Georgia Science

# Earth Systems

Adopted 2016

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| **Obtain, evaluate, and communicate information to investigate the composition and formation of Earth systems, including the Earth's place in the solar system.** SES1 | **a.** Construct an explanation of the origins of the solar system from scientific evidence including the composition, distribution and motion of solar system objects. SES1.A |
| | **b.** Ask questions to evaluate evidence for the development and composition of Earth's early systems, including the geosphere (crust, mantle and core), hydrosphere and atmosphere. SES1.B |
| | **c.** Develop a model of the physical composition of Earth's layers using multiple types of evidence (e.g., Earth's magnetic field, composition of meteorites and seismic waves). SES1.C |
| **Obtain, evaluate, and communicate information to understand how plate tectonics creates certain geologic features, landforms, Earth materials, and geologic hazards.** SES2 | **a.** Construct an explanation based on evidence that describes the mechanisms causing plate tectonic motion. SES2.A |
| | **b.** Develop and use models for the different types of plate tectonic settings (convergent, divergent and transform boundaries). SES2.B |
| | **c.** Construct an explanation that communicates the relationship of geologic features, landforms, Earth materials and geologic hazards to each plate tectonic setting. SES2.C |
| | **d.** Ask questions to compare and contrast the relationship between transformation processes of all rock types (sedimentary, igneous, and metamorphic) and specific plate tectonic settings. SES2.D |
| | **e.** Construct an argument using multiple forms of evidence that supports the theory of plate tectonics (e.g., fossils, paleomagnetism, seafloor age, etc.). SES2.E |
| **Obtain, evaluate, and communicate information to explore the actions of water, wind, ice, and gravity as they relate to landscape change.** SES3 | **a.** Plan and carry out an investigation that demonstrates how surface water and groundwater act as the major agents of physical and chemical weathering. SES3.A |
| | **b.** Develop a model of the processes and geologic hazards that result from both sudden and gradual mass wasting. SES3.B |
| | **c.** Construct an explanation that relates the past and present actions of ice, wind, and water to landform distribution and landscape change. SES3.C |

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| | **d.** Construct an argument based on evidence that relates the characteristics of the sedimentary materials to the energy by which they were transported and deposited. SES3.D |
| **Obtain, evaluate, and communicate information to understand how rock relationships and fossils are used to reconstruct the Earth's past.** SES4 | **a.** Use mathematics and computational thinking to calculate the absolute age of rocks using a variety of methods (e.g., radiometric dating, rates of erosion, rates of deposition, and varve count). SES4.A |
| | **b.** Construct an argument applying principles of relative age (superposition, original horizontality, cross-cutting relations, and original lateral continuity) to interpret a geologic cross-section and describe how unconformities form. SES4.B |
| | **c.** Analyze and interpret data from rock and fossil succession in a rock sequence to interpret major events in Earth's history such as mass extinction, major climatic change, and tectonic events. SES4.C |
| | **d.** Construct an explanation applying the principle of uniformitarianism to show the relationship between sedimentary rocks and their fossils to the environments in which they were formed. SES4.D |
| | **e.** Construct an argument using spatial representations of Earth data that interprets major transitions in Earth's history from the fossil and rock record of geologically defined areas. SES4.E |
| **Obtain, evaluate, and communicate information to investigate the interaction of solar energy and Earth's systems to produce weather and climate.** SES5 | **a.** Develop and use models to explain how latitudinal variations in solar heating create differences in air pressure, global wind patterns, and ocean currents that redistribute heat globally. SES5.A |
| | **b.** Analyze and interpret data (e.g., maps, meteograms, and weather apps) that demonstrate how the interaction and movement of air masses creates weather. SES5.B |
| | **c.** Construct an argument that predicts weather patterns based on interactions among ocean currents, air masses, and topography. SES5.C |
| | **d.** Analyze and interpret data to show how temperature and precipitation produce the pattern of climate regions (zones) on Earth. SES5.D |
| | **e.** Construct an explanation that describes the conditions that generate extreme weather events (e.g., hurricanes, tornadoes, and thunderstorms) and the hazards associated with these events. SES5.E |
| | **f.** Construct an argument relating changes in global climate to variation to Earth/sun relationships and atmospheric composition. SES5.F |
| **Obtain, evaluate, and communicate information about how** | **a.** Construct an argument from evidence that describes how life has responded to major events in Earth's history (e.g., major climatic change, tectonic events) through extinction, migration, and/or adaptation. SES6.A |

**life on Earth responds to and shapes Earth's systems.** SES6

**b.** **Construct an explanation that describes how biological processes have caused major changes in Earth's systems through geologic time (e.g., nutrient cycling, atmospheric composition, and soil formation).** SES6.B

**c.** **Ask questions to investigate and communicate how humans depend on Earth's land and water resources, which are distributed unevenly around the planet as a result of past geological and environmental processes.** SES6.C

**d.** **Analyze and interpret data that relates changes in global climate to natural and anthropogenic modification of Earth's atmosphere and oceans.** SES6.D