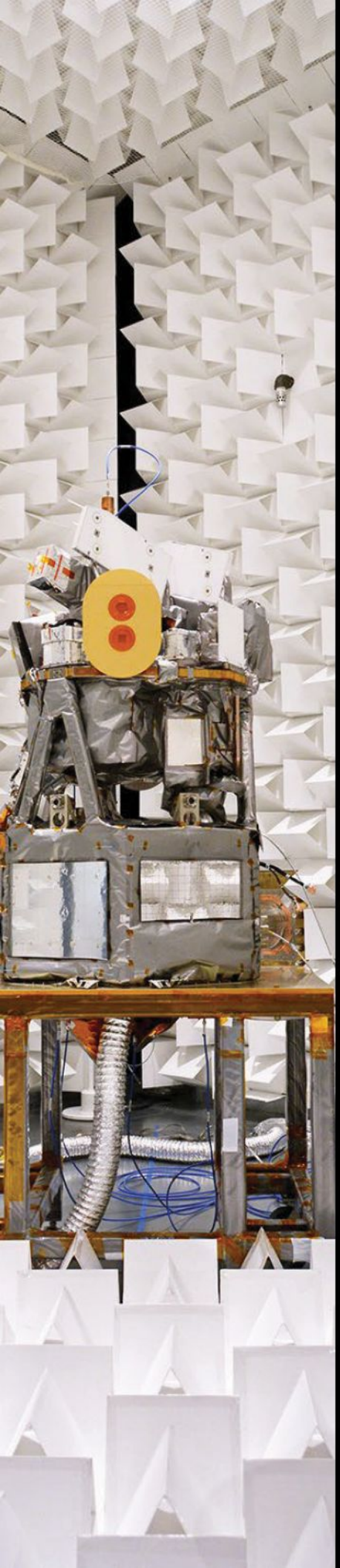


ESPASAT-EX

SPECIFICATIONS

SPACECRAFT FEATURES

Design Life: Single string, 2-year design life Ps 0.75

Structure: Aluminum frame with honeycomb panels. Aluminum isogrid available

Attitude Control System: Wheel based 3-axis Zero Momentum Bias with magnetic momentum desaturation. Star tracker, IMU, and coarse sun sensors. Instrument in the loop accommodated

Standard ACS performance:

Pointing accuracy 38.9 R, 39.3Y, 63.2 P arcsec three sigma (arcsec)

Pointing knowledge 27.6 R/Y, 29.4 P arcsec three sigma (arcsec)

Pointing Stability 11.5 arcsec/sec over 2.5 sec

Jitter Mission specific

Slew 1.5 degrees/sec

Propulsion: Hydrazine monopropellant blowdown

Tank capacity: 20.5 kg

Delta V: 175.2 m/s based on 158.1 kg launch wet mass

Command & Data Handling: Single 3U Master Avionics Unit hosting all spacecraft C&DH and power control functions, including spacecraft component interfaces and instrument payload state of health telemetry interfaces.

wer system: Shunt regulated, direct energy transfer system

Solar array 626W

Communication:

Command (NEN): 2 kbps S-Band, 32kbps available

Command (SN): 2 kbps S-Band

SOH telemetry (NEN) 8 kbps S-Band

SOH telemetry (SN) 8 kbps S-Band

Mission data: 4 Mbps S-Band

Thermal: Cold-biased passive thermal control design with surface treatments and MLI blanketing, software-controlled heater circuits with thermostatically controlled heater circuits for backup.

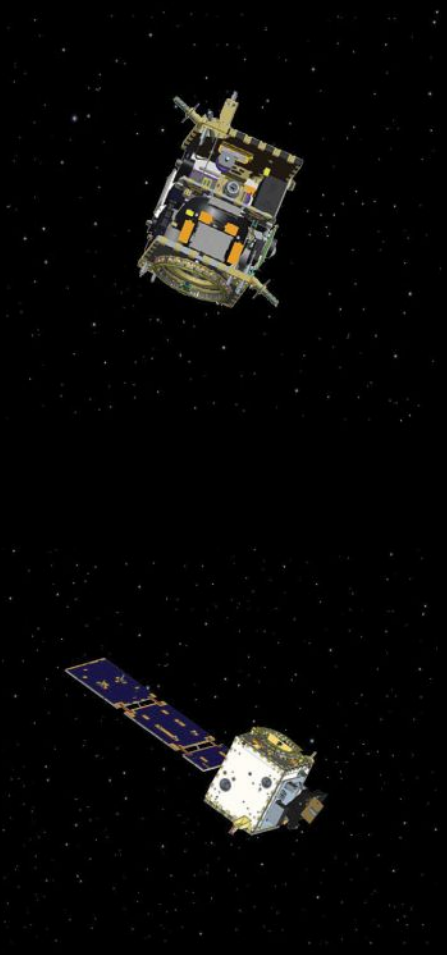
Additional Capabilities: Larger launch and smaller mass and instrument size (Launch Vehicle or ride-share dependent)

