

AFK12SE/NGSS Strand Disciplinary Core Ideas	Conceptual Understandings for K-2 Teachers	Conceptual Understandings for 3-5 Teachers
<p><b>ESS1: Earth’s Place in the Universe</b> <i>What is the universe, and what is Earth’s place in it?</i></p>		
<p><b>ESS1. A: The Universe and Its Stars</b> <i>What is the universe, and what does on in stars?</i></p> <p><b><u>K-2</u></b></p> <ul style="list-style-type: none"> <li>• Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.</li> <li>• At night one can see the light coming from many stars with the naked eye, but telescopes make it possible to see many more and to observe them and the moon and planets in greater detail.</li> </ul> <p><b><u>Grades 3-5</u></b></p> <ul style="list-style-type: none"> <li>• The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their size and distance from Earth.</li> </ul>	<ul style="list-style-type: none"> <li>• How do the positions of the sun, moon, and stars in the sky appear to change throughout the day?</li> <li>• How can patterns we observe help us make predictions about the motion or appearance of the sun, moon, and/or stars?</li> <li>• How do tools aid observations of astronomical phenomena?</li> </ul>	<ul style="list-style-type: none"> <li>• How do the positions of the sun, moon, and stars in the sky appear to change throughout the day?</li> <li>• How can patterns we observe help us make predictions about the motion or appearance of the sun, moon, and/or stars?</li> <li>• How do tools aid observations of astronomical phenomena?</li> <li>• How does the Sun compare to other stars in the universe?</li> </ul>
<p><b>ESS1.B: Earth and the Solar System</b> <i>What are the predictable patterns caused by Earth’s movement in the solar system?</i></p> <p><b><u>K-2</u></b></p> <ul style="list-style-type: none"> <li>• Seasonal patterns of sunrise and sunset can be observed, described, and predicted.</li> </ul> <p><b><u>Grades 3-5</u></b></p> <ul style="list-style-type: none"> <li>• The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily and seasonal changes in the length and direction of shadows; phases of the moon; and different positions of the sun, moon, and stars at different times of the day, month, and year.</li> </ul>	<ul style="list-style-type: none"> <li>• What patterns are observed with the position of the sun in the sky as seasons change?</li> <li>• How do patterns we observe help us make predictions about the position of the sun in the sky as seasons change?</li> </ul>	<ul style="list-style-type: none"> <li>• What patterns are observed with the position of the sun in the sky as seasons change?</li> <li>• How do patterns we observe help us make predictions about the position of the sun in the sky as seasons change?</li> <li>• Why are there seasons?</li> <li>• What causes the phases of the moon?</li> <li>• Why are interstellar objects not in the same position in the sky each night?</li> </ul>

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<ul style="list-style-type: none"> <li>Some objects in the solar system can be seen with the naked eye. Planets in the night sky change positions and are not always visible from Earth as they orbit the sun.</li> <li>Stars appear in patterns called constellations, which can be used for navigation and appear to move together across the sky because of Earth’s rotation.</li> </ul>		
<p><b>ESS1.C: History of Planet Earth</b>  <i>How do people reconstruct and date events in Earth’s planetary history?</i></p> <p><b><u>K-2</u></b></p> <ul style="list-style-type: none"> <li>Some events on Earth occur in cycles, like day and night, and others have a beginning and an end, like a volcanic eruption. Some events, like an earthquake, happen very quickly; others, such as the formation of the Grand Canyon, occur very slowly, over a time period much longer than one can observe.</li> </ul> <p><b><u>Grades 3-5</u></b></p> <ul style="list-style-type: none"> <li>Earth has changed over time. Understanding how landforms develop, are weathered (broken down into smaller pieces), and erode (get transported elsewhere) can help infer the history of the current landscape.</li> <li>Local, regional, and global patterns of rock formations reveal changes over time due to Earth forces, such as earthquakes.</li> <li>The presence and location of certain fossil types indicate the order in which rock layers were formed. Patterns of tree rings and ice cores from glaciers can help reconstruct Earth’s recent climate history.</li> </ul>	<ul style="list-style-type: none"> <li>What are different ways the Earth’s surface features can change over different time scales?</li> </ul>	<ul style="list-style-type: none"> <li>What are different ways the Earth’s surface features can change over different time scales?</li> <li>How can the changes in Earth’s surface features over time help scientists understand the history of the Earth?</li> <li>What different forms of evidence can be used to understand patterns in Earth’s formation?</li> <li>What evidence do scientists use to reconstruct Earth’s recent climate history?</li> </ul>
<p><b>ESS2: Earth’s Systems</b>  <i>How and why is Earth constantly changing?</i></p>		
<p><b>ESS2. A: Earth Materials and Systems</b></p>	<ul style="list-style-type: none"> <li>What effect can wind and water have</li> </ul>	<ul style="list-style-type: none"> <li>What effect can wind and water have on</li> </ul>

