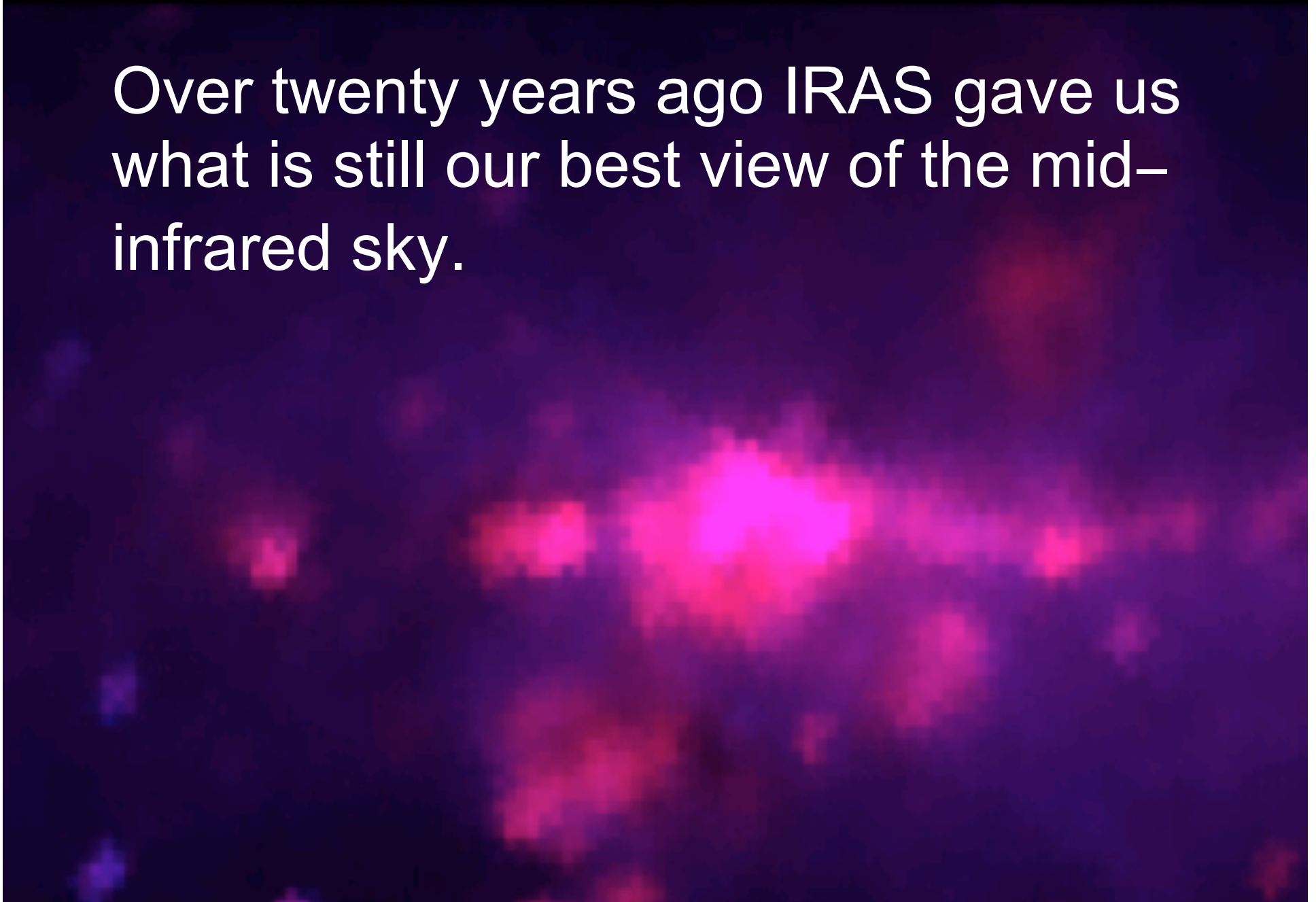