Higher instrument power

Improved pointing with instrument in the loop

Higher rate communications at X- or Ka-Band

Mission operations



MORE INFORMATION

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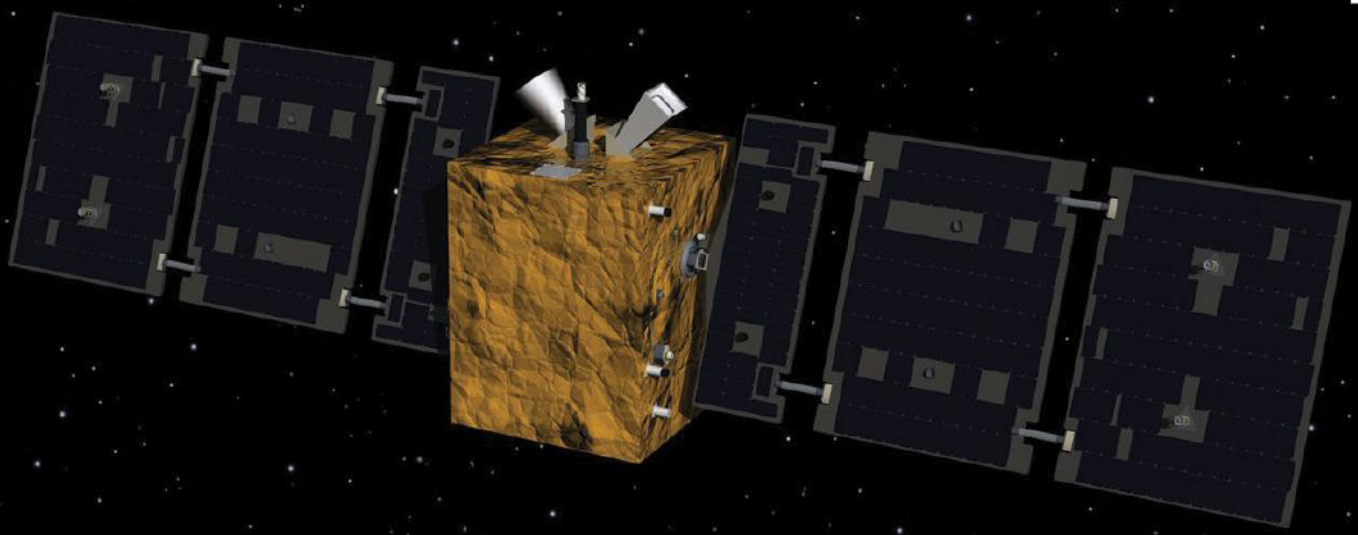
NORTHROP GRUMMAN



ESPASAT-EX

Our ESPASat -Ex spacecraft is a versatile and expandable vehicle for space and Earth science missions, remote sensing, and commercial applications. ESPASat family spacecraft are compatible with small launch vehicles including Pegasus®, Launcher One, and Electron and rideshare on EELV-class vehicles and Antares™. The spacecraft is designed for Low Earth Orbit and is adaptable for to HEO, MEO, Lunar, Earth trailing and Lagrange points. Other versions of ESPASat have flown in GEO. ESPASat-Ex is scalable to make full use of allowable rideshare and small launch vehicle volumes and mass capabilities.

FACILITIES AND SERVICES

We manufacture spacecraft in our Dulles, Virginia; Gilbert Arizona; and Redondo Beach California facilities. Each facility possesses the floor space to integrate the spacecraft and observatory including the capability to maintain contamination sensitive instruments under purge and to operate at a class 10k level. Each site is able to perform EMI/EMC, thermal vacuum, acoustic and vibration testing to qualify an observatory environmentally. Additionally our Dulles Mission Control Center can provide mission operations for LEOStar-3 missions.

