

POST FIELD TRIP THOUGHT

Discovering Rocks Exercise

So, the big question after the field trip was, how did the rock types, Types A, B, C and D, correspond to the rock cycle? Many people were a bit confused as to why there were four types. Good! If you remember learning about the rock cycle you would recall learning that there are three types of rocks; igneous, sedimentary and metamorphic. My design for this exercise was to have you observe and describe the physical characteristics of rocks, and infer how and where the rocks formed. To do this we must split igneous rocks into two types. Both form from the cooling and solidification of hot material, magma or lava, but the location is what makes the difference. Magma is molten rock under ground and if it cools and solidifies there, it becomes plutonic-igneous rock. If magma rises to the surface it becomes lava when it erupts from a volcano. It then cools and solidifies to become a volcanic-igneous rock.

So, what are the four types?

Type A = Sedimentary Rock

These rocks form from fragments of preexisting rock, chemicals (ions), and/or organic material.

Type B = Volcanic Rock

These are igneous rocks that form on the sea floor or on land by the cooling and solidifying of lava. These rocks will contain crystals, typically small (<1mm) crystals that form from fast cooling of lava, and/or volcanic glass, and/or fragments of glass and preexisting rock.

Type C = Metamorphic Rock

These rocks form when preexisting rocks are subjected to heat and pressure generated by the collision of plates, and/or chemical reaction caused by circulating fluids.

Type D = Plutonic Rock

These are igneous rocks that form from slow cooling and solidification, therefore large crystals, of magma under ground. Typically, this occurs in areas deep in the crust beneath a surface location of volcanic activity.

Field Trip Notes

Probably, the most thought provoking stop on the field trip was the bluff at Clayton Beach. That was intentional. The goal was to apply what you learned about isostasy to the real world, the relationship between the glacial ice, the continent, and sea water.

Here is the story. First, the Puget Sound existed in a similar form before the ice sheet advanced south. Global climate change allowed for the formation of the continent ice sheets, one of which repeatedly advanced and retreated into and out of the region. Erosion by the moving ice deepened, widened and shaped the surface of the Puget Sound trough. During the final maximum advance the ice was about 2000 meters (6000 feet) thick over the future site of Bellingham. At this time the weight of the ice caused the continent (lithosphere) to be depressed down into the mantle (asthenosphere). The asthenosphere flowed out from the depressed lithosphere. Then, the glaciers retreated for the last time in the last glacial period and the asthenosphere began to flow back, thus causing rebound of the lithosphere. The rate of rebound was extremely slow compared to the rate of melting ice. So, as the glacier retreated, sea water flooded the Puget Sound region. This sea water left beach deposits that were subsequently uplifted by more rebound of the continent, eventually rising them above sea level. Throw in a lot of wave erosion that shaped the steep bluff into what we saw on the field trip.

That was a quick version of about 1.6 million years of glacial history of the Puget Sound region.

If you want more, I have a collection of pictures and questions on the “Virtual Field Trip” page of my web site at: <http://faculty.whatcom.ctc.edu/bdougan>.

Feel free to send me questions or comments via email at; bdougan@whatcom.ctc.edu.