

# Satellites To Go!

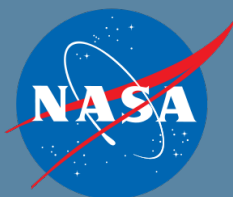
A take-home kit on NASA's Earth observation satellites.  
FOR FAMILIES WITH CHILDREN AGES 6-12



Developed by Meredith Field, Mark Bourassa, and Melissa Griffin at the Florida State University Center for Ocean-Atmospheric Prediction Studies with support from the NASA Science Mission Directorate.

Available online at <http://coaps.fsu.edu/outreach/satellites>

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All images by NASA unless otherwise noted.

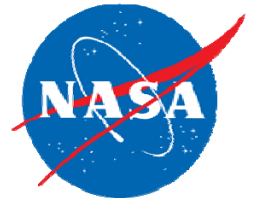
# Overview for Parents

We hope you enjoy this Satellites To Go kit! These activities are meant for parents to do together with their children. Parents are encouraged to read through this packet first so that they can better help their children learn about NASA satellites.

The materials at the beginning of this packet provide background information about satellites through fun matching and searching activities. Parents should feel free to read these sections out loud to their children, and to help them with the vocabulary sections as needed. The Satellite YUMM-E activity and storm surge experiment are exciting hands-on learning opportunities.

## What is NASA?

NASA stands for National Aeronautics and Space Administration. NASA was started in 1958 as a part of the United States government. NASA is in charge of U.S. science and technology that has to do with airplanes or space.



## What Does NASA Do?



Astronaut Ed White was the first American to walk in space.

NASA does a lot of different things. NASA makes satellites. The satellites help scientists learn more about Earth. NASA sends probes out into space. NASA scientists study things in the solar system, and even farther away. A new program will send humans to the moon, Mars and beyond. People at NASA work on ways to make air travel better for everyone on Earth, too. People at NASA also share the things they learn with others. This can help make life on Earth better.

## Where Is NASA?

NASA Headquarters is in Washington, D.C. There are ten NASA centers all over the United States. There are also seven test and research facilities. More than 18,000 people work for NASA! Being an astronaut is probably the best-known job at NASA, but astronauts make up just a small part of the workforce. A lot of engineers and scientists work at NASA. People are doing other jobs, too, such as secretaries, writers, lawyers and even teachers.

# What Is A Satellite?

A satellite is an object that moves around a larger object. Earth is a satellite because it moves around the sun. The moon is a satellite because it moves around Earth. Earth and the moon are called "natural" satellites.

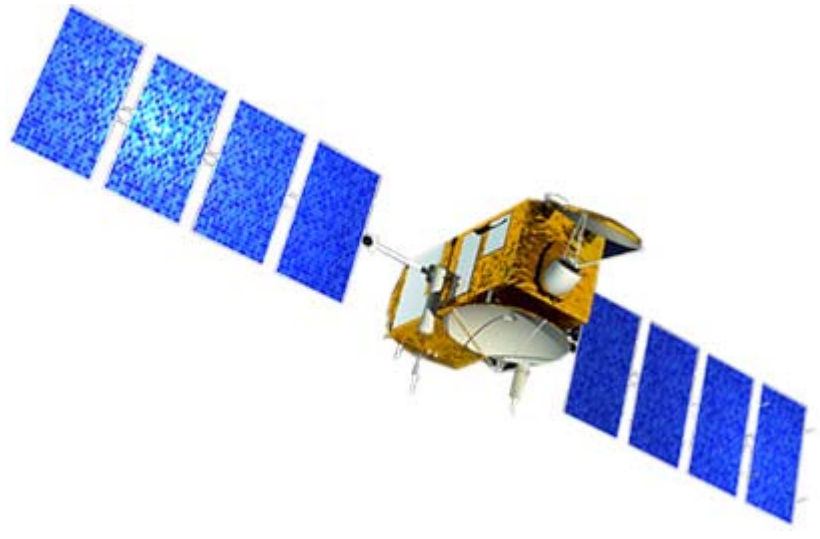
There are also thousands of artificial satellites. Some take pictures of planets, the sun and other objects, while others send TV signals and phone calls around the world.

NASA has more than a dozen Earth science satellites in orbit. They help NASA study the oceans, ice, land and atmosphere. Satellites fly high in the sky, so they can see large areas of Earth at one time. They can observe clouds, hurricanes, tornadoes, wildfires, floods, and droughts. All this information helps scientists predict weather and climate. It helps farmers know what crops to plant. And it helps with response to emergencies.

