Earth Systems Science Side-by-Side

2021 Knowledge and Skill Statement/Student Expectation	2021 Text	2017 Knowledge and Skill Statement/Student Expectation	2017 Text	Notes from TEA Staff
SCIENCE.EARTH.1	Scientific and engineering practices. The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to explain phenomena or design solutions using appropriate tools and models. The student is expected to:	**EARTH.1**	Scientific ~~processes~~. The student conducts laboratory and field investigations, for at least 40% of instructional time, using safe, ~~environmentally appropriate, and ethical practices~~. The student is expected to:	
		EARTH.2	Scientific ~~processes~~. The student ~~uses scientific methods during~~ laboratory and field investigations. The student is expected to:	
SCIENCE.EARTH.1A	ask questions and define problems based on observations or information from text, phenomena, models, or investigations;			
SCIENCE.EARTH.1B	apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;			
SCIENCE.EARTH.1C	use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;	**EARTH.1.A**	~~demonstrate~~ safe practices during laboratory and field investigations;	
SCIENCE.EARTH.1D	use appropriate tools such as a drawing compass, magnetic compass, bar magnets, topographical and geological maps, satellite imagery and other remote sensing data, Geographic Information Systems (GIS), Global Positioning System (GPS), hand lenses, and fossil and rock sample kits;	**EARTH.2.E**	~~demonstrate the~~ use ~~of course equipment, techniques, and procedures, including computers and web-based computer applications~~;	
		EARTH.2.F	use ~~a wide variety of additional course apparatuses, equipment, techniques, and procedures as appropriate~~ such as satellite imagery and other remote sensing data, Geographic Information Systems (GIS), Global Positioning System (GPS), ~~scientific probes, microscopes, telescopes, modern video and image libraries, weather stations~~, fossil and rock kits, bar magnets, ~~coiled springs, wave simulators, tectonic plate models, and planetary globes~~;	
SCIENCE.EARTH.1E	collect quantitative data using the International System of Units (SI) and qualitative data as evidence;	**EARTH.2.H**	~~use mathematical procedures such as algebra, statistics, scientific notation, and significant figures to analyze~~ data using the International System (SI) units; and	
SCIENCE.EARTH.1F	organize quantitative and qualitative data using scatter plots, line graphs, bar graphs, charts, data tables, digital tools, diagrams, scientific drawings, and student-prepared models;	**EARTH.2.G**	organize, ~~analyze, evaluate, make inferences, and predict trends from~~ data;	
SCIENCE.EARTH.1G	develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and			
SCIENCE.EARTH.1H	distinguish between scientific hypotheses, theories, and laws.	**EARTH.2.B**	~~know that~~scientific hypotheses~~are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories~~;	
		EARTH.2.C	~~know that~~ scientific theories ~~are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly reliable explanations, but may be subject to change as new areas of science and new technologies are developed~~;	
		EARTH.2.D	distinguish between scientific hypotheses and scientific theories;	
		~~**EARTH.1.B**~~	~~demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials; and~~	The use and conservation of resources are covered in elementary and middle school science.

		~~EARTH.1.C~~	~~use the school's technology and information systems in a wise and ethical manner.~~	
		~~EARTH.2.A~~	~~know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;~~	
SCIENCE.EARTH.2	Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:			
SCIENCE.EARTH.2A	identify advantages and limitations of models such as their size, scale, properties, and materials;			
SCIENCE.EARTH.2B	analyze data by identifying significant statistical features, patterns, sources of error, and limitations;	**EARTH.2.H**	use mathematical ~~procedures such as algebra, statistics, scientific notation, and significant figures to~~ analyze data ~~using the International System (SI) units~~; and	
SCIENCE.EARTH.2C	use mathematical calculations to assess quantitative relationships in data; and			
SCIENCE.EARTH.2D	evaluate experimental and engineering designs.			
