

## 5-ESS2-1 Earth's Systems

Students who demonstrate understanding can:

- 5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.** [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]

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

#### Developing and Using Models

Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

- Develop a model using an example to describe a scientific principle.

### Disciplinary Core Ideas

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

- Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.

### Crosscutting Concepts

#### Systems and System Models

- A system can be described in terms of its components and their interactions.

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

1	Components of the model								
a	Students develop a model, using a specific given example of a phenomenon, to describe* ways that the geosphere, biosphere, hydrosphere, and/or atmosphere interact. In their model, students identify the relevant components of their example, including features of two of the following systems that are relevant for the given example: <table border="1"> <tr> <td>i.</td> <td>Geosphere (i.e., solid and molten rock, soil, sediment, continents, mountains).</td> </tr> <tr> <td>ii.</td> <td>Hydrosphere (i.e., water and ice in the form of rivers, lakes, glaciers).</td> </tr> <tr> <td>iii.</td> <td>Atmosphere (i.e., wind, oxygen).</td> </tr> <tr> <td>iv.</td> <td>Biosphere (i.e., plants, animals [including humans]).</td> </tr> </table>	i.	Geosphere (i.e., solid and molten rock, soil, sediment, continents, mountains).	ii.	Hydrosphere (i.e., water and ice in the form of rivers, lakes, glaciers).	iii.	Atmosphere (i.e., wind, oxygen).	iv.	Biosphere (i.e., plants, animals [including humans]).
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2	Relationships								
a	Students identify and describe* relationships (interactions) within and between the parts of the Earth systems identified in the model that are relevant to the example (e.g., the atmosphere and the hydrosphere interact by exchanging water through evaporation and precipitation; the hydrosphere and atmosphere interact through air temperature changes, which lead to the formation or melting of ice).								
3	Connections								
a	Students use the model to describe* a variety of ways in which the parts of two major Earth systems in the specific given example interact to affect the Earth's surface materials and processes in that context. Students use the model to describe* how parts of an individual Earth system: <table border="1"> <tr> <td>i.</td> <td>Work together to affect the functioning of that Earth system.</td> </tr> <tr> <td>ii.</td> <td>Contribute to the functioning of the other relevant Earth system.</td> </tr> </table>	i.	Work together to affect the functioning of that Earth system.	ii.	Contribute to the functioning of the other relevant Earth system.				
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