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<p><i>How do Earth's major systems interact?</i></p> <p><b><u>K-2</u></b></p> <ul style="list-style-type: none"> <li>• Wind and water can change the shape of the land. The resulting landforms, together with the materials on the land, provide homes for living things.</li> </ul> <p><b><u>Grades 3-5</u></b></p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate.</li> <li>• Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.</li> <li>• Rainfall helps 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.</li> <li>• Human activities affect Earth's systems and their interactions at its surface.</li> </ul>	<p>on the shaping of land?</p> <ul style="list-style-type: none"> <li>• How do Earth's major systems interact?</li> </ul>	<p>the shaping of land?</p> <ul style="list-style-type: none"> <li>• How do Earth's major systems interact?</li> <li>• How can scientists investigate human impact on Earth's major systems?</li> </ul>
<p><b>ESS2.B.: Plate Tectonics and Large-Scale System Interactions</b></p> <p><i>Why do the continents move, and what causes earthquakes and volcanoes?</i></p> <p><b><u>K-2</u></b></p> <ul style="list-style-type: none"> <li>• Rocks, soils, and sand are present in most areas where plants and animals live. There may also be rivers, streams, lakes, and ponds.</li> <li>• Maps show where things are located. One can map the shapes and kinds of land and water in any area.</li> </ul>	<ul style="list-style-type: none"> <li>• Why do the continents move, and what causes earthquakes and volcanoes?</li> <li>• How do maps help to locate features on Earth?</li> </ul>	<ul style="list-style-type: none"> <li>• Why do the continents move, and what causes earthquakes and volcanoes?</li> <li>• How do maps help to locate features on Earth?</li> <li>• How can scientists use records/dates and maps of locations of natural earth events (like earthquakes and volcanic eruptions) to predict when the next event might occur?</li> </ul>

<p><b><u>Grades 3-5</u></b></p> <ul style="list-style-type: none"> <li>• The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges.</li> <li>• Maps can help locate the different land and water features where people live and in other areas of Earth.</li> </ul>		
<p><b>ESS2.C: The Roles of Water in Earth’s Surface Processes</b>  <i>How do the properties and movements of water shape Earth’s surface and affect its systems?</i></p> <p><b><u>K-2</u></b></p> <ul style="list-style-type: none"> <li>• Water is found in the ocean, rivers, lakes, and ponds.</li> <li>• Water exists as solid ice and in liquid form.</li> <li>• It carries soil and rocks from one place to another and determines the variety of life forms that can live in a particular location.</li> </ul> <p><b><u>Grades 3-5</u></b></p> <ul style="list-style-type: none"> <li>• Water is found almost everywhere on Earth: as vapor; as fog or clouds in the atmosphere; as rain or snow falling from clouds; as ice, snow, and running water on land and in the ocean; and as groundwater beneath the surface.</li> <li>• The downhill movement of water as it flows to the ocean shapes the appearance of the land.</li> <li>• Nearly all of Earth’s available water is in the ocean.</li> <li>• Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.</li> </ul>	<ul style="list-style-type: none"> <li>• How does water shape Earth’s surface and affect its systems?</li> <li>• What are different forms of water and where can they be found within Earth’s major systems?</li> </ul>	<ul style="list-style-type: none"> <li>• How does water shape Earth’s surface and affect its systems?</li> <li>• What are different forms of water and where can they be found within Earth’s major systems?</li> </ul>

<p><b>ESS2.D: Weather and Climate</b> <i>What regulates weather and climate?</i></p> <p><b><u>K-2</u></b></p> <ul style="list-style-type: none"> <li>Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time.</li> <li>People measure these conditions to describe and record the weather and to notice patterns over time.</li> </ul> <p><b><u>Grades 3-5</u></b></p> <ul style="list-style-type: none"> <li>Weather is the minute-by-minute to day-by-day variation of the atmosphere’s condition on a local scale. Scientists record the patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.</li> <li>Climate describes the ranges of an area’s typical weather conditions and the extent to which those conditions vary over years to centuries.</li> </ul>	<ul style="list-style-type: none"> <li>What are different components of weather and how are they measured?</li> <li>What are some patterns noticed in these weather components when recorded and examined for patterns over an extended (e.g., month or season) period of time?</li> </ul>	<ul style="list-style-type: none"> <li>What are different components of weather and how are they measured?</li> <li>What are some patterns noticed in these weather components when recorded and examined for patterns over an extended (e.g., month or season) period of time?</li> <li>In what ways does climate differ from weather?</li> <li>How can gathering information about weather patterns help to communicate consistencies and differences in climate?</li> </ul>
<p><b>ESS2.E: Biogeology</b> <i>How do living organisms alter Earth’s processes and structures?</i></p> <p><b><u>K-2</u></b></p> <ul style="list-style-type: none"> <li>Plants and animals (including humans) depend on the land, water, and air to live and grow. They in turn can change their environment (e.g., the shape of land, the flow of water).</li> </ul> <p><b><u>Grades 3-5</u></b></p> <ul style="list-style-type: none"> <li>Living things affect the physical characteristics of their regions (e.g., plants’ roots hold soil in place, beaver shelters and human-built dams alter the flow of water, plants’ respiration affects the air). Many types of rocks and minerals are formed from the remains of organisms or are altered by their</li> </ul>	<ul style="list-style-type: none"> <li>How do living organisms alter Earth’s processes and structures?</li> </ul>	<ul style="list-style-type: none"> <li>How do living organisms alter Earth’s processes and structures?</li> </ul>

