



## OPTICAL PAYLOAD FOR PRISMA

PRISMA (“PREcursore IperSpettrale della Missione Applicativa”) Payload is a hyperspectral electro-optical sensor under development for the Italian Space Agency (ASI) in the frame of a small mission (<500kg) for earth observation (environmental monitoring and risk management).

The mission is completely focused on the hyperspectral payload, which is currently in phase C/D of development and Flight Model realisation. The launch is scheduled for 2014.

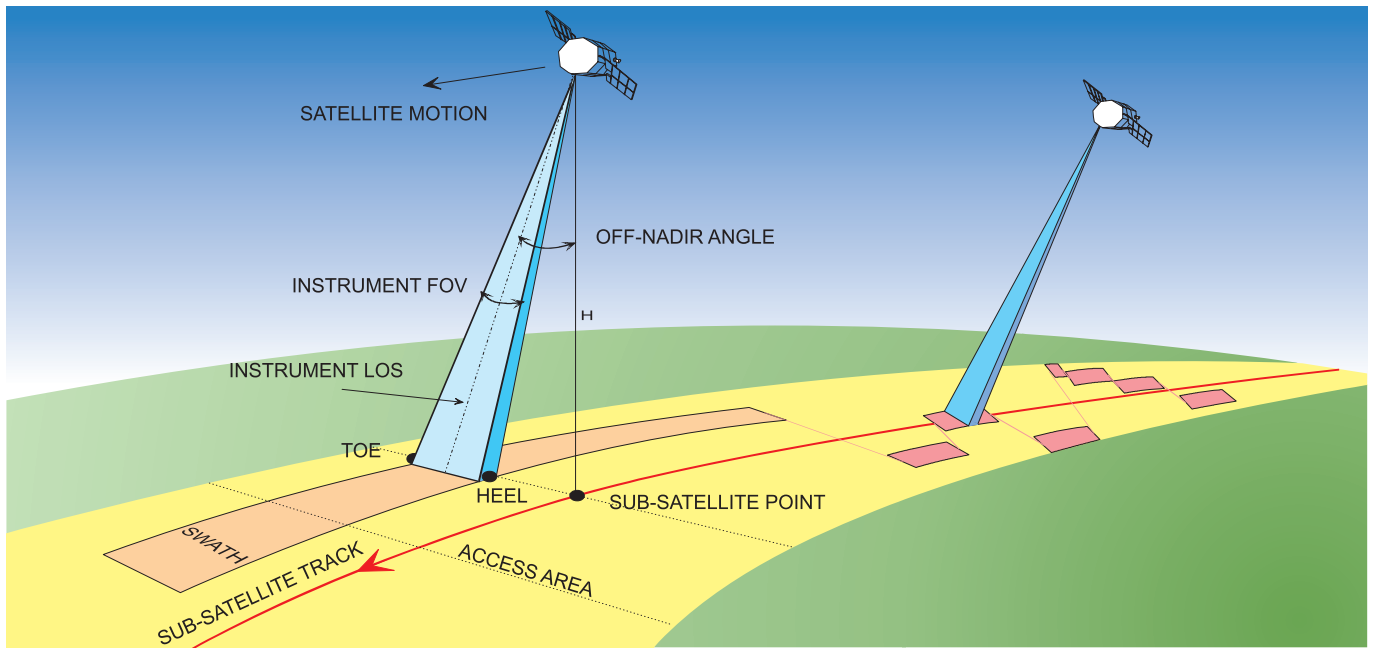
### GENERAL DESCRIPTION

The PRISMA Payload is composed of an imaging spectrometer (or hyperspectral imager), able to take images in a continuum of spectral bands ranging from 400 to 2500nm, and a medium resolution panchromatic camera.

The hyperspectral technique is based on the acquisition through the PRISMA electro-optical sensor of a “spectral cube” containing both spatial and spectral information of area target. The PRISMA Payload operates with a pushbroom scanning concept, from a sun-synchronous low earth orbit of 615Km.

To achieve the very demanding mission image quality requirements, the optical head comprises foreoptics telescope in TMA (Three Mirrors Anastigmatic) configuration.

This is common to the patented double band spectrometer, operating in VNIR and SWIR bands and to the panchromatic camera able to gather spatially coregistered images in order to derive higher resolution images with hyperspectral characteristics by postprocessing data fusion algorithms.



Italian Space Agency interests in PRISMA applications (in order of priority) are:

- Mapping of land cover and agricultural landscapes
- Pollution monitoring
- Quality of inland waters
- Coastal zones and Mediterranean sea
- Soil moisture
- Carbon cycle monitoring.

## TECHNICAL CHARACTERISTICS

Swath / FOV	30Km / 2.77°
GSD (615Km orbital altitude)	Hyperspectral: 30m
Panchromatic	5m
Spatial pixels: Hyperspectral	1000
Panchromatic	6000
Spectral range	VNIR: 400 – 1010nm
SWIR	920 – 2505nm
Spectral resolution	≤ 12nm
Spectral bands	> 220
Radiometric quantization	12 bit
VNIR SNR	> 200:1 on 400 – 1000nm > 600:1 @ 650nm
SWIR SNR	> 200:1 on 1000 – 1750nm > 400:1 @ 1550nm > 100:1 on 1950 – 2350nm > 200:1 @ 2100nm
PAN SNR	> 240:1
Absolute radiometric accuracy	Better than 5%
Aperture diameter	210mm
MTF (Nyquist frequency)	> 0.3 for VNIR > 0.3 for SWIR > 0.2 for PAN
Cooling System	Passive radiator
Optical Head dimensions	- 900mm width - 1650mm height (including radiator baffle) - 1010mm nadir
Optical Head mass	< 200Kg
Power consumption	< 95W average in Acquisition mode < 60W average in Standby mode
Lifetime	5 years

