Next Generation Science Standards Earth and Space Sciences

Middle School DCI

Earth's Place in the Universe

I The Universe and Its Stars

a The Universe and Its Stars ESS1.A

i Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models MS-ESS1-1

ii Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. MC-ESS1-2

II Earth and the Solar System

a Earth and the Solar System ESS1.B

i The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. MS-ESS1-2

ii The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. MS-ESS1-3

iii This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. MS-ESS1-1

iv The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. MS-ESS1-2

III The History of Planet Earth

a The History of Planet Earth ESS1.C

1 The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. MS-ESS1-4

Earth's Systems

I The History of Planet Earth

a The History of Planet Earth ESS1.C

i Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches. MS-ESS2-3

II Earth's Materials and Systems

a Earth's Materials and Systems ESS2.A

i 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. MS-ESS2-1

ii 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. MS-ESS2-2

III Plate Tectonics and Large-Scale System Interactions

a Plate Tectonics and Large-Scale System Interactions ESS2.B

i Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. MS-ESS2-3

IV The Roles of Water in Earth's Surface Processes

a The Roles of Water in Earth's Surface Processes ESS2.C

i Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. MS-ESS2-4

ii The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. MS-ESS2-5

iii Global movements of water and its changes in form are propelled by sunlight and gravity. MS-ESS2-4

iv Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. MS-ESS2-6

v Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations. MS-ESS2-2

V Weather and Climate

a Weather and Climate ESS2.D

i 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. MS-ESS2-6

ii Because these patterns are so complex, weather can only be predicted probabilistically. MS-ESS2-5

iii The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. MS-ESS2-6

Earth and Human Activity

I Natural Resources

a Natural Resources ESS3.A

i 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

II Natural Hazards

a Natural Hazards ESS3.B

i 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 MS-ESS3-2

III Human Impacts on Earth Systems

a Human Impacts on Earth Systems ESS3.C

i Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. MS-ESS3-3

ii 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-ESS3-3

iii 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

IV Global Climate Change

a Global Climate Change ESS3.D

i. 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