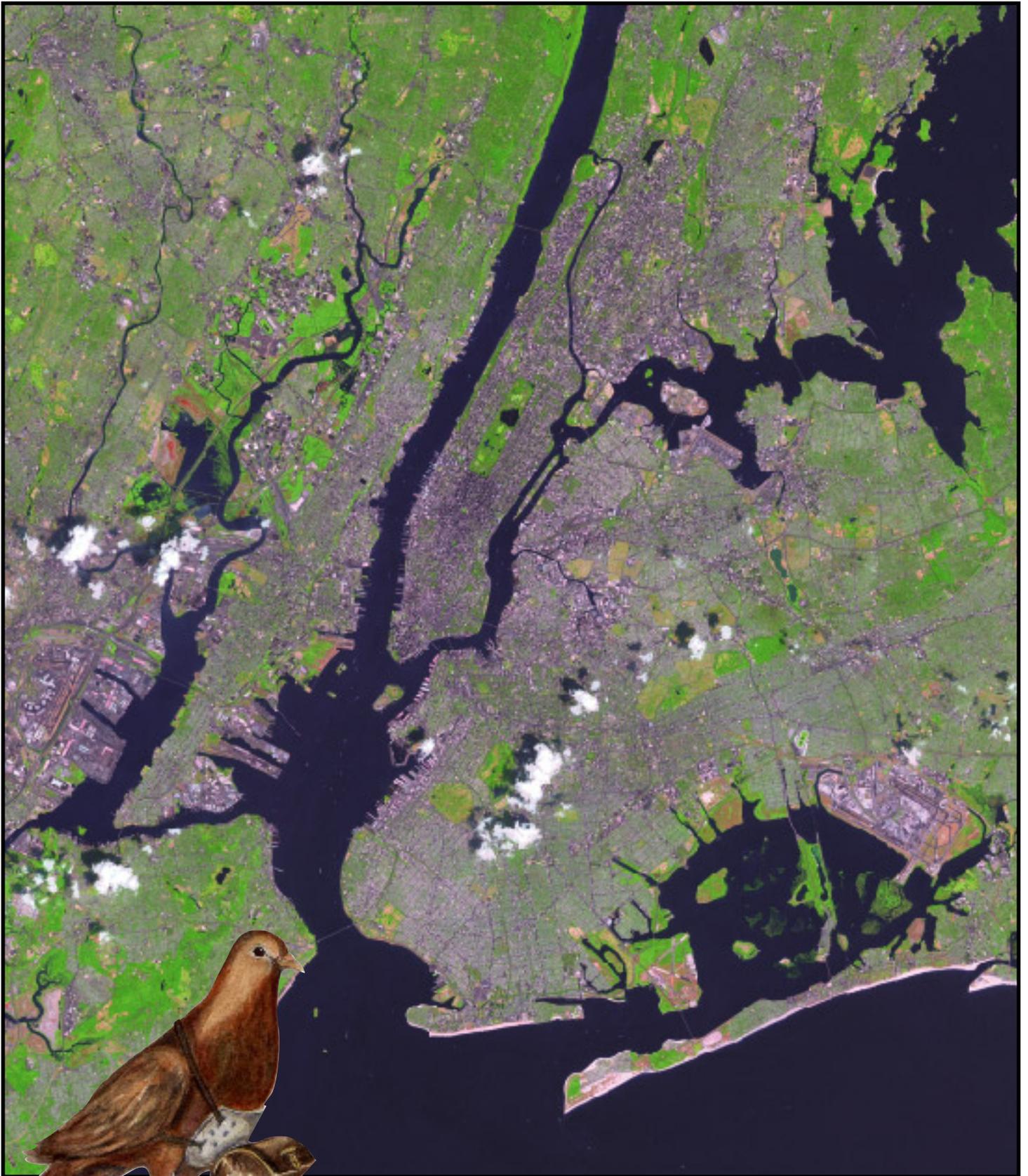




National Aeronautics and
Space Administration
Goddard Space Flight Center



LANDSAT 7
New York City



Amelia's Adventures in New York City

An adventure in remote sensing at <http://imagers.gsfc.nasa.gov>



About this Image

This false color Landsat 7 image of New York City was acquired on July 30, 1999. Using this band combination, the trees and grass appear bright green, developed urban areas appear light purple, land areas with bare soil and little vegetation appear tan, beaches show up as white areas along the coast, and the water appears black. Manhattan is located at the confluence of the Hudson and East Rivers, which flow into the Upper New York Bay. The Verrazano Narrows Bridge can be easily identified crossing from Staten Island to Brooklyn at the mouth of the bay. To create this image, three of the sensor's 30 m spectral bands were merged with the 15 m panchromatic band. Utilizing the high-resolution panchromatic band in densely developed urban regions enables a greater level of feature distinction and more accurate land use classification. Landsat imagery can help city planners assess and monitor urban sprawl and population growth patterns.

