



LOCKED ON EARTH

AT A GLANCE

GRADE LEVEL

- Grade K-2, 3-5, 6-8, 9-12

TIME REQUIRED

- 10-20 minutes prep time
- 10-20 minutes classtime

FORMAT

- Large group demonstration
- Small group exploration

MATERIALS

- 3 student volunteers
- Volunteer name tags: Earth, GEO 1, and GEO 2
- Weather tags: Hurricane, Thunderstorm, Lightning, Wildfire
- Pencils and science journal (or related materials to record observations)

THE SCIENCE EXPLAINED

Geostationary satellites, such as NOAA's Geostationary Operational Environmental Satellites (GOES)-R Series and Geostationary Extended Observations (GeoXO), orbit 22,236 miles above Earth's equator, at speeds equal to the Earth's rotation. This allows them to maintain their positions over specific geographic regions so they can provide continuous coverage of that area over time.

LESSON SUMMARY

Explore how geostationary satellites orbit Earth and observe weather phenomena in an interactive demonstration.

OBJECTIVES

The learner will:

- Model the orbital mechanics of a geostationary satellite to understand how it moves and what it observes;
- Explain the benefits that geostationary satellites provide meteorologists, forecasters and emergency teams on Earth.

PROCEDURE

Step One

Add cold water to a bottle and swirl around until the bottle feels cold to the touch

Step Two

Pour the cold water into a bucket

Step Three

Add one inch of hot water to cold bottle (ask an adult for help)

Step Four

Immediately place a bag of ice on top of the bottle

Step Five

Have students observe what happens, and record observations in their science journals



LOCKED ON EARTH AND NOAA GEOSTATIONARY SATELLITES

CONNECTIONS

NOAA's Geostationary Extended Observations (GeoXO) satellite system will be its next generation of geostationary satellites, replacing the current GOES-R Series. The information GeoXO supplies will improve short-term forecasting and warning of severe weather and hazards that threaten the security and well-being of everyone in the Western Hemisphere.

GeoXO will watch over the Western Hemisphere and support short-term forecasts and warnings of extreme weather and environmental hazards. NOAA is planning a two-satellite operational GeoXO constellation, plus two replacement satellites. The first GeoXO satellite is scheduled for launch in 2032.

Did you know ...

The second and third generations of GOES satellites included the GOES Imager. Using 5 spectral bands, the instrument could detect cloud formations and water vapor. The next generation Advanced Baseline Imager expanded the capability to detect fog and low clouds with greater detail thanks to its 16 spectral bands.

KEY RESOURCES

Learn more about satellites with NESDIS Education!

Select the link or scan the QR code to visit the page:

[NESDIS Education - Why Do Satellites Have Different Orbits?](#)





THINKING OUTSIDE THE BOX

Discussion Prompts and Extension Activities

DISCUSSION AND JOURNAL PROMPTS

- Insert prompts here

SUGGESTED EXTENSION ACTIVITIES

- Insert extension activity here