SCIENCE.EARTH.3	Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:			
SCIENCE.EARTH.3A	develop explanations and propose solutions supported by data and models consistent with scientific ideas, principles, and theories;			
SCIENCE.EARTH.3B	communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and	**EARTH.2.I**	communicate ~~valid conclusions supported by data using several formats such as technical reports, lab reports, labeled drawings, graphic organizers, journals, presentations, and technical posters.~~	
SCIENCE.EARTH.3C	engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.			
SCIENCE.EARTH.4	Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:	~~EARTH.3~~	~~Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:~~	
SCIENCE.EARTH.4A	analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student;	**EARTH.3.A**	~~in all fields of science,~~ analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, ~~including examining all sides of scientific evidence of those scientific explanations~~, so as to encourage critical thinking by the student;	
SCIENCE.EARTH.4B	relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content; and	**EARTH.3.D**	~~evaluate~~ the impact of research on scientific thought, society, and ~~public policy~~;	
		EARTH.3.F	~~learn and understand~~ the contributions of scientists ~~to the historical development of Earth and space sciences~~.	
SCIENCE.EARTH.4C	research and explore resources such as museums, planetariums, observatories, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers.	**EARTH.3.E**	explore careers ~~and collaboration among scientists in Earth and space sciences~~; and	
		~~EARTH.3.B~~	~~communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;~~	
		~~EARTH.3.C~~	~~draw inferences based on data related to promotional materials for products and services;~~	

SCIENCE.EARTH.5	Science concepts. The student understands the formation of the Earth and how objects in the solar system affect Earth's systems. The student is expected to:			
SCIENCE.EARTH.5A	analyze how gravitational condensation of solar nebular gas and dust can lead to the accretion of planetesimals and protoplanets;	**EARTH.5.A**	analyze how gravitational condensation of solar nebular gas and dust can lead to the accretion of planetesimals and protoplanets;	
SCIENCE.EARTH.5B	identify comets, asteroids, meteoroids, and planets in the solar system and describe how they affect the Earth and Earth's systems; and			
SCIENCE.EARTH.5C	explore the historical and current hypotheses for the origin of the Moon, including the collision of Earth with a Mars-sized planetesimal.	**EARTH.5.D**	explore the historical and current hypotheses for the origin of the Moon, including the collision of Earth with a Mars-sized planetesimal;	
		~~**EARTH.4**~~	~~Earth in space and time. The student knows how Earth-based and space-based astronomical observations reveal differing theories about the structure, scale, composition, origin, and history of the universe. The student is expected to:~~	The Earth in space and time strand was deleted from Earth Systems Science and information is covered in Astronomy.
		~~**EARTH.4.A**~~	~~evaluate the evidence concerning the Big Bang model such as red shift and cosmic microwave background radiation and current theories of the evolution of the universe, including estimates for the age of the universe;~~	The Earth in space and time strand was deleted from Earth Systems Science and information is covered in Astronomy.
		~~**EARTH.4.B**~~	~~explain how the Sun and other stars transform matter into energy through nuclear fusion; and~~	The Earth in space and time strand was deleted from Earth Systems Science and information is covered in Astronomy.
		~~**EARTH.4.C**~~	~~investigate the process by which a supernova can lead to the formation of successive generation stars and planets.~~	The Earth in space and time strand was deleted from Earth Systems Science and information is covered in Astronomy.
