gets hard inside the crust, it turns to granite. Most mountains are made of granite. It cools very slowly and is very hard.

When the magma flows down the sides of a volcano, it is called lava. When it cools and turns hard it is called obsidian, lava rock, or pumice. Harden magma or lava rock is igneous rock.

Sedimentary Rocks

When mountains are first formed, they are tall and jagged like the Rocky Mountains in the western United States. When mountains are old, they are rounded and much lower like the Appalachian Mountains in the eastern part of the U. S. These mountains get worn away and rounded by weathering and erosion as they age. Weathering is the breaking apart of something, while erosion is the wearing away of something. Rain, wind, running water, and the freeze/thaw cycle cause the mountains to crumble a little bit at a time, or wear away. Eventually the little bits of rock end up in streams and rivers that flow down from the mountains. These bits of rock are called sediment.



A: On a bedrock!

Rocks

The stream or river will carry the sediment to a larger body of water. As the water slows down, the sediment settles to the bottom of a lake or ocean. Over a really long period of time, perhaps millions of years, the sediment is compacted together and becomes hard. As the sediments are compacted and hardened, they turn into rock. Some examples of sedimentary rocks are shale and sandstone.

Sedimentary rocks often have fossils in them. Plants and animals that have died get covered up by new layers of sediment and are turned into stone.

Metamorphic Rocks

Metamorphic rocks are the most uncommon of the three kinds of rocks.

Rock Trivia

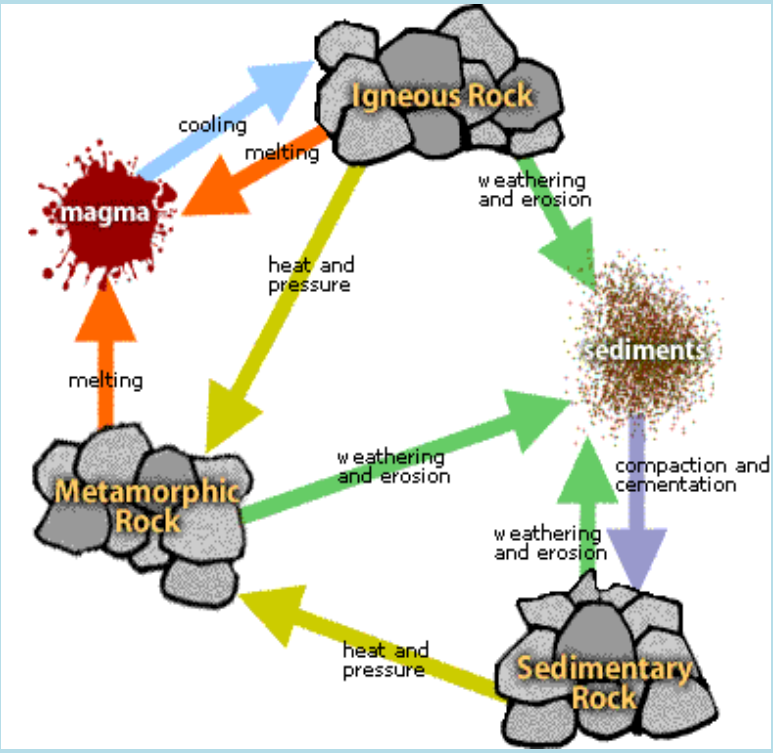
All rocks are made up of 2 or more minerals, but minerals are not made up of rocks.

Metamorphic means to change form. Metamorphic rocks were originally igneous or sedimentary rocks, but due to movement in the Earth's crust, were changed. They are usually found inside the Earth's crust where there is, or was, heat and pressure to form them. For example, shale, a sedimentary rock, can be changed into a metamorphic rock, such as slate.

If you squeeze your hands together very hard, you will feel heat and pressure. When the Earth's crust moves, it causes rocks to get squeezed so hard that they change.

Rocks

The diagram below shows the rock cycle.



To find out more about rocks and the rock cycle, click on the following link: Rocks and the Rock Cycle and The Rock Cycle

What do you notice about the rock cycle? According to the diagram, what rock groups can form from metamorphic rock? In your Science Journals, explain the rock cycle and what happens throughout.

A: A rock star!

Slow Land Changes

Natural processes cause changes in the Earth's surface. Some natural processes happen over a long period of time, hundreds of thousands of years. Slow, natural processes are erosion, weathering, and deposition.

What is the difference between weathering and erosion?

Weathering breaks rocks into smaller and smaller pieces and erosion carries the pieces away.

Weathering = breaks down the rocks

Erosion = collects and moves the rocks

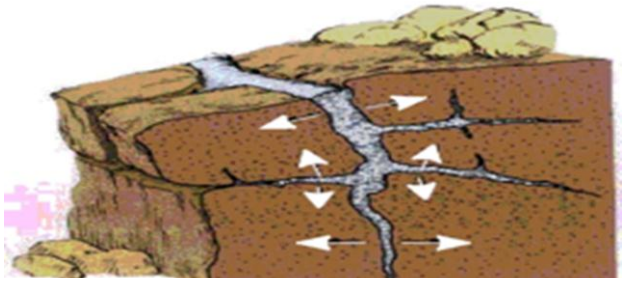
Weathering

Weathering can be caused by many different things. Some things that cause weathering are water, plants, and abrasion.

