MIRIS:韓国初の宇宙赤外線望遠鏡

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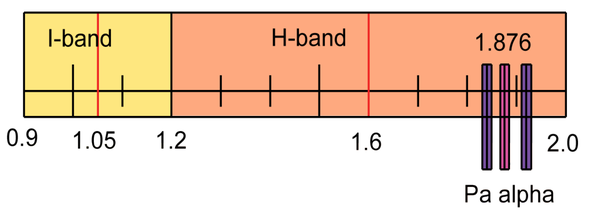
1. Introduction

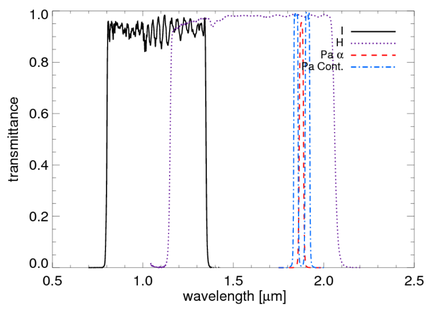
- The main payload of STSAT-3, MIRIS (Multipurpose InfraRed Imaging System) is the first Korean Infrared mission (PI:W. Han)
- The space observation camera with 8cm telescope aperture has a wide field of view (3.67° x 3.67°) , the wavelength coverage from 0.9 to 2 μm and the angular resolution of 51.6".
- The main objectives of MIRIS are Cosmic Near-Infrared Background (CIB) observation and Paα survey of Galactic plane.
- ISAS made a contribution on optical, mechanical and thermal design

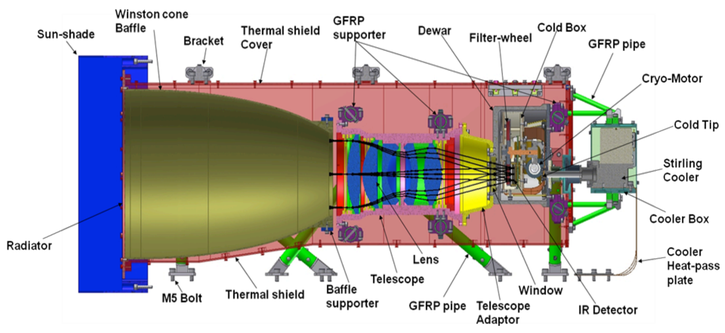
（国際共同ミッション推進経費）

- **STSAT-3 was successfully launched on Nov. 21, 2013 from Yasny launching site, Russia.**
  MIRIS is working well as expected!

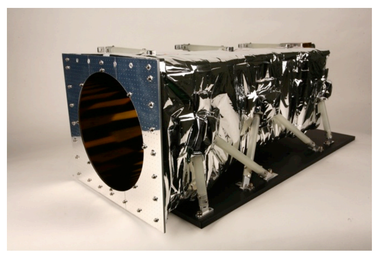


Filter band of MIRIS





Cross sectional view of MIRIS

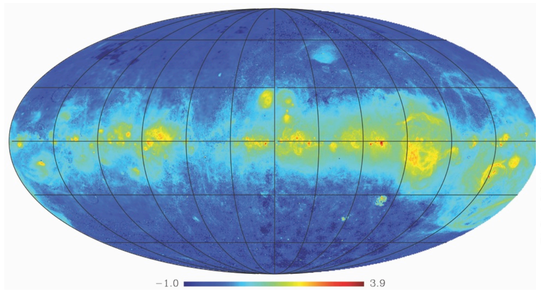


Flight Model of MIRIS

2. Paα Survey of Galactic Plane

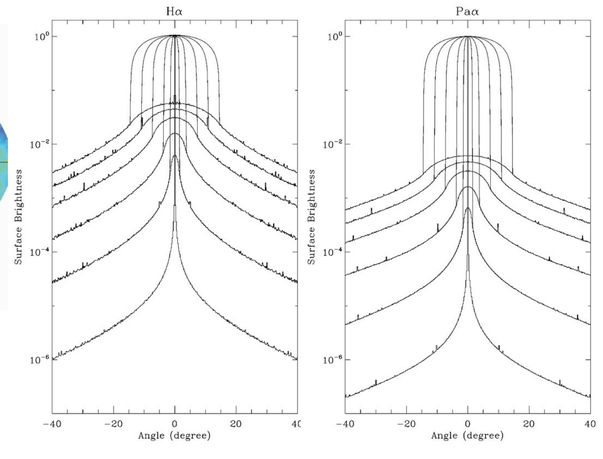
Origin of Warm Ionized Medium (WIM)

