Unit 3: Stability and Change on Earth

CONTENT AREA: General Earth Science	GRADES: 8	UNIT: 1 of 8
Pacing: Approx. 1 Month		
Constructing Explanations and Designing Solutions · 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. (MS-ESS3-1) **Engaging in Argument from Evidence** · 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. (MS-ESS3-4)	**Disciplinary Core Ideas** ESS3.A: Natural Resources • Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1) ESS3.B: Natural Hazards • 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. (MSESS3-2) ESS3.C: Human Impacts on Earth Systems • Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-4) ESS3.D: Global Climate Change • 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. (MS-ESS3-5)	**Crosscutting Concepts** **Patterns** ● Graphs, charts, and images can be used to identify patterns in data. (MS-ESS3-2) **Cause and Effect** ● Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS3-1),(MS-ESS3-4) **Stability and Change** ● Stability might be disturbed either by sudden events or gradual changes that accumulate over time. (MS-ESS3-5) - ***Connections to Engineering, Technology, and Applications of Science*** **Influence of Science, Engineering, and Technology on Society and the Natural World** ● All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (MS-ESS3-1),(MS-ESS3-4) ● The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. (MS-ESS3-2) -

		Connections to Nature of Science **Science Addresses Questions About the Natural and Material World** ● Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-ESS3-4)

Performance Expectations: MS-ESS3-1, MS-ESS3-2, MS-ESS3-4, and MS-ESS3-5

Evidence Statement(s): MS-ESS3-1, MS-ESS3-2, MS-ESS3-4, and MS-ESS3-5

Essential Question: Why aren't minerals and groundwater distributed evenly across the world?

21st Century Skills: 9.2.8.B.3, 9.2.8.B.4

Career Ready Practices: CRP4, CRP6, CRP7

Technology:HS-ETS1-1 HS-ETS1-3

Technical Terms (Suggested)	Core Instructional Materials	Assessment Statement
Extinction Fossil Record Time Relative Fossil Dating Natural Selection Minerals Energy Resources Renewable and Nonrenewable Population Pollution Fossil Fuels Climate Atmosphere Greenhouse Gases ** All terms should be taught in context rather than in isolation. These terms should be addressed after conceptual understanding.**	MS-ESS3-1 - Chromebook, internet access, smartboard, notebook, pen, pencil, whiteboard. MS-ESS3-2- Computer, Internet access, smartboard, notebook, pen, pencil, whiteboard. MS-ESS3-4- Computer, Internet access, smartboard, notebook, pen, pencil, whiteboard. MS-ESS3-5- Computer, Internet access, smartboard, notebook, pen, pencil, whiteboard.	*Students who understand the concepts can:* ● Construct a scientific explanation based on valid and reliable evidence of how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geosciences processes. ● Obtain evidence from sources, which must include the student's own experiments. ● Construct a scientific explanation based on the assumption that theories and laws that describe the current geosciences process operates today as they did in the past and will continue to do so in the future. *Students who understand the concepts can:* ● Analyze and interpret data on natural hazards to determine similarities and differences and to distinguish between correlation and causation. *Students who understand the concepts can:* ● 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.

		Students who understand the concepts can: ● Ask questions to identify and clarify a variety of evidence for an argument about the factors that have caused the rise in global temperatures over the past century. ● Ask questions to clarify human activities and natural processes that are major factors in the current rise in Earth's mean surface temperature.

Modifications

English Language Learners	Special Education	At Risk	Gifted & Talented
Scaffolding	Word walls	Teacher tutoring	Curriculum compacting
Word walls	Visual aides	Peer tutoring	Challenge assignments
Sentence/paragraph frames	Graphic organizers	Study guides	Enrichment activities
Bilingual dictionaries/translation	Multimedia	Graphic organizers	Tiered activities
Think alouds	Leveled readers	Extended time	Independent research/inquiry
Read alouds	Assistive technology	Parent communication	Collaborative teamwork
Highlight key vocabulary	Notes/summaries	Modified assignments	Higher level questioning
Annotation guides	Extended time	Counseling	Critical/Analytical thinking tasks
Think-pair-share	Answer masking		Self-directed activities
Visual aides	Answer eliminator		
Modeling	Highlighter		
Cognates	Color contrast		

