

HyspIRI Instrument Concept - VSWIR

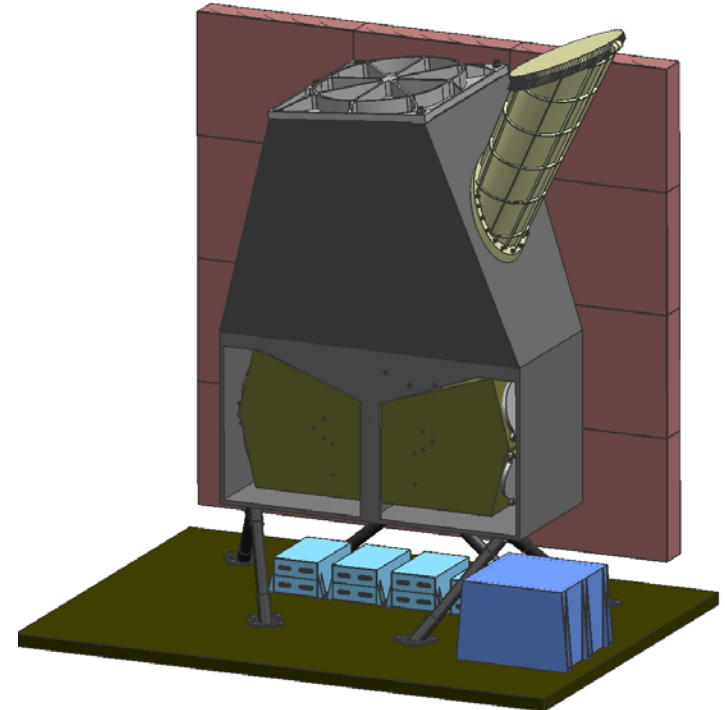
Carl Bruce

[cbrucejr@jpl.nasa.gov]

Outline

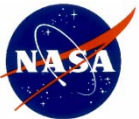
1. Key Requirements & Performance
2. An Instrument Concept Overview
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5. Ongoing Concept Trades

HyspIRI - VSWIR



Mass (CBE) 66Kg

Power (Ave.) 41Watts



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Pasadena, California



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VSWIR Requirements & Performance

Spectral

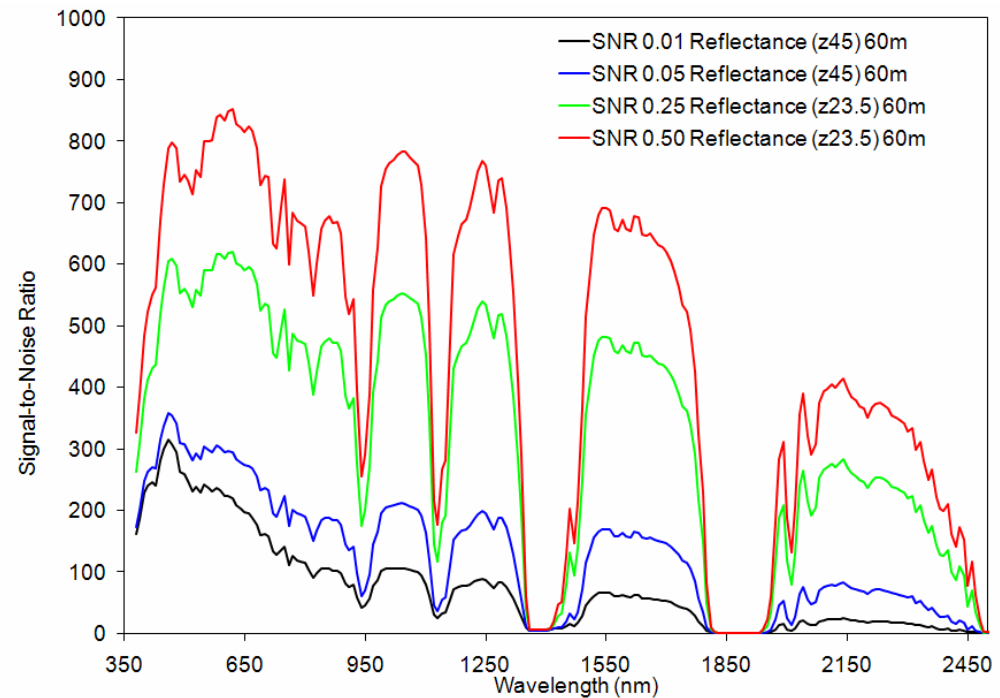
Range 380 to 2500 nm

Sampling 10 nm

Radiometric

Sampling 14 bit

Signal-to-Noise ratio

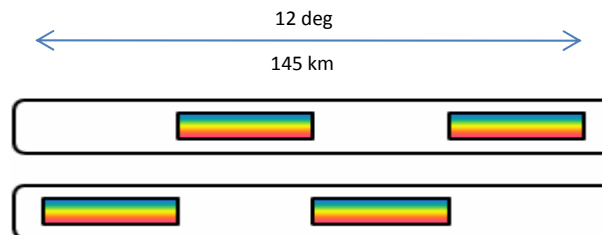




VSWIR Requirements & Performance

Spatial

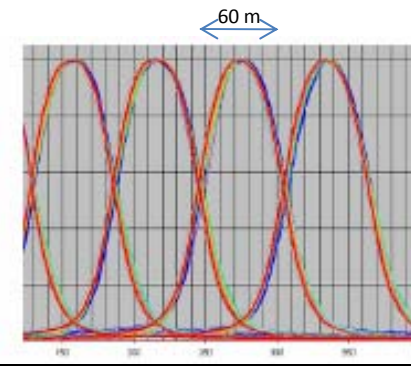
Field-of-View/ Spatial swath 12 deg/145 km
 IFOV/ Spatial Sample 86 μ rad/60m (GSD)