Weathering occurs when there is a large chunk of bedrock that is many hundreds of feet long. Over time it is broken down into smaller and smaller pieces. These pieces do not move to a new location, but they stay next to one another.

Weathering is most commonly caused by water, as it freezes and thaws. It usually occurs at the surface of the Earth where the bedrock is exposed to air. Weathering can extend many thousands of feet below the Earth. This happens when water follows cracks in the bedrock.

As the water travels through these cracks and spaces, it carries chemicals with it that loosen the grains off the rock, breaking the rock into smaller pieces



When the temperature drops below 32 F., the water freezes. As the water freezes, it expands to about 10% larger than it was when it was a liquid. This pushes the holes and cracks out, making them bigger.

As the water thaws, it is able to go further into the rock down this widened space. Water freezes and thaws over and over again, making the cracks and holes bigger and wider each time.

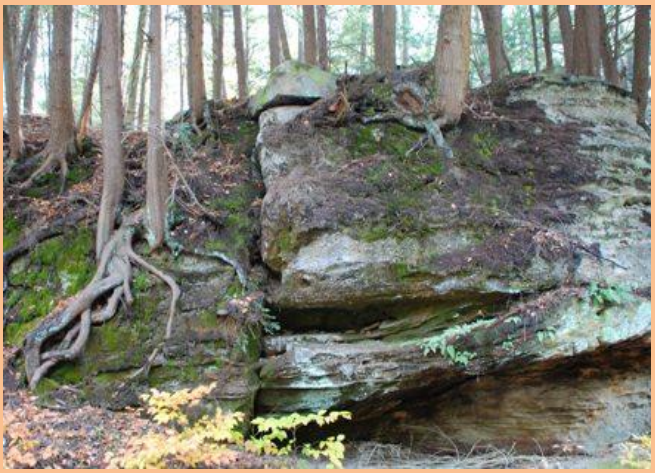
Over time, pieces of the rock split off of the bedrock. These big boulders get broken into smaller rocks and gravel.

Weathering and Erosion

One of the most famous places in the United States that is an example of water erosion is the Grand Canyon in Arizona. The deep gouge has been worn away by water and the Colorado River.

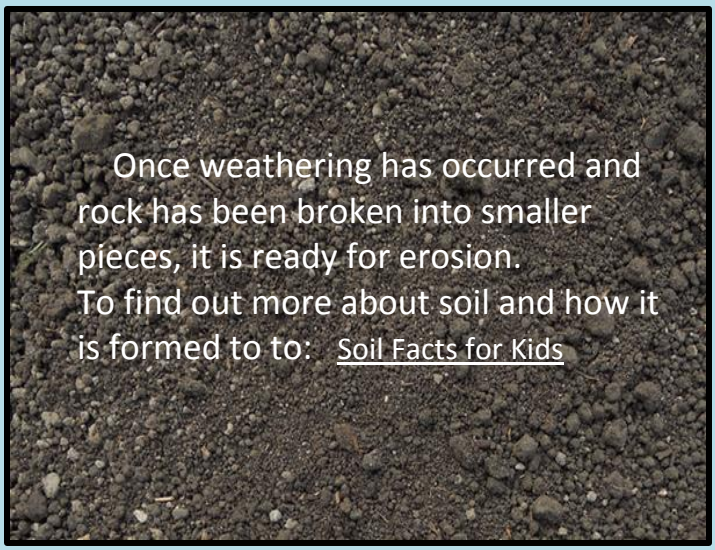
Abrasion happens when small pieces of rock or sand are carried across its surface by a glacier, stream, or the wind. As these particles scrape and rub across the rock, small pieces or chips break off of the larger rocks. Lots of abrasion occurs during landslides.

Plants can also cause weathering. The roots grow down into the cracks of the rock searching for water. As they move through these holes they act as a wedge to widen the cracks and holes.



As weathering occurs and the rocks break down into smaller and smaller pieces, they become dirt. This dirt mixes with decayed plants and animals and becomes the first layer of the Earth- soil. Soil is the thin layer of material on the Earth's surface where you would find the roots of plants. It only extends down a few feet or as far down as plant roots would extend. Soil is formed over a long period of time.

Weathering and



Once weathering has occurred and rock has been broken into smaller pieces, it is ready for erosion.
To find out more about soil and how it is formed to to: Soil Facts for Kids

As glaciers slide along the ground, they erode bedrock below them and carry the material with them. The rocks found in glaciers vary from fine particles to large boulders. As they move along they change the landscape in different ways. They can polish or make small scratches in the bedrock. Gravity is active as rocks fall downhill or are deposited along the way.

Erosion

Erosion happens when rocks and sediments are picked up and moved to another place by ice, water, or gravity. As the load of rocks and sediment can no longer be carried by the water, wind, or gravity, it is deposited and left in another place. This is called deposition.

An example of wind erosion.

