Dawn

Earth & Space Science | Lesson Guide

3rd Grade

Photo Description

The image shows a misty morning with fog floating low over green farm fields. The sun is rising in the distance, making the sky look pink and orange. You can see crops growing in rows and some power lines in the background.

Scientific Phenomena

This image captures the anchoring phenomenon of fog formation during dawn. Fog occurs when water vapor in the air condenses into tiny water droplets that float near the ground. This happens when warm, moist air meets cooler surfaces (like the ground that cooled overnight), causing the water vapor to change from an invisible gas back into visible water droplets. The timing at dawn is perfect because nighttime allows the ground to cool significantly while the air still holds moisture from the previous day.

Core Science Concepts

1. Water Cycle in Action: The fog demonstrates evaporation (water becoming invisible vapor) and condensation (vapor becoming visible droplets) happening simultaneously in nature.

2. Temperature Changes: The image shows how Earth's surface cools at night and begins warming again at sunrise, creating the perfect conditions for fog formation.

3. States of Matter: Water exists in different forms - as invisible water vapor in the air and as tiny liquid droplets that form the visible fog.

4. Weather Patterns: Fog is a weather phenomenon that occurs under specific conditions of temperature, humidity, and air movement.

Pedagogical Tip:

Use this image as a "Notice and Wonder" activity. Have students first observe without explanation, then share what they notice and what they wonder about. This builds scientific thinking skills and natural curiosity before introducing vocabulary.

UDL Suggestions:

Provide multiple ways for students to engage with this concept: visual learners can observe and draw the fog, kinesthetic learners can act out water molecules condensing, and auditory learners can describe what they see using scientific vocabulary. Consider having students breathe on a cold window to see condensation firsthand.

Zoom In / Zoom Out

1. Zoom In: At the molecular level, invisible water molecules in the air are slowing down as they cool and clustering together to form tiny visible droplets. Each fog droplet contains millions of water molecules that have changed from gas to liquid state.

2. Zoom Out: This local fog is part of Earth's global water cycle, where water continuously moves between oceans, atmosphere, and land. The water in this fog may have come from distant oceans and will eventually return there, connecting this farm field to water systems worldwide.

Discussion Questions

1. What do you think will happen to this fog as the sun gets higher in the sky? (Bloom's: Predict | DOK: 2)

2. How is the fog in this picture similar to what happens when you breathe on a cold window? (Bloom's: Analyze | DOK: 2)

3. Why do you think the fog is staying close to the ground instead of floating up high like clouds? (Bloom's: Analyze | DOK: 3)

4. What evidence can you see in the picture that tells you this is early morning? (Bloom's: Evaluate | DOK: 2)

Potential Student Misconceptions

1. Misconception: "Fog is smoke or pollution coming from the ground."
   Clarification: Fog is made of pure water droplets, just like clouds, not smoke or harmful particles.

2. Misconception: "The fog appears because it's cold outside."
   Clarification: Fog forms when warm, moist air meets cooler surfaces - it's the temperature difference that matters, not just cold weather.

3. Misconception: "Fog and clouds are completely different things."
   Clarification: Fog is essentially a cloud that forms at ground level - both are made of tiny water droplets suspended in air.

NGSS Connections

- Performance Expectation: 2-ESS1-1 - Use information from several sources to provide evidence that Earth events can occur quickly or slowly
- Disciplinary Core Ideas: 2-ESS1.C - Some events happen very quickly, others occur very slowly, over a time period much longer than one can observe
- Crosscutting Concepts: Patterns - Patterns in the natural world can be observed and used as evidence

Science Vocabulary

* Fog: A cloud that forms near the ground made of tiny water droplets floating in the air
* Condensation: When invisible water vapor cools down and turns into visible water droplets
* Water vapor: Water in its invisible gas form that floats in the air
* Evaporation: When liquid water changes into invisible water vapor and rises into the air
* Temperature: How hot or cold something is, measured with a thermometer
* Humidity: The amount of water vapor in the air

External Resources

Children's Books:
- Down Comes the Rain by Franklyn M. Branley
- The Magic School Bus: Wet All Over by Joanna Cole
- Water Is Water by Miranda Paul

YouTube Videos:
- "The Water Cycle Song" by Have Fun Teaching - Educational song explaining evaporation and condensation with animations (https://www.youtube.com/watch?v=ncORPosDrjI)
- "What is Fog? Weather Science for Kids" by SciShow Kids - Simple explanation of fog formation with kid-friendly visuals (https://www.youtube.com/watch?v=ELYudG_kZJI)