

## Standards Connections: Carbon & Climate

Activity	Page	Section	Standard
1	Background		<b>NGSS Disciplinary Core Idea. MS-ESS2.D – Weather and Climate.</b> Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns.
1	Doing the Activity	Step 5	<b>NGSS Disciplinary Core Idea. MS-ESS2.D – Weather and Climate.</b> Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns.
1	Doing the Activity	Step 10	<b>C3 Framework. Dimension 2. Geography.10.6-8.</b> Analyze the ways in which cultural and environmental characteristics vary among various regions of the world.
1	Doing the Activity	Step 10	<b>C3 Framework. Dimension 2. Geography.2.6-8.</b> Use maps, satellite images, photographs, and other representations to explain relationships between the locations of places and regions, and changes in their environmental characteristics.
1	Doing the Activity	Step 11	<b>NGSS Crosscutting Concepts. 1 – Patterns. MS.</b> Patterns may be used to identify cause and effect relationships.
1	Doing the Activity	Step 14	<b>Common Core. ELA-Literacy.Speaking and Listening.6.5.</b> Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.
1	Evaluate		<b>Common Core. ELA-Literacy.Writing.6-8.1.</b> Write arguments focused on discipline content.
1	Evaluate		<b>NGSS Science and Engineering Practices. 6 – Constructing Explanations and Designing Solutions. MS.</b> Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe nature operate today as they did in the past and will continue to do so in the future.
2	Background		<b>NGSS Disciplinary Core Idea. MS-ESS2.A – Earth's Materials and Systems.</b> All Earth processes are the result of energy flowing and matter 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.
2	Background		<b>NGSS Crosscutting Concepts. 1 – Patterns. MS.</b> Patterns in rates of change and other numerical relationships can provide information about natural systems.

2	Doing the Activity	Step 1	<b>Common Core. Math.7.EE.B.4.</b> Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
2	Doing the Activity	Step 3	<b>NGSS Disciplinary Core Idea. MS-ESS2.A – Earth’s Materials and Systems.</b> All Earth processes are the result of energy flowing and matter 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.
2	Doing the Activity	Step 4	<b>NGSS Crosscutting Concepts. 4 – Systems and System Models. MS.</b> Models can be used to represent systems and their interactions—such as inputs, processes and outputs— and energy, matter, and information flows within systems.
2	Doing the Activity	Step 11	<b>NGSS Science and Engineering Practices. 2 – Developing and Using Models. MS.</b> Develop and/or use a model to describe and/or predict phenomena.
2	Evaluate		<b>NGSS Science and Engineering Practices. 6 – Constructing Explanations and Designing Solutions. MS.</b> Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students’ own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
3	Background		<b>NGSS Disciplinary Core Idea. MS-ESS3.D – Global Climate Change.</b> Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth’s mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities.
3	Background		<b>NGSS Disciplinary Core Idea. MS-ESS2.D – Weather and Climate.</b> Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns.
3	Doing the Activity	Step 7	<b>NGSS Disciplinary Core Idea. MS-ESS2.D – Weather and Climate.</b> Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns.
3	Doing the Activity	Step 7	<b>C3 Framework. Dimension 2. Geography.10.6-8.</b> Analyze the ways in which cultural and environmental characteristics vary among various regions of the world.

3	Doing the Activity	Step 10	<b>NGSS Disciplinary Core Idea. MS-ESS3.D – Global Climate Change.</b> Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities.
3	Doing the Activity	Step 11	<b>NGSS Performance Expectation. MS-ESS3-5 – Earth and Human Activity.</b> Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
3	Doing the Activity	Step 12	<b>NGSS Crosscutting Concepts. 1 – Patterns. MS.</b> Patterns in rates of change and other numerical relationships can provide information about natural systems. Graphs, charts, and images can be used to identify patterns in data.
3	Doing the Activity	Step 12	<b>Common Core. ELA-Literacy.RST.6-8.7.</b> Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
3	Doing the Activity	Step 13	<b>C3 Framework. Dimension 2. History.16.6-8.</b> Organize applicable evidence into a coherent argument about the past.
3	Doing the Activity	Step 14	<b>NGSS Crosscutting Concepts. 7 – Stability and Change. MS.</b> Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale.
3	Evaluate		<b>NGSS Science and Engineering Practices. 7 – Engaging in Argument from Evidence. MS.</b> Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.
3	Evaluate		<b>Common Core. ELA-Literacy.WHST.6-8.1.</b> Write arguments focused on discipline content.
4	Background		<b>NGSS Disciplinary Core Idea. MS-ESS2.A – Earth's Materials and Systems.</b> All Earth processes are the result of energy flowing and matter 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.
4	Background		<b>NGSS Disciplinary Core Idea. MS-ESS2.A – Earth's Materials and Systems.</b> All Earth processes are the result of energy flowing and matter 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.

