

Program Activity

Gallery: Weinman Mineral Gallery

Course Name: Plate Tectonics – *Cream Cheese and Jelly Sandwich Faults* [Adapted from Lisa Wald, US Geological Survey – Earthquake Hazards Program]

Grade Level: 5th -12th

Activity: Post-field trip

Approximate Time Required: 1 class period

Vocabulary:

Earthquake, Fault, Strike-Slip Fault, Normal Fault, Thurst Fault, Reverse Fault, Plate Tectonics

Objective:

Investigate the three different types of earthquake faults caused by transform plate boundary movement and determine the geological impact on the crust.

Materials Needed:

Three slices of bread per student

Cream cheese

Strawberry or Grape Jelly (dark colored jelly)

Plastic knives for spreading and cutting – three per student/student pair

Fault Sheet/Overhead

Procedure:

1. Look at the diagrams of the four types of faults: strike-slip, normal, and thrust (reverse) faults. [\[link\]](#)
2. Each student spreads one side of bread with cream cheese about ¼" thick.
3. On a second slice of bread, spread a layer of jelly (using a new plastic knife).
4. Place the cream cheese side on top of the jelly bread.
5. On the top side of the sandwich, add another layer of cream cheese and jelly then top off with the third slice of bread. Be sure to use the same knife for cream cheese and another knife for the jelly.
6. Work with a partner. Take one sandwich and using a third (clean) plastic knife, cut your sandwich in half vertically so your cut is straight up and down.
7. Re-create the strike-slip fault and observe what happens to the layers of cream cheese and jelly. Write down your observations.
8. Using the other sandwich of the pair, cut it in half ON AN ANGLE so the cut is not straight up and down.
9. Now, using the two halves of this cream cheese and jelly sandwich, re-create the remaining two types of faults observed in the diagrams (normal fault and thrust fault).
10. Observe how the layers of cream cheese and jelly get moved as the different fault movements and write down your observations

*An earthquake occurs when two plates or blocks of earth suddenly slip past each other or collide with each other. The surface where they slip by each other is called a **fault**. Plate boundaries are made up of many faults and this is where most of the earthquakes that occur are found. The edges of plates are rough and they*

often get 'stuck' while the rest of the plate continues moving. Finally the pressure builds up so much that the edges of the faults 'unstick' and there is an earthquake as all that stored up energy is released.

Strike-slip faults are vertical and occur when the plates or crustal blocks slide past one another in a horizontal fashion with each plate moving in the opposite directions. The San Andreas fault in California is an example of this type of plate movement.

Normal faults occur at an angle between a hanging wall (block or plate located above the fault) and a foot wall (block or plate that is below the fault). Normal faults tend to occur where the lithosphere (crust and upper mantle) is being stretched and are common among rift basins where the plates/blocks are moving apart in opposite directions. Normal faulting is thought to be the way metamorphic rocks make their way to the earth's surface. To recreate a normal fault, one wall (hanging wall) moves down relative to the foot wall (the wall below the fault). The block literally breaks free of the other block and drops down.

There are pictures demonstrating the outcomes of normal faults on this website:
<http://www.pitt.edu/~cejones/Geolimages/7Structures/NormalFaults.html>

Reverse faults also occur at an angle but in this case the hanging wall moves upward relative to the foot wall. Reverse faults occur in areas where crustal plates are being pushed or squished together and the hanging wall (wall above the fault) is pushed up relative to the foot wall. It is the opposite of a normal fault.

There are pictures demonstrating reverse faults on this website:
<http://www.pitt.edu/~cejones/Geolimages/7Structures/ReverseFaults.html>

Thrust faults are reverse faults that occur at a lesser angle and involve one block or plate literally being thrust over the other so that whole pieces of continental crust are overridden. This is what occurred when the African plate slammed into the North American plate some 300 million years ago and piled rocks on top of each other all the way up the North American continent, creating the Appalachian Mountains.

There are pictures demonstrating thrust faults here:
<http://www.pitt.edu/~cejones/Geolimages/7Structures/ThrustFaults.html>

Observations:

Evaluation:

Modifications:

Georgia Standards:

S5E1 a, b; S6E5 e, f; SG3 b, c; SES2d