5E Model	
Performance Expectation: MS-ESS3-1 **Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.**	
Engage: Anticipatory Set	Video: Groundwater, Beneath the Surface http://science.kqed.org/quest/2014/03/26/groundwater-beneath-the-surface/ Pre-Discussion Questions What is water called beneath the surface? What are some dangers facing aquifers and groundwater? Post-Discussion Questions:

	Why is groundwater so vital to us? How does the water cycle operate? Extension Activity Name as many parts of the water cycle as you can and describe the function of each. Possible activity: Draw a water cycle with as many parts as you can to show how they all interact, and then replay the animation to check and fill in the rest. Compare groundwater to aquifers. How are they alike and how are they different? How are aquifers replenished or depleted?
Exploration: Student Inquiry	Students will work in pairs at computer stations on the "Energy in the U.S. Web-quest". Students will learn about renewable and nonrenewable energy sources and current and future consumption trends in the U.S. Students will need to utilize headphones during the video/audio sections of the Web-quest in order to successfully complete it. When students complete the Web-quest, the teacher will initiate a class discussion using the following discussion questions: 1. What agencies or organizations sponsored the Web sites you collected information from and what might their bias be? 2. Do you think the information presented on the Web sites is balanced? 3. What makes some energy sources renewable and others nonrenewable? 4. What are the advantages of using renewable energy sources? 5. Do you think the U.S. has an obligation to reduce its use of nonrenewable energy sources? Why? 6. What future energy trends do you think are likely for the U.S.? For more explicit teacher instructions visit http://sfrc.ufl.edu/extension/ee/woodenergy/files/activities/WoodEnergy_activity1.pdf After completing this Webquest, ask students to create a poster using the information they collected about energy in the U.S. The overarching topic of the poster can be open to students. For example, it could focus on renewable energy, impacts of energy on the environment, trends in U.S. energy consumption, or a comparison of U.S. energy consumption to other countries. Students should use graphics or pictures. Encourage students to draw or use magazine clippings or photos and to be as creative as possible. Students should also cite evidence and resources from the Web-quest in the poster text. Posters can be displayed around the classroom, lunchroom, or in school hallways.
Explanation: Concepts & Practices	In these lessons: Teachers Should: Introduce formal labels, definitions, and explanations for concepts, practices, skills or abilities. Students Should: Verbalize conceptual understandings and demonstrate scientific and engineering practices. Topics to Be Discussed in Teacher Directed Lessons (Disciplinary Core Ideas): ESS3.A: Natural Resources Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes.

Elaboration: Extension Activity	Extension Activities: Better Lessons (MS-ESS3-1) Measuring Energy in the Atmosphere: Exploring Climate Change What Are Fossil Fuels? Blame it on the Carbon Energy History Why is Coal So Important? Exploring Oil What are We Coming Home To?
Evaluation: Assessment	Assessment Task A: Student Poster 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. Following the WebQuest, students will use the information they gathered to create a poster. Student posters should include a scientific explanation which focuses on how the availability of non-renewable energy resources has and continues to change. See Rubric on pg. 4 http://sfrc.ufl.edu/extension/ee/woodenergy/files/activities/WoodEnergy_activity1.pdf

5E Model	
Performance Expectation: 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.**	
Engage: Anticipatory Set	Have students view series of National Geographic Videos on Catastrophic Events (volcanoes, hurricanes, tsunamis, tornadoes, and earthquakes. http://video.nationalgeographic.com/video/environment Lead classroom discussion on catastrophic events. Encourage students to share their previous understanding of and personal experiences with these events.
Exploration: Student Inquiry	Naturally Disastrous In this lesson, students are introduced to natural disasters and learn the difference between natural hazards and natural disasters. They discover the many types of natural hazards—avalanche, earthquake, flood, forest fire,

