

Space Acquired Photography

Interested in a photograph of the first space walk by an American astronaut, or the first photograph from space of a solar eclipse? Or maybe your interest is in a specific geologic, oceanic, or meteorological phenomenon? The U.S. Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center is making photographs of the Earth taken from space available for search, download, and ordering. These photographs were taken by Gemini mission astronauts with handheld cameras or by the Large Format Camera (LFC) that flew on space shuttle *Challenger* in October 1984. Space photographs are distributed by EROS only as high-resolution scanned or medium-resolution digitized products.

Project Gemini photographs were taken by NASA astronauts with handheld cameras during Gemini Missions III through XII between March 23, 1965, and November 15, 1966. The collection includes over 2,500 camera images of geologic, oceanic, and meteorological targets, as well as historical photography, such as the first docking of two space vehicles. The Gemini photography collection was shot on 70-mm and 5 inch by 5 inch film, primarily color, but with some black and white and color-infrared coverage. The USGS also provides search aids and product support through their commercial vendors (<http://edc2.usgs.gov/referrals/index.asp>).

The Gateway to Astronaut Photography of Earth (NASA-Johnson Space Center) hosts the complete collection of astronaut photographs of the Earth and is located at <http://eol.jsc.nasa.gov/>.

Shuttle LFC images were acquired during the space shuttle *Challenger* flight on October 5–13, 1984. The LFC was mounted in the cargo bay and operated by signals transmitted



Gulf Coast of the United States, including the area of Mobile, Alabama, and Pensacola, Florida. Entity ID: AR7G05000445609; Center Coordinates: 30°22'53"N, 87°8'35"W; Acquisition Date: 1965/08/24

from ground controllers. Shuttle LFC photographs are distributed as digital products only.

Gemini manned flight	Date	Astronauts	Duration
Gemini III	March 23, 1965	Virgil I. Grissom, John W. Young	4 hours 52 minutes 31 seconds
Gemini IV	June 3–7, 1965	James A. McDivitt, Edward H. White II	4 days 1 hour 56 minutes 12 seconds
Gemini V	August 21–29, 1965	L. Gordon Cooper, Jr., Charles Conrad, Jr.	7 days 22 hours 55 minutes 14 seconds
Gemini VII	December 4–18, 1965	Frank Borman, James A. Lovell, Jr.	13 days 18 hours 35 minutes 1 second
Gemini VI	December 15–16, 1965	Walter M. Schirra, Jr., Thomas P. Stafford	1 day 1 hour 51 minutes 24 seconds
Gemini VIII	March 16, 1966	Neil A. Armstrong, David R. Scott	10 hours 41 minutes 26 seconds
Gemini IX	June 3–6, 1966	Thomas P. Stafford, Eugene A. Cernan	3 days 21 hours
Gemini X	July 18–21, 1966	John W. Young, Michael Collins	2 days 22 hours 46 minutes 39 seconds
Gemini XI	September 12–15, 1966	Charles Conrad, Jr., Richard F. Gordon, Jr.	2 days 23 hours 17 minutes 8 seconds
Gemini XII	November 11–15, 1966	James A. Lovell, Jr., Edwin E. Aldrin, Jr.	3 days 22 hours 34 minutes 31 seconds

<http://science.ksc.nasa.gov/history/gemini/gemini.html>

Digital file sizes	Original film size	Spot size	File sizes	
			Black and white	Color/color infrared
Gemini	70 mm	21 micron (1200 dpi)	15 MB	45 MB
		14 micron (1800 dpi)	30 MB	90 MB
	5 x 5 inch	21 micron (1200 dpi)	40 MB	120 MB
		14 micron (1800 dpi)	80 MB	240 MB
Large Format Camera	9 x 18 inch	21 micron (1200 dpi)	117 MB (x 2 files)	350 MB (x 2 files)
		14 micron (1800 dpi)	262 MB (x 2 files)	787 MB (x 2 files)

Actual file sizes may differ from those listed in the table above. Metadata printed on the film are scanned along with the image data, and a USGS visual identifier is embedded in the image.

High-Resolution and Medium-Resolution Digitized Photography

Both Gemini and LFC film products have been scanned and are now available as either high-resolution scanned or medium-resolution digitized photography. Medium-resolution photography is digitized at approximately 400 dpi, and files are created in TIFF format. The file size for medium resolution products is approximately 15 MB for black and white images and 40 MB for color images. High-resolution images can be 105 MB per black and white image and as much as 240 MB for a color image.

Prices

*High resolution scanned: \$30.00 per frame**

*Medium resolution digitized: \$3.00 per frame**

**Prices subject to change.*

For current delivery options see

<http://eros.usgs.gov/products/aerial/space.html>

Search and Order

All the images at EROS can be searched and ordered through Earth Explorer at <http://earthexplorer.usgs.gov>

Data Applications

Gemini images were taken as long ago as the mid-1960s, before Landsat was launched, and cover many areas outside the United States for which 1960s aerial photography is not available.

The LFC imager involved only one flight mission in October of 1984. The LFC was retired from service after the loss of the space shuttle *Challenger*.

The Gemini and LFC imagery is useful for making general land cover assessments and for general studies of change in geomorphic features (for example, barrier islands) and hydrology (for example, wetlands/lakes).

For further assistance, please contact:

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