

## 4-ESS2-1 Earth's Systems

Students who demonstrate understanding can:

- 4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.** [Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

### Science and Engineering Practices

#### Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.

### Disciplinary Core Ideas

#### ESS2.A: Earth Materials and Systems

- Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.

#### ESS2.E: Biogeology

- Living things affect the physical characteristics of their regions.

### Crosscutting Concepts

#### Cause and Effect

- Cause and effect relationships are routinely identified, tested, and used to explain change.

## Observable features of the student performance by the end of the grade:

1	Identifying the phenomenon under investigation		
	a	From the given investigation plan, students identify the phenomenon under investigation, which includes the following idea: the effects of weathering or the rate of erosion of Earth's materials.	
	b	From the given investigation plan, students identify the purpose of the investigation, which includes providing evidence for an explanation of the phenomenon.	
2	Identifying the evidence to address the purpose of the investigation		
	a	From the given investigation plan, students describe* the data to be collected that will serve as the basis for evidence.	
	b	From the given investigation plan, students describe* the evidence needed, based on observations and/or measurements made during the investigation, including:	
		i.	The change in the relative steepness of slope of the area (e.g., no slope, slight slope, steep slope).
		ii.	The kind of weathering or erosion to which the Earth material is exposed.
		iii.	The change in the shape of Earth materials as the result of weathering or the rate of erosion by one of the following:
		1.	Motion of water.
2.		Ice (including melting and freezing processes).	
3.	Wind (speed and direction).		
4.	Vegetation.		
c	Students describe* how the data to be collected will serve as evidence to address the purpose of the investigation, including to help identify cause and effect relationships between weathering or erosion, and Earth materials.		
3	Planning the investigation		
	a	From the given investigation plan, students describe* how the data will be collected, including:	
		i.	The relative speed of the flow of air or water.
		ii.	The number of cycles of freezing and thawing.
iii.	The number and types of plants growing in the Earth material.		

		iv. The relative amount of soil or sediment transported by erosion.
		v. The number or size of rocks transported by erosion.
		vi. The breakdown of materials by weathering (e.g., ease of breaking before or after weathering, size/number of rocks broken down).
	b	Students describe* the controlled variables, including:
		i. Those variables that affect the movement of water (e.g., flow speed, volume, slope).
		ii. Those variables that affect the movement of air.
		iii. The water temperature and forms of matter (e.g., freezing, melting, room temperature).
	iv. The presence or absence of plants growing in or on the Earth material.	
4	Collecting the data	
	a	Students make and record observations according to the given investigation plan to provide evidence for the effects of weathering or the rate of erosion on Earth materials (e.g., rocks, soils, and sediment).