SCIENCE.EARTH.6	Science concepts. The student knows the evidence for the formation and composition of Earth's atmosphere, hydrosphere, biosphere, and geosphere. The student is expected to:	**EARTH.6**	Earth in space and time. The student knows the evidence for how Earth's atmospheres, hydrosphere, and geosphere formed ~~and changed through time.~~ The student is expected to:	
SCIENCE.EARTH.6A	describe how impact accretion, gravitational compression, radioactive decay, and cooling differentiated proto-Earth into layers;	**EARTH.5.B**	~~investigate thermal energy sources, including kinetic heat of~~ impact accretion, gravitational compression, and radioactive decay, ~~which are thought to allow protoplanet~~ differentiation into layers;	
SCIENCE.EARTH.6B	evaluate the roles of volcanic outgassing and water-bearing comets in developing Earth's atmosphere and hydrosphere;	**EARTH.6.B**	evaluate the role of volcanic outgassing and ~~impact of~~ water-bearing comets in developing Earth's atmosphere and hydrosphere;	
SCIENCE.EARTH.6C	evaluate the evidence for changes to the chemical composition of Earth's atmosphere prior to the introduction of oxygen;	**EARTH.6.A**	~~analyze the~~ changes ~~of~~ Earth's atmosphere ~~that could have occurred through time from the original hydrogen-helium atmosphere, the carbon dioxide-water vapor-methane atmosphere, and the current nitrogen-oxygen atmosphere~~;	
SCIENCE.EARTH.6D	evaluate scientific hypotheses for the origin of life through abiotic chemical processes; and	**EARTH.13.F**	~~discuss~~ scientific hypotheses for the origin of life by abiotic chemical processes ~~in an aqueous environment through complex geochemical cycles given the complexity of living systems~~.	
SCIENCE.EARTH.6E	describe how the production of oxygen by photosynthesis affected the development of the atmosphere, hydrosphere, geosphere, and biosphere.	**EARTH.6.C**	~~investigate~~ how the ~~formation~~ of ~~atmospheric~~ oxygen ~~and the ozone layer impacted the formation~~ of the geosphere and biosphere; and	
		~~**EARTH.5**~~	~~Earth in space and time. The student understands the solar nebular accretionary disk model. The student is expected to:~~	The Earth in space and time strand was deleted from Earth Systems Science and information is covered in Astronomy.
		~~**EARTH.5.C**~~	~~contrast the characteristics of comets, asteroids, and meteoroids and their positions in the solar system, including the orbital regions of the terrestrial planets, the asteroid belt, gas giants, Kuiper Belt, and Oort Cloud;~~	The Earth in space and time strand was deleted from Earth Systems Science and information is covered in Astronomy.
		~~**EARTH.5.E**~~	~~compare terrestrial planets to gas-giant planets in the solar system, including structure, composition, size, density, orbit, surface features, tectonic activity, temperature, and suitability for life; and~~	The Earth in space and time strand was deleted from Earth Systems Science and information is covered in Astronomy.

SCIENCE.EARTH.7	Science concepts. The student knows that rocks and fossils provide evidence for geologic chronology, biological evolution, and environmental changes. The student is expected to:	**EARTH.7**	~~Earth in space and time~~. The student knows that ~~scientific dating methods of~~ fossils and rock ~~sequences are used to construct a~~ chronology ~~of Earth's history expressed in the~~ geologic ~~time scale~~. The student is expected to:
		EARTH.8	~~Earth in space and time~~. The student knows that fossils provide evidence for geological and biological evolution. Students are expected to:
SCIENCE.EARTH.7A	describe the development of multiple radiometric dating methods and analyze their precision, reliability, and limitations in calculating the ages of igneous rocks from Earth, the Moon, and meteorites;	**EARTH.7.B**	calculate the ages of igneous rocks from Earth and the Moon and meteorites ~~using~~ radiometric dating methods; and
SCIENCE.EARTH.7B	apply relative dating methods, principles of stratigraphy, and index fossils to determine the chronological order of rock layers;	**EARTH.8.A**	~~analyze and evaluate a variety of~~ fossil ~~types such as transitional fossils, proposed transitional fossils, fossil lineages, and significant fossil deposits with regard to their appearance, completeness, and alignment with scientific explanations in light of this fossil data~~;
SCIENCE.EARTH.7C	construct a model of the geological time scale using relative and absolute dating methods to represent Earth's approximate 4.6-billion-year history;	**EARTH.7.C**	~~understand how multiple~~ dating methods ~~are used to~~ construct the geologic time scale, ~~which~~ represents Earth's approximate 4.6-billion-year history.
