
Hyperion Instrument Overview

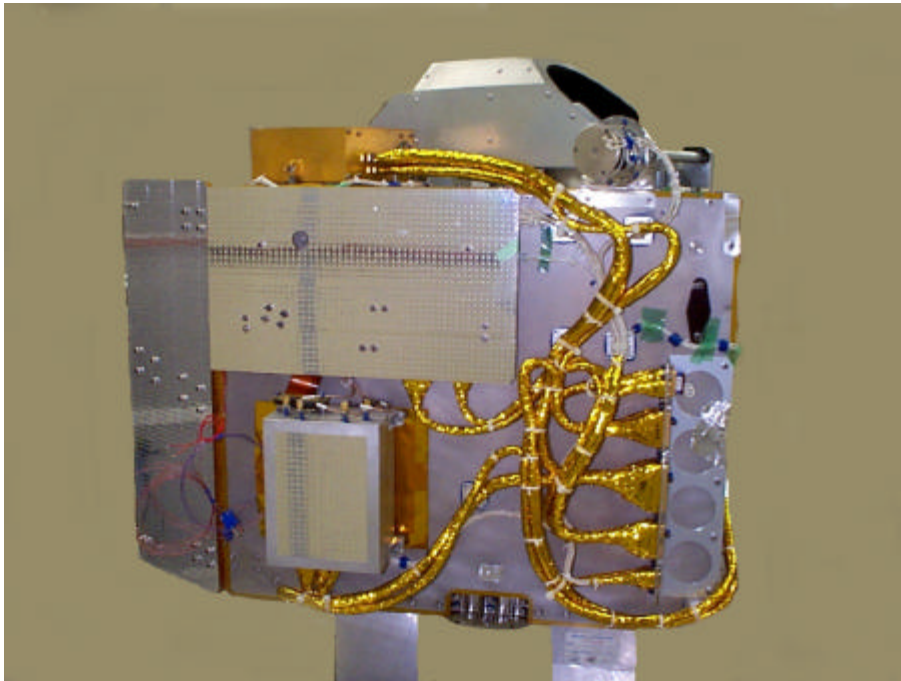
Dr. Jay Pearlman

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Hyperion Hyperspectral Imager



Hyperion Imaging Spectrometer



Convex Grating spectrometers with CCD VNIR and HgCdTe SWIR detectors (60 μ m pixels)

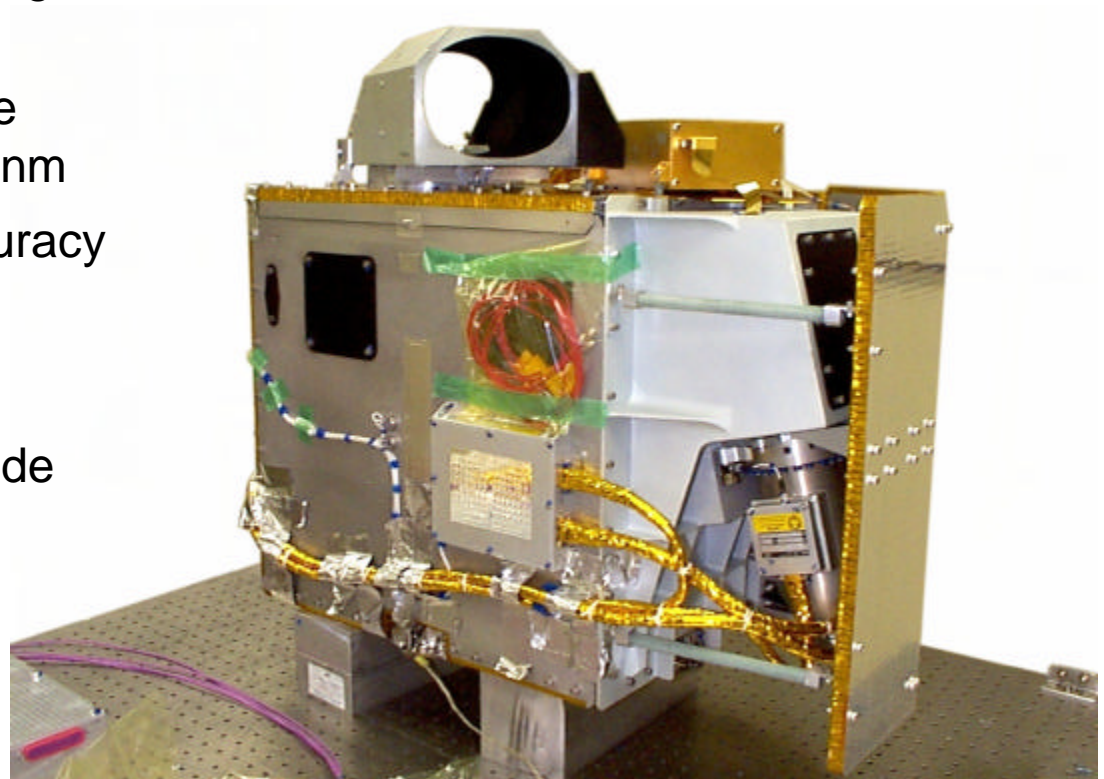
Multiple calibration options: lamps, lunar, solar, ground imaging and laboratory

