

Ohio: Earth and Space Sciences Grade Level Indicators Access to the Ohio Science Standards in PDF form.

Grade Level	Standard	GLOBE Protocol/Activity	NASA Resource
<p>Kindergarten</p> <p>ESS</p>	<p>Observing, exploring, describing and comparing weather changes, patterns in the sky and seasonal changes</p>	<p>Protocols: Air temperature, Clouds, Precipitation, Surface Temperature</p> <p>Source: <i>Do You Know Clouds Have Names</i></p> <p>Activities:</p> <ol style="list-style-type: none"> 1. Cloudscape 2. To Spread or Not to Spread 	<p>NASA Wavelength Digital Library: http://nasawavelength.org</p> <p>Visible Earth: http://visibleearth.nasa.gov</p> <p>Eyes on the Earth-3D http://eyes.jpl.nasa.gov</p> <p>Satellites that observe clouds or atmosphere</p> <p>Aura: Atmosphere composition http://aura.gsfc.nasa.gov</p> <p>Cloudsat: Structure, composition and effects of clouds on a global basis http://cloudsat.atmos.colostate.edu</p> <p>Goes: weather https://www.nasa.gov/content/goes</p> <p>GPM: precipitation https://pmm.nasa.gov/gpm</p> <p>Terra: Global Measurement of atmosphere http://terra.nasa.gov</p>
<p>Kindergarten</p> <p>LS</p>	<p>Observing, exploring, describing and comparing living things in Ohio</p>	<p>Protocols: Air Temperature, Surface Temperature</p> <p>Source: <i>Mystery of the Missing Humming Birds</i></p> <p>Activities:</p> <ol style="list-style-type: none"> 1. All Year Long 2. Honing in on Hummingbirds 	<p>NASA Wavelength Digital Library: http://nasawavelength.org</p> <p><i>Educators Guide to NASA Data and Images</i></p> <p>SATELLITE: LANDSAT http://landsat.gsfc.nasa.gov</p> <p>Terra: http://terra.nasa.gov</p>

Grade Level	Standard	GLOBE Protocol/Activity	NASA Resource
Kindergarten PS	Observing, exploring, describing and comparing Earth materials	Protocols: Soil temperature, Surface Temperature, Air Temperature Source: <i>The Scoop on Soils</i> Activities: 1. We All Need Soil 2. Getting to Know Soil 3. Soil Treasure Hunt	NASA Wavelength Digital Library: http://nasawavelength.org Activities: 1. Soil and My Backyard 2. Earth Systems in a Bottle SATELLITE: SMAP https://smap.jpl.nasa.gov
Grade 1 ESS	The Sun is Earth's source of Energy. The changes in energy that occur to land, air and water	Protocols: Soil temperature, Surface Temperature, Air Temperature Eclipse Source: <i>Mystery of the Missing Humming Birds</i> Activity: All Year Long	NASA Wavelength Digital Library: http://nasawavelength.org Activities: 1. Our Very Own Star: The Sun 2. The Source of Energy Lab 3. Eclipse Safety Bulletin 4. Sun as a Star Guide https://www.nasa.gov/pdf/145908main_Sun.As.A.Star.Guide.pdf SATELLITE: ISIS https://www.nasa.gov/mission_pages/iris/index.html
Grade 1 PS	Living things have basic needs which are met by	Protocols: Soil temperature, Surface Temperature,	NASA Wavelength Digital Library: http://nasawavelength.org 1. Harnessing the Sun's Energy 2. The Day Joshua Jumped Too Much https://sdo.gsfc.nasa.gov/assets/docs/ThinkScientifically_1.pdf