SCIENCE.EARTH.7D	explain how sedimentation, fossilization, and speciation affect the degree of completeness of the fossil record;	**EARTH.8.B**	explain how sedimentation, fossilization, and speciation affect the degree of completeness of the fossil record; and
SCIENCE.EARTH.7E	describe how evidence of biozones and faunal succession in rock layers reveal information about the environment at the time those rocks were deposited and the dynamic nature of the Earth; and		
SCIENCE.EARTH.7F	analyze data from rock and fossil succession to evaluate the evidence for and significance of mass extinctions, major climatic changes, and tectonic events.	**EARTH.8.C**	~~evaluate the~~ significance of ~~the terminal Permian and Cretaceous~~ mass extinction ~~events, including adaptive radiations of organisms after the events~~.
		EARTH.7.A	~~evaluate relative dating methods using original horizontality, rock superposition, lateral continuity, cross-cutting relationships, unconformities, index fossils, and biozones based on~~ fossil succession ~~to determine chronological order;~~
SCIENCE.EARTH.8	Science concepts. The student knows how the Earth's interior dynamics and energy flow drive geological processes on Earth's surface. The student is expected to:	**EARTH.9**	~~Solid Earth~~. The student knows Earth's interior ~~is differentiated chemically, physically, and thermally~~. The student is expected to:
		EARTH.10	~~Solid Earth.~~ The student knows ~~that plate tectonics is the global mechanism for major~~ geologic processes ~~and that heat transfer, governed by the principles of thermodynamics, is the~~ driving ~~force~~. The student is expected to:
SCIENCE.EARTH.8A	evaluate heat transfer through Earth's systems by convection and conduction and include its role in plate tectonics and volcanism;	**EARTH.9.A**	evaluate heat transfer through Earth's subsystems by ~~radiation~~, convection, and conduction and include its role in plate tectonics, volcanism, ~~ocean circulation, weather, and climate~~;
SCIENCE.EARTH.8B	develop a model of the physical, mechanical, and chemical composition of Earth's layers using evidence from Earth's magnetic field, the composition of meteorites, and seismic waves;	**EARTH.9.B**	~~examine~~ the chemical, physical, and ~~thermal structure~~ of Earth's ~~crust, mantle, and core, including the lithosphere and asthenosphere~~;
		EARTH.9.C	~~explain how scientists use geophysical methods such as~~ seismic wave ~~analysis, gravity~~, and magnetism ~~to interpret~~ Earth's ~~structure~~; and
SCIENCE.EARTH.8C	investigate how new conceptual interpretations of data and innovative geophysical technologies led to the current theory of plate tectonics;	**EARTH.10.A**	investigate how new conceptual interpretations of data and innovative geophysical technologies led to the current theory of plate tectonics;
SCIENCE.EARTH.8D	describe how heat and rock composition affect density within Earth's interior and how density influences the development and motion of Earth's tectonic plates;	**EARTH.10.B**	describe how heat and rock composition affect density within Earth's interior and how density influences the development and motion of Earth's tectonic plates;

SCIENCE.EARTH.8E	explain how plate tectonics accounts for geologic processes, including sea floor spreading and subduction, and features, including ocean ridges, rift valleys, earthquakes, volcanoes, mountain ranges, hot spots, and hydrothermal vents;	**EARTH.10.C**	explain how plate tectonics accounts for geologic processes and features, including sea floor spreading, ocean ridges and rift valleys, subduction zones, earthquakes, volcanoes, mountain ranges, hot spots, and hydrothermal vents;	
		EARTH.11.B	explain how plate tectonics accounts for geologic ~~surface~~ processes and features, including ~~folds, faults, sedimentary basin formation,~~ mountain ~~building, and continental accretion;~~	
		~~**Earth.6.D**~~	~~evaluate the evidence that Earth's cooling led to tectonic activity, resulting in continents and ocean basins.~~	Plate tectonics is covered in Grade 7.