Hyperspectral Imaging Capability to address technology and Earth Observation applications

Hyperion Hyperspectral Imager

The Hyperion is a push-broom imager with:

- 220 10nm bands covering the spectrum from 400nm - 2500nm
- 6% absolute radiometric accuracy
- Image swath width of 7.5 km
- IFOV of 42.4 microradian
- GSD of 30 m at 705 km altitude
- 12-bit image data
- Power: 51W orbit avg., 126W peak
- Mass: 49kg
- On year Life (2 year Goal)



Hyperion
12 months from order to delivery

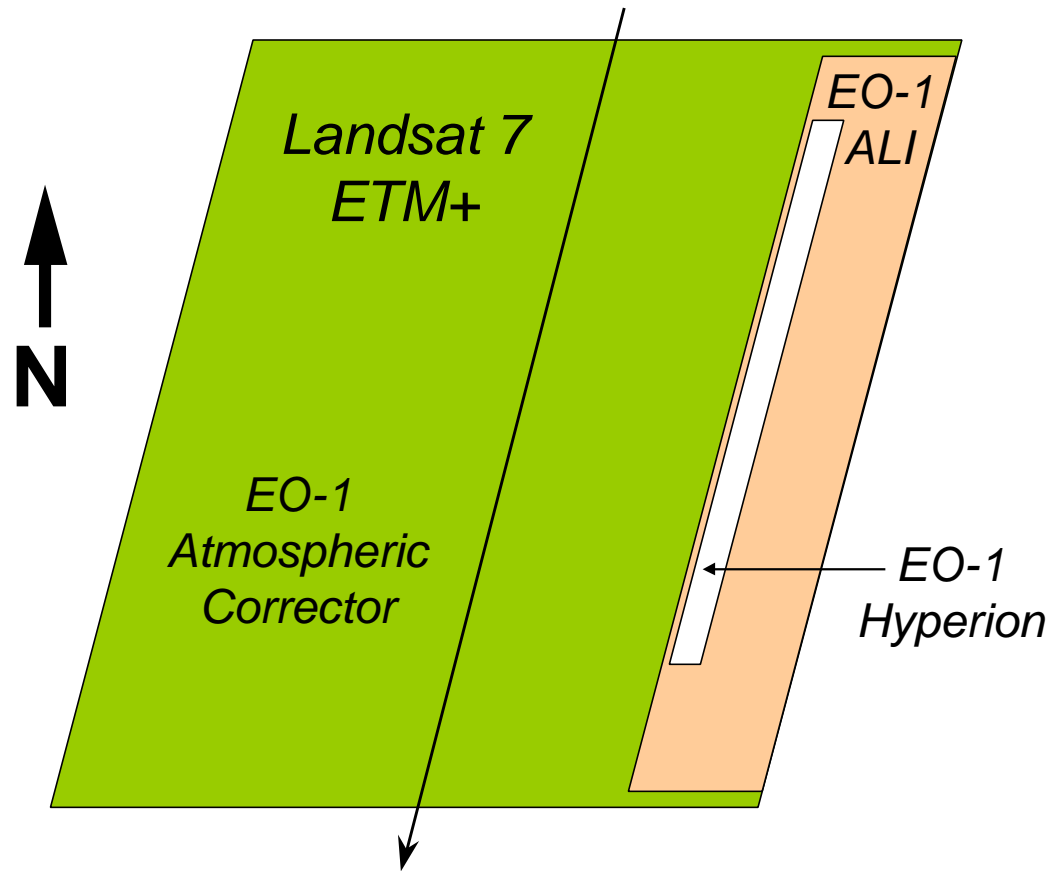
Performance of TRW Hyperspectral Instruments

Parameter	Lewis HSI	Hyperion
Volume (L x W x H, cm)	69x43x94	39x75x66
Weight (Kg)	39.5	49
Avg Power (W)	66	51
Peak Power (W)		126
Aperture (cm)	12	12
IFOV (mrad)	0.057	0.043
Crosstrack FOV (deg)	0.84	0.63
Wavelength Range (nm)	380 - 2450	400 - 2500
Spectral Resolution (nm)	5.1/6.45	10
No. Spectral Bands	384	220
Digitization	12	12
Frame Rate (Hz)	237	225
Typical SNR	100 - 200	65 - 130
Radiometric Calibration	<6%	<6%