	obtaining materials from the physical environment. Living things will only live in environments that meet their needs.	Air Temperature Source: <i>All About Earth</i> Activities: 1. Earth Systems in a Bottle 2. We're all Connected 3. Earth System Play	Resources for The Day...Too Much https://sdo.gsfc.nasa.gov/assets/docs/Book1_resources.pdf SATELLITE: LANDSAT http://landsat.gsfc.nasa.gov Terra http://terra.nasa.gov
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Grade Level	Standard	GLOBE Protocol/Activity	NASA Resource
Grade 2 ES S	Focuses on air and water as it relates to weather and weather changes	Protocols: Air Temperature, Precipitation Source: <i>Do You Know Clouds have Names?</i> Activities: 1. Cloud Fun 2. Cloudscape 3. To Spread or Not to Spread	1. Rain Gauge Activity https://pmm.nasa.gov/education/lesson-plans/rain-gauge-activity 2. Precipitation Tower https://pmm.nasa.gov/education/lesson-plans/precipitation-towers 3. Water in the Geosphere https://pmm.nasa.gov/education/lesson-plans/water-earths-geosphere 4. The Water Cycle animation https://pmm.nasa.gov/education/videos/water-cycle-animation SATELLITE: GPM https://www.nasa.gov/mission_pages/GPM/main/index.html
Grade 2 PS	Focuses on how ecosystems work by observations of simple interactions between the	Protocols: Air Temperature, Surface Temperature, Soil	NASA Wavelength Digital Library: 1.Introducing Habitats and Biodiversity 2.The Air We Breathe https://www.nasa.gov/pdf/62452main_The_Air_We_Breathe.pdf 3. Nature Mapping

	biotic/living and abiotic/nonliving parts of an ecosystems. Living things impact the environment in which they interact just as the environment impacts living things in that environment.	Temperature, Precipitation Source: <i>All About Earth, The World on Stage</i> Activities: 1. Earth System in a Bottle 2. We Are All Connected 3. Earth System Play Source: <i>Discoveries at Willow Creek</i> Activity: Water Wonders (Water Creatures)	4. Water Wonders http://bit.ly/2ni2f1b
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Grade Level	Standard	GLOBE Protocol/Activity	NASA Resource
Grade 3 ESS	Focuses on the nonliving resources of air, water, soil, rock and the energy resources.	Protocols: Air Temperature, Surface Temperature, Soil Temperature, Soil Moisture, Precipitation Source: <i>Discoveries at Willow Creek</i> Activities: 1. Water Wonders (Water Quality) 2. Magnify That	NASA Wavelength Digital Library: http://nasawavelength.org The Story of Fossil Fuels, Part 1 http://climatekids.nasa.gov/fossil-fuels-coal/ The Story of Fossil Fuels, Part 2 http://climatekids.nasa.gov/fossil-fuels-oil/ The Story of Fossil Fuels, Part 3 http://climatekids.nasa.gov/fossil-fuels-gas/ The Story of Fossil Fuels, Part 4 http://climatekids.nasa.gov/fossil-fuels-next/ Rainsticks and Folklore http://climatekids.nasa.gov/rainstick/ 10 Interesting Things About Air http://climatekids.nasa.gov/10-things-air/

		<p>Source: <i>What's Up In the Atmosphere?</i></p> <p>Activities: 1. Why (Not) So Blue? 2. Up in the Air</p>	<p>Why is the Ocean Important http://climatekids.nasa.gov/ocean/</p> <p>Satellites: Based on the Questions to be Answered Do Clouds Warm or Cool the Earth? AQUA, CALIPSO, CLOUDSAT, TERRA Do Particles in the Air Warm or Cool the Earth? AURA, TERRA What is the Precipitation Amount Around the Earth?</p>
Grade 3 PS	Matter has specific properties and different properties are found in all substances on Earth	<p>Protocols: Air Temperature, Surface Temperature, Soil Temperature, Soil Moisture, Water Temperature, Water pH</p> <p>Source: <i>Discoveries at Willow Creek</i></p> <p>Activity: Magnify That</p> <p>Source: <i>What's Up In the Atmosphere?</i></p> <p>Activity: 1. Sky Observers</p> <p>Source: <i>The Scoop on Soil</i></p> <p>Activities: 1. We All Need Soil 2. Getting to Know Soil</p>	<p>NASA Wavelength Digital Library: http://nasawavelength.org</p> <p>Uncovering Martian Water (Properties of Water) http://phoenix.lpl.arizona.edu/pdf/lesson_12.pdf</p> <p>Ice is a Mineral https://messenger.jhuapl.edu/Learn/pdf/ice_mineral.pdf</p> <p>Water in Earth's Hydrosphere https://go.nasa.gov/2nN0EUX</p>

