

Earth Processes: The Basis for Life

Context: The materials of the Earth’s crust are continually being transformed by natural forces from one rock type to another. Physical properties and appearance of the rock give clues to its geological history. Relative position of rocks in strata provides clues which help us infer the age and sequence of events.

How are rocks and landscapes formed? How does the physical earth support ecosystems? How can we use clues to solve a geological mystery?

Project: Create a cake that tells a geologic story. Experiment with different ingredients and cooking processes to represent igneous, sedimentary and metamorphic rocks and processes that form each. Hold a geology bakeoff and review in which you describe the story behind each other’s cakes and critique others interpretation of yours

Approach: The geological consulting company Terramax is having a party to celebrate a successful year. You have been hired to create specialty cake for the event. The geologists really enjoy solving geological mysteries by looking at evidence in the rocks. The party planner wants you build a cake that models a geological story that is told in the layers, ingredients and cooking a preparation steps. Each cake will become a field site at the party. The geologists will be able to slice into the sites and write their guess at what geological story is being told. Then they will be able to open the sealed envelopes which the bakers have written the geological story they were trying to tell.

To complete the Geocake you will first explore each rock type and become familiar with patterns of their appearance. Then you will research how each type is formed in the Earth and how that leads to the appearance you see in the rocks. You will then apply the ideas of appearance patterns of processes of formation to see how baking materials could be used to show each type in way that could be used final cake. Next you’ll plan a geological story that can be told through the cake. Write a rigorous geological explanation of the origin of the rock you are illustrating in the form of a field report. Write a humorous restaurant menu description using geological terms and cooking terms together. On the challenge day you will get to travel to each field site and survey each other’s creations and try to decipher the story that is told in the cake . You will pick one site to complete a full field report for. The creators of the cake will then compare your analysis with their intended meaning of the parts of their model.

Expert Involvement: Local geologists review student work and provide advice.

Tools: geological dating simulation, stream table, groundwater simulator

Primary Standards: Oklahoma Science Standards
HS-ESS2-1 Develop a model to illustrate how Earth’s internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
HS-ESS2-3 Develop a model based on evidence of Earth’s interior to describe the cycling of matter by thermal convection.
HS-ESS2-5 Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.