SCIENCE.EARTH.8F	calculate the motion history of tectonic plates using equations relating rate, time, and distance to predict future motions, locations, and resulting geologic features;	**EARTH.10.D**	calculate the motion history of tectonic plates using equations relating rate, time, and distance to predict future motions, locations, and resulting geologic features;	
SCIENCE.EARTH.8G	distinguish the location, type, and relative motion of convergent, divergent, and transform plate boundaries using evidence from the distribution of earthquakes and volcanoes; and	**EARTH.10.E**	distinguish the location, type, and relative motion of convergent, divergent, and transform plate boundaries using evidence from the distribution of earthquakes and volcanoes; and	
SCIENCE.EARTH.8H	evaluate the role of plate tectonics with respect to long-term global changes in Earth's subsystems such as continental buildup, glaciation, sea level fluctuations, mass extinctions, and climate change.	**EARTH.10.F**	evaluate the role of plate tectonics with respect to long-term global changes in Earth's subsystems such as continental buildup, glaciation, sea level fluctuations, mass extinctions, and climate change.	
		~~**EARTH.9.D**~~	~~describe the formation and structure of Earth's magnetic field, including its interaction with charged solar particles to form the Van Allen belts and auroras.~~	The structure of Earth's magnetic field was deleted from Earth Systems Science.
		~~**EARTH.11.C**~~	~~analyze changes in continental plate configurations such as Pangaea and their impact on the biosphere, atmosphere, and hydrosphere through time;~~	The history of plate tectonics is covered in Grade 7.
SCIENCE.EARTH.9	Science concepts. The student knows that the lithosphere continuously changes as a result of dynamic and complex interactions among Earth's systems. The student is expected to:	**EARTH.11**	~~Solid Earth~~. The student knows that the ~~geosphere~~ continuously changes ~~over a range of time scales involving~~ dynamic and complex interactions among Earth's ~~subsystems.~~ The student is expected to:	
SCIENCE.EARTH.9A	interpret Earth surface features using a variety of methods such as satellite imagery, aerial photography, and topographic and geologic maps using appropriate technologies;	**EARTH.11.D**	interpret Earth surface features using a variety of methods such as satellite imagery, aerial photography, and topographic and geologic maps using appropriate technologies; and	
SCIENCE.EARTH.9B	investigate and model how surface water and ground water change the lithosphere through chemical and physical weathering and how they serve as valuable natural resources;			
SCIENCE.EARTH.9C	model the processes of mass wasting, erosion, and deposition by water, wind, ice, glaciation, gravity, and volcanism in constantly reshaping Earth's surface; and	**EARTH.11.A**	~~compare the roles of~~ erosion and deposition ~~through the actions of~~ water, wind, ice, gravity, and ~~igneous activity by lava~~ in constantly reshaping Earth's surface;	
SCIENCE.EARTH.9D	evaluate how weather and human activity affect the location, quality, and supply of available freshwater resources.	~~**EARTH.12.A**~~	~~evaluate how the use of energy, water, mineral, and rock resources affects Earth's subsystems;~~	The use of resources and their impact on Earth are covered in Grade 6.
SCIENCE.EARTH.10	Science concepts. The student knows how the physical and chemical properties of the ocean affect its structure and flow of energy. The student is expected to:			
SCIENCE.EARTH.10A	describe how the composition and structure of the oceans leads to thermohaline circulation and its periodicity;	**EARTH.14.C**	~~explain~~ how ~~thermal energy transfer between the ocean and atmosphere drives surface currents~~, thermohaline ~~currents, and evaporation that influence climate~~.	
SCIENCE.EARTH.10B	model and explain how changes to the composition, structure, and circulation of deep oceans affect thermohaline circulation using data on energy flow, ocean basin structure, and changes in polar ice caps and glaciers; and			

SCIENCE.EARTH.10C	analyze how global surface ocean circulation is the result of wind, tides, the Coriolis effect, water density differences, and the shape of the ocean basins.			
