

Earth's Changing Surface

Lesson 5b: Changing Landforms

Grade 2	Length of lesson: 40 minutes	Placement of lesson in unit: 5b of 6 two-part lessons on Earth's changing surface
Unit central questions: What does the surface of Earth look like? Does it ever change?		Lesson focus questions: How quickly or slowly do landforms change over time? How do we know?
Main learning goal: Earth's surface is always changing. Some changes happen very slowly over a long period of time, and other changes happen quickly.		
Science content storyline: The land hasn't always looked the way it does today. It's changing all the time. Some changes happen very slowly over a long period of time, such as the formation of a river delta or the erosion that carves out a canyon. Other changes happen quickly, such as the movement of rock during a landslide.		
Ideal student response to the focus questions: Landforms change over time. Sometimes they change very fast, like in floods or landslides. But most of the time, changes happen very slowly, like when rivers form deltas or canyons by moving dirt and rocks from one place to another.		

Preparation

<p>Materials Needed</p> <ul style="list-style-type: none"> • Science notebooks • Chart paper and markers <p>Student Handouts</p> <ul style="list-style-type: none"> • 5.1 The Grand Canyon (from lesson 5a) • 5.2 Deltas (from lesson 5a) • 5.3 Landslides (1 per pair) 	<p>Ahead of Time</p> <ul style="list-style-type: none"> • Review the content background document. • ELL support: Identify Tier 2 and Tier 3 words in the lesson plan to review in advance with ELL students, such as <i>landslide</i>. Also review vocabulary words from the previous lesson, including <i>delta</i>, <i>measurement</i>, <i>measure</i>, <i>Mississippi River</i>, <i>mouth (of a river)</i>, <i>deposit/deposited</i>, <i>evidence</i>.
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Lesson 5b General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
3 min	Link to previous lesson: The class reviews key ideas about deltas from the previous lesson. Then the teacher summarizes the kinds of data scientists collect to determine how quickly or slowly landforms change over time.	<ul style="list-style-type: none"> The land hasn't always looked the way it does today. It's changing all the time. Some landforms change very slowly, like the Grand Canyon and the Mississippi River delta.
5 min	Lesson focus questions: The teacher reviews the focus questions from the previous lesson: <i>How quickly or slowly do landforms change over time? How do we know?</i> Then students share their ideas.	
5 min	Setup for activity: The teacher sets up an activity in which students compare three landform examples to determine how quickly or slowly landforms can change.	<ul style="list-style-type: none"> Landform changes can happen in many ways, such as landslides and the formation of deltas and canyons.
10 min	Activity: Students review the landform examples from the previous lesson and read about a new landform. Then they compare the changes in all three examples and arrange the landforms in order from slowest to fastest change.	<ul style="list-style-type: none"> Some landform changes happen so slowly, we can't see them. The formation of a river delta and the erosion of the Grand Canyon are examples of changes that happen very slowly over time. Other changes happen very quickly, such as the movement of rock during a landslide.
10 min	Follow-up to activity: Students share their decisions and evidence regarding how they ordered the three landforms from slowest to fastest change.	
6 min	Synthesize/summarize today's lesson: The teacher reviews the focus questions, and students share their ideas and evidence based on the three examples. Then the teacher summarizes key science ideas from the lesson.	<ul style="list-style-type: none"> The land hasn't always looked the way it does today. It's changing all the time. Some changes happen so slowly, we can't see them. The formation of a river delta and the erosion of the Grand Canyon are examples of changes that happen very slowly over time. Other changes happen very quickly, such as the movement of rock during a landslide.
1 min	Link to next lesson: The teacher announces that in the next lesson, students will use what they've learned about landforms to explain changes that happen in the world around them.	