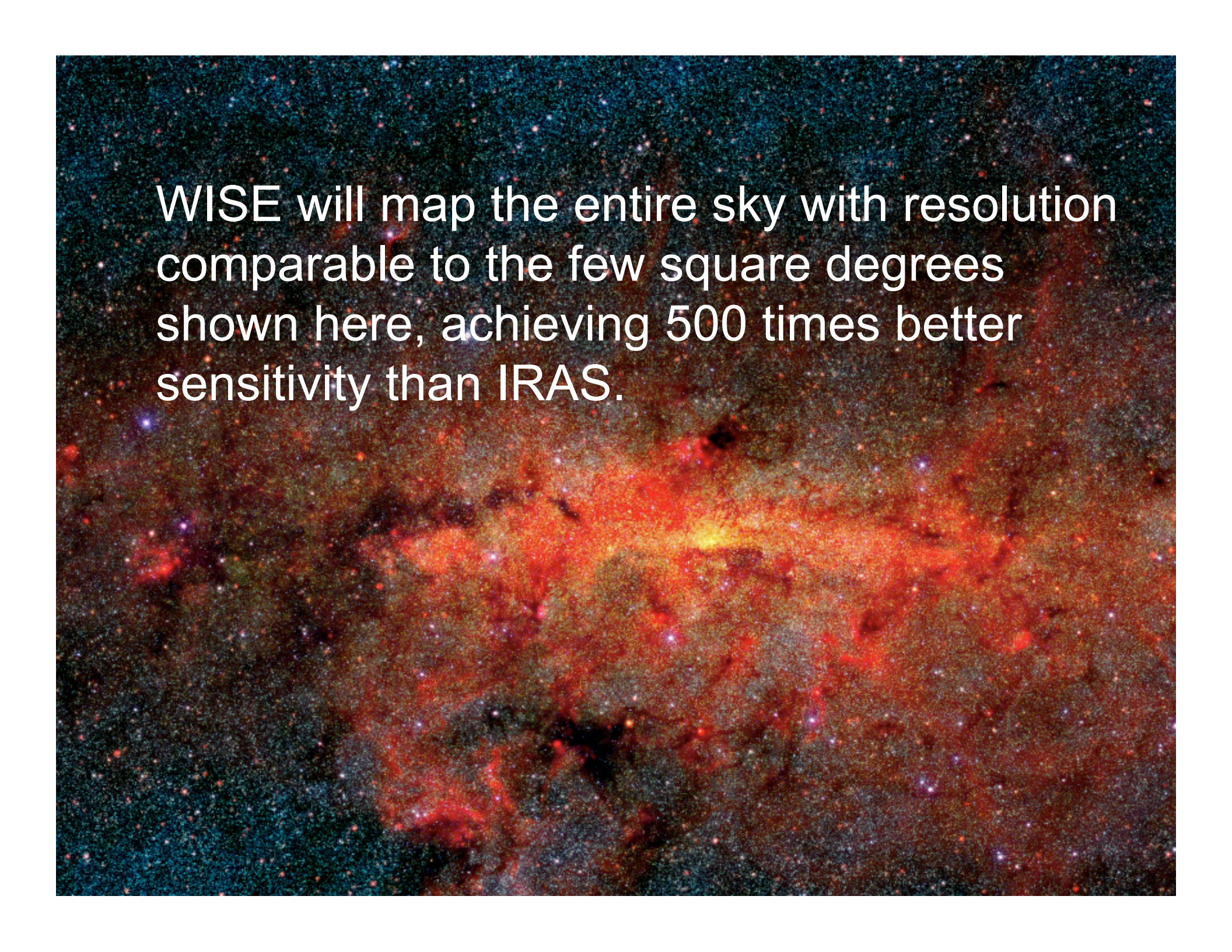