SCIENCE.EARTH.11	Science concepts. The student knows that dynamic and complex interactions among Earth's systems produce climate and weather. The student is expected to:	**EARTH.15**	~~Fluid Earth~~. The student knows that interactions among Earth's five subsystems influence climate and ~~resource availability~~, ~~which affect Earth's habitability~~. The student is expected to:	
SCIENCE.EARTH.11A	analyze how energy transfer through Milankovitch cycles, albedo, and differences in atmospheric and surface absorption are mechanisms of climate;	**EARTH.14.A**	analyze ~~the uneven distribution of solar~~ energy ~~on Earth's surface, including~~ differences in atmospheric ~~transparency, surface~~ albedo, ~~Earth's tilt, duration of insolation, and differences in~~ atmospheric and surface absorption ~~of energy;~~	
SCIENCE.EARTH.11B	describe how Earth's atmosphere is chemically and thermally stratified and how solar radiation interacts with the layers to cause the ozone layer, the jet stream, Hadley and Ferrel cells, and other atmospheric phenomena;			
SCIENCE.EARTH.11C	model how greenhouse gases trap thermal energy near Earth's surface;	**EARTH.14.B**	~~investigate~~ how ~~the atmosphere is heated from~~ Earth's surface ~~due to absorption of solar energy, which is re-radiated as~~ thermal energy ~~and~~ trapped ~~by selective absorbers~~; and	
SCIENCE.EARTH.11D	evaluate how the combination of multiple feedback loops alter global climate;			
SCIENCE.EARTH.11E	investigate and analyze evidence for climate changes over Earth's history using paleoclimate data, historical records, and measured greenhouse gas levels;	**EARTH.15.B**	investigate evidence ~~such as ice cores, glacial striations, and fossils for climate variability and its use in developing computer models to explain present and predict future~~ climates;	
SCIENCE.EARTH.11F	explain how the transfer of thermal energy among the hydrosphere, lithosphere, and atmosphere influences weather; and	**EARTH.14.C**	explain how thermal energy transfer ~~between the ocean and~~ atmosphere ~~drives surface currents, thermohaline currents, and evaporation that~~ influence ~~climate~~.	
SCIENCE.EARTH.11G	describe how changing surface-ocean conditions, including El Niño-Southern Oscillation, affect global weather and climate patterns.	**EARTH.15.A**	describe how changing surface-ocean conditions, including El Niño-Southern Oscillation, affect global weather and climate patterns;	
		~~**EARTH.14**~~	~~Fluid Earth. The student knows that Earth's global ocean stores solar energy and is a major driving force for weather and climate through complex atmospheric interactions. The student is expected to:~~	Ocean's impact on weather and climate is covered in Grades 5 and 8.
		~~**EARTH.15.C**~~	~~quantify the dynamics of surface and groundwater movement such as recharge, discharge, evapotranspiration, storage, residence time, and sustainability;~~	The hydrosphere and the movement of water within it are covered in Grades 4-7.
		~~**EARTH.15.E**~~	~~analyze recent global ocean temperature data to predict the consequences of changing ocean temperature on evaporation, sea level, algal growth, coral bleaching, hurricane intensity, and biodiversity.~~	Aquatic ecosystem balance and factors that disrupt the balance are covered in Aquatic Science.
SCIENCE.EARTH.12	Science concepts. The student understands how Earth's systems affect and are affected by human activities, including resource use and management. The student is expected to:	**EARTH.12**	~~Solid Earth~~. The student ~~knows that~~ Earth ~~contains energy, water, mineral, and rock~~ resources ~~and that~~ use ~~of these~~ resources ~~impacts~~ Earth's ~~subsystems~~. The student is expected to:	
SCIENCE.EARTH.12A	evaluate the impact on humans of natural changes in Earth's systems such as earthquakes, tsunamis, and volcanic eruptions;	**EARTH.11.E**	evaluate the impact of changes in Earth's ~~subsystems~~ on humans such as earthquakes, tsunamis, volcanic eruptions, hurricanes, flooding, and ~~storm surges and the impact of humans on Earth's subsystems such as population growth, fossil fuel burning, and use of fresh water~~.	