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3 min	<p>Link to Previous Lesson</p> <p>Synopsis: The class reviews key ideas about deltas from the previous lesson. Then the teacher summarizes the kinds of data scientists collect to determine how quickly or slowly landforms change over time.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> The land hasn't always looked the way it does today. It's changing all the time. Some landforms change very slowly, like the Grand Canyon and the Mississippi River delta. 	Ask questions to elicit student ideas and predictions.	<p>Show slides 1 and 2.</p> <p>In our last lesson, we learned about a new landform, the Mississippi River delta. What is a delta and how does it form?</p>	<p>A delta is land that forms when a river carries dirt and rocks down to where the river meets the ocean or another large body of water like the Gulf of Mexico.</p> <p>It comes from along the river, all the way down.</p> <p>It took thousands of years!</p> <p>Scientists can measure how much land is there.</p> <p>They could see if the measurements changed from year</p>	<p>And where does all that dirt and rock come from?</p> <p>How long did it take for the Mississippi River delta to form?</p> <p>How do we know that?</p> <p>And how do scientists know that it took that long?</p>

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		Summarize key science ideas.	<p>Show slide 3.</p> <p>So scientists collect all kinds of data to see how slowly or quickly landforms are changing. They can take measurements each year and compare them with measurements from other years to see if they're different. They can also take pictures and look at maps to see if a landform is changing over time.</p>	to year.	
5 min	<p>Lesson Focus Questions</p> <p>Synopsis: The teacher reviews the focus questions from the previous lesson: <i>How quickly or slowly do landforms change over time? How do we know?</i> Then students share their ideas.</p>	Set the purpose with a <u>focus question</u> or goal statement.	<p>We've learned from our investigations that landforms change even though we can't always see it happening.</p> <p>Some changes take a very long time, like when water carves out a canyon or forms a delta.</p> <p>But do changes always happen slowly, or can they happen quickly, too?</p> <p>Show slide 4.</p> <p>Today we'll continue thinking about the same questions from last time: <i>How quickly or slowly do landforms change over time? How do we know?</i></p> <p>This time, though, we'll explore a different kind of change.</p> <p>So do you think that landforms always change slowly like the Grand Canyon? Or can they change quickly, too? Let's hear your ideas.</p>		

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			<p>Can you think of any other changes that might happen quickly?</p> <p>So we know that landforms can change really slowly, like when rivers carve out a canyon or a delta forms or and mountains get taller or shorter. And we think that some changes can happen quickly, too.</p> <p>Let's find out more about this.</p>	<p>The mountains have been the same since I was little, so changes must be happening very slowly, like the Grand Canyon.</p> <p>Well, when a volcano explodes, it happens fast.</p> <p>Earthquakes happen fast too.</p>	<p>Yes, volcanoes happen very quickly, don't they?</p>
5 min	<p>Setup for Activity</p> <p>Synopsis: The teacher sets up an activity in which students compare three landform examples to determine how quickly or slowly landforms can change.</p>		<p>Last time, we looked at two different examples of landforms to see how quickly or slowly they changed over time. Which landform examples did we investigate?</p> <p>Show slide 5.</p>	<p>The Grand Canyon.</p> <p>The Mississippi River delta.</p>	

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	<p>Main science idea(s):</p> <ul style="list-style-type: none"> Landform changes can happen in many ways, such as landslides and the formation of deltas and canyons. 	<p>Make explicit links between science ideas and activities before the activity.</p> <p>Ask students questions to elicit student ideas and predictions.</p>	<p>Is the Grand Canyon changing slowly or quickly? How do you know?</p> <p>How about the Mississippi River delta? How long did it take this delta to form?</p> <p>So both landforms are changing very slowly over a long period of time, right?</p> <p>Show slide 6.</p> <p>Today we'll look at a new landform example: landslides. A landslide is a change that happens on the side of a mountain or hill.</p> <p>What do you think is happening in this photo?</p> <p>ELL support: ELL students can find it helpful to share new ideas and observations in their home languages before sharing them in English. Give students an opportunity to talk about their observations with a shared-language partner or small group, if possible.</p> <p>That's right! Soil and rocks are breaking away from the mountainside and sliding down to the</p>	<p>The Grand Canyon is changing slowly because it took millions of years for the river to carve it out.</p> <p>Thousands of years!</p> <p>The river carries dirt and rocks to the delta.</p> <p>The land is breaking apart!</p>	<p>Where does the mud come from?</p>