Grade Four

Earth Systems

1. Explain that air surrounds us, takes up space, moves around us as wind, and may be measured as barometric pressure.
2. Identify how water exists in the air in different forms (e.g., in clouds, fog, rain, snow and hail).
3. Investigate how water changes from one state to another (e.g., freezing, melting, condensation, evaporation).
4. Describe weather by measurable quantities such as temperature, wind direction, wind speed, precipitation, and barometric pressure.
5. Record local weather information on a calendar or map and describe changes over a period of time (e.g., barometric pressure, temperature, precipitation symbols, cloud conditions).
6. Trace how weather patterns generally move from west to east in the United States.
7. Describe the weather which accompanies cumulus, cumulonimbus, cirrus and stratus clouds.

Grade Seven

Earth Systems

1. Explain that Earth's capacity to absorb and recycle materials naturally (e.g., smoke, smog, sewage) can change the environmental quality depending on the length of time involved (e.g. global warming).
2. Describe the water cycle and explain the transfer of energy between the atmosphere and hydrosphere.
3. Make simple weather predictions based on the changing cloud types associated with frontal systems.
4. Determine how weather observations and measurements are combined to produce weather maps and that data for a specific location at one point in time can be displayed in a station model.
5. Read a weather map to interpret local, regional and national weather.
6. Describe the connection between the water cycle and weather-related phenomenon (e.g., tornadoes, floods, droughts, hurricanes).

Grade Eight

Earth Systems

Use models to analyze the size and shape of Earth, its surface and its interior (e.g., globes, topographic maps, satellite images).

Grade Nine

Earth Systems

1. Explain the relationships of the oceans to the lithosphere and atmosphere (e.g., transfer of energy, ocean currents, landforms).

Historical Perspectives and Scientific Revolutions

1. Use historical examples to explain how new ideas are limited by the context in which they are conceived; are often initially rejected by the scientific establishment; sometimes spring from unexpected findings; and usually grow slowly, through contributions from many different investigators (e.g., heliocentric theory and plate tectonics theory).

Grade Ten

Earth Systems

1. Explain climate and weather patterns associated with certain geographic locations and features (e.g., tornado alley, tropical hurricanes and lake effect snow).
2. Describe how organisms on Earth contributed to the dramatic change in oxygen content of Earth's early atmosphere.

Historical Perspectives and Scientific Revolutions

1. Describe advances and issues in Earth and space science that have important long-lasting effects on science and society (e.g., geologic time scales, global warming, depletion of resources, exponential population growth).

Grade Eleven

Earth Systems

1. Explain heat and energy transfers in and out of the atmosphere and its involvement in weather and climate (radiation, conduction, convection and advection).
2. Explain the impact of oceanic and atmospheric currents on weather and climate.
3. Use appropriate data to analyze and predict upcoming trends in global weather patterns (e.g., el Niño and la Niña, melting glaciers and icecaps, changes in ocean surface temperatures).
4. Explain how interactions among Earth's lithosphere, hydrosphere, atmosphere and biosphere have resulted in the ongoing changes of the Earth system.
5. Explain the effects of biomass and human activity on climate (e.g., climatic change, global warming).
6. Interpret weather maps and their symbols to predict changing weather conditions worldwide (e.g., monsoons, hurricanes and cyclones).

Historical Perspectives And Scientific Revolutions

1. Use historical examples to show how new ideas are limited by the context in which they are conceived; are often rejected by the social establishment; sometimes spring from unexpected findings; and usually grow slowly, through contributions from many different investigators (e.g., global warming, heliocentric theory, theory of continental drift).
2. Describe advances in earth and space science that have important long-lasting effects on science and society (e.g., global warming, heliocentric theory, plate tectonics theory).