- ✓ Comparison between Paα and Hα observations
- ✓ Dust scattering around HII region and dust clouds



All-sky Hα map
(Finkbeiner, D.P. 2003)

- ✓ 6′ (FWHM) resolution
- ✓ Composite of the Virginia Tech Spectral line Survey (VTSS) in the northern & the southern H-Alpha Sky Survey Atlas (SHASSA)



Monte-Carlo Simulation

- ✓ Less significant dust scattering
- ✓ Uniform dust distribution; E(B-V) = 0.1
- ✓ Point source or Spherical HII region

Interstellar Turbulence

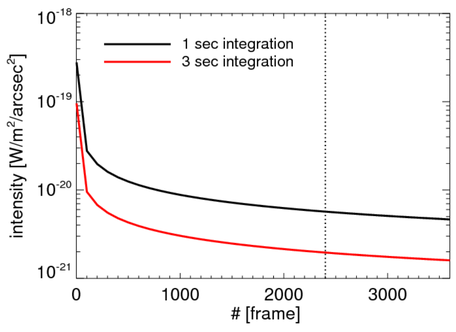
- ✓ Find the physical properties of interstellar turbulence
- ✓ Measure the structure function

Expected Sensitivity

- ✓ Sensitivity = $6.6e^{-21}$ W/m²/arcsec² @ 2,400 frames with 1 sec integration (3σ)
- ✓ Targeted resolution = 1′ – 2′
  (Applying image filter to remove artifacts & depending the pointing stability)

Possible Observing Targets

- ✓ Warm ionized medium
- ✓ Faint extended HII regions
- ✓ Dust clouds
- ✓ Extended Hα sources
- ✓ …

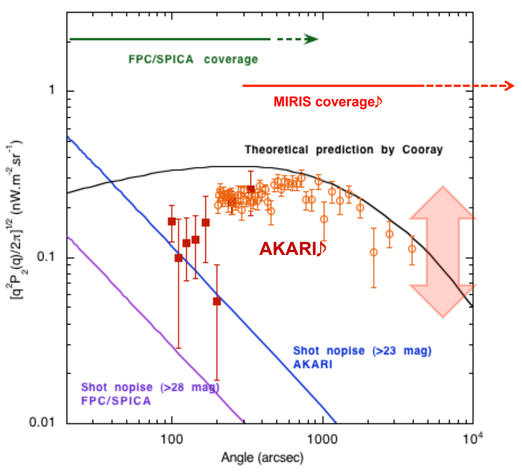


3. Cosmic Near-Infrared Background

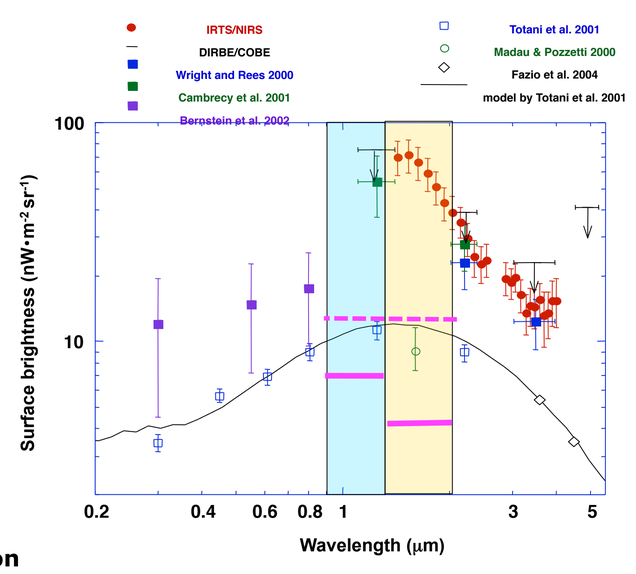
Nature of Excess sky brightness and fluctuation in Near-Infrared