## Parts of a Satellite

Satellites come in many shapes and sizes. But most have at least 2 parts in common - an antenna and a power source. The antenna is used to send and receive information. The power source can be a solar panel or battery. Many NASA satellites also carry cameras and scientific sensors.

Adapted from: <http://www.nasa.gov/audience/forstudents/k-4/stories/what-is-a-satellite-k4.html>



The photo on the left shows the NASA Ocean Surface Topography Mission/Jason-2 satellite being prepared for launch. The photo in the middle shows a rocket launching the satellite into space on June 20, 2008. The diagram on the right shows the satellite with its solar panels expanded.

# Eyes On The Earth

The following images of Earth were taken by NASA satellites. See if you can match the images to the descriptions.

\_\_\_\_\_ 1. Wildfires in southern California (10/24/07).

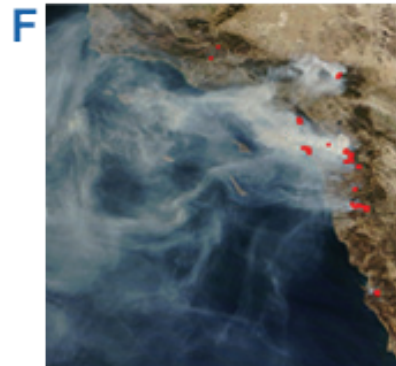
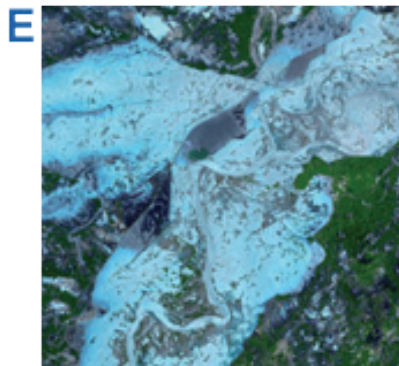
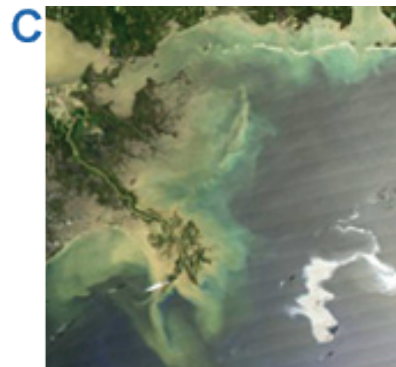
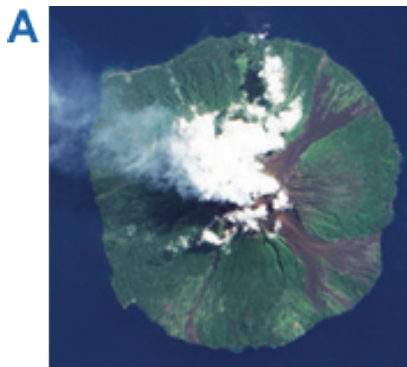
\_\_\_\_\_ 2. Oil in the Gulf of Mexico from the Deepwater Horizon oil spill (4/25/10).

\_\_\_\_\_ 3. Manam Volcano erupts near Papua New Guinea (6/28/09).

\_\_\_\_\_ 4. Hurricane Katrina begins to make landfall at New Orleans (8/28/05).

\_\_\_\_\_ 5. The view of La Plata, Maryland, just after a tornado came through. A horizontal line shows the path the tornado took (5/1/02).

\_\_\_\_\_ 6. Flooding along the Indus River in Pakistan after heavy monsoon rains (8/18/10).



# What Does That Mean?

Learn more about satellite observations of Earth by matching the words and definitions below!

- \_\_\_\_\_ 1. The National Aeronautics and Space Administration. A branch of the United States Government that studies and explores space and Earth from space.
- \_\_\_\_\_ 2. An object that orbits a larger object.
- \_\_\_\_\_ 3. The path a satellite takes as it moves around an object.
- \_\_\_\_\_ 4. The physical features of a place, including its shape, height, and depth.
- \_\_\_\_\_ 5. An instrument that uses radio waves to detect and locate objects.
- \_\_\_\_\_ 6. An instrument that measures the distance between the satellite and the surface of the Earth below.
- \_\_\_\_\_ 7. The air that surrounds Earth.
- \_\_\_\_\_ 8. The short-term conditions of the atmosphere.
- \_\_\_\_\_ 9. The long-term conditions of the atmosphere, oceans, ice, and land.
- \_\_\_\_\_ 10. A prediction of the future conditions of the atmosphere or oceans.

