North Carolina Science

Earth and Environmental Science

Earth's Place in the Universe

1. **Explain how Earth's position relative to the sun influences conditions on Earth.** ESS.EES.1
    1. Use models to illustrate the formation of the solar system. ESS.EES.1.1
    2. Use mathematics and computational thinking to analyze Earth's motion through space. ESS.EES.1.2
    3. Use models to illustrate how the sun produces energy. ESS.EES.1.3
    4. Construct an explanation to infer how incoming solar radiation interacts with Earth systems to support life. ESS.EES.1.4

Earth's Systems

1. **Analyze how the geosphere is shaped by plate tectonics and the rock cycle.** ESS.EES.2
    1. Use models to explain how mantle convection powers plate tectonics. ESS.EES.2.1
    2. Analyze and interpret data to predict locations of volcanoes and earthquakes based on plate boundaries. ESS.EES.2.2
    3. Use models to explain how plate tectonics influence topography. ESS.EES.2.3
    4. Carry out investigations to explain how the rock cycle and rates of weathering, erosion, and soil formation influence Earth's systems. ESS.EES.2.4
    5. Analyze and interpret data to explain how volcanic activity influences changes in Earth's atmosphere, geosphere, biosphere, and hydrosphere. ESS.EES.2.5
2. **Analyze how the interactions between the hydrosphere and atmosphere transfer energy and influence climate.** ESS.EES.3
    1. Carry out investigations to explain the properties of water. ESS.EES.3.1
    2. Use models to explain how water is an agent of energy transfer. ESS.EES.3.2
    3. Analyze and interpret data to explain how major greenhouse gases influence climate. ESS.EES.3.3
    4. Analyze and interpret data to attribute how atmospheric composition and surface conditions influence heat retention in the troposphere. ESS.EES.3.4
    5. Construct an explanation to conclude that heat exchange between the ocean and atmosphere results in local, regional, global weather phenomena, and climate patterns. ESS.EES.3.5

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3 **Analyze the connections between the biosphere and other Earth systems (geosphere, hydrosphere, atmosphere).** ESS.EES.4

1 Use models to explain how abiotic/biotic interactions shape various ecosystems. ESS.EES.4.1

2 Analyze and interpret data to explain how carbon cycling influences various ecosystems. ESS.EES.4.2

3 Analyze and interpret data to explain past climate trends. ESS.EES.4.3

4 Construct an explanation to predict how potential future changes in abiotic factors could impact biodiversity and species distribution. ESS.EES.4.4

5 Obtain, evaluate and communicate information to explain how biodiversity impacts ecosystem resilience. ESS.EES.4.5

Earth and Human Activity

1 **Evaluate how human consumption patterns impact Earth's systems.** ESS.EES.5

1 Analyze and interpret data to explain the impacts of land use on Earth's systems. ESS.EES.5.1

2 Analyze and interpret data to evaluate how human use of ground and surface waters impacts water quality and availability in river basins, wetlands, estuaries, and aquifers. ESS.EES.5.2

3 Construct an argument to evaluate the ways that human activities influence atmospheric composition. ESS.EES.5.3

4 Construct an argument to evaluate the benefits and trade-offs of using non-renewable or renewable energy sources for electricity production and transportation fuels. ESS.EES.5.4

5 Construct an argument to evaluate potential solutions that will ensure sustainable consumption of Earth's resources. ESS.EES.5.5

6 Construct an argument to evaluate a range of solutions to mitigate impacts of human activities on Earth's systems. ESS.EES.5.6

2 **Analyze how Earth's systems impact humans and the biosphere.** ESS.EES.6

1 Analyze and interpret data to infer how use of natural resources impacts ecosystems and human populations, including human health. ESS.EES.6.1

2 Construct an argument to infer how some natural hazards (such as flooding and wildfires) are increasing in frequency and intensity due to human activities. ESS.EES.6.2

3 Construct an argument to explain how natural hazards and other environmental problems may impact some human populations more than others. ESS.EES.6.3