

# The Rock Cycle

## Process and Cause

January 9th, 2010

### SUMMARY

Rocks are thought of as solid and unchanging. However, over thousands to millions of years rocks change from one type to another. There are several processes that make this occur.

#### **Rocks change as they move through the rock cycle**

- The rock cycle is a set of natural processes that form, change, break down, and re-form rocks.
- A cycle is made up of repeating events that happen one after another.
- Rocks do not follow one path in the cycle. There are many ways a rock can move through the cycle.
- James Hutton, the “Father of Geology,” is credited with discovering the rock cycle.
- He also came up with the idea of uniformitarianism: the processes that happened in the past also happen in the future. This idea is important because it helps us understand what processes form the earth.

#### **Each rock type is part of the rock cycle**

- Scientists believe earth formed about 4.6 Ga (billion years ago).
- When it first formed, it was most likely molten rock. This is the beginning of Earth’s rock cycle. Let’s see what can happen to a rock from here.
  - The molten rock cools and forms an igneous rock. The igneous rock can:
    - Melt to become molten rock
    - Weather to become a sedimentary rock
    - Metamorphose to become a metamorphic rock.
  - These three things can happen to any rock! (Yes: metamorphic rocks can metamorphose into other metamorphic rocks.)

#### **The rock cycle is driven by plate tectonics**

- The rock cycle happens because the plates that make Earth’s surface are constantly moving.
- This idea was first suggested by JT Wilson. He called this idea the Wilson cycle.
  - The Wilson cycle states that plate tectonics move large masses of rock in and out of Earth causing the cycle to occur.
  - In other words, land is being pushed into the magma, melting, solidifying, surfacing, etc.
- Let’s see why this happens:
  - New crust is being made where two plates spread apart. This is known as a divergent boundary. Divergent boundaries can be found in oceans.

- At the boundary, we can observe that the two plates move away from each other. (Ex: If we were to place a stick on each plate and measure the distance between them, we would see the distance increase over time.)
- The plates move away from each other because magma is forming new rock. As more rock forms, the plates spread farther apart. Here we find igneous rocks forming.
- These plates will continue to move until they encounter another plate.
- Two things can happen when plates meet each other:
  - First, one plate can sink under another. This is known as a subduction zone. We can generally expect to find metamorphic rock forming here. Eventually the rocks will melt.
  - Second, the plate can collide with another plate. We call these plates colliding continental plates. Here tremendous pressure distorts the rock. As a result, the plates lift creating mountains and metamorphic rock.
- If a mountain forms, it eventually will weather away and possibly be able to form sedimentary rocks.