

# Unit 2: Earth's Systems

Content Area: **Science**  
Course(s): **Environmental Science**  
Time Period: **1st Marking Period**  
Length: **5 Weeks**  
Status: **Published**

## Unit Overview

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The Earth is an integrated system of four interacting components - the geosphere, the atmosphere, the hydrosphere and the biosphere.

Earth's surface is a complex and dynamic set of interconnected systems- principally the geosphere, hydrosphere, atmosphere, and biosphere – that interact over a wide range of temporal and spatial scales. All of the Earth's processes are the result of energy flowing and matter cycling within and among these systems.

Interactions among the solid earth, the oceans, the atmosphere and organisms have resulted in the ongoing evolution of the earth system.

## Transfer

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Understand that the geosphere encompasses all rock, soils and sediments on Earth's surface.

Earth's surface is continually altered by erosion.

Identify how human activities affect the atmosphere.

Identify the layer of atmosphere living organisms reside in.

Realize that without currents parts of the Earth would be frozen.

Become aware of their own role in the biosphere.

## **Meaning**

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## **Understandings**

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The solid parts of Earth, the geosphere, is constantly being acted on by other forces.

All four systems are integrated and can therefore have an effect on each other.

Earthquakes, volcanoes and mountains are all events that generally happen at tectonic plate boundaries.

The atmosphere is composed almost entirely of nitrogen and oxygen.

The Earth's atmosphere is divided into 4 layers based on changes in temperature that take place at different altitudes.

Greenhouse gases slow the escape of heat from Earth's surface.

The hydrosphere includes all the water on or near Earth's surface.

Surface currents in the ocean affect the climate of the land they flow near.

The biosphere is the narrow layer at the Earth's surface where life can exist.

## **Essential Questions**

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What is the composition and structure of the Earth?

What are tectonic plates and how do they affect Earth's formations?

How do wind and water alter the Earth's surface?

What is the difference between physical and compositional layers of Earth?

What is the basic composition of Earth's atmosphere?

How is heat transferred in the atmosphere?

What is the greenhouse effect?

What are the three major processes of the water cycle?

How does the ocean regulate Earth's temperature?

What factors confine life to the biosphere?

## **Application of Knowledge and Skill**

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### **Students will know...**

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Earth as a system consists of rock, air, water and living things that interact with each other.

Tectonic plates are the boundaries where volcanoes, earthquakes and mountain building happens.

Describe how wind and water alter Earth's surface.

Earth's atmosphere is composed almost entirely of Nitrogen and Oxygen.

Greenhouse effect is affected by human activities.

The three mechanisms of heat transfer are conduction, convection and radiation.

The three major processes of the water cycle include condensation, evaporation and precipitation.

Ocean currents regulate the climates on the lands they flow near.

The Biosphere is made up of the uppermost part of the geosphere, most of the hydrosphere, and the lower part of the atmosphere.

Earth is a closed system, energy enters and leaves the system but matter does not.

### **Students will be skilled at...**

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Describe and construct the composition and structure of Earth.

Explain the main cause of earthquakes, volcanoes and the building of mountains.

Compose a graphic organizer for the layers of the Earth's atmosphere.

Analyze the three mechanisms of heat transfer.

Relate greenhouse effect to climate change.

Identify and explain the three major processes in the water cycle.

Create a graphic organizer for the properties of ocean water, types of ocean currents and the regulation of Earth's temperature.

Analyze the parts of the biosphere and relate them to life on different parts of the Earth.

## **Academic Vocabulary**

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geosphere

crust

mantle

core

lithosphere

asthenosphere

tectonic plate

erosion

atmosphere

troposphere

stratosphere

ozone

radiation

conduction

convection

greenhouse effect

water cycle

evaporation

condensation

precipitation

salinity

fresh water

biosphere

## Learning Goal 1

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The geosphere is the solid part of the Earth that consists of all rock, and the soils and sediments on the Earth's surface.

SCI.HS-ESS1-5	Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.
SCI.HS-ESS2-3	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.
SCI.HS-ESS2-2	Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.
SCI.HS-ESS2-1	Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.

## Target 1

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SWBAT describe the composition and structure of the Earth.

## Target 2

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SWBAT describe the Earth's tectonic plates and explain the causes of earthquakes, volcanoes and mountain formation.

## Learning Goal 2

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The atmosphere is the mixture of gases that surrounds the Earth.

SCI.HS-ESS2-4	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
SCI.HS-ESS2-6	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

## **Target 1**

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SWBAT describe the layers and composition of the Earth's atmosphere.

## **Target 2**

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SWBAT explain the difference between conduction, convection and radiation.

## **Learning Goal 3**

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The hydrosphere includes all of the water at or near the surface of the Earth.

SCI.HS-ESS2-6	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
SCI.HS-ESS2-4	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
SCI.HS-ESS2-5	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
SCI.HS-ESS2-2	Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.

## **Target 1**

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SWBAT describe the properties of ocean water and explain how the ocean regulates the temperature of the atmosphere.

## **Formative Assessment and Performance Opportunities**

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Class discussions

Paper and pencil tests

Science notebook

Student displays and presentations

Student experiments

Student worksheets

## **Summative Assessment**

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All assessments are differentiated and aligned to the science standards and curriculum. Alternate assessments may include projects or presentations, or a common paper/pencil assessment or both. Common Assessment is administered through LinkIt.

## **Accommodations/Modifications**

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- Partner students for additional support
- Provide access to Albert.io online resource specific to Earth's Systems
- Provide additional diagrams of earth's components and energy flow

## **Unit Resources**

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- Environmental Science, Holt, Reinhart & Winston, 2008
- Interactive classroom and whiteboard activities
- Internet
- Supplemental textbooks/teacher resources
- Videos and online videos

## **21st Century Life and Careers**

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CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
CAEP.9.2.12.C.5	Research career opportunities in the United States and abroad that require knowledge of world languages and diverse cultures.

## **Interdisciplinary Connections**

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MA.K-12.2	Reason abstractly and quantitatively.
MA.N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the

	scale and the origin in graphs and data displays.
MA.N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
MA.N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
LA.RST.11-12.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
LA.RST.11-12.2	Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LA.RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LA.WHST.11-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
LA.WHST.11-12.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LA.SL.11-12.5	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.