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10 min	<p>Activity</p> <p>Synopsis: Students review the landform examples from the previous lesson and read about a new landform. Then they compare the changes in all three examples and arrange the landforms in order from slowest to fastest change.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> Some landform changes happen so slowly, we can't see them. The formation of a river delta and the erosion of the Grand Canyon are examples of changes that happen very slowly over time. Other changes happen very quickly, such as the movement of rock during a landslide. 	<p>Make explicit links between science ideas and activities during the activity.</p> <p>Engage students in using and applying new science ideas in a variety of ways and contexts.</p> <p>Engage students in analyzing and interpreting data and observations.</p>	<p>Show slides 8 and 9.</p> <p>Today you'll pair up with your partner from last time and read an essay about landslides. Then you'll compare this landform example with our Grand Canyon and delta examples and think about how fast or slow these landforms change.</p> <p>Once you've decided which landforms change the fastest and slowest, you'll arrange the examples in order from slowest-changing landform to fastest-changing landform.</p> <p>You'll place the handout for the slowest-changing landform on the left side of your desk and the handout for the fastest-changing landform on the right side of your desk. Then you'll place the handout for the landform that changes slowly but not as slowly as the first landform somewhere in the middle.</p> <p>NOTE TO TEACHER: <i>Highlight the continuum on the slide and explain how students should arrange their landform handouts on their desks from left to right to show the slowest-changing landform, the fastest-changing landform, and the landform that falls somewhere in the middle.</i></p> <p>After putting your landforms in order, you'll need to find evidence in the three readings to support your decisions. Be prepared to explain why you put the landforms in the order you did.</p>		

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			<p>NOTE TO TEACHER: <i>Have students pair up with their partners from the previous lesson. Then distribute handout 5.3 (Landslides) to each pair. Direct pairs to read the text together and study the photograph. Then have them review the information on handouts 5.1 (The Grand Canyon) and 5.2 (Delta) and compare the rates of change for all three landforms. Based on the information in the readings, have pairs decide which landform changed the slowest, which changed the fastest, and which is between the other two. Then ask them to arrange the landform handouts on their desks in order from slowest to fastest change. During the activity, circulate among the groups to answer any questions.</i></p> <p>ELL support: Reinforce the different parts of the answer so that ELL students can tell the difference between a claim and evidence.</p>		
10 min	<p>Follow-Up to Activity</p> <p>Synopsis: Students share their decisions and evidence regarding how they ordered the three landforms from slowest to fastest change.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> Some landform changes happen so slowly, we 	<p>Make explicit links between science ideas and activities after the activity.</p> <p>Engage students in communicating</p>	<p>Show slide 10.</p> <p>Let’s hear your ideas about how quickly or slowly you think each of our three landforms is changing compared to the others. Make sure to include evidence to support your choices.</p> <p>Listen carefully as your classmates share their ideas and evidence and be prepared to agree or disagree, ask questions, or add on.</p> <p>Which landform example shows the <i>slowest</i></p>		

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	<p>can't see them. The formation of a river delta and the erosion of the Grand Canyon are examples of changes that happen very slowly over time. Other changes happen very quickly, such as the movement of rock during a landslide.</p>	<p>in scientific ways.</p> <p>Engage students in constructing explanations and arguments.</p>	<p>change?</p> <p>First, tell us what you learned about in the reading and saw in the photos or maps. Then tell us what evidence you found that helped you decide that this landform example shows the slowest change.</p> <p>Does another group have any other evidence to share?</p> <p>NOTE TO TEACHER: <i>Talk through the slowest example of landform change first, then discuss the "middle" example, and finish with the example of the fastest change.</i></p> <p>Next, let's talk about the example you put in</p>	<p>We think the Grand Canyon is an example of the slowest change.</p> <p>The reading said that it took millions of years for the canyon to form, so that's a lot slower than the other examples!</p> <p>We think that because the Grand Canyon is so big, maybe that's why it's the slowest to change.</p>	<p>What evidence from the reading helped you make that decision?</p>