## IRAS 12 $\mu$ m and 25 $\mu$ m View of the Galactic Center

Over twenty years ago IRAS gave us what is still our best view of the mid-infrared sky.



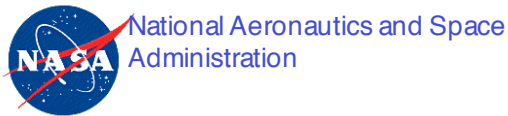


WISE will map the entire sky with resolution comparable to the few square degrees shown here, achieving 500 times better sensitivity than IRAS.

# What Is WISE?



- The **Wide-field Infrared Survey Explorer**
  - A NASA Midex all-sky survey at **3.3, 4.65, 12 & 23  $\mu\text{m}$**  with 500 to 500,000 times more sensitivity than previous surveys
  - A **cold 40-cm telescope in a sun-synchronous polar low Earth orbit** like IRAS & COBE
- JPL is managing, SDL is building the instrument, Ball is building the spacecraft, IPAC will process and distribute the data.
- WISE will deliver to the scientific community 6 & 17 months after launch
  - Over 1 million calibrated **images** covering the whole sky in 4 infrared bands
  - **Catalog** of hundreds of million of objects seen in these 4 IR bands
- Aiming for launch in June **2009**



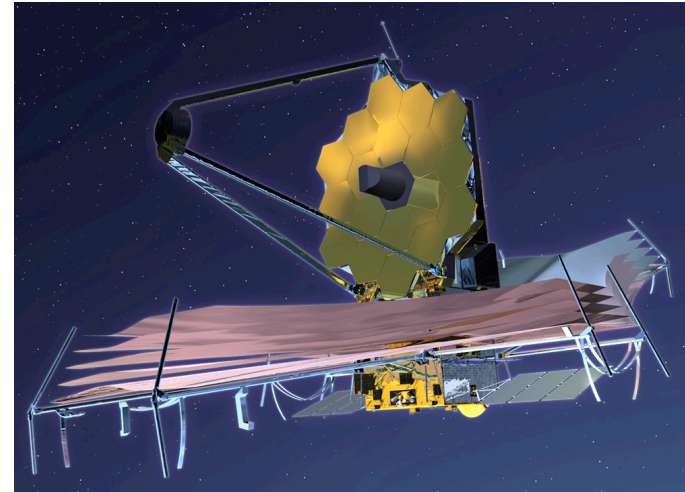
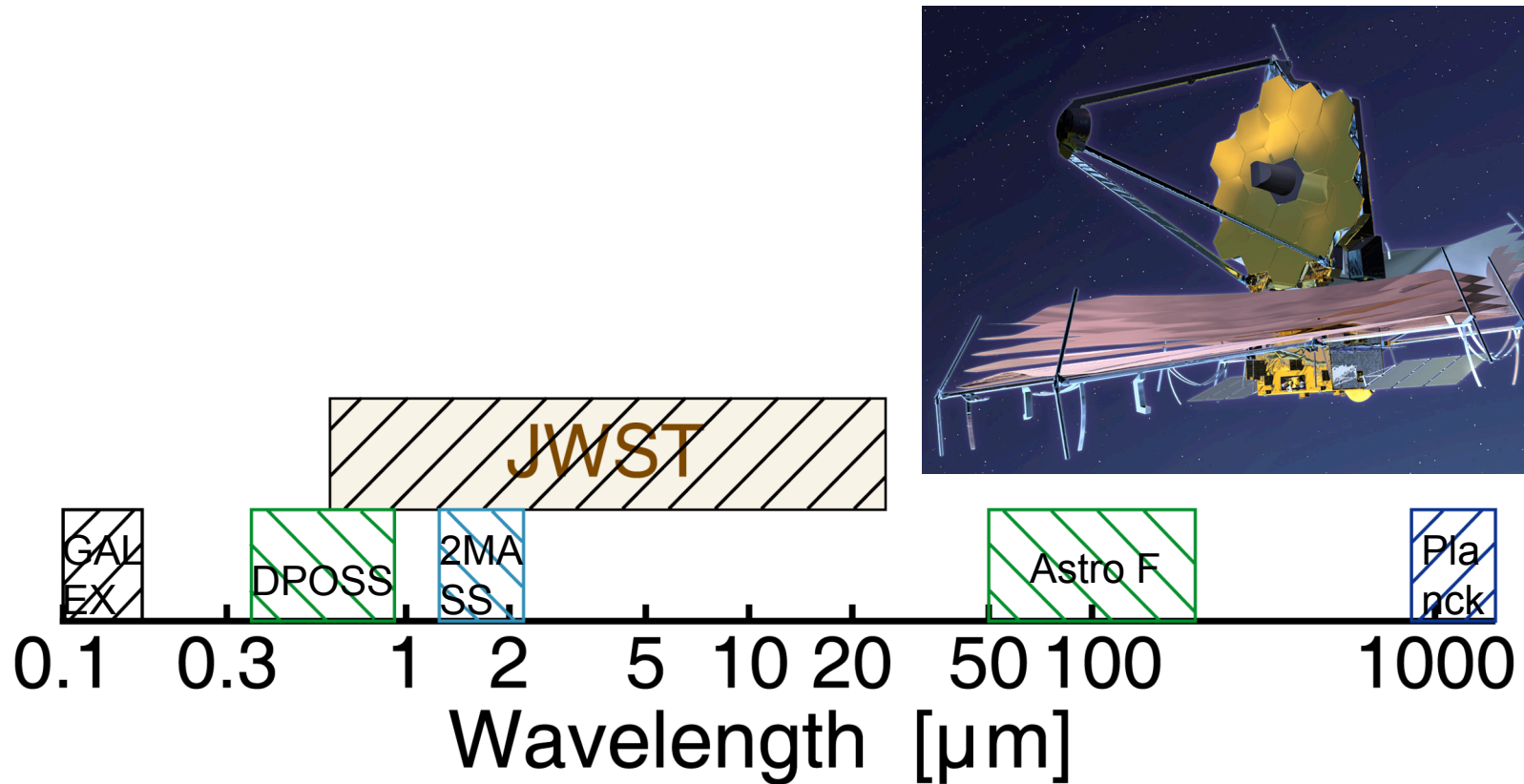
# WISE Science Team



