



Sand Slides

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Sand Slides is an authentic, inquiry-driven, and hands-on, learning experience for all ages that consists of taking sand from around the world, preparing microscope slides with the sand on it, and trying to identify the various biogenic/abiogenic components of the sand as part of a geoscience lesson. This lesson can be implemented in a formal classroom setting with elementary school students, but it also has potential to be scaled up for high school geology classes and beyond.

The title, Sand Slides, is likely not an intuitive indicator of what exactly this lesson entails. However, the concept is surprisingly simple. By using sand samples from various locations around the world (some familiar to the students, others far and exotic), students prepare their own microscope “samples” of different kinds of sand and make detailed qualitative observations about what they see in their particular samples.

This lesson introduces students to the distinction between living and nonliving matter, and the roles each of these play in maintaining a healthy ecosystem and supporting life on our planet. It targets a fourth-grade, level audience, and is congruent with the Next Generation Science Standards (NGSS) for that grade level (Table 1).

Sand Slides represents a fun and creative way to introduce elementary school students to fundamental aspects of earth science, specifically those that are pertinent to living organisms and nonliving materials found in the environment.

Students discover that sand is created from many different components. Students learn about the unique geological features of sand from different parts of the world, and why/how these sand samples acquired these specific features. For example, they can see the pores produced by air bubbles in igneous sand grains, appreciate the diversity of creatures that compose coral-based sand, and make predictions about the origins of dune sand (Figure 2, Figure 3).

Access the Sand Slides Lesson Plan (serc.carleton.edu/download/files/273995/sand_slides_lesson_plan.pdf) and the Sand Slides Data Collection Chart (serc.carleton.edu/download/files/273996/sand_slides_data_collection_chart.pdf)

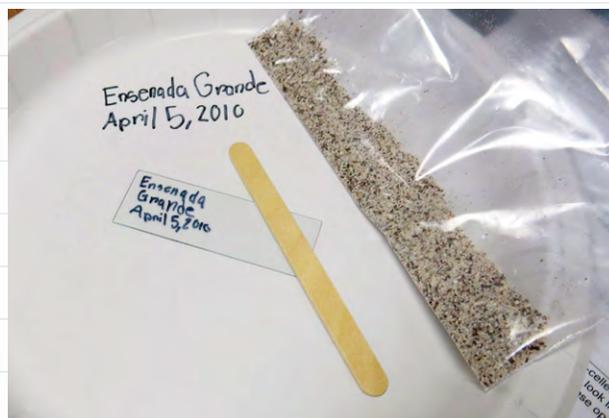


Figure 1. 4th grade students prepare their slides, sand, and plates.

Photo credit: USC Young Scientists Program.



Figure 2. 4th grade student Samantha Duran from the USC Young Scientists Program (YSP) at Foshay Learning Center in Ms. Mabry’s class inspects the sand particles on her microscope slide.

Photo credit: Claire Chatinover and USC YSP.



Figure 3. 4th grade student Christopher Magaña from the USC Young Scientists Program (YSP) at Foshay Learning Center in Ms. Mabry’s class uses his hand lens to check out his sand slide.

Photo credit: Claire Chatinover and USC YSP.

Through this, they gain an enhanced appreciation for the geological diversity that exists on our planet. In addition to the geographical aspects of the lesson, students also learn what the terms “abiogenic” and “biogenic” mean in the context of sand, and how sand can contain living (biogenic) and nonliving (abiogenic) matter. Sand Slides demonstrates that students already have their own internal concept of what sand is, where it comes from and what it is made of, making this activity a natural and relatable method for introducing students to Earth science.

It is easy to engage students in this lesson by encouraging them to relate their experiences with sand (say, a fun trip to the beach!) with what they observe during the lesson activity.

In addition to providing students with a hands-on opportunity for understanding living versus nonliving matter in the environment, this lesson also incorporates interdisciplinary concepts related to geography and biodiversity around the globe. Students cultivate a greater appreciation for this diversity through the course of the lesson. The central theme of the lesson is to differentiate between matter that is abiogenic, or nonliving, and biogenic, or living, and encourage students to hypothesize why and how these contrasting types of matter made it into their sand samples, based on the geographic location the sand originated from.