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			<p>the middle, between the slowest and fastest change. This middle landform is changing slowly, but it isn't the slowest.</p> <p>Who would like to share which landform example you placed in the middle to show a slow change but not the slowest?</p> <p>NOTE TO TEACHER: <i>The delta example is difficult because students have to use the maps to see where the land is building up and think about the time points on the maps (AD 0 and AD 2000). This will be challenging for 2nd graders, so make sure they aren't just guessing. They should understand that the delta is changing because the land mass on the AD 2000 map is bigger than it is on the AD 0 map. These changes happened over a period of 2 thousand years. To determine which landform is changing more slowly, students should compare time frames of the changes in both examples (thousands of years for the Mississippi River delta compared with millions of years for the Grand Canyon). Then students should use that evidence to order the landform examples. It might help to write 2,000,000 and 2,000 on the board and have the students compare which is the bigger number.</i></p> <p>Which landform example shows the <i>fastest</i> change? Who would like to share?</p>	<p>We think the delta is an example of a slow change. But it's not the slowest, so we put it in the middle.</p> <p>Because it took thousands of years to form, not millions of years like the Grand Canyon.</p> <p>We think the landslide is an example of the fastest change!</p>	<p>How do you know that the delta isn't the slowest-changing landform?</p> <p>How do you know</p>


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		<p>Link science ideas to other science ideas.</p> <p>Ask questions to elicit student ideas and predictions.</p> <p>Engage students in analyzing and interpreting data and observations.</p>	<p>Show slide 11.</p> <p>What do you think is the same about these three landform examples, and what do you think is different about them? Make sure to support your ideas with evidence from the readings.</p> <p>NOTE TO TEACHER: <i>As students share their ideas and evidence, record them on chart paper.</i></p> <p>First, let's talk about what these examples have in common. What do you think is the same about them?</p> <p>Do these three examples have anything else in common?</p> <p>What carved out the Grand Canyon?</p> <p>What formed the Mississippi River delta?</p> <p>What caused the landslide to happen?</p> <p>So what else do you think these examples have in common? What caused all three of these</p>	<p>Because it only took minutes to happen!</p> <p>All of the examples show landforms changing.</p> <p>No.</p> <p>The Colorado River.</p> <p>The river.</p> <p>Rain.</p>	<p>that?</p> <p><i>Questions to ask:</i></p> <ul style="list-style-type: none"> • How do you know? • What's your evidence? • What did the readings tell you?

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		Summarize key science ideas.	<p>changes to happen?</p> <p>Show slide 12.</p> <p>So all three examples have two things in common:</p> <ol style="list-style-type: none"> 1. They all show landforms changing. 2. Water caused the changes in all of these landforms. <p>Now what do you think is different about these three examples?</p>	<p>Water!</p> <p>They're different kinds of landforms.</p> <p>The changes happened at different speeds.</p> <p>The changes to the Grand Canyon happened very slowly over millions of years. Deltas form slowly over thousands of years. So the changes are slow, but not as slow as the changes that formed the Grand Canyon. And landslides cause the</p>	<p>Can you tell us more about the different speeds?</p>

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			<p>Show slide 13.</p> <p>So we've identified several ways the three examples are different:</p> <ol style="list-style-type: none"> 1. All of the examples show different kinds of landforms that change at different speeds. 2. It took millions of years for the Colorado River to carve out the Grand Canyon. 3. The Mississippi River delta took thousands of years to form. 4. Landslides take only minutes to change the land. <p>How can the land change fast in landslides but slow when a delta forms?</p> <p>How can rivers change the land very quickly?</p>	<p>land to change very fast.</p> <p>With landslides, the mud and rocks move really fast down a hill or mountain, but it takes a long time for a river to move dirt and rocks to a delta.</p> <p>When it floods, a river has a lot more water and moves very fast, so it can carry away more soil and rocks more</p>	

