

Atmosphere Learning Progression

Grades K-2: GLOBE Protocols Aligned with NASA Resources and NGSS Standards

NGSS Disciplinary Core Ideas Progression of Learning: Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region and time. People record weather patterns over time to learn more about the interactions that occur within our Earth system. Through participating in a series of GLOBE and NASA learning activities, interacting with the characters in the Elementary GLOBE Storybooks, and collecting data using the GLOBE protocols, students have the opportunity to engage in authentic science learning experiences. Using science journals to record their observations, students become scientists as they explore the world around them. (NASA Langley GLOBE Resource Page: www.globe.gov/web/nasa-langley-research-center/home/resources)

NGSS Performance Expectations: (Note: the following Performance Expectations and 3 Dimensional Learning are aligned with GLOBE and NASA Resources and are meant to support the development of the associated content and skill development but may not lead to complete mastery)

K-PS3-1 Make observations to determine the effect of sunlight on Earth's surface.

K-PS3-2 Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.

K-ESS2-1 Use and share observations of local weather conditions to describe patterns over time.

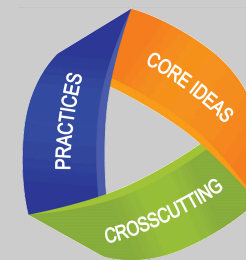
K-ESS3-2 Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.

1-PS4-3 Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.

1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.

2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.



Science Practices:

Asking Questions and Defining Problems

Ask questions based on observations to find more information about the natural and/or designed world. (K-2-ETS1-1, K-ESS3-2)

Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)

Planning and Carrying Out Investigations

Make observations (firsthand or from media) to collect data that can be used to make comparisons. (K-PS3-1, 1-ESS1-2)

Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to

Disciplinary Core Ideas:

PS1.A: Structure and Properties of matter

Different kinds of matter exist and many of them can be either solid or liquid depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1)

PS3.B: Conservation of Energy and Energy Transfer

Sunlight warms Earth's surface. (K-PS3-1, K-PS3-2)

PS4.B: Electromagnetic Radiation

Some materials allow light to pass through them, others allow only some light through, and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1-PS4-3)

ESS1.B Earth and the Solar System:

Seasonal patterns of sunrise and sunset can be observed, described, and predicted.

Crosscutting Concepts:

Patterns:

Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-ESS2-1, 1-ESS1-2, 2-PS1-1)

Cause and Effect:

Events have causes that generate observable patterns. (K-PS3-1, K-PS3-2, K-ESS3-2)
Simple tests can be designed to gather evidence to support or refute student ideas about

<p>answer a question. (1-PS4-3, 2-PS1-1)</p> <p>Analyzing and Interpreting Data: Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-ESS2-1)</p> <p>Constructing Explanations and Designing Solutions: Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem. (K-PS3-2)</p> <p>Obtaining, Evaluating, and Communicating Information: Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world. (K-ESS3-2)</p>	<p>(1-ESS1-2)</p> <p>ESS2.D Weather and Climate: Weather is the combination of sunlight, wind, snow, or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. (K-ESS2-1)</p> <p>ESS3.B: Natural Hazards: Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that communities can prepare for and respond to these events. (K-ESS3-2)</p> <p>ETS1.A Defining and Delimiting Engineering Problems A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)</p>	<p>causes. (1-PS4-3)</p> <p>Interdependence of Science, Engineering, and Technology People encounter questions about the natural world every day. (K-ESS3-2)</p> <p>Influence of Engineering, Technology, and Science on Society and the Natural World People depend on various technologies in their lives; human life would be very different without technology. (K-ESS3-2)</p>
<p>GLOBE Application</p>		
<p>Atmosphere Protocols:</p> <ul style="list-style-type: none"> • Air Temperature • Clouds • Surface Temperature • Precipitation <p>Data Investigation Sheets:</p> <ul style="list-style-type: none"> • Atmosphere Investigation Integrated 1-Day • Atmosphere Investigation Clouds 1-Day • Atmosphere Investigation Surface Temperature <p>Elementary GLOBE Storybooks:</p> <ul style="list-style-type: none"> • It's All About Earth 	<p>GLOBE Learning Activities:</p> <ol style="list-style-type: none"> 1. All Year Long: Seasonal Changes in a particular habitat (K-PS2-1, K-ESS2-1, 1-ESS1-2) 2. Weather Adds Up to Climate: Weather patterns over a long period of time can be used to describe climate (K-ESS2-1, K ESS3-2, 1-ESS1-2) 3. Cloud Fun: Observe cumulus clouds and weather conditions (K-ESS2-1) 4. Earth System Play: Interconnections of Earth systems (K-PS2-1) 5. Making a Sundial: Construct a sundial and observe the movement of the sun through the sky over the course of a day (K-PS2-1, K-ESS2-1, 1-ESS1-2) 6. See the Light Introduces students to properties of light(1-PS4-3) 7. Cloud in a Jar Students will observe the formation of a cloud inside a jar. (K-ESS2-1) 8. Cloud Dance This lesson plan provides a comprehensive overview of 	<p>Guiding Question(s):</p> <ol style="list-style-type: none"> 1. How can we observe changes in sunlight on Earth's surface? 2. How does the amount of daylight change over the year as the seasons change? 3. What patterns do we observe in the weather (sunlight, wind, snow/rain, and temperature)? 4. How is the weather connected to other parts of nature, like