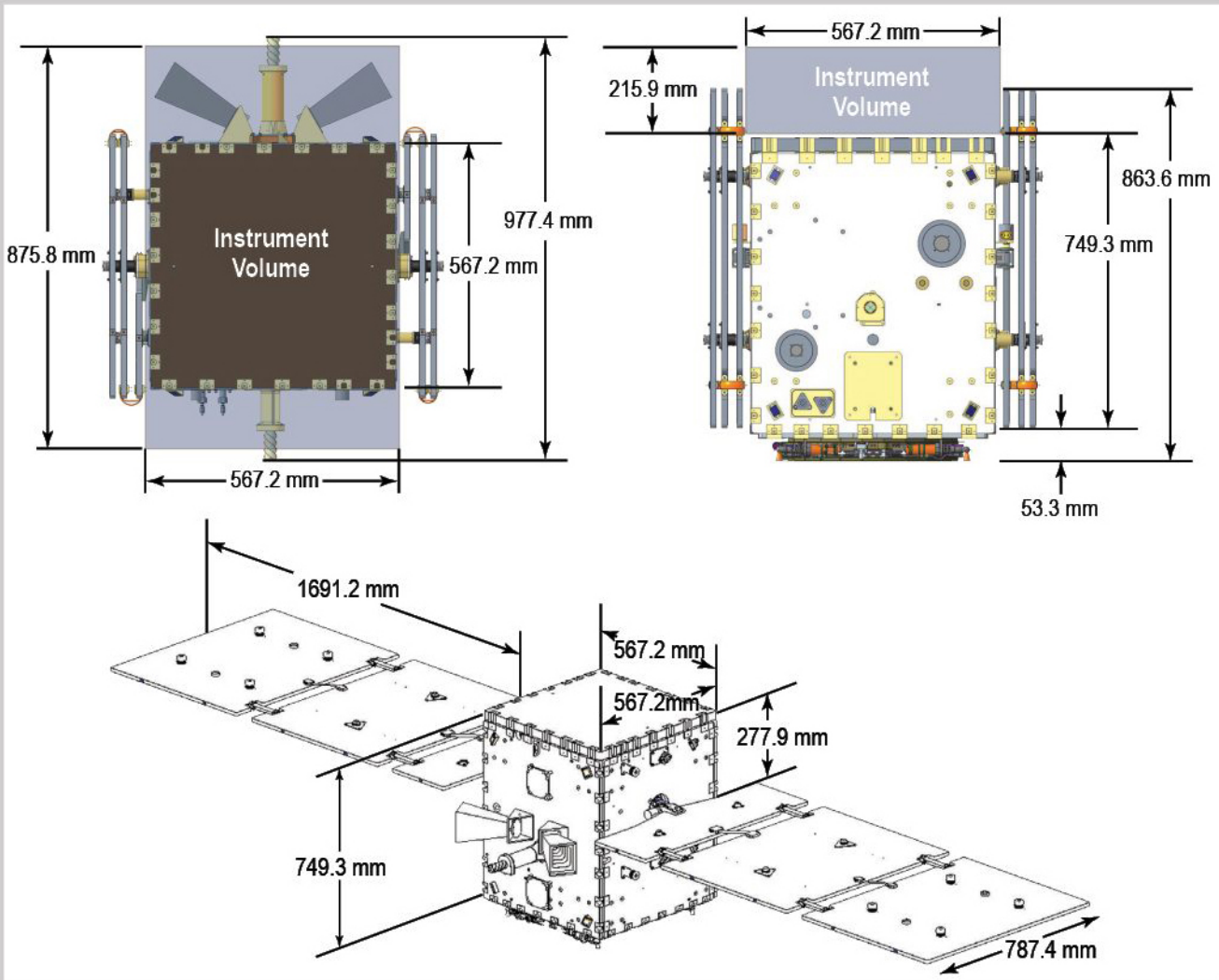
PAYLOAD ACCOMMODATION

Mass:	50 kg standard.
Power:	100 W orbit-average-power standard.
Data interface:	115 kbps UART. Others available.
Mission data storage:	16 Gb
Thermal:	Instrument thermally isolated from spacecraft.
Instrument Mounting:	Instrument on top of spacecraft.
Instrument volume:	.22m high by .87m by .57m standard on ESPA Grande ring in 4m Atlas fairing. Other configurations possible. Launch Vehicle fairing dependent.