SCIENCE.EARTH.12B	analyze the impact on humans of naturally occurring extreme weather events such as flooding, hurricanes, tornadoes, and thunderstorms;			
SCIENCE.EARTH.12C	analyze the natural and anthropogenic factors that affect the severity and frequency of extreme weather events and the hazards associated with these events;			

SCIENCE.EARTH.12D	analyze recent global ocean temperature data to predict the consequences of changing ocean temperature on evaporation, sea level, algal growth, coral bleaching, and biodiversity;			
SCIENCE.EARTH.12E	predict how human use of Texas's naturally occurring resources such as fossil fuels, minerals, soil, solar energy, and wind energy directly and indirectly changes the cycling of matter and energy through Earth's systems; and	**EARTH.12.A**	~~evaluate~~ how the use of energy, ~~water~~, mineral, ~~and rock~~ resources ~~affects~~ Earth's ~~subsystems~~;	
SCIENCE.EARTH.12F	explain the cycling of carbon through different forms among Earth's systems and how biological processes have caused major changes to the carbon cycle in those systems over Earth's history.	**EARTH.13.C**	~~analyze the empirical relationship between the emissions of~~ carbon ~~dioxide, atmospheric carbon dioxide levels, and the average global temperature trends over the past 150 years;~~	
		EARTH.15.D	explain ~~the global~~ carbon cycle, ~~including how carbon exists in~~ different forms ~~within the five subsystems and how these forms affect life; and~~	
		~~**EARTH.12.B**~~	~~describe the formation of fossil fuels, including petroleum and coal;~~	Fossil fuel formation is covered in Grade 5.
		~~**EARTH.12.C**~~	~~discriminate between renewable and nonrenewable resources based upon rate of formation and use;~~	Renewable and nonrenewable resources are covered in Grade 4.
		~~**EARTH.13**~~	~~Fluid Earth. The student knows that the fluid Earth is composed of the hydrosphere, cryosphere, and atmosphere subsystems that interact on various time scales with the biosphere and geosphere. The student is expected to:~~	Interactions among atmospheric subsystems are covered in Grade 8.
		~~**EARTH.13.A**~~	~~quantify the components and fluxes within the hydrosphere such as changes in polar ice caps and glaciers, salt water incursions, and groundwater levels in response to precipitation events or excessive pumping;~~	Fluxes within the hydrosphere have been deleted from Earth Systems Science.
		~~**EARTH.13.B**~~	~~analyze how global ocean circulation is the result of wind, tides, the Coriolis effect, water density differences, and the shape of the ocean basins;~~	Ocean circulation is covered in Grade 8.
		~~**EARTH.13.D**~~	~~discuss mechanisms and causes such as selective absorbers, major volcanic eruptions, solar luminance, giant meteorite impacts, and human activities that result in significant changes in Earth's climate;~~	Events that result in significant climate changes are covered in Grade 8.
		~~**EARTH.13.E**~~	~~investigate the causes and history of eustatic sea-level changes that result in transgressive and regressive sedimentary sequences; and~~	The history of eustatic sea level changes has been deleted from Earth Systems Science.
SCIENCE.EARTH.13	Science concepts. The student explores global policies and careers related to the life cycles of Earth's resources. The student is expected to:			
SCIENCE.EARTH.13A	analyze the policies related to resources from discovery to disposal, including economics, health, technological advances, resource type, concentration and location, waste disposal and recycling, mitigation efforts, and environmental impacts; and	**EARTH.12.D**	analyze the economics of resources from discovery to disposal, including technological advances, resource type, concentration and location, waste disposal and recycling, and environmental ~~costs~~; and	
SCIENCE.EARTH.13B	explore global and Texas-based careers that involve the exploration, extraction, production, use, disposal, regulation, and protection of Earth's resources.	**EARTH.12.E**	explore careers that involve the exploration, extraction, production, use, and disposal of Earth's resources.	
KEY	**Blue double underline: indicates content new to the grade level**		~~**Orange strike through: indicates content was deleted**~~	