

THE VALUE OF PERFORMANCE.

NORTHROP GRUMMAN



GALEX

The Galaxy Evolution Explorer

A NASA Small Explorer (SMEX) mission, GALEX used an ultraviolet telescope to explore the origin and evolution of galaxies and the origins of stars and heavy elements. Originally scheduled for 28 months in duration, GALEX was decommissioned following ten years of extended operations. The main objectives of the GALEX program were to:

- Map the history of star formation in the Universe over the redshift range $0 < z < 2$ (80 percent of the age of the Universe), and answer fundamental questions:
 - (1) What is the star formation and metal production history of galaxies?
 - (2) When and where did the stars and elements we see today have their origins?
- Perform the first ultraviolet all-sky imaging survey (1,000,000 galaxies)
- Perform the first ultraviolet wide-area spectroscopic surveys (100,000 galaxies)

Northrop Grumman was the prime contractor for the GALEX spacecraft bus, instrument integration, and the satellite (spacecraft bus and instrument) environmental test campaign, as well as the ground data system.

Facts At A Glance

GALEX performed the first ultraviolet all-sky survey covering approximately 1 million galaxies.

GALEX performed the first ultraviolet wide area spectroscopic surveys covering approximately 100,000 galaxies.

Mission

SMEX program galactic astronomy

Customer

California Institute of Technology

Specifications

Spacecraft

Mass:	280 kg (617 lb.)
Solar Arrays:	675 W EOL, single deployable fixed array
Stabilization:	3-axis, Zero Momentum Bias, stellar target pointing
Pointing:	<783 arcsec control, <30 arcsec knowledge
PL Data Storage:	32 Gbit
Uplink:	S-band: 2 kbps
Downlink:	S-band: 2 Mbps; X-band 40 Mbps
Propulsion:	None
Mission Life:	28 months (baseline mission)
Orbit:	690 km altitude Earth orbit @ 29° inclination
Status:	Baseline mission complete. Decommissioned in 2013 after ten years of extended operations

Payload

Instrument:	50 cm Ultraviolet Telescope
Wavelength	135-300 nm, two bands large format ultraviolet photon counting detectors
Coverage:	ultraviolet photon counting detectors
Inertial Pointer:	Slew rate 0-2,400 arcsec/sec, pointing knowledge <30 arcsec

Launch

Launch Vehicle:	Pegasus® XL
Site:	KSC, Cape Canaveral, Florida
Date:	April 28, 2003

The Space Segment

The GALEX satellite represented the space segment of the mission with a Northrop Grumman-supplied spacecraft bus and the JPL-supplied instrument. The spacecraft bus provided all of the on-orbit support for the instrument to obtain science data and transmit it to the ground for distribution and processing. The instrument consisted of a 50 centimeter UV Telescope, its focal plane detectors and supporting electronics.

The Ground Segment

The ground segment comprised Ground Stations, a Mission Operations Center (MOC) and Science Operations and Data Analysis (SODA). The MOC, located at Northrop Grumman's Dulles, Virginia campus, was responsible for command and control of the satellite. SODA, located at the California Institute of Technology, was responsible for science data processing and science operations mission planning.

Mission Partners

California Institute of Technology

Principal Investigator: Dr. Chris Martin; science operations and data analysis

Jet Propulsion Laboratory

Project management and instrument development

University of California Berkeley

Science detectors

Laboratoire d'Astronomie Spatiale (Marseille, France)

Back focal assembly optics

Johns Hopkins University

Science data archive

Yonsei University (Seoul, South Korea)

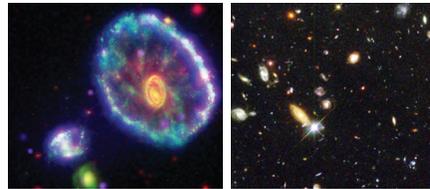
Science operations and data analysis support

Universal Space Networks (Newport Beach, California)

Ground stations

Northrop Grumman

Spacecraft development, satellite integration and test, launch vehicle integration, ground data system, mission operations, and Pegasus launch vehicle



GALEX's ultraviolet surveys produced an unprecedented database of nearby and distant galaxies.



GALEX spacecraft with solar arrays stowed, in Northrop Grumman's Dulles, Virginia satellite manufacturing facility.

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