Goals and Objectives

- Validate space-based hyperspectral imaging
- Support evaluation of other EO-1 instruments through comparison with Landsat data over an entire growing season
 - Advanced Land Imager
 - Atmospheric Corrector
- Produce science-quality hyperspectral data

Hyperion Swath



Swath is 7.5km wide; standard "image cube" is 20km long by 7.5km wide

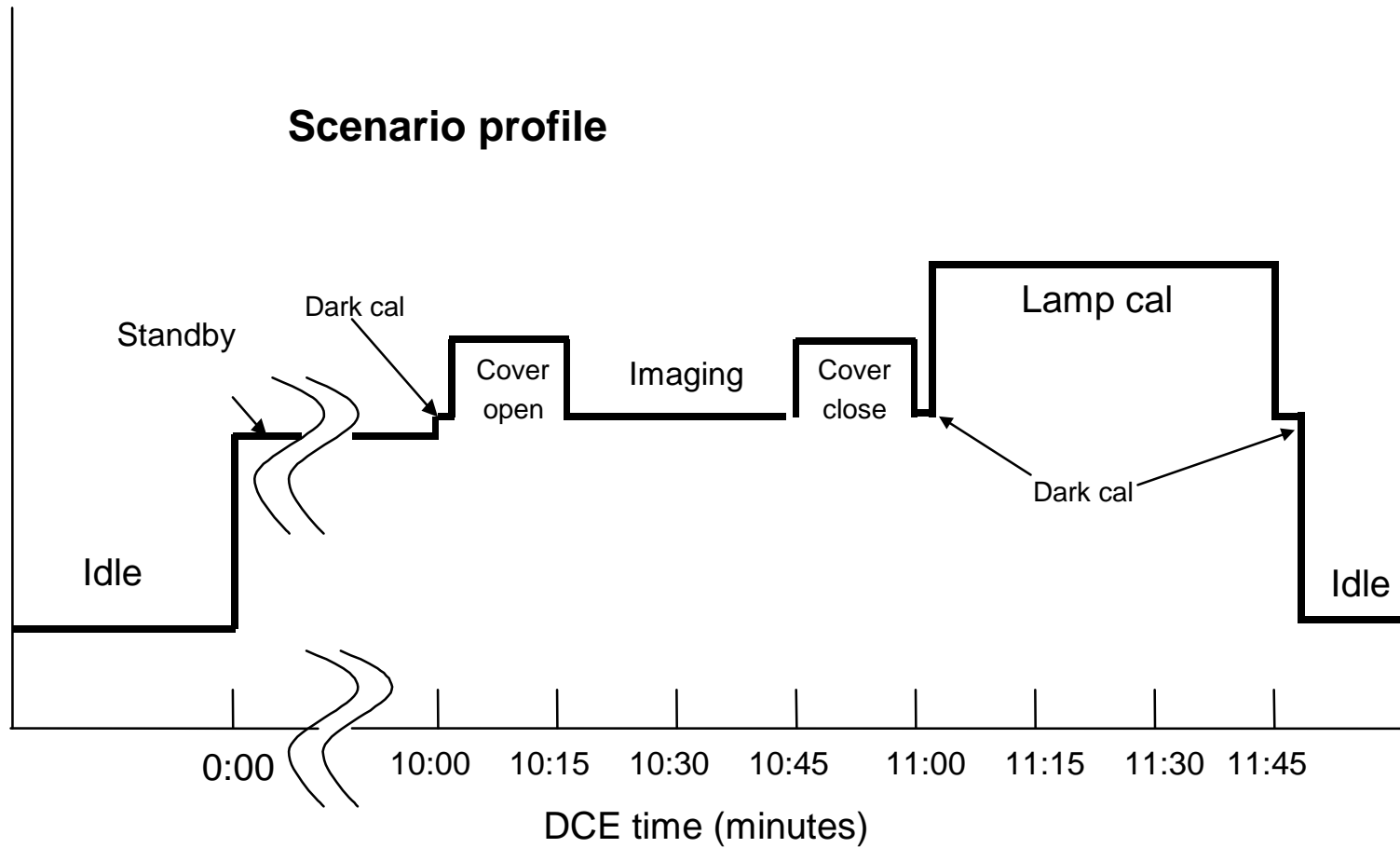
Hyperion Instrument Modes

- Idle: ASPs off, lamps off, not imaging
- Standby: warm-up for imaging
- Imaging:
 - dark cal, lamp cal (cover closed)
 - solar cal (cover at 37 degrees)
 - Imaging (cover open); also vicarious and lunar cal