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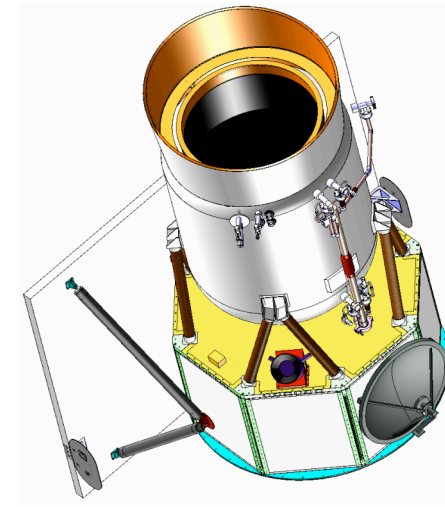
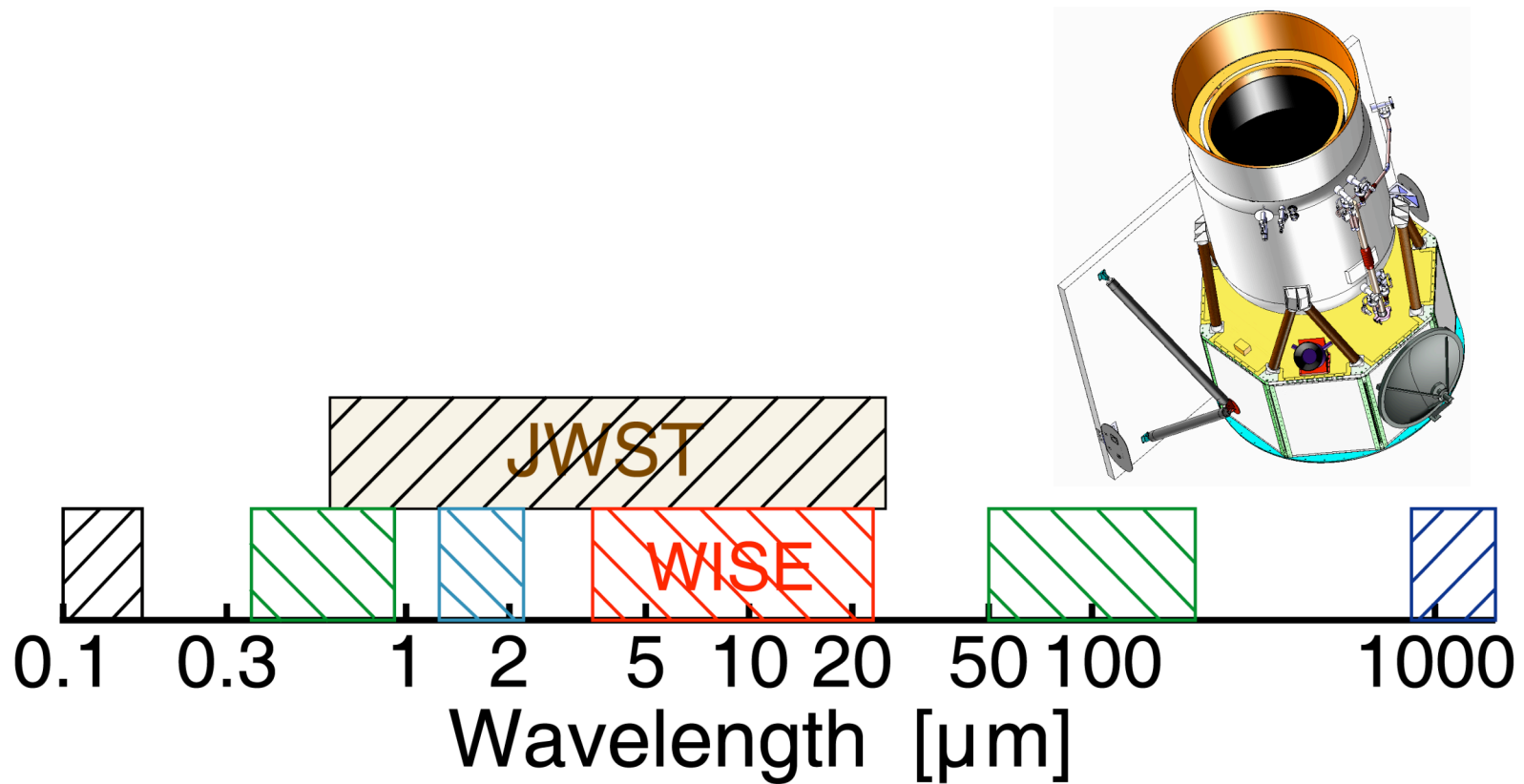
<b>Ned Wright</b>	UCLA	COBE, MAP, Spitzer	PI
Andrew Blain	Caltech	SCUBA	ULIRGs
Martin Cohen	MIRA	IRAS, ISO, MSX	Calibration, Galactic Structure
Nahide Craig	UCB	RHESSI, CHIPS,	E/PO lead
Roc Cutri	IPAC	IRAS, 2MASS	Data Proc. lead, AGN
<b>Peter Eisenhardt</b>	JPL	Spitzer	Proj. Scientist., Distant Galaxies
Nick Gautier	JPL	IRAS, Spitzer	Interstellar Dust
Isabel Hawkins	UCB	EUVE	E/PO
Tom Jarrett	IPAC	2MASS	Nearby Galaxies, SDP, E/PO
Davy Kirkpatrick	IPAC	2MASS	Brown Dwarfs, SDP QA
Carol Lonsdale	IPAC	IRAS, 2MASS, SWIRE	ULIRGs, NVO coordination
John Mather	GSFC	COBE, JWST	JWST Coordination
Ian McLean	UCLA	UKIRT, Keck, NIRSPEC	Detectors
Robert McMillan	UA	Spacewatch	Asteroids
Deborah Padgett	IPAC	NICMOS, Spitzer	Debris Disks, Low Mass Stars
Michael Ressler	JPL	Keck, JWST	Facility Scientist, Low Mass Stars
Michael Skrutskie	UVa	2MASS PI	BD's, Low Mass Stars
Adam Stanford	UCDavis	Keck	Distant Galaxies
Charles Steidel	Caltech	Keck	Distant Galaxies, NVO coordination
Russell Walker	MIRA	IRAS, MSX	Calibration, Asteroids, Zodi Cloud