- ✓ Subtraction of Zodiacal Light: Revision of **ZL model**
- ✓ Measurement of **large-scale (degree scale) fluctuation of CIB**
- ✓ Measurement of **an absolute CIB level**
- ✓ MIRIS will delineate the origin of excess brightness and fluctuation

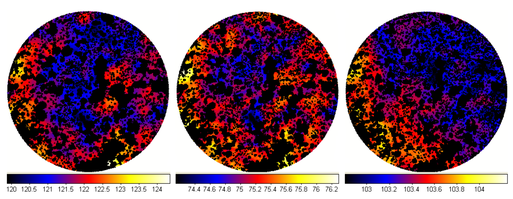
pop.III origin? Other exotic source?



AKARI and Spitzer detected large fluctuation of the sky that can not be explained by known foreground sources.
MIRIS can detect fluctuation at large angular scale up to ~5 degree.



IRTS, COBE detcted large excess sky brightness that can not be explained by known foreground sources



Smoothed image of infrared excess emission in NEP Monitor field observed by AKARI. Angular diameter is 10 arcmin and wavelength band is 2.4, 3.2 and 4.1μm from left to right.
(Matsumoto et al. 2010)

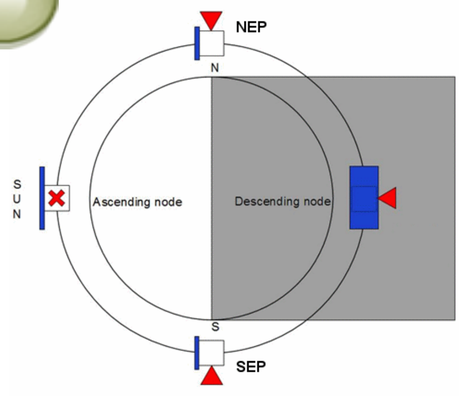
Observation of CIB

- ✓ Low background region
- ✓ North Ecliptic Pole (NEP) (primary): **10° x 10°**
- ✓ Secondary Targets: SEP, NGP (North Galactic Pole) or SGP

4. Observation Plan

Operation

- ✓ Observation of NEP or SEP for CIB (10° x 10°)
- ✓ Observations in night-side regions: Paα Survey of Galactic Plane (360° x 6°)
- ✓ 1 Field of view: 3.67° x 3.67°
- ✓ Calibration: **Monitoring** of the selected region of both NEP and SEP

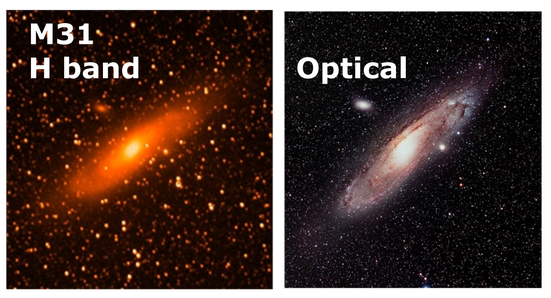


Observation Phase

Operation Mode	PV Phase 3 months	1st Phase 1 month	2nd Phase 12 months	3rd Phase 8 months
Space Observation	(1 month)			User Observations
- Paα Survey	4 orbits/day		6 orbits/day	
- CIB	4 orbits/day	10 orbits/day		
- Calibration	2 orbits/day		2 orbits/day	

Japan side can propose observation programs in 3rd Phase.

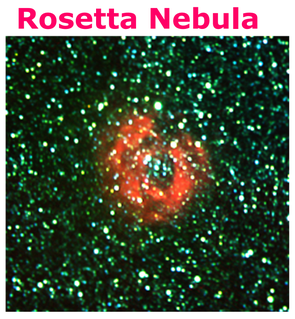
★ First Light Images



Orion Nebula

Blue: I, Green: H

Rosetta Nebula



Red: Paα band