4	Doing the Activity	Step 1	<b>NGSS Disciplinary Core Idea. MS-ESS2.A – Earth's Materials and Systems.</b> 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.
4	Doing the Activity	Step 5	<b>NGSS Performance Expectation. MS-ESS3-5 – Earth and Human Activity.</b> Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
4	Doing the Activity	Step 8	<b>NGSS Performance Expectation. MS-ESS3-5 – Earth and Human Activity.</b> Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
4	Doing the Activity	Step 8	<b>C3 Framework. Dimension 1. Developing Questions &amp; Planning Inquiries 5.6-8.</b> Determine the kinds of sources that will be helpful in answering compelling and supporting questions, taking into consideration multiple points of views represented in the sources.
4	Doing the Activity	Step 11	<b>NGSS Science and Engineering Practices. 6 – Constructing Explanations and Designing Solutions. MS.</b> Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
4	Doing the Activity	Step 12	<b>Common Core. ELA-Literacy.WHST.6-8.2.</b> Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
4	Doing the Activity	Step 12	<b>C3 Framework. Dimension 2. Geography.2.6-8.</b> Use maps, satellite images, photographs, and other representations to explain relationships between the locations of places and regions, and changes in their environmental characteristics.
4	Evaluate		<b>Common Core. ELA-Literacy. SL.6.4, SL.7.4.</b> Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
4	Evaluate		<b>C3 Framework. Dimension 4. Communicating Conclusions &amp; Taking Informed Action 4.6-8.</b> Present adaptations of arguments and explanations on topics of interest to others to reach audiences and venues outside the classroom using print and oral technologies (e.g., posters, essays, letters, debates, speeches, reports, and maps) and digital technologies (e.g., Internet, social media, and digital documentary).

5	Background		<b>NGSS Disciplinary Core Idea. MS-ESS3.D – Global Climate Change.</b> Human factors, such as the release of greenhouse gases from burning fossil fuels, are a major factor in the current rise in Earth’s mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and actions.
5	Doing the Activity	Step 2	<b>C3 Framework. Dimension 2. Geography.2.6-8.</b> Use maps, satellite images, photographs, and other representations to explain relationships between the locations of places and regions, and changes in their environmental characteristics.
5	Doing the Activity	Step 2	<b>NGSS Crosscutting Concepts. 1- Patterns. MS.</b> Patterns in rates of change and other numerical relationships can provide information about natural systems.
5	Doing the Activity	Step 5	<b>NGSS Science and Engineering Practices. 3 – Planning and Carrying Out Investigations. MS.</b> Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions.
5	Doing the Activity	Step 7	<b>NGSS Science and Engineering Practices. 4 – Analyzing and Interpreting Data. MS.</b> Analyze and interpret data to provide evidence for phenomena.
5	Doing the Activity	Step 9	<b>C3 Framework. Dimension 2. Geography.4.6-8.</b> Explain how cultural patterns and economic decisions influence environments and the daily lives of people in both nearby and distant places.
5	Doing the Activity	Step 9	<b>NGSS Disciplinary Core Idea. MS-ESS3.D – Global Climate Change.</b> Human factors, such as the release of greenhouse gases from burning fossil fuels, are a major factor in the current rise in Earth’s mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and actions.
5	Doing the Activity	Step 11	<b>NGSS Science and Engineering Practices. 7 – Engaging in Argument from Evidence. MS.</b> Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.
5	Evaluate		<b>Common Core. Math.MP.2.</b> Reason abstractly and quantitatively.