

Answer Key Activity 2

The Function and Importance of the GOES-R Instruments

In this activity you will be exploring the GOES-R satellite and its capabilities.

Time:	Activity 2:	Introduction	5 minutes
		Activity 2.1 with discussion	35-50 minutes
		Activity 2.2 with discussion	20-30 minutes

Activity 2.1 Importance of the GOES-R Instruments

Watch the videos, [Watchful Eyes: The Role of Geostationary Weather Satellites](#) and [NASA | AF The Future of Weather Monitoring](#), to help complete the following:

1. When was the first weather satellite launched? What type of orbit did it have?

The first weather satellite, Tiros 1, was launched April 1, 1960. Tiros 1 had a polar orbit. It would see the same area on Earth two times per day as it orbited from the North Pole to the South Pole many times per day. The polar orbit would give weather forecasters a snapshot of the weather at mid-latitudes only two times per day.

The first geostationary satellite, Geostationary Operational Environmental Satellite (GOES-1), was launched in 1975. GOES was able to watch an area of the Earth continuously because of its geosynchronous orbit over the equator allowed weather forecasters to watch storms as they developed and moved.

2. ABI is an acronym for what device?

ABI is an acronym for the Advanced Baseline Imager on GOES-R.

3. Describe the importance of ABI.

The importance of ABI on GOES-R is that it will allow scientists to see the weather over the United States more often, six times faster than previously possible, and in more detail allowing for more accurate and rapid forecasts changes. GOES-R ABI will follow the activity over the United States every five minutes. The GOES-R ABI mesoscale mode will also allow one minute data over two locations. ABI can monitor lightning strikes indicating potential tornado activity and allowing for double the lead time for warnings. It can provide valuable evacuation time by tracking hurricanes more accurately. ABI is important because it can track thermal images of forest fires and monitor solar activity to provide for better warnings for electrical power grid and communication issues on Earth. Monitoring the solar activity can help protect astronauts.

GOES-R the functions of ABI will allow for; improved hurricane tracking and intensity forecasting, aviation flight route planning due to natural disasters or poor weather, air quality warnings and alerts, increased warning lead time for severe weather, better fire detection and intensity estimation and a better way to collect data for long-term climate variability studies.

4. Complete the GOES-R Instrument Chart*.

Refer to the GOES-R Teacher Copy Activity 2 ABI Chart for answers.

5. Infer and explain why it is important for a satellite to do multiple tasks.

It is important for a satellite to perform multiple tasks for both financial and practical reasons. Putting one satellite into orbit that can perform multiple tasks is cheaper than building and launching multiple satellites that perform only one function each. Having a satellite perform multiple functions allows data to be collected more accurately and easily than having multiple satellites broadcasting data to Earth.

Too many satellites in space are a safety hazard because they can impact each other potentially damaging the satellite or causing it to crash to Earth.

More Information:

*Use these resources and the videos to help you complete the ABI Chart.

[GOES-R Trifold Brochure](#)

[GOES-R Poster Back](#)

Activity 2.2 GOES-R and Tornadoes

Watch the video, [Tornadoes with Tim Samaras](#), and read the article: [Next-Gen Weather Satellites to Improve Tornado Warnings](#) to help complete the following:

1. What information was Tim Samaras trying to collect from tornadoes?

He was trying to determine the weather inside a tornado. He was trying to determine the moisture content and wind shear. He wanted to study what was bringing the tornado rotation to the ground so he can predict where tornadoes are going to be.

2. Describe how satellites aided Mr. Samaras in his search for tornadoes.

Satellite imagery helps to locate the storms that are likely to have tornadoes. Mr. Samaras uses visible satellite imagery to look for areas of instability that can not be predicted by radar. The satellites allowed for the tracking of boundaries of old storms. By tracking the old storms and looking at the clouds of new storms as they form he could try to predict tornadoes.

3. Explain how GOES-R may help in the early detection of tornadoes.

ABI may help in the early detection of tornadoes because ABI can better detect the super-cold “overshooting tops” that mean severe weather is imminent. The Geostationary Lightning Mapper (GLM) could use help in the early detection of tornadoes by detecting an increase in lightning which indicate more instability in the atmosphere.

Optional Video: [Tim Samaras's Last Storm Videos](#)

Activity 2.1 Importance of the GOES-R Instruments Videos:

[Watchful Eyes: The Role of Geostationary Weather Satellites](#)

<https://www.youtube.com/watch?v=18RlraTqtGo>

[NASA | ABI: The Future of Weather Monitoring](#)

<https://www.youtube.com/watch?v=IOwU2VNej1U>

[GOES-R Trifold Brochure](#) http://www.goes-r.gov/downloads/tri-brochure-2014-01-23_v9.pdf

[GOES-R Poster Back](#)

<http://www.goes-r.gov/education/images/poster-product-back.pdf>

Activity 2.2 GOES-R and Tornadoes

[Tornadoes with Tim Samaras](#)

https://www.youtube.com/watch?v=3Cx_FH_t3f4

[Next-Gen Weather Satellites to Improve Tornado Warnings article](#)

http://science.nasa.gov/science-news/science-at-nasa/2012/29feb_tornadosurprise/

[Tim Samaras's Last Storm Videos](#)

https://www.youtube.com/watch?v=9IP_dmp3-b8