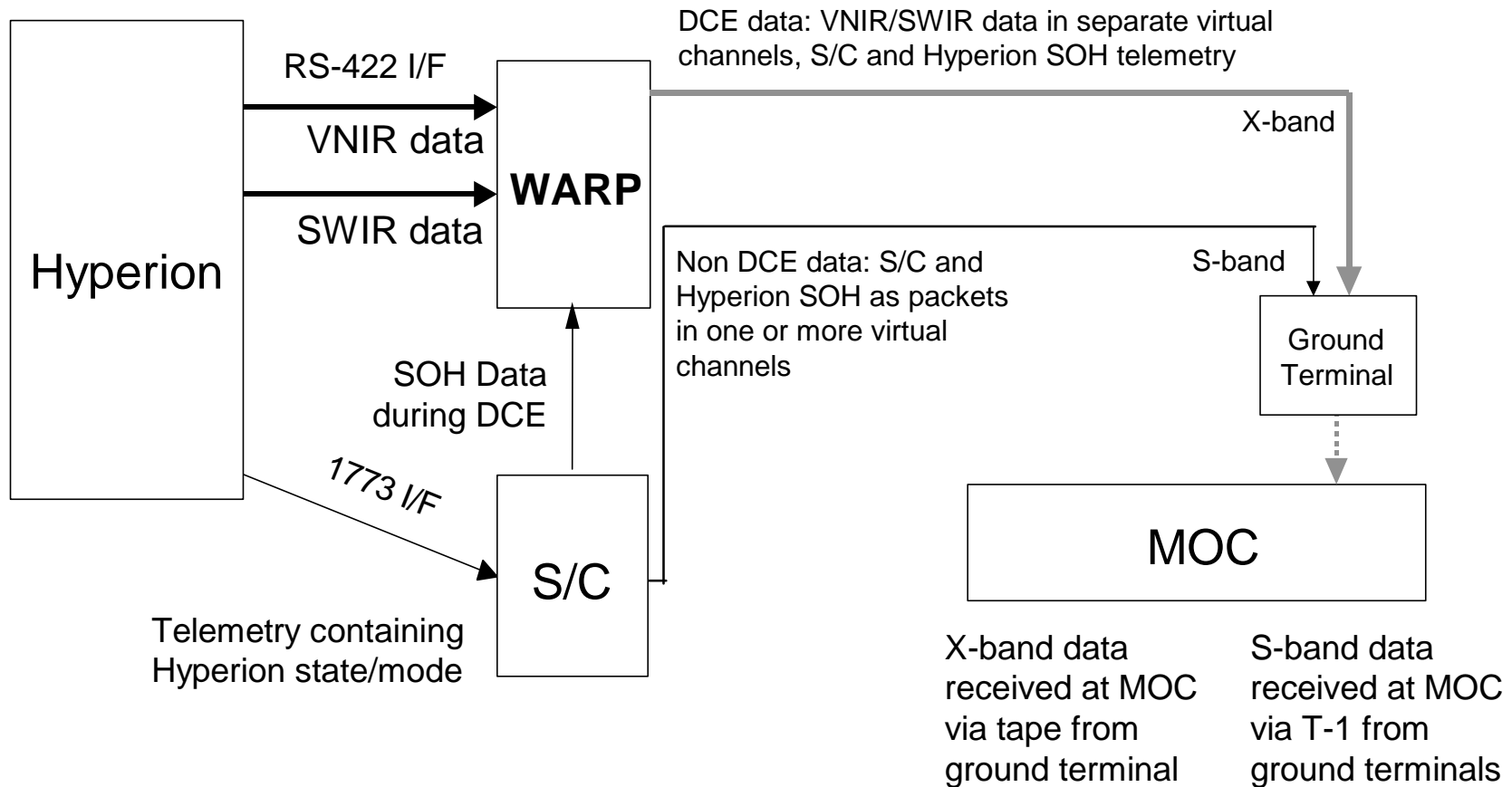
Hyperion Nominal Data Modes

Mode	Cover Position	Data collect	Comment
Standby	Closed	None	Default mode for active state
Dark calibration	Closed	Minimum 100 frames	Performed as close as possible to imaging, before and after
Lamp calibration	Closed	Minimum 100 frames	Performed after second dark calibration; two radiance levels
Solar calibration	Open 37 degrees	Minimum 1 second Nominal 1 cube	Performed over North Pole only to keep cover out of ALI keep-out zone; yaw maneuvers required
Lunar calibration	Fully open (135°)	Minimum: 1 second Nominal: 1 cube	Performed on dark side of earth; off-track spacecraft pointing required
Ground calibration	Fully open (135°)	Minimum 1 second Nominal 1 cube	Ground target selected
Imaging	Fully open (135°)	Minimum 1 second Nominal 9 cubes	Nominal data collect is equivalent to Landsat scene, and takes 27 seconds.

Typical Data Collection Event



Hyperion Data Handling



Instrument Characterization Sites



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- ▲ Radiometric Cal
- ★ MTF, GSD
- ☰ Spectral
- ★ Dynamic Range
- ★ Geodetic
- ★ Reference
- ★ Performance Assessment