**Earth and Space Sciences**

**MS-ESS1 Earth’s Place in the Universe**

**MS-ESS1-1 Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.**

Further explanation: Examples of models can be physical, graphical, or conceptual. Examples could incorporate latitude and season connections, why Lubec is the first town in the continental U.S. to see the sunrise, and tides (king, neap, spring).

Developing and using models; the universe and its stars; earth and the solar system; patterns

**MS-ESS1-2 Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.**

Further explanation: Emphasis for the model is on gravity as the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them. Examples of models can be physical (such as the analogy of distance along a football field or computer visualizations of elliptical orbits) or conceptual (such as mathematical proportions relative to the size of familiar objects such as students’ school or state).

Developing and using models; the universe and its stars; earth and the solar system; systems and system models

**MS-ESS1-3 Analyze and interpret data to determine scale properties of objects in the solar system.**

Further explanation: Emphasis is on the analysis of data from Earth-based instruments, space-based telescopes, and spacecraft to determine similarities and differences among solar system objects. Examples of scale properties include the sizes of an object’s layers (such as crust and atmosphere), surface features (such as volcanoes), and orbital radius. Examples of data include statistical information, drawings and photographs, and models.

Analyzing and interpreting data; earth and the solar system; scale, proportion, and quantity

**MS-ESS1-4 Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth’s 4.6-billion-year-old history.**

Further explanation: Emphasis is on how analysis of rock formations and the fossils they contain are used to establish relative ages of major events in Earth’s history. Examples of Earth’s major events could range from being very recent (such as the last Ice Age or the earliest fossils of homo sapiens) to very old (such as the formation of Earth or the earliest evidence of life). Examples can include the formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms, or significant volcanic eruptions.

Constructing explanations and designing solutions; the history of planet earth; scale, proportion, and quantity