	hurricane, landslide, thunderstorm, tornado, tsunami and volcano—as well as specific examples of natural disasters. Students also explore why understanding these natural hazards is important to survival on our planet. https://www.teachengineering.org/view_lesson.php?url=collection/cub_/lessons/cub_natdis/cub_natdis_lesson01.xml Save Our City In this lesson, students learn about various natural hazards and specific methods engineers use to prevent these hazards from becoming natural disasters. They study a hypothetical map of an area covered with natural hazards and decide where to place natural disaster prevention devices by applying their critical thinking skills and an understanding of the causes of natural disasters. https://www.teachengineering.org/view_activity.php?url=collection/cub_/activities/cub_natdis/cub_natdis_lesson01_activity1.xm
Explanation: Concepts & Practices	In these lessons: Teachers Should: Introduce formal labels, definitions, and explanations for concepts, practices, skills or abilities. Students Should: Verbalize conceptual understandings and demonstrate scientific and engineering practices Topics to Be Discussed in Teacher Directed Lessons (Disciplinary Core Ideas): ESS3.B: Natural Hazards 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.
Elaboration: Extension Activity	Earthquake Hazards http://betterlesson.com/lesson/629624/earthquake-hazards In this activity, students will identify major seismic hazards and evaluate the effectiveness of various safety measures.
Evaluation: Assessment	

5E Model	
Performance Expectation: 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.**	
Engage: Anticipatory Set	Have students view the following videos then lead a class discussion on the rate of human population growth and the effect this is having on natural resources . 7 Billion: How Did We Get So Big So Fast? http://www.npr.org/2011/10/31/141816460/visualizing-how-a-population-grows-to-7-billion Are We Using Up More Than What Is Available? http://www.theworldcounts.com/stories/consequences_of_depletion_of_natural_resources Video: Sustainable Development within Environmental Limits http://study.com/academy/lesson/sustainable-development-within-environmental-limits.html
Exploration: Student Inquiry	Why Do We Build Dams? In this activity, students will be introduced to the concept of a dam and its potential benefits, which include water supply, electricity generation, flood control, recreation and irrigation. This lesson begins an ongoing classroom scenario in which student engineering teams working for the Splash Engineering firm design dams for a fictitious client, Thirsty County. https://www.teachengineering.org/view_lesson.php?url=collection/cub_/lessons/cub_dams/cub_dams_lesson01.xml How Much Water Do You Use? In this activity, students will keep track of their own water usage for one week, gaining an understanding of how much water is used for various everyday activities. Students will then relate their own water usages to the average residents of imaginary Thirsty County, and calculate the necessary water capacity of a dam that would provide residential water to the community. https://www.teachengineering.org/view_activity.php?url=collection/cub_/activities/cub_dams/cub_dams_lesson01_activity1.x Following these activities, students will be asked to synthesize their understanding of this concept by constructing an argument that explains the connection between human population and the availability of natural resources. Students should refer to concrete examples from these activities in order to support their argument with evidence.
	In these lessons:

Explanation: Concepts & Practices	Teachers Should: Introduce formal labels, definitions, and explanations for concepts, practices, skills or abilities. Students Should: Verbalize conceptual understandings and demonstrate scientific and engineering practices Topics to Be Discussed in Teacher Directed Lessons (Disciplinary Core Ideas): ESS3.C: Human Impacts on Earth Systems Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.
Elaboration: Extension Activity	Related Activities Earth Science Week: MS-ESS3-4 http://www.earthsciweek.org/ngss-performance-expectations/ms-ess3-4
Evaluation: Assessment	Assessment Task A: Why Do We Build Dams? Proposal 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. After you have introduced the hypothetical Thirsty County scenario, divide the class into engineering teams of 2-3 students each, and ask each team to write a short "proposal" response to the municipality of Thirsty County to address the residents' needs. Proposals should comment on the needs of the residents, some possible solutions (at least a Plan A and Plan B), and benefits/problems associated with each plan proposed. For example, students may write a statement that says their team will "address the residents' needs by designing a dam that provides people with water during summer droughts, protects buildings from flash floods and storms, and produces hydropower as a clean energy alternative to coal-fired power plants.

