Unit 7 - Earth’s Changing Climate

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **Full Year**
Status: **Published**

Unit Overview

In order to delve into the mechanism of climate change, students investigate with a computer simulation, data, physical models, and science texts. They refute claims based on common misconceptions—an increase in solar energy or direct heating from human activities cause global warming. Students learn how energy from the sun interacts with Earth's atmosphere and surface. The unit concludes with a Science Seminar where students analyze evidence and debate whether large volcanic eruptions cool or warm Earth.

Enduring Understandings

Changes in the amount of carbon dioxide and methane in the atmosphere are correlated with changes in the amount of energy absorbed by Earth’s surface.
Carbon dioxide and methane affect the balance of energy entering and exiting the Earth system.
Carbon dioxide and methane redirect outbound energy, which causes less energy to exit.

Essential Questions

What could be causing ice to melt and temperatures to increase on Earth?
What kinds of changes to the atmosphere could affect how much energy is absorbed by Earth’s surface?
How can the amount of energy absorbed by Earth’s surface change?
How do carbon dioxide and methane affect energy entering or exiting the Earth system?
Why does an increase in carbon dioxide or methane result in more energy entering and exiting the Earth system?
Why are carbon dioxide and methane increasing in the atmosphere?

Learning Objectives

Engage the class in reflecting on stability and change in Earth’s climate.
Read about past climate changes and what factors led a system with a stable climate to change.
Write explanations of the present climate change. (Climate Change)
Represent their ideas about stability and change in Earth’s climate by creating visual models in the Earth’s Changing Climate Modeling Tool.
Analyze data showing ice decrease and temperature increase over time.
Use the Sim to model ice melting and observe energy.
Generate claims about why the ice on Earth’s surface is melting.
Use the Sim to test how increasing or decreasing gases in the atmosphere affects temperature, energy, and ice.

Use unit vocabulary to explain the changes that could affect how much energy is absorbed by Earth's surface.
Use a token model to track energy entering and exiting a system.
Use the Sim to test the amount of energy that enters and exits the Earth system in various scenarios.
Use the Sim to investigate how gases redirect outgoing energy back toward Earth's surface. (Climate Change)

Standards: Content

SCI.MS-ESS3-2	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
SCI.MS-ESS3-3	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
SCI.MS-ESS3-4	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
SCI.MS-ESS3-5	Ask questions to clarify evidence of the factors that have caused climate change over the past century.

Standards: Interdisciplinary

Assessment Evidence

Formative	Teacher observations, Class discussions, Lab Activities, Key concepts and vocabulary quizzes, Warm Ups, Open Ended Responses, Modeling, Simulations, Innovators Monthly Research
Summative	In correlation with the NJSLS, students must demonstrate the following as summative assessments: MS-ESS3-2., Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. MS-ESS3-3., Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. MS-ESS3-4., Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. MS-ESS3-5., Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. Other summative assessments will include but are not limited to: lesson activities, summative tests, lab skills, demonstrations, and vocabulary quizzes.
Alternative & Benchmark	Alternative - Read to the student and chart oral responses. Word banks, sentence frames, oral responses, graphic organizers, observations, portfolios of student work, orally administered assessments, and anecdotal notes. Benchmark – LinkIt Benchmark Assessment, Teacher Generated Assessments
Assessment Evidence Resource	

Instructional Resources

Smartboard, Computers, Websites and digital interactives/models, Multi-media presentations, Video Streaming, Amplify Digital Curriculum, Generation Genius, BrainPop, Mystery Science, Microsoft 365, Primary and Secondary Source Documents, Lab Materials as needed, Amplify Readings, Labs, Simulations

Instructional Resource List

Curricular Mandates

Below are the curricular requirements as defined in NJ Administrative Code and Statute

	Amistad		Diversity, Equity, and Inclusion
	Holocaust		LGBT and Disabilities (Grades 6-12)
X	Climate Change		Asian American & Pacific Islander

Social Emotional Learning (SEL) Competencies

NJ Social and Emotional Learning Competencies & Sub-Competencies

	Self-Awareness		Relationship Skills
X	Responsible Decision-Making		Social Awareness
	Self-Management		

21st Century Skills & Themes

X	Global and Cultural Awareness	X	Technology Literacy		Planning and Budgeting

X	Creativity and Innovation		Financial Institutions		Risk Management and Insurance
X	Information and Media Literacy		Digital Citizenship		Economic and Government Influences
X	Critical Thinking and Problem Solving		Credit Profile		Career Awareness and Planning
	Civic Financial Responsibility		Financial Psychology		