NORTHROP GRUMMAN

ESPASAT-EX

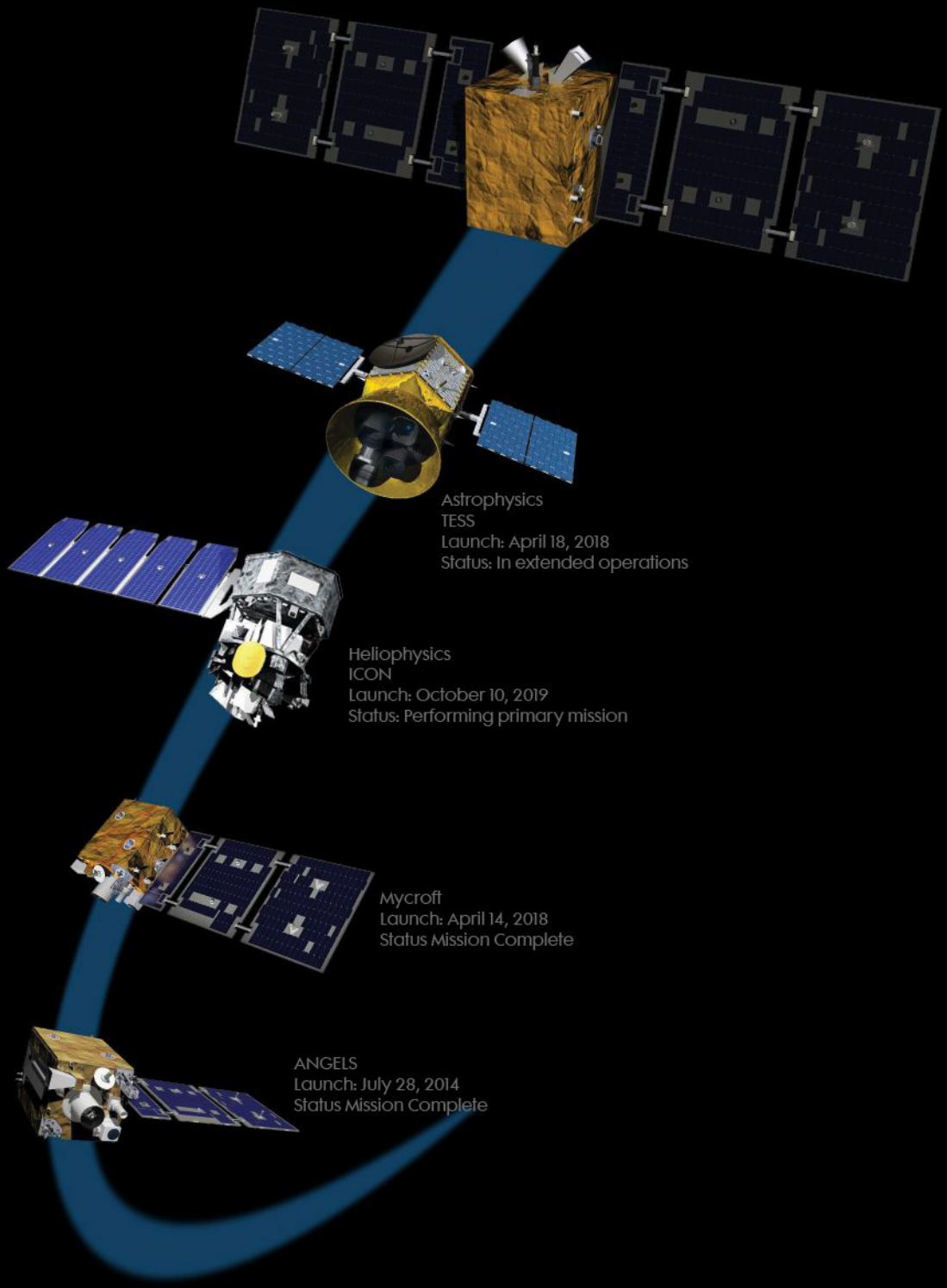
Rapid IV-045



Rapid IV-043

Months	4	8	12	16	20	24	28	32	36	40	44	48
SRR/MDR ▼		▼	PDR	▼	CDR			IIRR	▼	▼ PER	▼	▼
Preliminary Design											PSR	OAR
Detail Design												
Spacecraft AI&T												
Observatory I&T												
Ship and Launch												
On-orbit Test												

ESPASAT-EX HERTITAGE



The ESPASat –Ex's heritage derives from our successful ESPASat product line (ANGELS, Mycroft) and our most recently launched NASA Explorer programs TESS and ICON. Both ANGELS and Mycroft launched as secondary payloads mounted on ESPA rings while ICON launched on Northrop Grumman's small launch vehicle, Pegasus. ESPASat-Ex is designed to fit in the allowable ride share volume for an ESPA Grande in a 4m fairing. The design is scalable volumes allowable for the standard or other sized ESPA rings and for a 5m fairings and can be adapted for small launch vehicles such as Pegasus and Electron.