

“Earth’s Changing Surface”

Lesson 5 Analogy Chart

Lesson Focus Questions: *Where does the soil and rock in a delta come from, and where does it go? Does the rock and soil ever change?*

Part of model	... is/are like ...	Part of real world	Process:
Soda can			
Soda in the can			
Frozen soda in the can			
<p align="center">Pictures of a tree root growing in a crack in a rock</p>			

Earth's Changing Surface

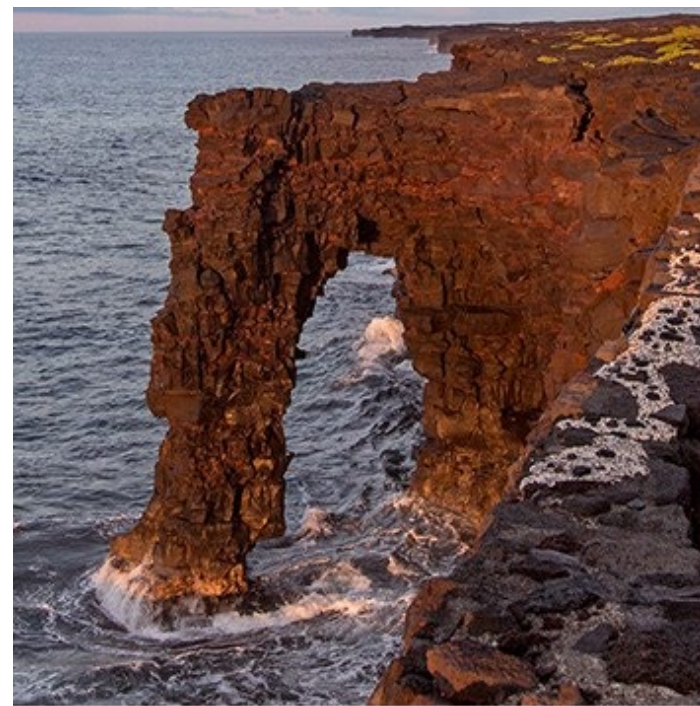
For each location, record your ideas and wonderings about what is *causing* these land changes.

	Cause	Effect
1.		Over time, a sea arch forms out of a sea cliff.
2.		Over time, sand dunes form between a windy, sandy area and a mountain range.
3.		Over time, mountains became shorter and rounder.



Image ©2020 TerraMetrics; map data ©2020

Over time, a **sea arch** forms out of a sea cliff.



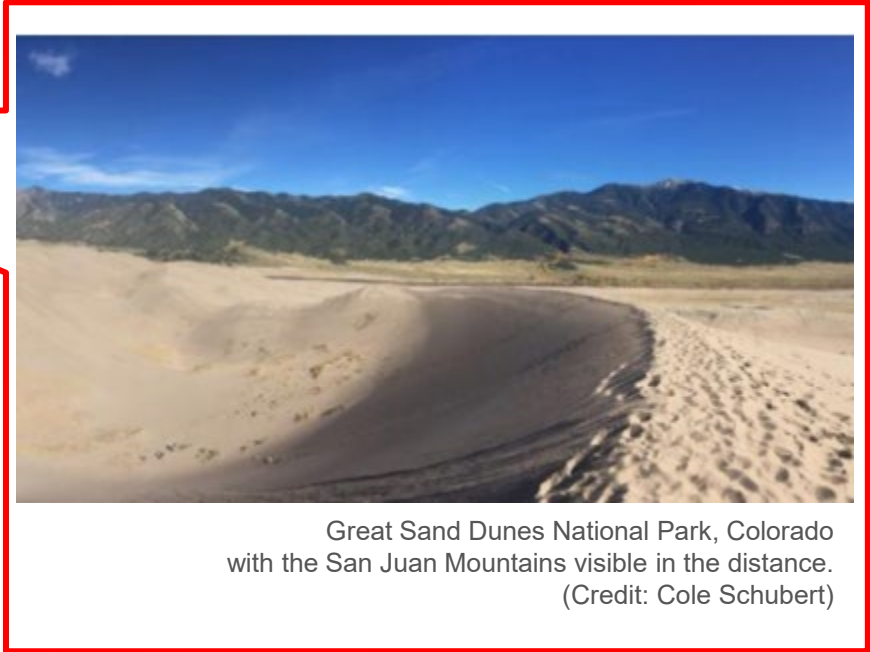
Hōlei Sea Arch (NPS Photo/J. Wei)

Location #1

Over time, **sand dunes** form between a windy, sandy area and a mountain range.