<p>activities.</p>		
<p><b>ESS3: Earth and Human Activity</b>  <i>How do Earth’s surface processes and human activities affect each other?</i></p>		
<p><b>ESS3.A: Natural Resources</b>  <i>How do humans depend on Earth’s resources?</i>  <b>K-2</b></p> <ul style="list-style-type: none"> <li>● Living things need water, air, and resources from the land, and they try to live in places that have the things they need.</li> <li>● Humans use natural resources for everything they do: for example, they use soil and water to grow food, wood to burn to provide heat or to build shelters, and materials such as iron or copper extracted from Earth to make cooking pans.</li> </ul> <p><b>Grades 3-5</b></p> <ul style="list-style-type: none"> <li>● All materials, energy, and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways.</li> <li>● Some resources are renewable over time, and others are not.</li> </ul>	<ul style="list-style-type: none"> <li>● What are some different ways that humans use Earth’s natural features and resources for their benefit?</li> <li>● What are examples of renewable versus nonrenewable resources found on Earth?</li> <li>● How will humans continued use of Earth’s non-renewable resources impact Earth’s development and climate over time?</li> </ul>	<ul style="list-style-type: none"> <li>● What are some different ways that humans use Earth’s natural features and resources for their benefit?</li> <li>● What are examples of renewable versus nonrenewable resources found on Earth?</li> <li>● How will humans continued use of Earth’s non-renewable resources impact Earth’s development and climate over time?</li> </ul>
<p><b>ESS3.B: Natural Hazards</b>  <i>How do natural hazards affect individuals and societies?</i>  <b>K-2</b></p> <ul style="list-style-type: none"> <li>● Some kinds of severe weather are more likely than others in a given region.</li> <li>● Weather scientists forecast severe weather so that communities can prepare for and respond to these events.</li> </ul> <p><b>Grades 3-5</b></p> <ul style="list-style-type: none"> <li>● A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions,</li> </ul>	<ul style="list-style-type: none"> <li>● How are the geographical features of a region associated with the kind of severe weather event that may occur?</li> <li>● How do communities use weather forecasts to prepare for severe weather?</li> </ul>	<ul style="list-style-type: none"> <li>● How are the geographical features of a region associated with the kind of severe weather event that may occur?</li> <li>● How do communities use weather forecasts to prepare for severe weather?</li> <li>● What steps can humans take to reduce impacts of natural hazards?</li> </ul>

<p>severe weather, floods, coastal erosion).</p> <ul style="list-style-type: none"> <li>• Humans cannot eliminate natural hazards but can take steps to reduce their impacts.</li> </ul>		
<p><b>ESS3.C: Human Impacts on Earth Systems</b>  <i>How do humans change the planet?</i>  <b><u>K-2</u></b></p> <ul style="list-style-type: none"> <li>• Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things—for example, by reducing trash through reuse and recycling.</li> </ul> <p><b><u>Grades 3-5</u></b></p> <ul style="list-style-type: none"> <li>• Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth’s resources and environments. For example, they are treating sewage, reducing the amounts of materials they use, and regulating sources of pollution such as emissions from factories and power plants or the runoff from agricultural activities.</li> </ul>	<ul style="list-style-type: none"> <li>• What are some ways that humans impact the Earth?</li> <li>• What are some ways humans can reduce their impact on the Earth?</li> </ul>	<ul style="list-style-type: none"> <li>• What are some ways that humans impact the Earth?</li> <li>• What are some ways humans can reduce their impact on the Earth?</li> </ul>
<p><b>ESS3.D: Global Climate Change</b>  <i>How do people model and predict the effects of human activities on Earth’s climate?</i>  <b><u>K-2</u></b>          N/A</p> <p><b><u>Grades 3-5</u></b></p> <ul style="list-style-type: none"> <li>• If Earth’s global mean temperature continues to rise, the lives of humans and other organisms will be affected in many different ways.</li> </ul>	<ul style="list-style-type: none"> <li>• What will happen to humans and other organisms if the global climate changes?</li> </ul>	<ul style="list-style-type: none"> <li>• What will happen to humans and other organisms if the global climate changes?</li> <li>• What information are scientists using to model and predict the effects of human activities on Earth’s climate?</li> </ul>