

## *The Rock Cycle*

The continual set of processes affecting rocks is called the *rock cycle*. All existing rocks on Earth have been changed over time by various geologic processes. Earth was formed about 4.6 billion years ago, and the oldest known rock unit is found in Canada, dated at just over 4 billion years old. This rock material was altered by heat and pressure into the metamorphic rock gneiss.

Originally all of Earth's crustal rocks had an igneous origin. They start as semi-molten magma in the upper mantle and either rise to the surface as extrusive lava (like basalt) in volcanoes and oceanic rifts, or emplaced below the surface as intrusive rocks (like granite).

Through tectonic processes combined with erosion, igneous rocks become exposed on the surface and are eroded by water, freeze/thaw cycles, wind, and/or biologic processes (such as lichens). Weathered material is either dissolved or removed as solid particles. The solid particles resulting from erosion are transported to lower elevations by gravity and water, depositing as sediments. These sediments can be buried beneath the Earth's surface and

compressed and cemented to form sedimentary rock, such as sandstone. Soluble material can be precipitated from water to form sedimentary rocks such as limestone and gypsum. Sedimentary rocks can also be exposed at the surface and undergo erosion, providing materials for future sedimentary rocks.

If sedimentary rocks become buried deep within the crust, they can be subjected to high heat and pressure along with physical stresses such as compression or extension, which transforms them into metamorphic rocks such as schist or gneiss ("metamorphic" simply means "changed form"). Sometimes igneous rocks can be metamorphosed by similar processes (like granite into gneiss). Tectonic uplift and erosion can lead to surface exposure of metamorphic rocks, which will undergo breakdown through weathering.

Tectonic processes can also carry sedimentary, igneous or metamorphic rocks into the mantle where they melt into magma and start the whole rock cycle again.

Because all existing rocks in Earth's crust have participated in the rock cycle at least once, scientists study meteorites, which were formed at the same time as our solar system and planets, in order to understand

what the original rocks on Earth were like. IMM has some excellent examples of these extraterrestrial visitors in our meteorite exhibit.

Various examples of the three different types of rocks are listed below. Specimens of some of these rocks can be found throughout the museum.

*How many can you find?*

### **Igneous**

Basalt	Gabbro	Diorite
Rhyolite	Syenite	Andesite
Granite	Granodiorite	Obsidian

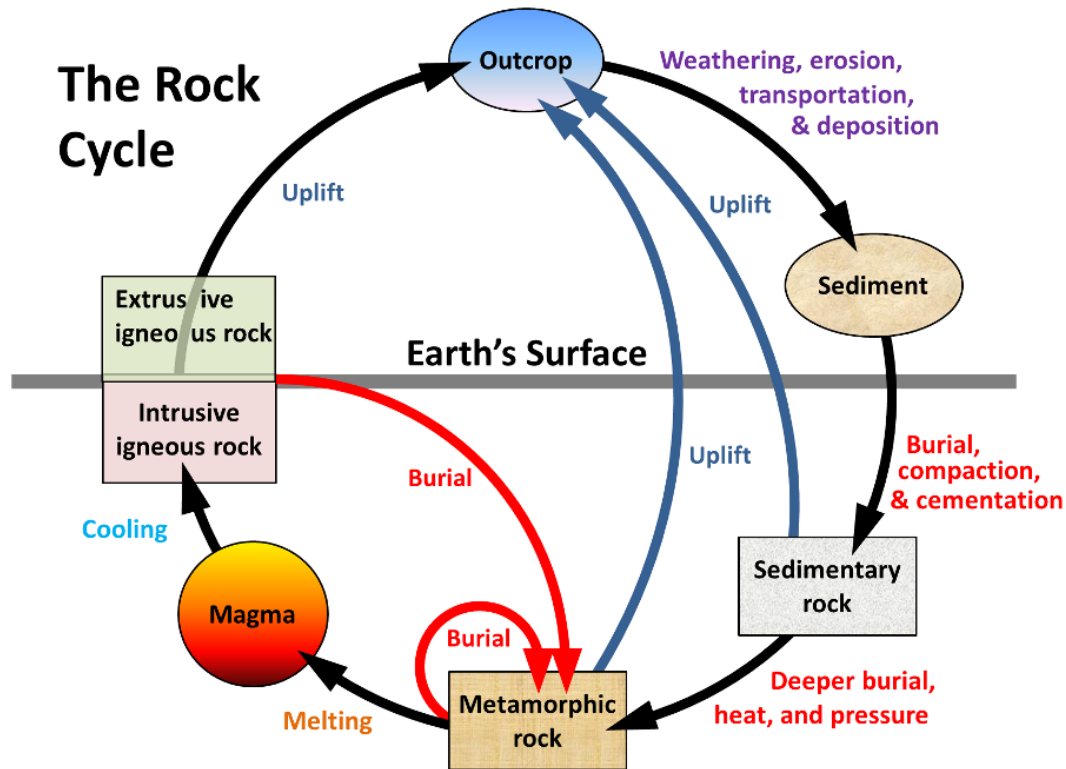
### **Sedimentary**

Sandstone	Shale	Chert
Limestone	Gypsum	Claystone
Siltstone	Conglomerate	Coal

### **Metamorphic**

Gneiss	Marble	Greenstone
Schist	Phyllite	Metaquartzite
Slate	Skarn	Serpentinite

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