Four detector arrays (640 x 480 pixel) cover the FOV

Uniformity

Spectral-Spatial >95% (0.5 nm)



Pushbroom Uniformity Depiction

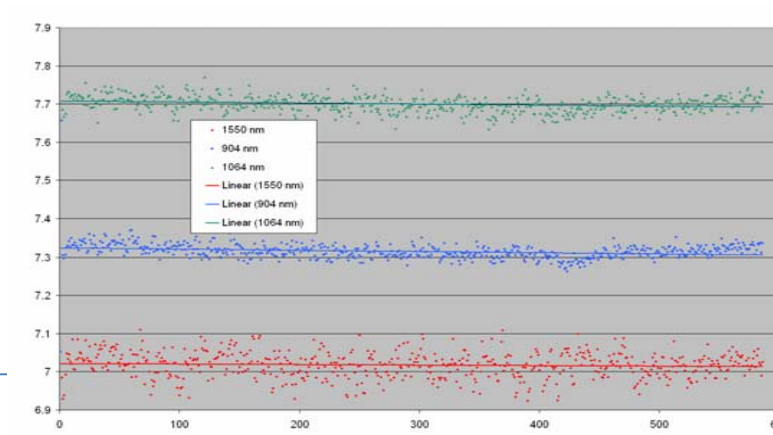
- Grids are the detectors
- Spots are the IFOV centers
- Colors are the wavelengths

X Spectral-IFOV shift

X Failure by "frown"

X Failure by twist

✓ **Required Uniformity**

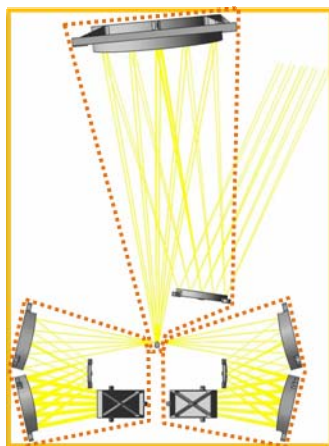




A VSWIR Instrument Concept

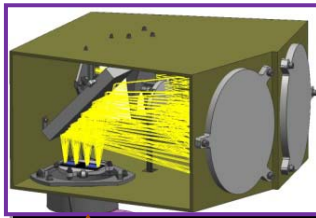
Optics

- Front End Telescope consists of a primary spherical mirror and a secondary aspherical mirror
- Back End Spectrometers consist of 2 optimized Offner spectrometers



Spectrometers (2x)

- 2 identical Offner spectrometers
- Each contains:
 - E-Beam grating
 - Si air slits
 - FPA assembly



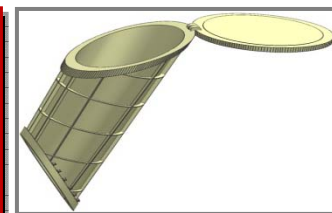
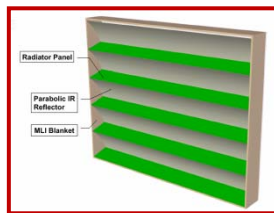
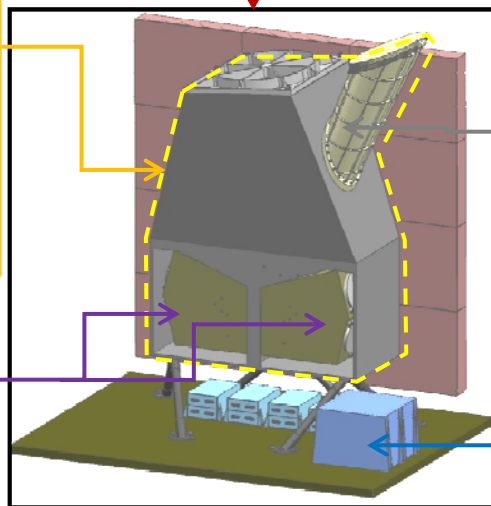
FPA (2x)

- Mount is adjustable in 6 DOF
- Thermal strap connects mount to radiator
- Each assembly contains two Teledyne 6604a detector arrays
- Includes integral OSF



Radiator

- Area 1.4m²
- M3 heritage; 4x larger



Baffle/Cover

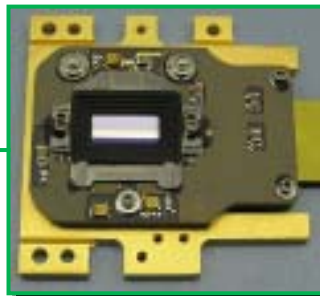
- Launch cover
- Used as a solar reflectance calibration target

Electronics Boxes

- M3 Derivative
- Electra module with:
 - SPARC processor
 - FPGAs for high-speed compression in logic
- Compressed data sent to s/c via LVDS interface

Detectors (4x)

- Teledyne 6604a detectors; full flight heritage from M3.
- Analog I/O
- Each spectrum readout as snapshot, so that there is no time delay, yaw, or jitter impact to the spectral-IFOV-uniformity.