5E Model	
Performance Expectation: MS-ESS3-5 **MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.**	
Engage: Anticipatory Set	Show the trailer for the movie “Chasing Ice”. Have students work in small groups or pairs to try and identify themes or ideas conveyed by the trailer. https://chasingice.com/ Have students read the online National Geographic article “The Big Thaw”. The article explores the issues around global warming and melting glaciers. View and discuss each photo from the photo gallery. http://ngm.nationalgeographic.com/2007/06/big-thaw/big-thaw-text Show students a graph of the increase in average temperature on Earth over the last few years. Have students examine the graph and make hypotheses about why the temperature has increased. http://climate.nasa.gov/vital-signs/global-temperature/
Exploration: Student Inquiry	Activity 1: Exploring Global Climate Change Have students view the video Global Warming 101. After viewing the video, lead a brief discussion about the facts presented.

	http://video.nationalgeographic.com/video/101-videos/global-warming-101. Allow students to view the National Geographic site on Global Warming http://environment.nationalgeographic.com/environment/global-warming/ Next, student will the explore NASA's climate change website: On this site, students can view facts, explore interactive features, view videos, read articles related to climate change, providing them with a basis of understanding on this topic. http://climate.nasa.gov/. After exploring the site, direct students to NASA's whiteboard animation series. Guide students in viewing and discussion several of these video animations. Following each video, lead students in a discussion to assess their thoughts and reactions. http://climate.nasa.gov/climate_resource_center/earthminute Climate Hot Map http://www.climatehotmap.org/index.html Activity 2: Viewpoints on Global Warming To expose students to opposing viewpoints on global warming, have students read the article: Is Global Warming Real? This article presents the five top arguments both for and against global warming. http://www.conserve-energy-future.com/is-global-warming-real.php After reading this article, have students complete the Venn-Diagram to answer the question: Has human activity caused the world's climate to change over the past 100 years? Have students discuss their completed diagrams. What were some of the similarities and differences among the completed Venn-Diagrams? http://www-tc.pbs.org/now/classroom/globalvenn.pdf Activity 3: Making Predictions About the Effects of Global Warming With a basic understanding of the global climate change, students can now make predictions about the potential impact of global warming. Ask students to hypothesize about how the world's climate could change over the next 100 years if humans do not take action. Have students make predictions about the effects such climate changes could have on humans. Have students explore NASA proposed solutions to climate change, specifically proposed energy innovations. In groups, have students visit the following website and select one of the innovations. Students should read the article on their chosen innovation and gather key facts. Have students share these facts through brief group presentations. http://climate.nasa.gov/solutions/energy_innovations/
Explanation: Concepts & Practices	In these lessons: Teachers Should: Introduce formal labels, definitions, and explanations for concepts, practices, skills or abilities. Students Should: Verbalize conceptual understandings and demonstrate scientific and engineering practices. Topics to Be Discussed in Teacher Directed Lessons (Disciplinary Core Ideas): ESS3.D: Global Climate Change

	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.
Elaboration: Extension Activity	Global Warming Project (PBS) http://www-tc.pbs.org/now/classroom/globalproject.pdf
Evaluation: Assessment	Assessment Task A: Question Debate Ask questions to identify and clarify evidence of an argument. Following Activity 2- Viewpoints on Global Warming, students will be asked to pick a position on the topic of global warming. Using the evidence they gathered for both positions on their Venn-Diagram, the students will then be asked to construct a series of questions that could be used in a class debate on the topic. The questions that the students formulate should be directed to those who identify with the opposing view. Students will be assessed on the quality of the questions they develop and their overall participation in the debate.

Why aren't minerals and groundwater distributed evenly across the world?

Students construct an understanding of the ways that human activities affect Earth's systems. Students use practices to understand the significant and complex issues surrounding human uses of land, energy, mineral, and water resources and the resulting impacts on the development of these resources. Students also understand that the distribution of these resources is uneven due to past and current geosciences processes or removal by humans. The crosscutting concepts of *patterns, cause and effect*, and *stability and change* are called out as organizing concepts for these disciplinary core ideas. In this unit of study students are expected to demonstrate proficiency in *asking questions, analyzing and interpreting data, constructing explanations, and designing solutions.* Students are also expected to use these practices to demonstrate understanding of the core ideas.

