

THE VALUE OF PERFORMANCE.

NORTHROP GRUMMAN

RHESSI

Space-based Solar Flare Observatory

The Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI) is a NASA Small Explorer (SMEX) space observatory with a primary mission to explore the physics of particle acceleration and explosive energy release in solar flares. RHESSI combines, for the first time, high-resolution imaging in hard X-rays and gamma rays with high-resolution spectroscopy, allowing a detailed energy spectrum to be obtained at each point of the image.

Northrop Grumman was responsible for the design and manufacture of the spacecraft and participated in the integration and test of the payload at the University of California at Berkeley.

RHESSI was launched in February 2002 on an Northrop Grumman Pegasus® XL rocket from Cape Canaveral Air Force Station to begin a two-year mission. At the end of the two years, RHESSI's net spacecraft availability was 100 percent and the mission was extended. After more than ten years, RHESSI continues to collect and download data.

Spacecraft

The spacecraft, derived from Northrop Grumman's LEOSTar™-2 core design, provides a mature, reliable platform. The attitude control functions include a spin control mode for adjustment of the vehicle spin rate to a commandable value, and a normal mode to keep the spin axis pointed at the sun.

Facts At A Glance

- Launched February 5, 2002 on an Northrop Grumman Pegasus XL from Cape Canaveral Air Force Station, Florida
- 600 km circular, 38° inclination, Low Earth Orbit mission
- RHESSI successfully completed its two-year mission in March 2004 and continues to collect on-orbit data
- The onboard instrument observes and collects X-ray and gamma ray emissions with an unprecedented combination of high-resolution imaging and spectroscopy

Customer

University of California at Berkeley

Specifications

Spacecraft

Launch Mass:	291 kg (641.5 lb.)
Solar Arrays:	Four deployable wings, triple-junction GaAs cells, 505 W EOL
Orbit:	600 km circular @ 38° inclination
Stabilization:	Spin Stabilized @ 15 RPM
Pointing Knowledge:	540 arcsec control, 330 arcsec knowledge
Data Storage:	32 Gbits
Data Downlink:	S-band: 4 Mbps
Propulsion:	None
Mission Life:	2 years
Current Status:	Operational

Launch

Launch Vehicle:	Pegasus® XL
Launch Site:	Cape Canaveral Air Force Station, Florida
Date:	February 5, 2002

Instrument

Imager/Spectrometer

The imager is a 1.7 meter long carbon fiber composite tube with grid tray assemblies at each end. The grid trays are aluminum structures with nine sets of collimating grids in each tray. The spectrometer is a cryostat containing the nine germanium detectors. The nine sets of grids in the imager are required to be aligned with the nine detectors in the spectrometer. Rotation of the spacecraft causes the flux of high energy particles in the field of view of the instrument to be modulated by the collimating grids. The instrument covers energies from soft X-rays (3 keV) to high-energy gamma-rays (20 MeV).

Data Availability

Unlike most other scientific missions, there are no proprietary data rights. All data, and the software needed to analyze them, are freely available online. This allows many talented scientists around the world to analyze RHESSI data along with the complementary observations of the same flares that are available from other instruments in space and from ground-based observatories. For more information, visit: <http://hesperia.gsfc.nasa.gov/rhessidatcenter>.

Mission Partners

University of California at Berkeley

Procuring agency. Program management and science lead. System integrator, and operator of satellite on-orbit. Developer of the instrument spectrometer.

NASA Goddard Spaceflight Center

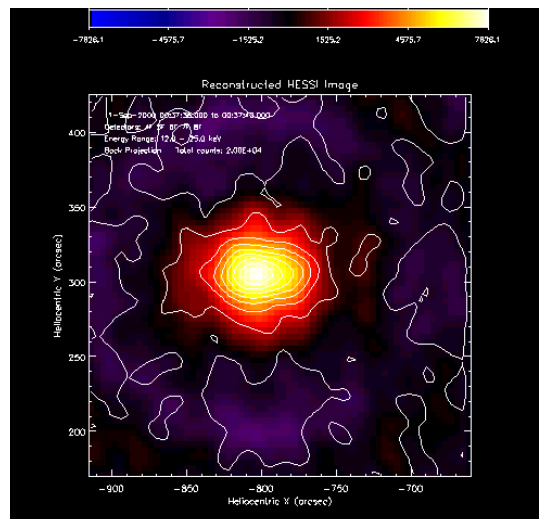
Mission management, technical oversight, and data archiving. Developer of the instrument grids and cryocooler.

Paul Scherrer Institut (Switzerland)

Developer of the imaging telescope and optical aspect system for the payload instrument

Northrop Grumman

Contractor for spacecraft design and manufacture, with support to payload integration and system test



A solar flare reconstructed by the RHESSI "Image Widget." (Graphic courtesy NASA)