

# **Gradualism versus Catastrophism**

Curriculum written by XXXXX

A curriculum written with the goal of educating 8<sup>th</sup> grade science students on the difference between gradual and cataclysmic geological events

**Introduction:**

Welcome, lucky teacher, to the best 8<sup>th</sup> grade geology curriculum ever written. The goal of this curriculum is to teach both you and your students a few geology basics, namely it will inform about Catastrophism and Gradualism.

Catastrophism is the word used to describe geologic changes that happen quickly, with one or a sequence of quick events, such as a volcanic eruption, an earthquake, or a mass flood.

Gradualism describes other, slower changes, caused by erosion, or geologic plates moving around.

It is vital that these principles are understood if you're going to understand the "story" behind the rocks. It is one of the keys to identifying the events which made the world the way it is.

**Learning Outcome:**

Over the course of teaching this curriculum, your students will not only obtain a more advanced understanding of the world we live in, but also learn about the concept of Catastrophism versus Gradualism.

**Intended Audience:**

This curriculum is intended to be taught to an 8<sup>th</sup> grade science class during their earth science unit.

**Pre-Trip Activity:**

**For this activity you need:**

- 1.) A Tarp
- 2.) Sand
- 3.) Bucket
- 4.) Access to water

**Goal:**

To demonstrate the basic concept of Catastrophism and Gradualism.

**Instructions:**

Place a tarp out (preferably outside) and dump a bunch of sand on it. Tell the students to pile the sand into a giant pile, as tall as they can. Once they've completed this, tell them to step back. Slowly pour the water on the top of the mound, and point out to the students the small channels eroded (streams where the sand has washed away) into the sand. Also feel free to point out the deposits of sand at the bottom of the hill (an alluvial fan).

**Explain** to them that the slow pouring and the sand slowly being eroded away represents "Gradualism", a process that can take thousands and millions of years in nature.

Next Dump all the water on the sand (getting kids a little wet is okay. They like it.). Note that all the sand is washed all over the tarp.

**Explain** to the students that a dramatic geologic event where a lot of things change quickly is called "Catastrophism".

**Field Trip:**

**The Twin Sisters Dunite, and the Wickersham Valley**

**Directions:** From Seattle drive north on *Interstate 5* to the *Cook Road* off-ramp just north of the Highway 11 exit, Chuckanut Drive. Take the *Cook Road* east to Sedro-Woolley, and head east on *Highway 20*. Turn north on *Highway 9* and travel 4 miles west to reach Twin Sisters Dunite, and the Wickersham Valley. The location is east of Mirror Lake, and parking is available on the east side of the road.

**Instructions:** Point your students to the far off mountain. The mountain will be across the valley, and colored bronzish-red. Explain to them that this mountain is called Twin Sisters, and is 8 miles long, 3 miles wide, and 6,500 feet tall. Try to get the overall bigness of this hunk of rock into their heads (“Is it bigger than a bus?”). Explain that the entire mountain is made of the mineral Dunite, a rock type that is usually contained at least seven to ten kilometers beneath the surface of the crust. Do things that large just jump around? No. It takes a lot of pressure and time, especially to travel 7 miles up through the layers of rock and dirt. Explain to them that this occurs slowly, and then ask them if they think it’s a catastrophic or a gradual event. Gradual is the correct answer.

Next, direct your students’ attention to Wickersham Valley, which they’re standing in. It runs from north to south. Ask them how they think the valley could have appeared. Chances are, none of them will know the right answer. That’s okay, humor them, reassure them that they’re smart, then tell them the real answer. The real answer is that it was carved out, probably 2 million years ago initially, by an immense flooded river which made its way through.

Explain that glaciers blocked a few rivers (the Fraser and the Nooksack, if you want to get specific, though be warned, the more specifics you give, the greater the

chance your students will lose interest), so the rivers built up into lakes which eventually rose higher than a divide, and poured through, cutting out a valley on its way.

Ask the students if this was a gradual event or a catastrophic event. Explain that it was a catastrophic event, because the river moved very quickly, and the erosion happened over a matter of years, instead of millions of years.

**Post Activity:** Once the students arrive back at school, divide them into teams. Hand each team sheets with different geological events, and have them try to guess if the events are catastrophic or gradual. Examples of events would be Earthquakes, Rain, Volcanoes, and huge floods.

## Bibliography

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