<ul style="list-style-type: none"> • Do You Know the Clouds have Names? • What's Up in the Atmosphere? Exploring Colors in the Sky <p>GLOBE Art Connection: Cloudscape-Using a variety of craft materials students create their own sky with the different types of clouds that they observe in the sky. (K-ESS2-1, 2-PS1-1)</p> <p>GLOBE STEM: Science, Technology, Engineering, and Mathematics (STEM)</p>	<p>how to integrate movement into learning about cloud types, making the experience both educational and enjoyable for young students.(K-ESS2-1, K-ESS3-2)</p> <p>9. Cloud Clues: Learners will explore a variety of materials to determine how much light passes through, experiencing first-hand the differences between opaque, transparent, and translucent. (K-ESS3-2, 2-PS1-1)</p> <p>10. Sky Observers: Students observe sky color, recognize that sky color changes. (K-ESS2-1, K-ESS3-2)</p> <p>11. Seashores on the Move: To help students understand how sea level rise can affect coastal communities and environments. (K-2-ETS1-1)</p>	<p>bodies of water and plants?</p> <p>5. How is the weather predictable?</p> <p>6. Why is it important to listen to the weather forecast?</p> <p>7. How can we prepare for severe weather that can have harmful effects?</p>
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NASA ASSETS

NASA [Next Gen STEM for Educators](#):
resources that educators can use for lesson planning purposes.

NASA Resources:

- [NASA's Climate Kids](#)
- [NASA EO Kids](#)
- [NASA For Kids K-4](#)
- [NASA Kids' Club](#)
- [NASA Kids' Science](#)
- [Earth Minute Videos](#)

NASA Learning Activities:

- [The Types of Clouds and What they Mean](#) (K-ESS2-1, K-ESS3-2)
- [Precipitation Towers: Modeling Weather Data: Basic Level](#) (K-ESS2-1, K-ESS3-2)
- [Evidence of Weather](#)
- [Severe Weather](#) (K-ESS3-2)



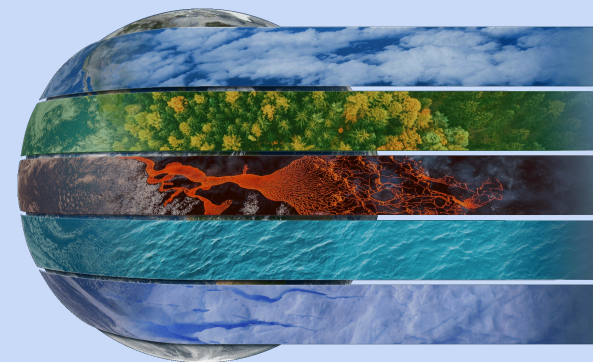
MY NASA DATA' Visualization Tool: [Earth System Data Explorer](#)

My NASA Data Variable Suggestions:

- Monthly Surface Air Temperature
- Daily Total Cloud Cover
- Monthly Total Cloud Cover
- Monthly Surface Skin Temperature
- Daily Precipitation Amount

MY NASA DATA Lessons:

- [Interactive Weather Observations](#) (K-ESS2-1)
- [What Makes Cities Hot?](#) (K-PS3-1, K-PS3-2, 1-ESS1-2)
- [Earth System Satellite Images: Analyzing One Image](#) (Instead of using the data cubes, guide student learning with questions like "what do you see, what do you wonder") (All)



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