

# EO-Sat1

## HIGH PERFORMANCE EARTH-OBSERVATION SATELLITE

EO-Sat1 is a high performance Earth-Observation satellite designed to produce data for a broad range of Earth observation applications. The satellite features two imaging payloads – one narrow angle, high resolution and one wide angle, medium resolution – capable of providing true diffraction limited imagery from 2.5 m GSD and 30 km swath, to 60 m GSD and 184 km swath. Both instruments cover the same 10 spectral bands in the visible to near-infrared spectrum. An agile, fully dual-redundant bus allows imaging in continuous nadir coverage, spot and stereoscopic modes.

EO-Sat1 is ideally sized for launching in quantities of three to five, significantly improving the economy of deploying a constellation for increased imaging coverage and reduced revisit intervals.

### SYSTEM SPECIFICATIONS EO-Sat1

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Reference orbit	700 km, sun-synchronous
Instruments	HiRes, MedRes
Swath	HiRes: 30 km MedRes: 184 km
GSD	HiRes: 2.5 m, 10 m MedRes: 15 m, 60 m
Spectral bands	HiRes: 10 MedRes: 10
SNR	150–350 (band dependent)
Pointing accuracy (without GCPs)	Knowledge: 43 m ( $3\sigma$ ) Control: 98 m ( $3\sigma$ )
Off-nadir imaging	$\pm 30^\circ$
Radiometric quantization	12-bit
Data storage	384 GByte (+384 GByte redundant)
Downlink	400 Mbps (X-band)
TT&C	VHF/UHF and/or S-Band
Mass	400 kg
Redundancy	Dual-redundant bus
Design lifetime	5 years



## Applications

The unique combination of high resolution and medium resolution instruments, both imaging in the same 10 spectral bands, cater for a broad range of applications, including:

- Monitoring the state and evolution of vegetation in agricultural lands and forests (MedRes)
- Detailed land cover mapping (MedRes & HiRes)
- Monitoring built environment and in particular human settlements (HiRes)
- Disaster management (HiRes)

EO-Sat1 data is processed to Level 1B (band aligned and radiometrically calibrated), and delivered in standard GeoTIFF format.



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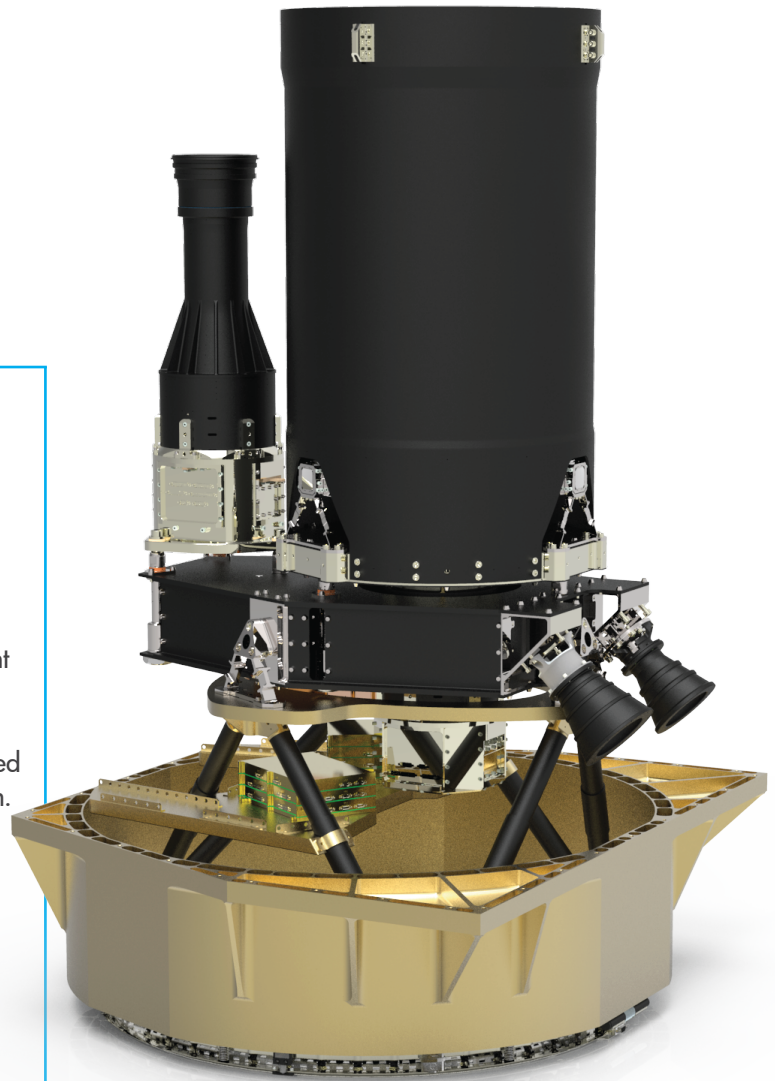
## PAYLOAD

EO-Sat1 carries two imaging instruments: a high resolution (HiRes) and a medium resolution (MedRes) instrument. The HiRes consists of a modified Ritchey-Chrétien astrograph front end, while the MedRes consists of a Double Gauss refractive front end. Both instruments provide large focal planes and low optical aberrations, while delivering true diffraction limited performance over the full spectral range from 400 to 930 nm. Two identical sets of Time Delayed Integration (TDI) capable sensors provide 10 spectral bands for each instrument. The number of TDI stages are in-flight configurable to allow optimisation of the dynamic range and signal to noise ratio per band.

The HiRes swath is centred within the MedRes swath, and the two instruments can be operated simultaneously or separately.



The dual-redundant on-board data storage can store up to 700 square scenes, which equates to 23.7 million km<sup>2</sup> of MedRes imagery, or 0.7 million km<sup>2</sup> of HiRes imagery.



### SPECTRAL BANDS EO-Sat1 at 700 km orbital altitude

Band	$\lambda_c$ (nm)	$\lambda_w$ (nm)	HiRes GSD	MedRes GSD
Deep Blue	425	50	10 m	60 m
Blue	490	65	10 m	60 m
Green	560	35	10 m	60 m
Yellow	605	40	10 m	60 m
Red	660	60	2.5 m	15 m
Red Edge-1	703	25	2.5 m	15 m
Red Edge-2	745	25	10 m	60 m
NIR-1	783	40	10 m	60 m
NIR-2	865	40	10 m	60 m
NIR-3	910	40	10 m	60 m

In a lower orbit, EO-Sat1 will gain GSD at the cost of swath. At 500 km, for example, the HiRes has GSDs of 1.8 and 7.2 m with a swath of 22 km, while the MedRes has GSDs of 11 and 43 m with a swath of 131 km.