# James Webb Space Telescope



JWST science will be supported by existing and planned all-sky, sensitive surveys except in a “gap” between 2.2 and 50  $\mu\text{m}$

# WISE Will Fill “the Gap”



WISE mission will fill this gap in the support for JWST science

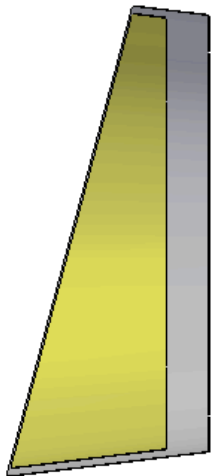
# Key Science Themes



- The nature of and evolutionary history of **ultra-luminous infrared galaxies**
  - The most luminous galaxies in the Universe
- The space density, mass function, and formation history of **brown dwarf stars** in the solar neighborhood
  - The closest stars to the Sun ( $T > 200\text{K}$  if closer than  $\alpha$  Cen)
- Radiometric diameters and albedos for most known **asteroids**
- Map **clusters of galaxies and large scale structure** within 7-billion light years
- The very faint end of the luminosity function of **protostars** in nearby star formation regions
- The evolution of circumstellar dust and **debris disks**

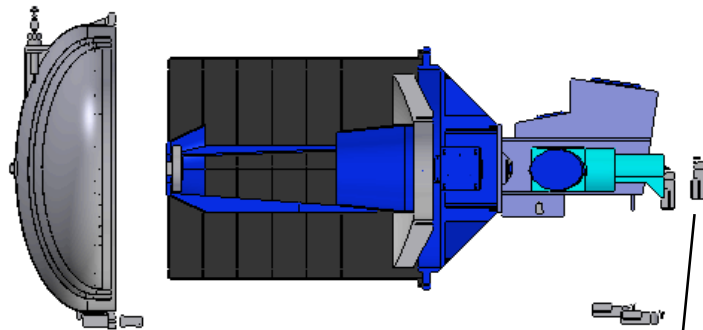
# Modular Payload Components

## Aperture Shade



## Telescope Assembly

- 40-cm afocal front end
- Scan mirror based on Spirit III design



## Aperture Cover

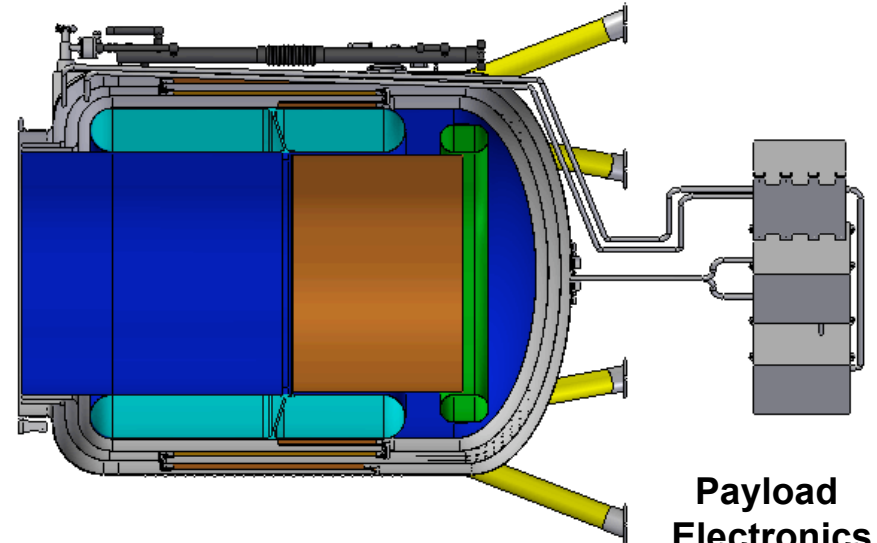
- Deployed on-orbit

## 1024<sup>2</sup> Focal Planes

- HgCdTe arrays at 3.3 and 4.65 microns (Rockwell)
- Si:As BIB arrays at 12 and 23 microns (DRS)
- 2.75"/pix (2x2 binning 23 microns)
- Team includes co-inventor of Si:As BIBs