To see how a glacier causes erosion and deposition click on the following link: glacial erosion

For a fun way to find out about weathering and erosion and the long term effects go to: Weathering and erosion and Shape It Up - An Earth Changing Activity and Weathering and Erosion Video

Fast Land

Erosion and weathering are slow processes that change the surface of the earth. There are also processes that change the surface of the Earth that happen quickly. Landslides, volcanoes, and earthquakes are some of these processes

Landslides

A landslide happens when rocks and sediment loosen and roll down a slope, or a slanted surface, together. Sometimes landslides are small and hardly noticeable. But other times, they can be very large and include the whole side of a mountain.

Many different things can cause a landslide to happen.

A landslide can happen when the base of a slope is worn away and the sides of the mountain weaken from erosion.

Rain can also cause a landslide. The water adds weight to the slop and causes a slide.

Volcanoes can also start a landslide. Landslides after volcanic eruptions are extremely hot, fast, and dangerous.

Wildfires burn roots of pants and trees that hold the soil together. Then, gravity moves the soil and starts a landslide. Gravity does not start a landslide but it moves the rocks and soil down the slope.
As a slide moves down the slope, it can pick up speed and energy. Some slides travel so fast that they produce powerful winds that can strip the leaves off trees. When a slide is coming down a mountain, the momentum can cause much of the material to roll several feet back up the other side of the valley.

Fast Land

Gravity has a major role in landslides. Even though it is not the reason that a landslide starts, without gravity the rocks and soil wouldn't move down the slope.

To watch a landslide as it happens, click on the link: landslide

To read about a landslide in Minnesota click go to the following link: landslide in MN

Volcanoes

Volcanic activity is another of the ways that the Earth's surface changes over time.

A volcano is formed when hot molten rock, ash, and gases escape from an opening in the Earth's surface. As the molten rock and ash cool and harden, they form the volcano shape. When pressure builds up, eruptions occur. Gasses and rock shoot up through the opening and spill over and fill the air with lava fragments.

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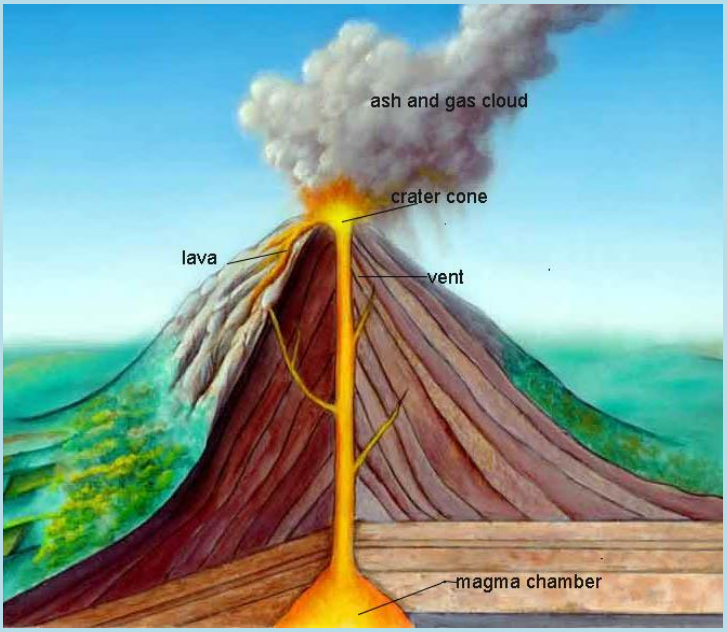
Not all volcanic activity takes place inside a volcano. More lave reaches the earth's surface through cracks in the Earth's crust. As the lava seeps through these cracks or vents, huge landforms can be formed without a volcano actually



Volcanoes can be active, extinct, and dormant. Active volcanoes can erupt at any time. Dormant volcanoes have not erupted in a really long time and it is unlikely that extinct volcanoes will erupt.

Fast Earth

When volcanoes erupt, the effect on plant life is deadly. The lava, heat, and ash cover the landscape and trees and other plant life are destroyed. While the immediate effect on plant life is deadly, the long-term effect is positive.

Magma contains rich nutrients that plans need to survive. So each time a volcano erupts, it brings these nutrients with it. When a volcano explodes and sends ash into a large area, it acts as a fertilizer that enriches the soil. Because of this, the soil near a volcano is some of the richest soil on the Earth.

What causes an earthquake?

The Earth is made up of huge pieces of flat rock called tectonic plates. There are plates along the surface of the earth that slowly move continuously past each other. Where these plates meet is called a fault. When the plates rub together an earthquake happens. Most of the time the shaking only lasts for a few minutes and does not cause any serious damage. But at other times they are strong enough to knock down buildings.

What did the mother volcano say to the baby volcano?

A: Do you lava me as much as I lava you?

The intensity of earthquakes are measured with the Richter Scale.

Earthquakes

Earthquakes are the shaking and rolling of the earth's surface. They are the way the Earth releases stress. More than a million earthquakes shake up the world each year. The West coast is most at risk of having an earthquake, but earthquakes can happen in the Midwest and along the East Coast.