PHENOMENA, DRIVING QUESTIONS AND STORYLINE

WEATHER AND CLIMATE

This unit explores the anchoring phenomenon: Weather and climate change over time and vary from place to place. For example, some years are warmer than others or have more severe weather events, such as droughts, floods, and storms. There are also long-term trends in climate, such as rising average global temperatures. Students generate and answer questions such as: What causes weather events? What causes climate to vary from place to place? Have local severe weather events changed over the past 50 years? In what ways is the climate changing? What might be causing climate change?

Phenomenon	Driving Questions	Guiding Questions	Activities	PE	Storyline/Flow (How an activity leads to subsequent activities)
The weather seems to be getting more extreme (hotter/colder, drier/wetter, stronger storms, etc.).	Is the climate changing?	What is climate change, and how does it affect us? (Activity 1)	1, 10, 14, 15, 16, 17	MS-ESS3-5	The impacts of climate change are widespread and diverse. Climate is influenced by many factors and varies by location. Climate also changes over time. Human activities, such as the release of greenhouse gases into the atmosphere, have contributed to current global warming. This is causing changes to climates around the world.
		Why do different parts of the world have different climates? (Activity 10)			
		What role does the atmosphere play in weather and climate? (Activity 14)			
		Has Earth's atmosphere always been the same as it is today? (Activity 15)			
		What is contributing to the current global warming? (Activity 16; assessment activity)			
		Is the growth of Sunbeam City affecting its weather, atmosphere, and water availability? (Activity 17; applying MS-ESS3-5)			

PHENOMENA, DRIVING QUESTIONS AND STORYLINE

WEATHER AND CLIMATE (continued)

Phenomenon	Driving Questions	Guiding Questions	Activities	PE	Storyline/Flow (How an activity leads to subsequent activities)
Weather forecasts are sometimes wrong but often correct.	How can we predict weather?	How is daily weather data different from seasonal weather data? (Activity 2) How have severe weather events affected your region? (Activity 3) What percent of Earth's surface is covered in water? (Activity 5) What is the pattern of prevailing winds around Earth? (Activity 11) How will you design instruments to measure wind speed and direction? (Activity 12) How can weather maps be used to forecast weather? (Activity 13; assessment activity)	2, 3, 5, 11, 12, 13	MS-ESS2-5	Weather conditions vary from day to day, month to month, and across seasons. Sometimes weather conditions can be severe, causing damage to property and loss of life. Weather patterns are influenced by the movement of water in the atmosphere. This movement is determined by winds, landforms, and ocean temperatures and currents. Weather data are collected by a variety of instruments. These data can be used to forecast upcoming weather conditions (e.g., when different air masses collide at warm and cold fronts). Since many factors interact to influence the weather at a particular location, weather can only be predicted probabilistically.

PHENOMENA, DRIVING QUESTIONS AND STORYLINE

WEATHER AND CLIMATE (continued)

Phenomenon	Driving Questions	Guiding Questions	Activities	PE	Storyline/Flow (How an activity leads to subsequent activities)
The weather changes a lot during the year and from location to location.	What causes differences in weather and climate?	How is daily weather data different from seasonal weather data? (Activity 2) How have severe weather events affected your region? (Activity 3) Does the distribution of climates show any regional or global patterns? (Activity 4) What percent of Earth's surface is covered in water? (Activity 5) How do different surfaces on Earth gain and lose thermal energy? (Activity 6) How do ocean temperatures vary over the surface of Earth? (Activity 7) How does water behave when it mixes? (Activity 8) How do oceans affect climate? (Activity 9) Why do different parts of the world have different climates? (Activity 10) What is the pattern of prevailing winds around Earth? (Activity 11) How can a weather map be used to forecast weather? (Activity 13) What role does the atmosphere play in weather and climate? (Activity 14) (Assessment activity)	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14	MS-ESS2-6	Weather conditions vary from day to day, month to month, and across seasons. Sometimes weather conditions can become severe. Climates are described by the same conditions used to describe weather, and represent the average weather in a location over a long period of time. Climate patterns vary by latitude, altitude, and geographic land distribution. Oceans have an important effect on climate. They absorb energy from the sun, with the water nearest the equator warming up much more than water at higher latitudes. Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents that redistribute thermal energy. The atmosphere also has currents that move air and water from one place to another. Air and water are also driven by energy from the sun and, as with ocean currents, are influenced by the Coriolis effect, which is a result of the Earth's rotation. The resulting pattern of prevailing winds affects regional weather and climate. The way that Earth's atmosphere interacts with the sun's energy and the oceans thus helps determine Earth's average temperature and its different climate zones.