## Cryostat

- 2-stage solid hydrogen
- Team has experience flying hydrogen cryostats



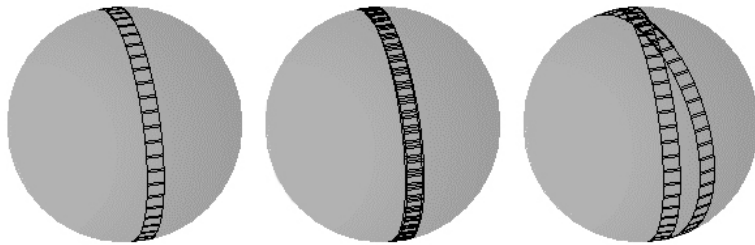
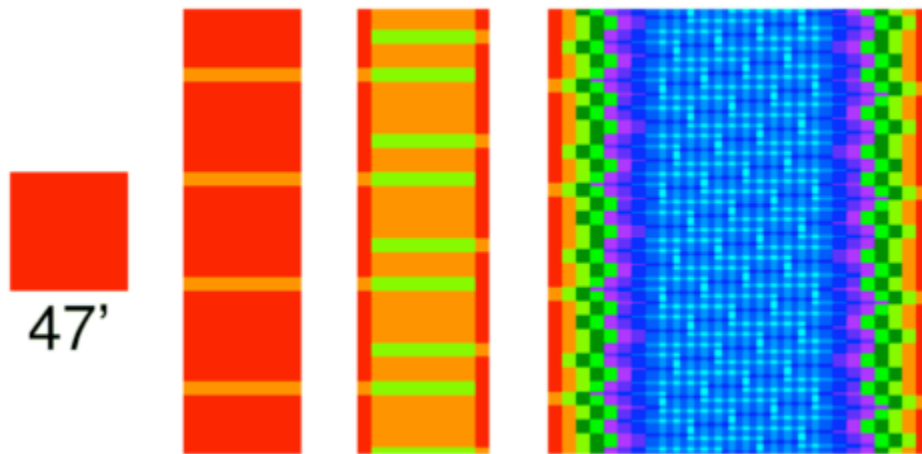
## Payload Electronics



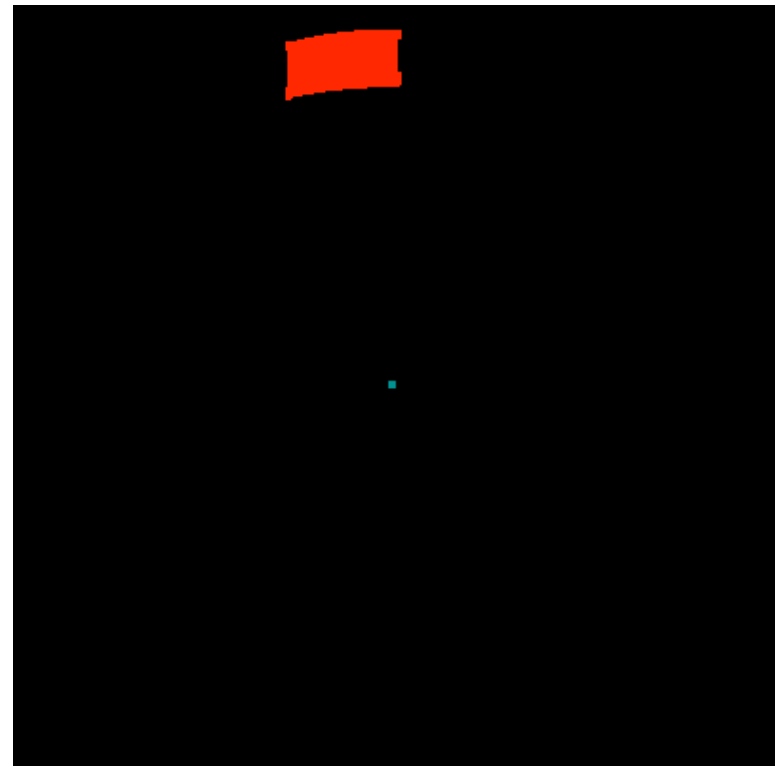
# WISE Survey Strategy Provides $\geq 8$ Exposures Per Position



