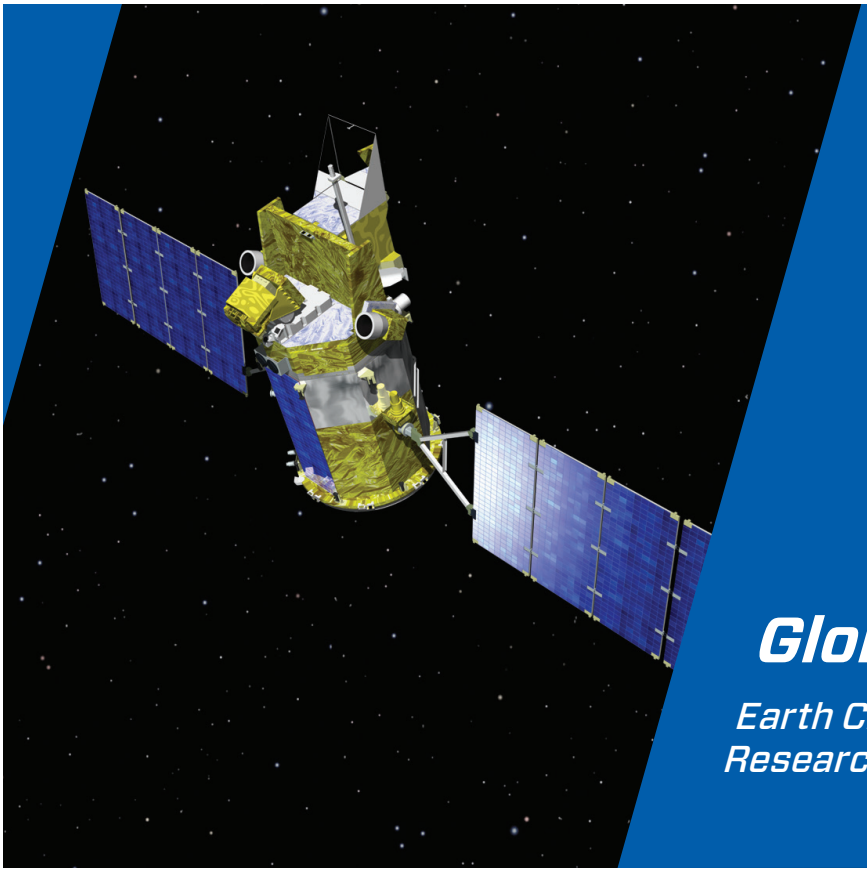

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# Glory

## Earth Climate and Atmospheric Research Satellite

Glory was a low-Earth orbit (LEO) scientific research satellite designed to achieve two major goals:

- To collect data on the properties and distributions of aerosols in the Earth's atmosphere
- To collect data on solar irradiance for the long-term Earth climate record

The data was designed to enable scientists to draw conclusions about the effects of aerosols on Earth's atmosphere and climate system, and to measure the effects of solar irradiance on Earth. Glory was to accomplish these objectives by utilizing two separate instruments, the Aerosol Polarimetry Sensor (APS) and the Total Irradiance Monitor (TIM).

Glory was launched from Vandenberg Air Force Base (VAFB), California aboard Northrop Grumman's Taurus® XL (3110) launch vehicle. The spacecraft was lost due to a launch vehicle failure.

## Spacecraft

The Glory spacecraft employed Northrop Grumman's LEOStar™ bus design, with deployable solar panels, 3-axis stabilization, and X-band/S-band RF communications capabilities. The structure consisted of an octagonal aluminum space frame and a hydrazine propulsion module containing enough fuel for at least 36 months of service.

### *Coverage*

The Glory spacecraft incorporated Northrop Grumman's LEOStar™ bus design, with deployable solar panels, 3-axis stabilization, and X-band/S-band RF communications capabilities.

Glory was to be part of the NASA "A-Train" constellation of six Earth science satellites flying in close proximity.

### *Mission*

Collect data on the properties and distribution of aerosols in the Earth's atmosphere, and on solar irradiance for the long-term Earth climate record.

### *Customer*

NASA Goddard Space Flight Center

## Specifications

### Spacecraft

| | |
|---|---|
| Mass: | 528 kg (1,164 lb.) |
| Redundancy: | Redundant |
| Solar Arrays: | Bi-axial articulated, one body-mounted panel |
| Stability: | 3-axis, stabilized, Zero Momentum Bias |
| Pointing: | 142 arcsec control, 62 arcsec knowledge |
| Propulsion: | 45 kg, monopropellant blowdown, 4-4N thrusters |
| Power: | 766 W total from arrays and body-mounted panel |
| Mission Life: | 3 years (goal of 5 years or more) |
| Orbit: | 705 km, sun-synchronous, circular – low-Earth orbit (LEO) |

### Launch

| | |
|---|---|
| Launch Vehicle: | Taurus XL |
| Site: | Vandenberg Air Force Base |
| Date: | March 4, 2011 |

### Instruments

*Aerosol Polarimetry Sensor (APS)*

The APS was designed to collect global aerosol data based on measurements of light reflected within the solar reflective spectral region of Earth's atmosphere. Since clouds can have a significant impact on the quality of these measurements, an onboard cloud camera would be used to distinguish between clear and cloud filled scenes. A three-year mission life (five-year or more goal) was planned to provide a minimum time period to observe seasonal and regional trends and characterize the evolution of aerosols during different climate events, such as El Niño, volcanic eruptions, etc.

*Total Irradiance Monitor (TIM)*

Developed and provided by the University of Colorado's Laboratory for Atmospheric and Space Physics (LASP), the TIM instrument was designed to collect high accuracy, high precision measurements of total solar irradiance (TSI), or the amount of solar radiation in the Earth's atmosphere over a period of time. The TIM is a heritage-design instrument that was originally flown on Northrop Grumman's SORCE satellite, launched in January 2003.

## Mission Partners

### NASA Goddard Space Flight Center

Responsible for project management, system engineering, and science data archive

### NASA Goddard Institute for Space Studies

APS science operations

### Raytheon Space and Airborne Systems

Development of the APS instrument

### Laboratory for Atmospheric and Space Physics (LASP) (Boulder, CO)

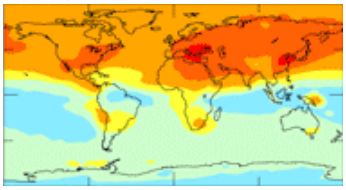
TIM instrument development and science operations

### Northrop Grumman

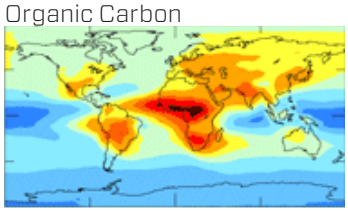
Design, assembly, integration, and test of spacecraft, including payloads; launch vehicle integration, mission operations/control and Taurus XL launch vehicle

Technicians make final preparations to the Glory spacecraft at Vandenberg Air Force Base prior to launch

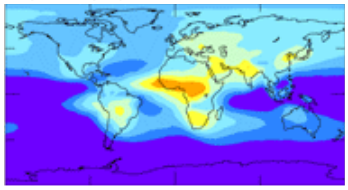
Sulfates



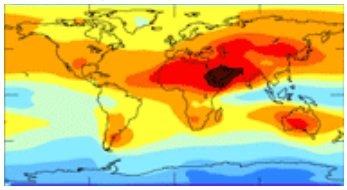
Organic Carbon



Black Carbon



Soil Dust



The Glory Aerosol Polarimetry Sensor (APS) was designed to take measurements to distinguish various species of aerosols

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