Landsat 7 Program

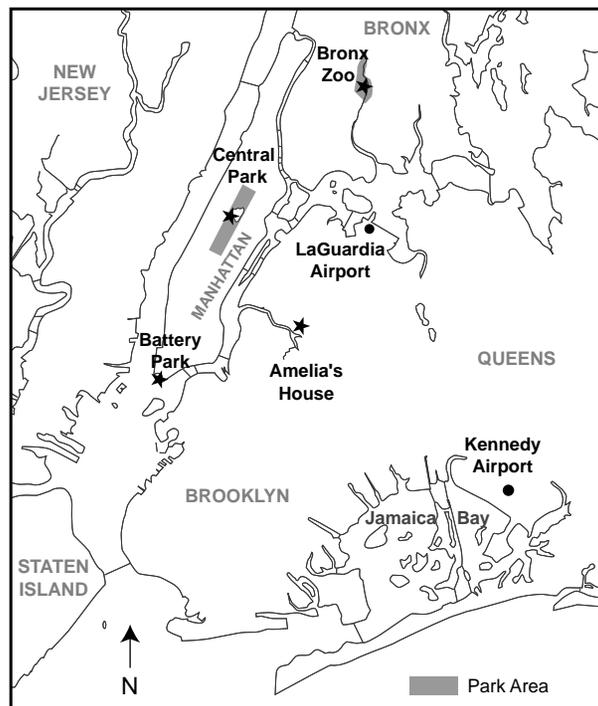
Landsat 7 is part of NASA's Earth Science Enterprise program, a long term coordinated research effort dedicated to studying how our global environment is changing. It is the latest in a series of satellites that have provided a continuous set of calibrated Earth science data to users worldwide since the early 1970s. Landsat 7 provides images of the land surface and the surrounding coastal regions to national and international users. Those who observe, monitor, characterize, study, map and manage the Earth's continental surfaces over time use these data.

What People Can Do with Landsat

With Landsat, people study, map, and manage the Earth's land surfaces. We can monitor deforestation, wildfires, and snow cover; damage from floods, storms, earthquakes, and volcanic eruptions; monitor and manage agricultural areas, study patterns and extent of population growth, and monitor land use change.

Landsat 7 Satellite

Landsat 7 was launched into orbit on April 15, 1999 on a Delta-II expendable launch vehicle. The Landsat Program is a partnership between NASA and the U.S. Geological Survey (USGS). NASA was the lead agency for the development and launch of Landsat 7. USGS is the lead agency for post-launch Landsat 7 operations. Visit <http://landsat.gsfc.nasa.gov> to learn more about the Landsat 7 satellite.



line map of New York City

For The Classroom

Students follow Amelia the Pigeon's adventure on a satellite image. They use measuring and math skills to determine the distance she traveled. Using the satellite image, students write a description of what Amelia sees along the way. This activity encourages students to compare and contrast information from maps versus satellite imagery.

Objectives

- Measure and calculate the scale of the satellite image
- Interpret and describe places and land features in the satellite image
- Use measurements and scale to calculate size of places and land features

Standards:

National Science Education Standards: E; NGS: 1 & 3; NCTM: Standard 4 Measurement, Standard 5 Data Analysis; ITEA: Standard 1, 3, 17

Materials:

Ruler (with cm), New York City satellite image, Line map

Engage: Show the students the color Landsat satellite image of New York City. Ask if they can tell you anything about the image. Ask where they think it came from (a camera on a plane, a satellite, an astronaut). Discuss with the students that this is a view of New York City from a satellite up in space. Satellites orbit the Earth carrying instruments providing us with images that help scientists to study our planet Earth.

Explore: Using the "line map" of New York City, introduce the places that Amelia traveled in her adventure. 1) Amelia's house in Brooklyn; 2) Bronx Zoo; 3) Central Park; 4) Battery Park; 5) Back home. Ask the students to locate the places on the satellite image. Then have students measure, compute, and record the distances Amelia traveled using the satellite image. Given: Central Park is 4 kilometers long. For younger students, you can tell them that 1 cm = 2 km. Answers: Amelia's house to Bronx Zoo = 14km; Bronx Zoo to Central Park = 10km; Central Park to Battery Park = 10km; Battery Park back home = 8km.

Explain: Along the way, Amelia saw many interesting places on the ground. Using the satellite image, ask the students to describe what Amelia saw as she flew between each location. Examples: lakes, parks, water, bridges, or streets. Ask the students what the satellite image shows that a map doesn't. What does a map show us that a satellite image doesn't? Record answers on the board under the titles: "satellite images" or "maps". Possible answers - Satellite images: clouds, grass, trees, beaches, boats. Maps: names of places, compass, grid lines and scales (on some maps). Discuss uses for each. For example, maps can help provide directions to a place. Satellite images can help predict weather or urban growth.

Extend: Ask the students to answer these questions using the satellite image: How long is the biggest island in Jamaica Bay? (4 km) How long is the longest airport runway? (Kennedy Airport = 4 km) How long is the longest beach? (about 15 km) How long is the longest bridge? (Verrazano Narrows Bridge = 1.5 km) Bonus: Can you find a race track? (Oval shape NW of Kennedy Airport)

Evaluate: Ask students to write a story about Amelia's trip describing what she sees along each leg of her trip. Evaluate for the presence of descriptions based on characteristics unique to a satellite image. Visit <http://imagers.gsfc.nasa.gov> for an interactive adventure and more classroom activities.