National Parks Service map of Great Sand Dunes National Park



Great Sand Dunes National Park, Colorado with the San Juan Mountains visible in the distance. (Credit: Cole Schubert)

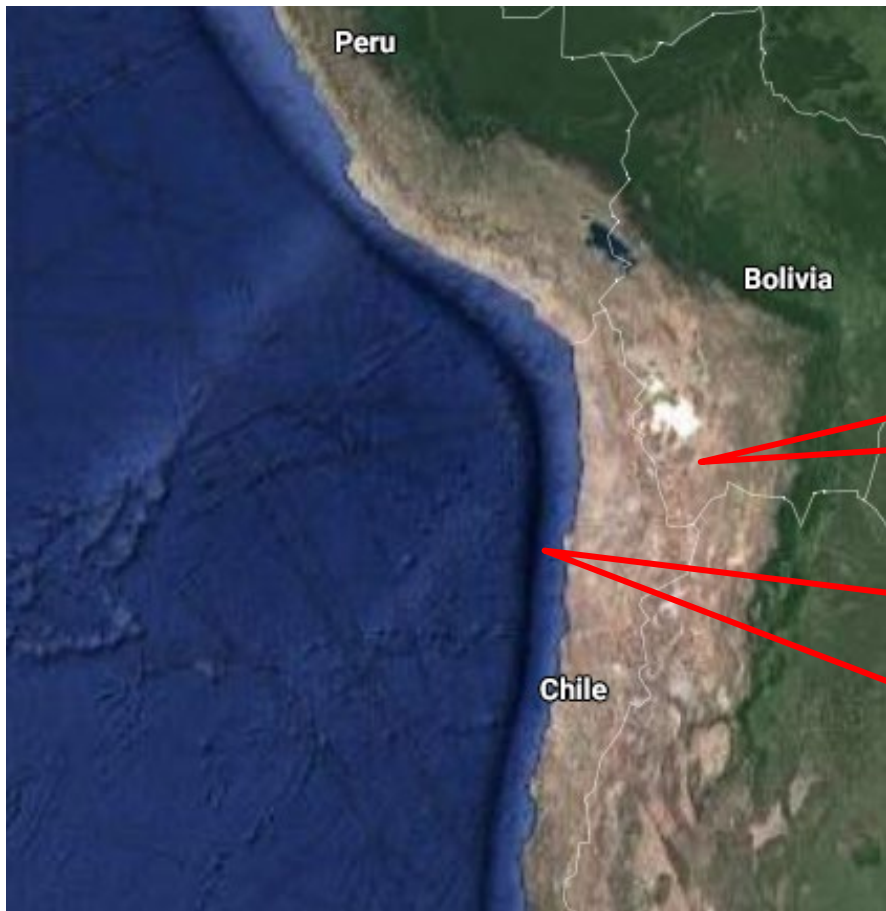
Over time, **mountains** became shorter and rounder.



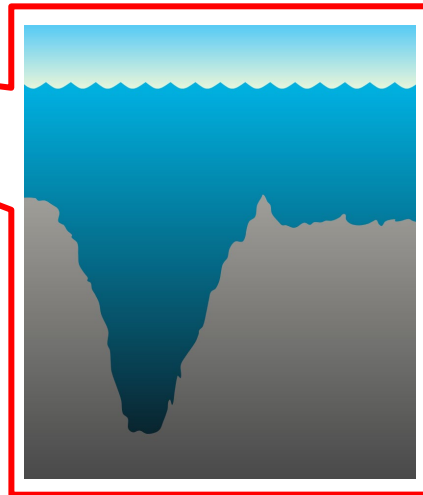
USGS topographic map



On the Appalachian Trail (NPS)



A **mountain range** becomes taller along the coast.



A deep **ocean trench** is found along the coast.

Image ©2020 NASA, TerraMetrics; map data ©2020 Google

Teacher/Video	SSUP_ECS_GR4_WI_L5_Potter_C4-6
Content Area	Earth's Changed Surface
STeLLA Strategy	Strategy F: Make explicit links between science ideas and activities
Context	This is lesson 5 in the Earth's Changing Surface unit. In this lesson, students explore three models to think about where the materials that are deposited in the Mississippi River delta come from. In these clips, students are investigating 1) two pictures, taken a decade apart, of a tree growing in a rock, 2) what happens to rocks when they are shaken in a bottle, and 3) what happens to an unopened soda can when it is frozen.

- 00:00:03 Teacher: So it's-- it was the one with the soda. Explain what might have caused the soda can, um, to change that- the deformities in the soda can. And what do you think will happen to the can when the soda inside thaws out, and describe what you think happens over time when water freezes and then thaws and a crack in a rock. Okay, so we're gonna start, anybody having ideas on that one? Um, Erin, what do you got?
- 00:00:26 Erin: Um, there is-- it- I can tell because it's different and, um, with the-- it's different because, um, the one that was not, um, frozen did- had the top was in-
- 00:00:45 Teacher: Okay.
- 00:00:45 Erin: -and the bottom was in. But then when the frozen one, the top was up and the bottom was up.
- 00:00:52 Teacher: Okay. So it would be-
- 00:00:53 Erin: I mean, out.
- 00:00:54 Teacher: What do you think would happen if the liquid that was-- would be in rocks. If water was in rocks, what do you think would happen to the rock?
- 00:01:00 Erin: It would froze.
- 00:01:01 Teacher: The water would freeze. And what would happen to the rock?
- 00:01:03 Erin: The rock could probably either burst or crack open.
- 00:01:08 Teacher: Okay, so we have a claim that a rock, if water got into a rock that it would- could- the water would- may freeze and cause a rock to burst or crack open,

her words. Yep.