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		Summarize key science ideas.	<p>Show slide 14.</p> <p>As we learned in our last lesson, landforms can change very slowly, like the Grand Canyon and the Mississippi River delta. But they can also change very quickly, like during a flood. So landforms can change quickly or slowly depending on how much water is flowing. During a flood, the water is very powerful and fast moving, so it can change the land quickly. But most of the time, rivers cause changes to happen very slowly over time.</p> <p>Landslides can happen when a lot of heavy rain falls on mountains or hills in a short amount of time. Such a large amount of water can cause the land to change very quickly. But landslides can also happen slowly over time.</p> <p>It's important to remember that landforms can change slowly or quickly depending on the conditions. Rivers don't always change the land slowly, and landslides don't always happen quickly.</p> <p>CONTENT NOTE TO TEACHER: <i>Make sure students understand that landslides can occur slowly over time, and rivers can change landforms very quickly (such as during a flood). The landform examples in this lesson illustrate that change can happen very slowly or very quickly. But students shouldn't think that rivers always change landforms slowly,</i></p>	quickly.	

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			<i>and landslides always happen quickly.</i>		
6 min	<p>Synthesize/Summarize Today’s Lesson</p> <p>Synopsis: The teacher reviews the focus questions, and students share their ideas and evidence based on the three examples. Then the teacher summarizes key science ideas from the lesson.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> The land hasn’t always looked the way it does today. It’s changing all the time. Some changes happen so slowly, we can’t see them. The formation of a river delta and the erosion of the Grand Canyon are examples of changes that happen very slowly over time. Other changes happen very quickly, such as the movement of rock during a landslide. 	<p>Highlight key science ideas and focus question throughout.</p> <p>Engage students in making connections by synthesizing and summarizing key science ideas.</p>	<p>Show slide 15.</p> <p>Let’s revisit our focus questions, <i>How quickly or slowly do landforms change over time? How do we know?</i></p> <p>So how would you answer these questions based on what we learned today?</p> <p>ELL support: During this discussion, be explicit about evidence for these changes so that ELL students will have examples to draw from when they answer the focus questions in their science notebooks.</p>	<p>I think landforms can change quickly or slowly.</p> <p>We read about how landslides can change the land very quickly, but we also know that the Grand Canyon is changing very slowly.</p> <p>Because it’s only 2 centimeters deeper than it was 50 years</p>	<p>Do you have evidence that supports your idea? Tell us more about why you think landforms can change quickly or slowly.</p> <p>How do we know that the Grand Canyon is changing very slowly?</p>

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			<p>Does anyone else have an idea or evidence to share?</p> <p> <i>Embedded Assessment Task</i></p> <p>Show slide 16.</p> <p>Now I'd like you to write a new answer for our focus questions in your notebooks. Use the sentence starter on the slide and include evidence from <i>all three</i> of our landform examples to support your ideas.</p> <p><i>I think landforms change [slowly/quickly/both]. My evidence is _____.</i></p> <p>Remember to circle one of the options in the sentence starter to show whether you think changes happen slowly, quickly, or both slowly and quickly.</p>	<p>ago.</p> <p>It's changing faster than the Grand Canyon but slower than changes that happen when there are landslides.</p>	<p>What about the Mississippi River delta? How fast is it changing?</p>

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		Summarize key science ideas.	<p>ELL support: ELL students benefit from verbalizing their thoughts before writing them down. Allow students to talk with a partner about their ideas before expressing them in writing.</p> <p>Whole-class share-out: Who would like to share how you completed the sentence on the slide? Do you think landforms change slowly, quickly, or both slowly and quickly.</p> <p>So from our investigations of three landform examples, we know that canyons and deltas form very slowly, and landslides change the land very quickly.</p> <p>Show slide 17.</p> <p>Let's review the key science ideas we've been learning about:</p> <ul style="list-style-type: none"> • Landforms change over time. • Some changes happen quickly, and we can see these changes happening. Examples of changes that happen quickly are floods and landslides. • Some changes happen very slowly over time, but we can't always see them happening. Examples of landforms that change very slowly over time are deltas or canyons. 		

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1 min	<p>Link to Next Lesson</p> <p>Synopsis: The teacher announces that in the next lesson, students will use what they've learned about landforms to explain changes that happen in the world around them.</p>	Link science ideas to other science ideas.	<p>Show slide 18.</p> <p>So we know that landforms change over time, and that these changes can happen quickly or slowly.</p> <p>Next time, you'll use what you've learned about landforms to explain changes that happen in the world around us.</p>		