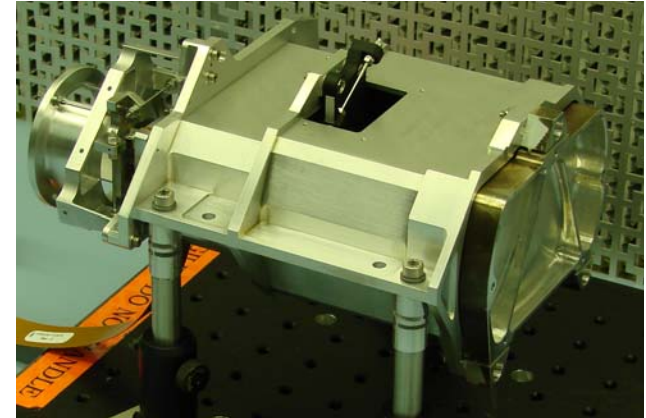


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Concept's Key Technologies are Proven

1. Spatially and spectrally uniform Offner spectrometer
2. Finely adjustable optics and detector mounts that can be locked within fraction of a micron (< 0.1 microns)
3. Electron beam fabricated convex gratings with large ruling period ($\gg \lambda$)
4. Electron beam fabricated air slits (non-uniformity $< .05$ microns)





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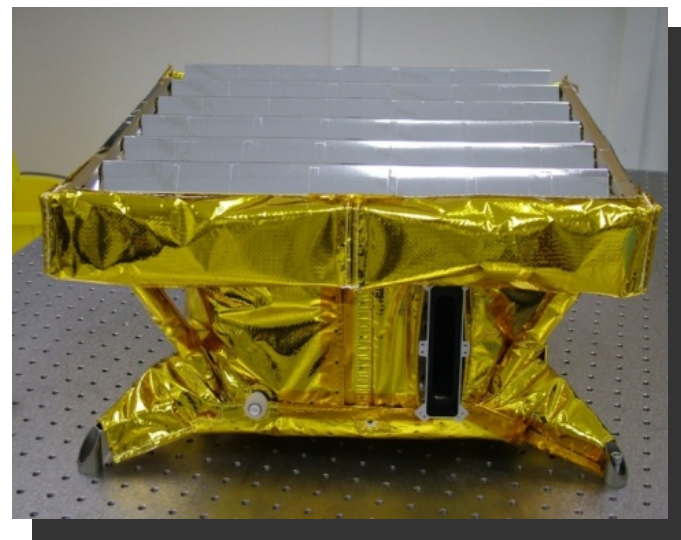
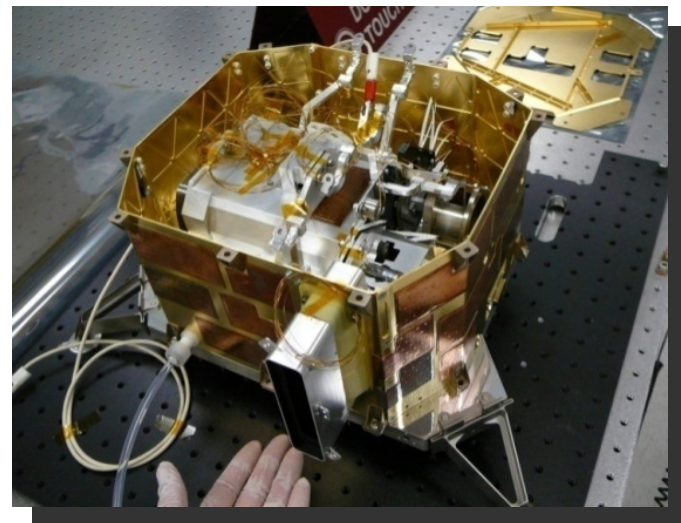
TRL & Heritage for this Concept

No new technology is required

Technology Readiness Highlights

Key Technology	TRL	Comments
Optimized Spectrometer	9	Flown on M3
Grating	9	Flown on Hyperion, CRISM, M3, ARTEMIS
Detector array	9	Flown on M3, CRISM, ARTEMIS
Uniform Slit	9	Flown on ARTEMIS
Opto-Mechanical (alignment & stability)	9	Flown on M3

M³ Spectrometer





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Instrument Concept Trades

Ongoing Instrument Concept Trades:

1. Instrument Electronics' Architecture

2. Instrument Sensitivity/Stability Vs. Radiator Area and Mass