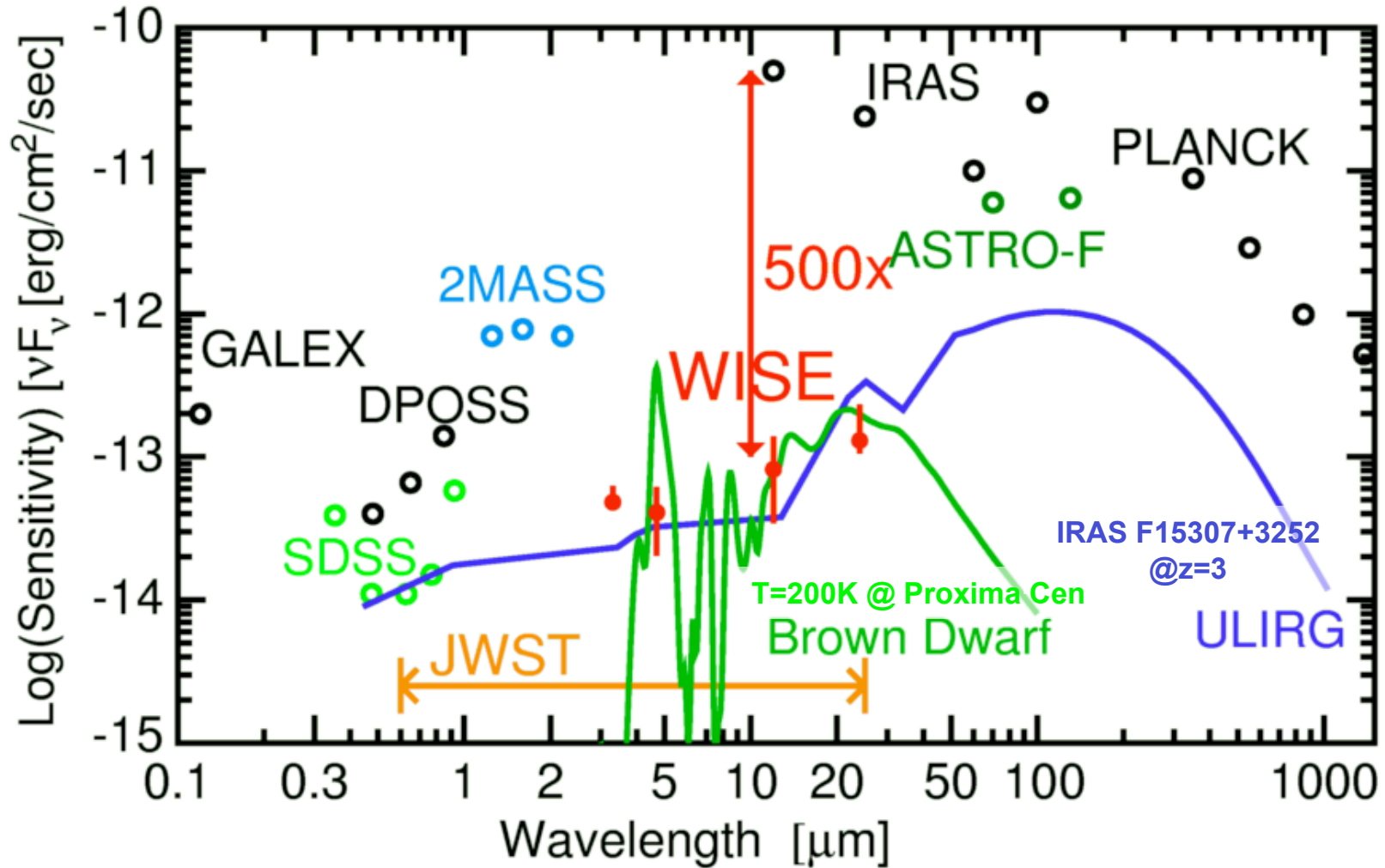
- Scan mirror enables efficient surveying
  - 8.8-s exposure/11-s duty cycle
- 10% frame to frame overlap
- 92% orbit to orbit overlap
- Sky covered in 6 months observing
- Single observing mode
- 8 or more over 99+% of sky, median 14 exposures/position after losses to Moon and SAA



1 Orbit      2 Consecutive Orbits      2 Orbits 20 Days Apart



# Sensitivity



SNR>5 for **120, 160, 650, 2600  $\mu\text{Jy}$**  at 3.3, 4.65, 12, 23  $\mu\text{m}$

## Summary



- 
- WISE is underway, in Phase B. Scheduled for confirmation into Phase C/D on November 22, 2005.
  - Launch scheduled for June 2009.
  - WISE will have a data release prior to the JWST launch.

*<http://ds9.ssl.berkeley.edu/wise/>*