- A. Altimeter
- B. Atmosphere
- C. Climate
- D. Forecast
- E. NASA
- F. Orbit
- G. Radar
- H. Satellite
- I. Topography
- J. Weather



Astronauts help construct the International Space Station, a satellite research facility that orbits Earth.

# Word Radar

Now see if you can “detect” your new vocabulary words in the word find below. Words may be across, down, or diagonal.

ALTIMETER  
ATMOSPHERE  
CLIMATE  
FORECAST

NASA  
ORBIT  
RADAR

SATELLITE  
TOPOGRAPHY  
WEATHER

G	K	Y	W	N	B	D	W	N	U	V	I	O	E	I
Y	M	N	N	F	K	N	P	Y	M	U	Y	R	I	J
B	G	D	T	H	N	G	R	Q	Y	N	C	B	P	C
A	T	M	O	S	P	H	E	R	E	B	U	I	G	Q
X	T	S	L	F	X	C	G	K	K	Y	A	T	D	Q
L	N	F	O	R	E	C	A	S	T	Y	L	D	Q	L
Z	U	M	R	T	N	R	A	D	A	R	T	J	I	F
Q	Z	X	Z	U	F	Q	Z	I	K	B	I	O	Q	T
K	D	C	A	E	C	U	P	E	Y	W	M	R	M	H
O	G	Z	P	A	C	L	I	M	A	T	E	L	D	V
N	T	O	P	O	G	R	A	P	H	Y	T	K	N	R
Z	A	O	S	A	T	E	L	L	I	T	E	C	Y	A
S	R	S	H	Q	R	A	C	M	P	D	R	W	E	M
Z	X	T	A	W	C	O	E	Y	N	D	J	E	N	M
Z	T	R	J	H	S	X	N	W	E	A	T	H	E	R



# Satellite YUMM-E Recipe

*Build your own satellite, then eat it!*

## Ingredients:

- **1 rectangular snack**, such as a Rice Krispies treat, Twinkie, or brownie.
- **Assorted candies or crackers**, such as licorice, Smarties, mints, chocolates, and/or graham crackers.
- **A sticky food**, such as icing, peanut butter, or the filling from caramel cream candies or Twinkies.



## Build Your Satellite!

1. Use the **rectangular snack** as the main body of your satellite. This holds the brains of the satellite: the **computer**.
2. Use the **sticky food** to attach the **candies and/or crackers** to the snack cake. The candies and crackers can represent the **solar panels** that provide power to a satellite, **antennas** for communicating with scientists on Earth, and various **instruments**, such as radar, a camera, a Global Positioning System, and more - be creative!
3. Now think about these questions: **What is your satellite's name? What parts does it have? What does it measure? How does it help scientists?** Share your answers with a teacher, friend or family member!
4. Before you eat your satellite, take a picture of it and send the photo to [outreach@coaps.fsu.edu](mailto:outreach@coaps.fsu.edu). We'll post it on our website!

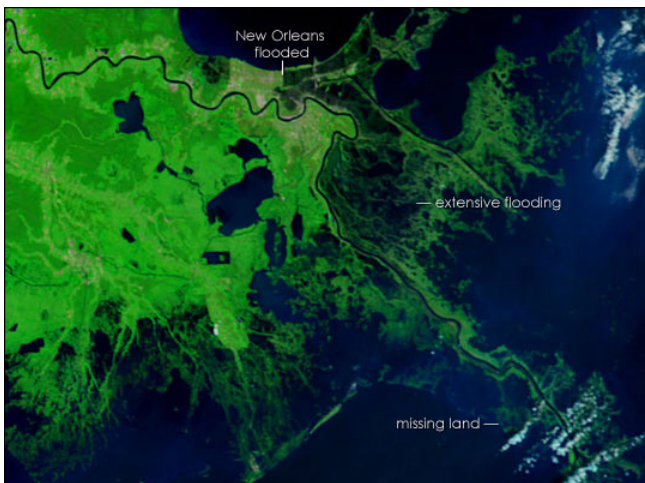
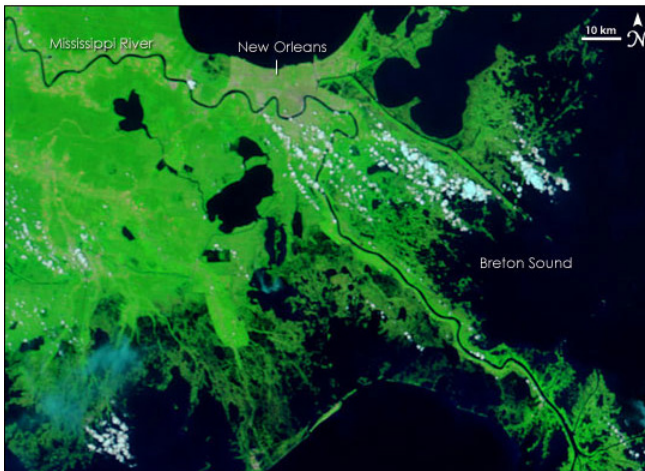


