

Grade 7 - Unit 5 - Geologic Processes

Unit Focus

This unit will begin with a "fossil mystery" in which students will need to apply their understanding of geologic processes to propose an answer to this mystery and justify their solution with scientific evidence. Throughout this unit, students will be exploring various geologic processes such as continental drift, plate tectonics, earthquakes and volcanoes and apply their understanding of the processes to natural phenomena and recent geologic events. Students will also discover the process of how a scientific theory evolves and becomes accepted by examining the history of geologic discoveries and how these understandings helped us to recognize patterns that allow us to predict future geologic events. Students will use maps and data to provide evidence for their claims as they explain how geologic processes shape the Earth, ultimately making a prediction, based on data and calculations, of how the Earth will look in the future. Additionally, students will share their expertise by creating a children's book about a local geologic phenomenon of their choosing, that will be shared with our Grade 3 students as they also study this geologic history of Connecticut.

This unit has been divided into four learning arcs which, when taken together, create a picture of the geologic evolution of our planet.

Learning Arcs:

1. Continental Drift
2. Layers of the Earth
3. Why is Earth an "active planet"?
4. How does water shape the Earth?

Stage 1: Desired Results - Key Understandings

Established Goals	Transfer	
<p>Next Generation Science <i>Middle School Earth and Space Sciences: 6 - 8</i></p> <ul style="list-style-type: none"> • Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. <i>MS-ESS2-3</i> • Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. <i>MS-ESS2-2</i> • Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. <i>MS-ESS2-1</i> <p>Next Generation Science Standards (DCI) <i>Science: 7</i></p> <ul style="list-style-type: none"> • All Earth processes are the result of energy flowing and matter 	<p>T1 Analyze qualitative and quantitative data to interpret patterns, draw conclusions, and/or make predictions.</p> <p>T2 Create models to explore complex systems, show mastery of key science concepts, and/or develop solutions through creation of a product open to testing and redesign.</p>	
	Meaning	
	Understandings	Essential Questions
	<p>U1 Tectonic processes continually shape the earth's surface.</p> <p>U2 All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems.</p> <p>U3 The geologic time scale is interpreted from the</p>	<p>Q1 How does the earth's surface move?</p> <p>Q2 How can the boundaries of tectonic plates be inferred from the location of earthquakes and volcanoes?</p> <p>Q3 How can I describe patterns using models? (MS)</p>

Stage 1: Desired Results - Key Understandings

<p>cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. <i>ESS2.6.A1</i></p> <ul style="list-style-type: none"> • Global movements of water and its changes in form are propelled by sunlight and gravity. <i>ESS2.6.C3</i> • Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. <i>ESS3.6.B1</i> • Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. <i>ESS2.6.B1</i> • Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches. <i>ESS1.6.C2</i> • The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. <i>ESS1.6.C1</i> • The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. <i>ESS2.6.A2</i> • Water's movements-both on the land and underground-cause weathering and erosion, which change the land's surface features and create underground formations. <i>ESS2.6.C5</i> 	<p>analyses of rock strata and the fossil record. U4 the history of natural hazards can help forecast geological events (earthquakes, tsunamis, volcanic eruptions)</p>	<p>Q4 How have natural processes shaped our environment?</p>
<h3>Acquisition of Knowledge and Skill</h3>		
<h4>Knowledge</h4>		<h4>Skills</h4>
<p>Student Growth and Development 21st Century Capacities Matrix <i>Critical Thinking</i></p> <ul style="list-style-type: none"> • Analyzing: Students will be able to examine information/data/evidence to make inferences and identify possible underlying assumptions, patterns, and relationships. <i>MM.1.2</i> <p><i>Collaboration/Communication</i></p> <ul style="list-style-type: none"> • Product Creation: Students will be able to effectively use a medium to communicate important information (findings, ideas, feelings, issues, etc.) for a given purpose. <i>MM.3.2</i> 	<p>K1 Tectonic processes continually generate new ocean seafloor at ridges and destroy old seafloor at trenches. K2 Volcanic activity and the folding and faulting of rock layers during the shifting of the Earth's crust affect the formation of mountains, ridges, and valleys. K3 Earth's surface is constantly being shaped and reshaped by natural processes. Some of these processes, like earthquakes and volcanic eruptions, produce dramatic and rapid change. Others, like weathering and erosion, usually work less conspicuously over longer periods of time. K4 The geologic timescale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. K5 Maps of ancient land and water patterns, based on investigations of rock and fossils, make clear how Earth's plates have moved great distances, collided and spread apart. K6 Glaciation is responsible for creating landforms, bodies and water and rock and mineral deposits. K7 <i>Scientific Literacy Terminology:</i> core, mantle, crust, fault, tectonic plates, plate boundary, continent, volcano, earthquake, Pangaea, lithosphere, asthenosphere, convergent, divergent, transform, convection, radiation, weathering, glaciation, erosion, sedimentary, metamorphic, igneous.</p>	<p>S1 Plot the location of volcanoes and/or earthquakes comparing it to the location of plate boundaries. S2 Locate ancient locations of plate boundaries and use data evidence to determine how the plates have moved to support or challenge the Theory of Plate Tectonics. S3 Predict the future movement of tectonic plates based on data. S4 Explain and provide evidence about how glaciation has shaped our local environment.</p>