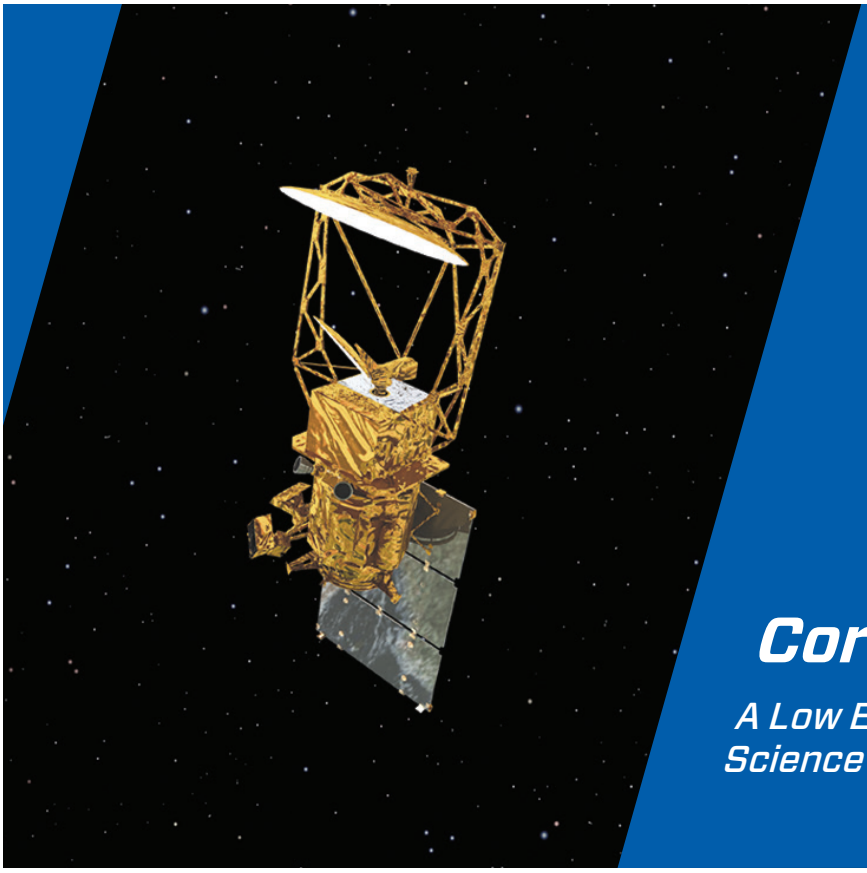

THE VALUE OF PERFORMANCE.

NORTHROP GRUMMAN

Coriolis

A Low Earth Orbit Meteorological Science Satellite

Coriolis is a USAF/SMC and Space and Naval Warfare Systems Command meteorological science mission to demonstrate the viability of using polarimetric radiometry to measure ocean surface wind speed and direction from space, and to image Coronal Mass Ejections.

Spacecraft

Northrop Grumman was the space system integrator as well as the designer and manufacturer of the spacecraft developed backup ground station elements, supported launch vehicle integration, and continues to provide sustaining engineering support. Key performance features include extremely low levels of Electromagnetic Interference (EMI) emissions to protect the operation of WindSat's passive radiometers; physical accommodation of WindSat, with its 125 kilogram spinning platform, that ensures an unobstructed science field of view while providing the necessary power, pointing knowledge, control, and stability; and full redundancy with robust fault management and safing capabilities. Northrop Grumman built robustness into Coriolis' control and safing algorithms including satellite recovery and placement in a thermally safe, power safe attitude in response to disruption of the WindSat spin rate or failure of its momentum compensation system.

Coriolis was launched in January 2003 from Vandenberg Air Force Base aboard a Titan II rocket. Designed for a three year mission, Coriolis remains operational.

Facts At A Glance

- Joint Air Force and Navy program
- Launched January 6, 2003 on a Titan II rocket from Vandenberg AFB
- 830 x 830 km, 98.7° inclination
- Coriolis continues to perform on-orbit well beyond its three year design life
- WindSat measures ocean surface wind speed and direction and the SMEI images coronal mass ejections
- Extremely low spacecraft electromagnetic emissions to prevent interference with WindSat's radiometers
- Simple, easily integrated design based on Northrop Grumman's flight-proven LEOStar-3 modular spacecraft architecture

Customer

USAF SMC/SDTW

Kirtland Air Force Base, New Mexico

Naval Research Laboratory

Specifications

Spacecraft

Mass:	816 kg (1,799 lb.)
	Redundancy: Fully Redundant
Solar Arrays:	Fixed, 3-panel, 2-jct GaAs, 1174 W EOL
Orbit:	830 x 830 km @ 98.7° inclination
Stabilization:	3-axis, pitch momentum bias
Pointing:	324 arcsec control
	194 arcsec knowledge
Data Storage:	30 Gbits
Data Downlink:	25.6 or 51.2 Mbps (selectable), X-band
Propulsion:	Four 4.48 Newton (1 lb.) thrusters
	82 kg Hydrazine
	(204 mps DV)
Mission Life:	3 years; 5 year goal
Current Status:	Operational

Launch

Launch Vehicle:	Titan II
Launch Site:	Vandenberg Air Force Base, California
Date:	January 6, 2003

Instruments

Windsat, Passive Polarimetric Microwave Radiometer
A highly sensitive 6.8 to 37 GHz receiver for measuring ocean surface wind speed and direction. Provides risk reduction data for the National Polar-orbiting Operational Environmental Satellite System (NPOESS) development of the Conical Microwave Imager Sounder (CMIS). WindSat is 3.3 meters high with a mass of 305 kg, and it includes a 125 kg rotating platform that spins about the Earth-pointing yaw axis at 29.6 RPM.

Solar Mass Ejection Imager (SMEI)
A 35 kg all-sky camera experiment for imaging Coronal Mass Ejections (CME) propagating from the sun through the solar wind. 4π steradians of sky coverage is provided per orbit. SMEI was deactivated after completing its mission after four years on orbit.

Mission Partners

USAF SMC/SDTW (Kirtland Air Force Base, New Mexico)
Procuring agency, provided customer program management

Naval Research Laboratory
On-orbit operator, led the WindSat instrument development

NPOESS Integrated Program Office (Silver Spring, Maryland) and the Naval Center for Space Technology (Washington, D.C.)
Developed the WindSat instrument

Air Force Research Laboratory
Led the SMEI instrument development

University of Birmingham (Birmingham, U.K.), University of California (San Diego, California), Rutherford Appleton Laboratories (Oxfordshire, U.K.), and Boston College
Developed the SMEI instrument

Northrop Grumman
Prime contractor and system integrator responsible for spacecraft design and manufacture, payload integration, and system test; launch support; on-orbit operations support

Coriolis in final checkout

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