

## Photo Description



This image shows dry, cracked soil that has broken into puzzle-like pieces. Small green and red plants are growing through some of the cracks. The ground looks very dry and hard, like it hasn't had water for a long time.

## Scientific Phenomena

The Anchoring Phenomenon is soil cracking due to drought conditions and water loss. This happens when clay particles in soil shrink as water evaporates, causing the ground to contract and form deep cracks in a polygonal pattern. The process demonstrates how Earth materials change when water is removed from the system, and how life persists even in challenging conditions as evidenced by the small plants growing through the cracks.

## Core Science Concepts

1. Water Cycle and Evaporation: Water in soil evaporates into the atmosphere, leaving behind dry, cracked earth that shows evidence of the water cycle in action.
2. Weathering and Erosion: The cracking process is a form of physical weathering where Earth materials break apart due to environmental conditions.
3. Plant Adaptations: Some plants can survive in harsh, dry conditions by growing deep roots and storing water efficiently.
4. States of Matter: Soil contains water that can change from liquid to gas (water vapor) through evaporation.

### Pedagogical Tip:

Use this image as a "Notice and Wonder" activity where students first observe without judgment, then generate questions. This builds scientific thinking skills and engages natural curiosity.

### UDL Suggestions:

Provide tactile experiences by having students handle dry clay that cracks when it dries, and compare it to moist clay. This supports kinesthetic learners and makes abstract concepts concrete.

## Zoom In / Zoom Out

1. Zoom In: At the microscopic level, clay particles are surrounded by thin films of water. When this water evaporates, the particles move closer together, creating tension that eventually causes the soil to crack along lines of weakness.
2. Zoom Out: This cracked soil is part of a larger drought system that affects entire watersheds, agricultural regions, and climate patterns. It connects to global water distribution and weather systems that determine rainfall patterns.

### Discussion Questions

1. What do you think happened to the water that used to be in this soil? (Bloom's: Analyze | DOK: 2)
2. How might these cracks actually help the small plants that are growing here? (Bloom's: Evaluate | DOK: 3)
3. What would happen to this cracked soil if it rained heavily tomorrow? (Bloom's: Predict | DOK: 2)
4. Why do you think the cracks formed in this particular pattern instead of straight lines? (Bloom's: Analyze | DOK: 3)

### Potential Student Misconceptions

1. Misconception: "The ground cracks because it's hot outside."

Clarification: While heat helps water evaporate faster, the cracking happens specifically because water leaves the soil, not just because of high temperatures.

2. Misconception: "Nothing can grow in cracked, dry soil."

Clarification: Some plants are specially adapted to survive in dry conditions and can actually use the cracks to reach deeper soil layers.

3. Misconception: "Cracked soil is permanently damaged."

Clarification: When water returns through rain or irrigation, the soil can absorb moisture and the cracks can close up again.

### Cross-Curricular Ideas

1. Mathematics - Measurement and Patterns: Have students measure the width of soil cracks using rulers or string, then create a bar graph comparing crack sizes from different areas of the photo. They can also count the number of polygon shapes formed by the cracks to practice geometry skills.
2. ELA - Descriptive Writing: Ask students to write a short story from the perspective of a seed trying to grow in cracked soil, or have them write a descriptive paragraph about what they observe in the photo using vivid sensory words (rough, dusty, hard, parched).
3. Social Studies - Water Resources and Agriculture: Connect this image to how droughts affect farmers and communities. Students can research which regions of the world experience droughts, learn how people adapt their farming practices during dry periods, and explore how water is distributed in their own community.
4. Art - Texture and Pattern: Have students create crayon rubbings of cracked pavement or dried clay to explore texture. They can also use paint or markers to recreate the cracking patterns they see in the photo, experimenting with how to show depth and shadows in their artwork.

### STEM Career Connection

1. Soil Scientist (Pedologist): Soil scientists study soil properties, health, and how soil changes over time. They help farmers understand their land, predict droughts, and find ways to keep soil healthy and productive. These scientists might spend time in the field collecting samples like the cracked soil in this photo, then analyze them in laboratories. Average Annual Salary: \$65,000
2. Hydrologist: Hydrologists study water on Earth—where it comes from, where it goes, and how it moves through soil and rocks. They track droughts, predict floods, and help communities manage their water supplies during dry times. This job connects directly to understanding why soil cracks when water disappears. Average Annual Salary: \$84,000

3. Agricultural Engineer: Agricultural engineers design tools, irrigation systems, and farming techniques that help crops survive in dry conditions. They might invent new ways to keep water in soil or create equipment that works in cracked, drought-affected land. Average Annual Salary: \$78,000

### NGSS Connections

- Performance Expectation: 5-ESS2-1 - Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
- Disciplinary Core Ideas: 5-ESS2.A Earth Materials and Systems, 2-ESS1.C The History of Planet Earth
- Crosscutting Concepts: Cause and Effect, Systems and System Models

### Science Vocabulary

- \* Evaporation: When liquid water changes into invisible water vapor and rises into the air.
- \* Drought: A long period of time with little or no rainfall.
- \* Clay: A type of soil made of very tiny particles that can hold water well.
- \* Weathering: The process of breaking down rocks and soil through natural forces.
- \* Adaptation: Special features that help plants and animals survive in their environment.

### External Resources

Children's Books:

- The Magic School Bus Wet All Over: A Book About the Water Cycle by Joanna Cole
- Droughts by Michael Woods
- A Seed Is Sleepy by Dianna Hutts Aston