# Storm Surge Experiment

Storm surge happens when strong winds from a hurricane push water from the ocean onto land. Storm surge can flood beaches, roads, and buildings. NASA satellites help scientists find out where storm surge happens and how it changes the landscape.



Photo of storm surge by the National Weather Service.



The images above were taken from a NASA satellite. They show the wetlands near New Orleans before (top) and after (bottom) storm surge caused by Hurricane Katrina. The wetlands acted as a sponge and soaked up water from the storm surge.

In this activity, you will make a model coastline with houses and other features. Then you will test your model to see where your coastline might flood during a hurricane's storm surge.

## What You'll Need:

- Plate
- Container of craft clay, such as Play-Doh
- Several sugar cubes
- Cup of water (optional: tint with blue food coloring)
- Hair dryer (optional)
- Sand (optional)
- Small stones (optional)



## Create Your Storm Surge!

1. Place your plate on a firm surface that you don't mind getting wet.
2. Using the clay, create a coastline on one side of the plastic plate. Your coastline can include both steep and shallow slopes into the water, as well as hills and inlets.
3. Place your sugar cube "houses" along the coast.
4. Pour the water into the plate around the clay. The water represents the ocean.
5. Use your mouth to blow "wind" across the water towards the land. The water will have nowhere to go and will pile up on the shore. You may also use a hair dryer to create stronger winds.
6. Did you see water pile up along the coast? Did any of your sugar cube houses flood? Change the shape of the coastline to see how it affects storm surge. Change the location of the houses to see if there is anywhere where they will not flood. Add sand and stones to try to protect your coastline.



An example coastline with sugar cube houses, some of which have been damaged by storm surge.

## More About Storm Surge

During storm surge, hurricane winds push water into a mound at the storm's center. As the hurricane gets closer to the coast, the mound of water is unable to escape anywhere but onto land. A hurricane will cause more storm surge in areas where the ocean floor and coastal areas slope gradually.

Barriers called levees can help protect coastlines from storm surge. Levees can be natural or artificial, and they are usually made of earthen materials such as stone and sand. Wetlands also help protect the coast by absorbing water from storm surges. In coastal areas, buildings are often constructed on stilts or hills to protect them from storm surge.

# Additional Resources

For additional games and fun activities, visit the following NASA websites!



## Climate Kids:

### NASA's Eyes on the Earth

Command the "Climate Time Machine," pilot a research blimp through a "Wild Weather Adventure," and more!

<http://climate.nasa.gov/kids/>



Fly along with NASA satellites orbiting Earth.

## Eyes on the Earth 3D

Fly along with NASA satellites orbiting Earth.

<http://climate.nasa.gov/Eyes/>



## NASA Kids' Club

News, photos, and games for grades K-4.

<http://kids.msfc.nasa.gov>



## SkyWatch

Learn where to look for satellites in the night sky from your own backyard!

<http://spaceflight.nasa.gov/realdata/sightings/>

# Satellites To Go Evaluation

Date \_\_\_\_\_

Age(s) of the child(ren) who participated in these activities \_\_\_\_\_

1. Which of these activities did you like the most?
2. Were there any activities that you did not like?
3. Were there any activities that you found confusing?
4. Do you have any additional comments or suggestions?

Please email completed evaluation to [outreach@coaps.fsu.edu](mailto:outreach@coaps.fsu.edu) or mail to:

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