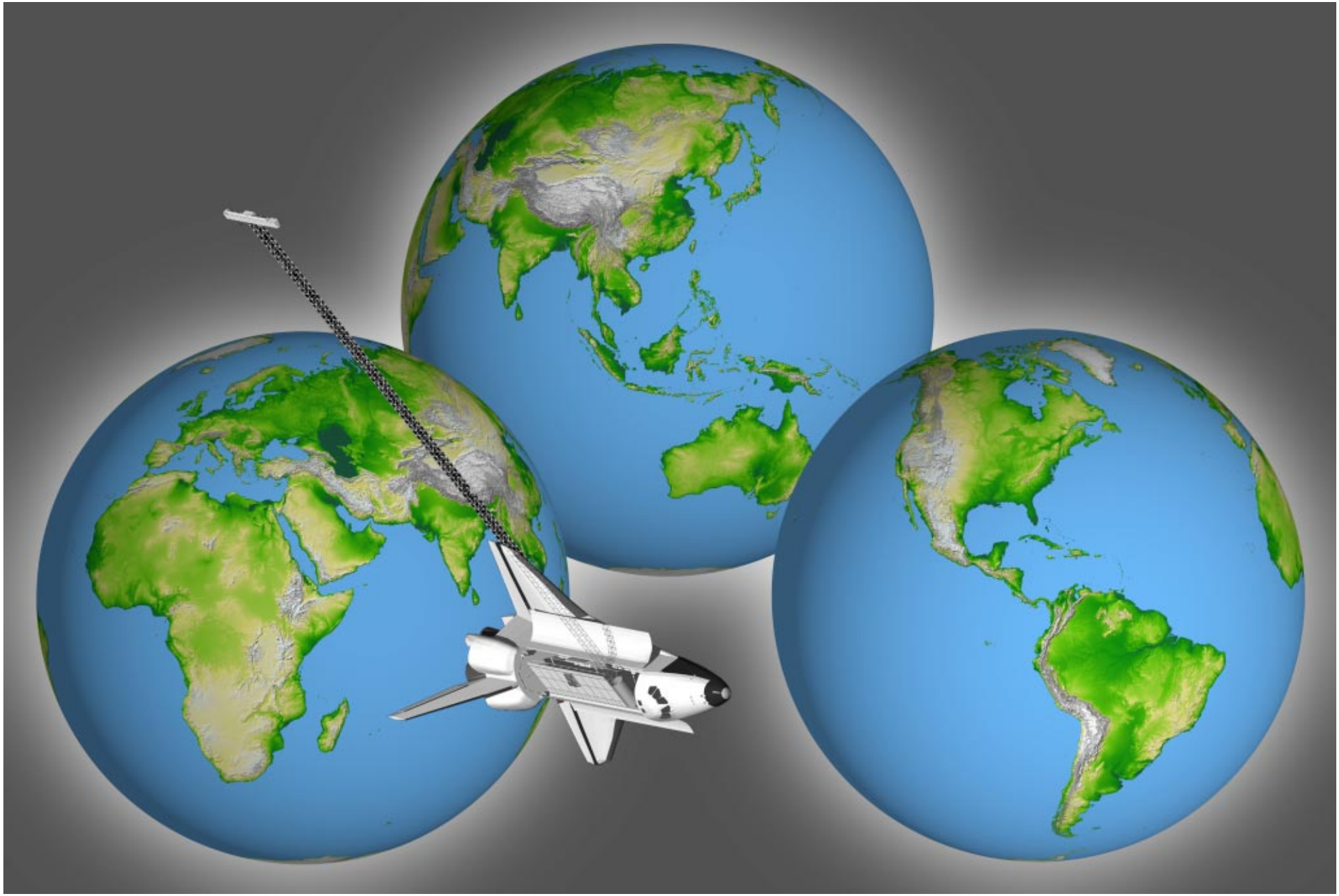
National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

The World in Three Dimensions:
Shuttle Radar Topography Mission



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The World in Three Dimensions: Shuttle Radar Topography Mission

The Shuttle Radar Topography Mission (SRTM) has achieved its goal of producing the most complete high-resolution map of Earth's landforms. Radar measurements over 80 percent of Earth's landmass, home to nearly 95 percent of the world's population, were collected during a single 11-day Space Shuttle mission in February 2000. These data were then processed to create the SRTM digital elevation model. Nearly every natural process at Earth's surface and most human activities are affected by the altitude, slope, and shape of that surface, making the SRTM elevation model an important input to scientific research and for planning many human endeavors.