- 00:01:17 Male Student 1: Um-
- 00:01:18 Teacher: What's your idea?
- 00:01:19 Male Student 1: In the- in the, um, um, like the frozen one, the soda that was frozen it was like- - um, it would burst open because it's frozen it's like freezing ice.
- 00:01:32 Teacher: So can you link that idea to a rock?
- 00:01:35 Male Student 1: No.
- 00:01:35 Teacher: How might that frozen stuff in there affect a rock if we're talking about water inside a rock?
- 00:01:41 Male Student 1: Water inside a rock is that the rock would probably just like split open.
- 00:01:46 Teacher: Right, the rock would split or ice would cause the rock-- the frozen water would cause the rock split open. Give me a thumbs up if you would agree with that, that if water was freezing inside a rock something similar would happen to your-1111 that would happen in your soda can that the rock could- could burst open or crack and break into something smaller. Let's look at the third task which was to shake the rocks in the- in the can. And the questions you were supposed to ponder and come up with a description for it was, 11 describe the differences that occurred after the- to the rocks after the ju-jug was shaken. And to thinking back to what happened to the rocks in the jug, explain what might happen to large pieces of rock that roll down a mountain slope. And who has an idea for that, Damien?
- 00:02:28 Damien: Um, that it will like-- if it rolls down it might just like, uh, start turning into like little pieces and then it'll keep on rolling. But th-then until it hits the ground, it might just like crack or just turn into little pieces.
- 00:02:46 Teacher: Okay, do you have evidence for that around from around here?
- 00:02:48 Damian: Yeah, the pictures and, uh, the jug.
- 00:02:52 Teacher: The jug. Okay, anybody else have any other ideas for that, Stephanie?
- 00:02:58 Stephanie: That when we shook the- the bottle that they bro- that they broke, and some of the rocks became into sand. And if the- and if a bigger boulder rolled down the- a mountain, it would probably make the mountain smaller and the rock would probably break up into smaller pieces.
- 00:03:18 Teacher: Okay. So that seems to be kind of a common theme 'cause you had- you-- Do you have any ideas on that? How can plants or freezing or thawing of water change the surface of the earth? Gavin, go for it.
- 00:03:31 Gavin: Um, it could change the earth because, um, when we talked about the rock exploding, when, um, freezing water got into to it, um, m-mountains are

mostly made out of rocks. So, if ice keeps going into the rock, the rock might, um, like blow up, then the mountain might keep lowering.

- 00:03:55 Teacher: Okay. So how- let me try to summarize this right. So because the mountain is made out of rocks, water could get into a rock and break down all the rocks. Is that what you're saying?
- 00:04:05 Gavin: Yeah.
- 00:04:05 Teacher: Okay, into smaller pieces. What do you think, Stephanie, what do you think about what he said?
- 00:04:11 Stephanie: I kind of agree and kind of disagree.
- 00:04:15 Teacher: Okay. Let's hear that.
- 00:04:16 Stephanie: The- because my-my inference is the water that freezes and thaws will mess with the creating- the creation of rocks, but it will also make more rocks-rocks with the broken pieces that ha- that have been created by the frozen process.
- 00:04:35 Teacher: So you're saying that at one place then where there are like maybe five rocks after that process happens, there could be a lot of rocks so that you're getting more rocks?
- 00:04:43 Stephanie: Yeah, because-because it will, um, the rocks will have been cha- changing temperatures and will-will mess with it. And it will, uh, crack in half, I think.
- 00:04:54 Teacher: So where would you get the evidence from to support that?
- 00:04:56 Stephanie: Uh, the ca- the ca- the frozen can because if it change- if it changes temperatures quickly, it-it cracked like there's did.

Lesson Analysis Protocol: Potter, SSUP_ECS_GR4_WI_L5_Potter_C4-6

1. Identify Lens and Strategy

- What instances of making explicit links between science ideas and activities do you observe in this clip?

2. Analyze the Video

- What do students understand (or not) about weathering?
- How did the teacher's use of the identified STeLLA strategies reveal, support, and challenge student thinking?

Lesson Analysis Step	To Do	Your Analysis
Claim	Turn an observation, question or judgment into a specific claim that responds to the focus question.	
Evidence	Point to a specific place in the video transcript, lesson plan, or student work that supports your claim. Be sure to use timestamps if your evidence comes from a transcript.	
Reasoning	Connect your claim and evidence with reasoning based on STeLLA Strategies, research on teaching and learning, your teaching experience, or scientific principles.	
Consider Alternatives	Alternatives may include an alternative interpretation of evidence, new questions this clip, or analysis might raise, and/or alternative question(s), activity(s) or strategies that might have better supported student learning.	

3. Reflect and Apply

What did you learn through this analysis that you want to apply to your own practice?