



Annual Conference Guildford
April 2017

What makes physical geography accessible?

Activities to help remove misconceptions and improve understanding.

Title of Activity **Chocoholic Weathering**

Topic or Theme Weathering (and erosion)

What is frequently misunderstood or not grasped?

The geographical conditions that affect chemical weathering (other than acid on limestone) and the impact on landscape development and differences across the globe. The role of water (moisture) in chemical weathering. The difference between weathering and erosion and why weathering is called 'weathering'.

Activity Description Using a Snickers bar to reveal the 'hidden' process of rock weathering, climatic conditions and chemical weathering rates

Materials

Piece of granite rock and/or magnified image of granite rock on screen , A4 paper, Snickers bars
Small coloured Post It Notes

Set-Up and Procedure

1. Give each student $\frac{1}{4}$ of a Snickers bar and ask to place in their mouths - and instruct they should allow to melt or such but **they should not bite or chew** the bar.
2. Students try and sense what they taste (is there an order?) and what happens. The order should be (i) chocolate, (ii) caramel, (iii) nougat, (iv) peanuts.
3. Whilst they are sucking, students 'speed draw' an annotated diagram(s) explaining the weathering processes that could affect the rock. Tell them they have until their Snickers piece has melted to complete (about 4 minutes!)
4. Ask groups to discuss about and note down what were the conditions in their mouths that enabled the breakdown of the Snickers bar. Share
5. Draw out analogy with the conditions and products of weathering in granite and granitic rocks, which are the most common igneous rocks found on continents. The chocolate corresponds to hornblende, the (toffee) caramel is analogous to biotite in granite, the nougat corresponds to feldspar and the final ingredient, peanuts, is analogous to the physical breakdown of the mineral quartz. Quartz, being the most resistant mineral, requires mechanical weathering, represented by biting in the simulation to break down the mineral.
6. Consider the 'geographical conditions' mouth (i.e. warm (hot) and humid (wet)
7. Discuss- (i) What effect did this have on chemical weathering and dissolution? (ii) What are the implications for weathering processes and weathering rates in different climates across the world? (ask students to consider tropical, hot desert, temperate and arctic climates). (iii) Consider the rates of weathering in a densely forested area compared to an open (dryland) area. (iv)How might this help understand why the process of breaking down rocks is termed 'weathering' ?

Follow up

- Ask - where did the melting components go? - what process was involved and what was left after melting had finished?
- Relate the process to human digestion. Emphasise the role water plays - its integral role in the chemical weathering processes (of oxidation, hydrolysis, and solution), and in dispersing/transporting food stuffs or the weathered material. Link to role of water in weathering.
- Ask students to explain why the removal of material is considered a different process to weathering – and ask what this process is called (i.e erosion).
- Discuss the difference between weathering (the break down) and erosion (the removal) of material with students using this analogy.
- Link chocolate bar components to different mineral components in granite rock (chocolate corresponds to hornblende, the (toffee) caramel to biotite in granite, the nougat to feldspar and the final ingredient, peanuts, is analogous to the physical breakdown of the mineral quartz. Quartz, being the most resistant mineral, requires mechanical weathering, represented by biting in the simulation to break down the mineral.
- Have students return to their weathering poster (from the start of the lesson) and add/amend information using what they have learned in the lesson. Clarify misconceptions and muddled understanding between weathering and erosion. .
- Finally, set students the challenge of explaining why and how sandy beaches are dominated by quartz grains.
- If you have a weathered rock samples/images, ask students to identify and suggest which minerals are weathered.

The significance of melting in the mouth

- The order of melting (weathering) is analogous to the chemical weathering of different minerals in a granitic rock. Give a small sample of weathered granite and/or show a magnified image of (weathered) granite to each group.
- Help students to identify the mineral components of the granite – 1. black hornblende, 2. black biotite mica, 3. pink/grey/white feldspars and 4. white/glassy quartz



Weathered granite, with minerals illustrated.

Image source <http://johnsbluemountainsblog.blogspot.co.uk/2014/01/the-hartley-granite-blue-mountains-nsw.html>