Sand Slides Lesson Plan	
Subject / Grade Level: Earth Science/ 4th Grade	
NGSS Performance Expectation: 4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.	
Lesson objective(s):	
<ol style="list-style-type: none"> 1) Students discover that sand is created from many different components and that different locations/ landscapes around the world vary geologically. 2) Students use evidence to classify sand samples as biogenic or abiogenic and hypothesize how the sand sample acquired its specific features. 	
Materials:	
<ul style="list-style-type: none"> • Sand Samples • Paper Plates • Microscope Slides • Sharpies • Elmer’s Glue • Hand Lenses 	
Differentiation strategies to meet the needs of diverse learners:	
<ul style="list-style-type: none"> - Think-pair-share, for students that learn best when engaging with classmates. - Multisensory learning, to accommodate students that are auditory learners and visual learners, as well as encourage students to engage their senses in the learning process. - Awareness of social and cultural backgrounds of students, in order to reinforce the real-life application of what they are learning. 	
ENGAGEMENT:	
<ol style="list-style-type: none"> 1. Start with a quick refresher on the three types of rocks: igneous, metamorphic, and sedimentary rocks. 2. Tell students that today they are going to learn about the relationship between rocks, living things, and sand. 3. Ask if any of them has ever been to the beach. <ol style="list-style-type: none"> a. Ask where it was and then tell them to describe their experience with the sand. What color was it? What did it feel like? b. Write down those observations on the board 4. The question for the day is: “How is sand made?” 5. Have students write out a prediction for how they think sand is made. Show students specific examples of rocks and skeletal remains to demonstrate what could be broken down to make said sand. 6. Explain to the students that there are two kinds of sand and they are made out of different materials. 	

Figure 4. Sand Slides Lesson Plan.

Resources

To collect sand samples from different locations, ask your students to bring them back with them from vacation. Emphasize that they should clearly identify where and when they collected their sand. In addition, the International Sand Collectors Society (sandcollectors.org/) may be of help in trading samples. We used the following resources to help students identify components in their sand.

Common components of Abiogenic Sand:

manoa.hawaii.edu/exploringourfluidearth/sites/default/files/M1U5-Table5.7.%20Common%20components%20of%20abiogenic%20sand.pdf

Common components of Biogenic Sand:

manoa.hawaii.edu/exploringourfluidearth/sites/default/files/M1U5-Table5.8.%20Common%20components%20of%20biogenic%20sand.pdf

About the Authors

Dieuwertje Kast (DJ Kast) is the STEM Programs Manager for the University of Southern California's (USC) Joint Educational Project. She coordinates supplemental science lessons for K-5 across six schools through the Wonderkids and Young Scientists Programs. She also teaches college prep science classes to high school students through USC's Neighborhood Academic Initiative. DJ is currently a doctoral student focusing on Teacher Education in Multicultural Societies in STEM at USC. Her mission is to level the playing field for underserved students in STEM. She can be reached at dkast@usc.edu.

Dena Deck is program design collaborator and lead instructor in the Ernest E. Just Marine Science Program for Middle School minority students and an educational advisor and master teacher in professional development for inner city Charter School district teachers. She helped establish research sites for NOAA's LiMPETS sand crab program. Dena works in direct classroom education, field immersion, citizen science, and environmental activism, and she finds new ways—including the use of music and art—to educate and inspire others to learn about the ocean and the aquatic biosphere. She can be reached at denadeck@yahoo.com.

Rita Barakat is a third-year Neuroscience Graduate Student and NSF Graduate Research Fellow, interested in studying language networks in the brain using functional Magnetic Resonance Imaging (fMRI) technology. She is also a program assistant and site coordinator for the Young Scientists Program (YSP) at the University of Southern California, an informal STEM education program that aims to increase representation of diverse individuals in the sciences. Rita has developed lesson curricula and taught grades kindergarten through twelfth, as part of YSP and other outreach programs. She can be reached at rbarakat@usc.edu.