The SRTM project has released a new global data set called SRTM30 that greatly improves upon the best previous global elevation data set, called GTOPO30, which was compiled and produced by the U.S. Geological Survey. Both data sets have a uniform data spacing of 30 arcseconds, which is 1/120 of a degree of latitude and longitude, or about 1 kilometer (0.6 mile) at the equator. However, in many areas of the world, GTOPO30 was derived from crude and sparse data from various sources. In contrast, SRTM data are of uniform high resolution, more than adequate to meet the resolution originally targeted by GTOPO30. SRTM coverage gaps, primarily in the polar regions, were filled with existing GTOPO30 data to maintain global coverage. SRTM30 improves our view of Earth's landforms and is particularly useful for scientists involved in global studies.

The SRTM30 dataset is depicted here as three globe images of Earth as viewed from points in space centered over the Americas, Africa, and the western Pacific. Color-coding depicts the lowest elevations in green, with elevations rising through yellow and tan, to white at the highest elevations.

NEAR-GLOBAL, HIGH-DETAIL, MANY USES

SRTM30 is the first release of a product derived from the entire near-global SRTM elevation data set. In its full detail, the SRTM data set provides far more precise information, with 1 arcsecond (about 30 meters or 98 feet) sampling of the terrain. An accurate description of Earth's surface elevation is of fundamental importance to many human activities and to most branches of Earth science, and SRTM meets many of those needs.

Topographic data find application in geology, hydrology, climatology, ecology, and in the interplay of these sciences. For example, mountain landforms may give evidence of their seismic uplift or volcanic origins. Their higher elevations are usually cooler and catch the rains and snows of passing air masses, and the cooler temperatures and moisture supply create habitat for plants that could not survive in the surrounding lower, warmer, and drier terrain.

THE SRTM ADVANTAGE

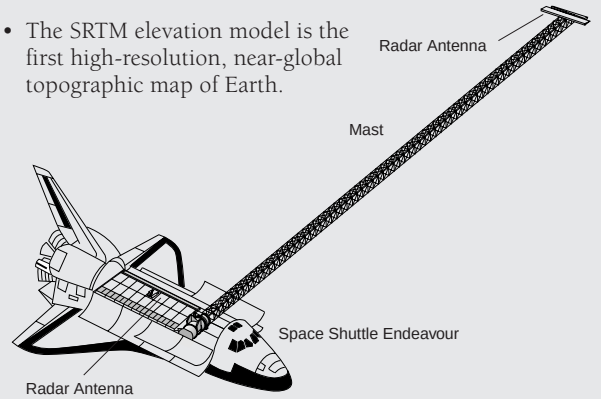
By obtaining its data from orbit, with radar, and in a single mission, SRTM avoided the various problems that have prevented acquisition of worldwide elevation data in the past. Typically, previous mapping surveys have involved the use of aerial photography and ground surveys. They were slow, labor-intensive, piecemeal, hindered by difficult terrain and persistent cloud cover, and limited by access restrictions in some areas. In contrast, SRTM looked through clouds with radar, covered nearly all terrain within its orbital range, and used a single set of hardware and software to produce a data set of high quality and consistency.

Topography is fundamental to our daily lives. It strongly affects our weather, directs our water supply, and blocks or allows passage in our travels. Meanwhile, uses of topographic data in science are innumerable, and SRTM will allow the study of the surface of our planet in far greater detail than previously possible.

SRTM is a cooperative project of the National Aeronautics and Space Administration (NASA), the Department of Defense's National Imagery and Mapping Agency (NIMA), and the German and Italian space agencies. The Jet Propulsion Laboratory, California Institute of Technology, manages the SRTM project for NASA's Earth Science Enterprise and NIMA. SRTM data are distributed by the U.S. Geological Survey (USGS) Earth Resources Observation Systems (EROS) Data Center, Sioux Falls, South Dakota.

SRTM Mission Results

- SRTM mapped nearly all of Earth's landmass between latitudes 60 degrees north and 56 degrees south. That is about 120 million square kilometers (46 million square miles).
- More than 12 terabytes of radar data were acquired for production of the elevation model plus a radar image "snapshot" of Earth.
- The full-resolution SRTM digital elevation model shows detail as small as about 30 meters (98 feet), about the size of a basketball court.
- The SRTM elevation model is the first high-resolution, near-global topographic map of Earth.



SRTM simultaneously used antennas in the payload bay and at the end of a mast to record radar signals reflected off Earth's landforms from two differing viewpoints.

For more information, visit these Web sites:

SRTM — http://www.jpl.nasa.gov/srtm/

USGS — http://edc.usgs.gov/srtm/data/obtainingdata.html

NASA Planetary Photojournal — http://photojournal.jpl.nasa.gov

National Imagery and Mapping Agency — http://www.nima.mil/