This unit is based on MS-ESS3-1, MS-ESS3-2, MS-ESS3-4, and MS-ESS3-5.

#	STUDENT LEARNING OBJECTIVES	CORRESPONDING PEs and DCIs
1	**Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.** *[Clarification Statement: Emphasis is on how these resources are limited and typically nonrenewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geologic traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock).]* **(MS-ESS3-1)**	MS-ESS3-1

2	**Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.** *[Clarification Statement: Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires) or local (such as building basements in tornado-prone regions or reservoirs to mitigate droughts).]* **(MS-ESS3-2)**	MS-ESS3-2
3	**Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.** *[Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.]* **(MS-ESS3-4)**	MS-ESS3-4
4	**Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.** *[Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]* **(MS-ESS3-5)**	MS-ESS3-5

The Student Learning Objectives above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that

ESS3.A: Natural Resources

Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes.

ESS3.B: Natural Hazards

Mapping the history of natural hazards in a region, combined with an understanding of

Crosscutting Concepts

Cause and Effect

Cause and effect relationships may be used to predict phenomena in natural or designed systems.

Connections to Engineering, Technology, and Applications of Science

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. **Analyzing and Interpreting Data** Analyzing data in 6–8 builds on K–5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. Analyze and interpret data to determine similarities and differences in findings. **Engaging in Argument from Evidence** Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s). 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. **Asking Questions and Defining Problems** Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships	**related geologic forces can help forecast the locations and likelihoods of future events.** **ESS3.C: Human Impacts on Earth Systems** **Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.** **ESS3.D: Global Climate Change** **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.**	**Influence of Science, Engineering, and Technology on Society and the Natural World** **All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment.** **Patterns** **Graphs, charts, and images can be used to identify patterns in data.** **Connections to Engineering, Technology, and Applications of Science** **Influence of Science, Engineering, and Technology on Society and the Natural World** **The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus**

between variables, and clarifying arguments and models. Ask questions to identify and clarify evidence of an argument.		technology use varies from region to region and over time. Cause and Effect Cause and effect relationships may be used to predict phenomena in natural or designed systems. Connections to Engineering, Technology, and Applications of Science Influence of Science, Engineering, and Technology on Society and the Natural World All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. Connections to Nature of Science Science Addresses Questions About the Natural and Material World

		Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. **Stability and Change** **Stability might be disturbed either by sudden events or gradual changes that accumulate over time.**

Connections to other DCIs in this grade-band: MS.PS1.A ; MS.PS1.B ; MS.ESS2.D ; MS.PS3.C ; MS.LS2.A ; MS.LS4.D ; MS.PS3.A
Articulation of DCIs across grade-bands: 4.PS3.D ; 4.ESS3.A ; HS.PS3.B ; HS.LS1.C ; HS.ESS2.A ; HS.ESS2.B ; HS.ESS2.C ; HS.ESS3.A ; 3.ESS3.B ; 4.ESS3.B ; HS.ESS2.B ; HS.ESS2.D ; HS.ESS3.B ; HS.ESS3.D ; 3.LS2.C ; 3.LS4.D ; 5.ESS3.C ; HS.LS2.A ; HS.LS2.C ; HS.LS4.C ; HS.LS4.D ; HS.ESS2.E ; HS.ESS3.A ; HS.ESS3.C ; HS.PS3.B ; HS.PS4.B ; HS.ESS2.A ; HS.ESS2.D ; HS.ESS3.C ; HS.ESS3.D
Common Core State Standards Connections: ELA: SL.8.5 RST.6-8.1, WHST.6-8.2, WHST.6-8.9 ; RST.6-8.1, RST.6-8.7 ; WHST.6-8.1, WHST.6-8.9 ; RST.6-8.1 **Math: 6.EE.B.6, 7.EE.B.4 ; MP.2, 6.EE.B.6, 7.EE.B.4 ; 6.RP.A.1, 7.RP.A.2, 6.EE.B.6, 7.EE.B.4 ; MP.2, 6.EE.B.6, 7.EE.B.4**