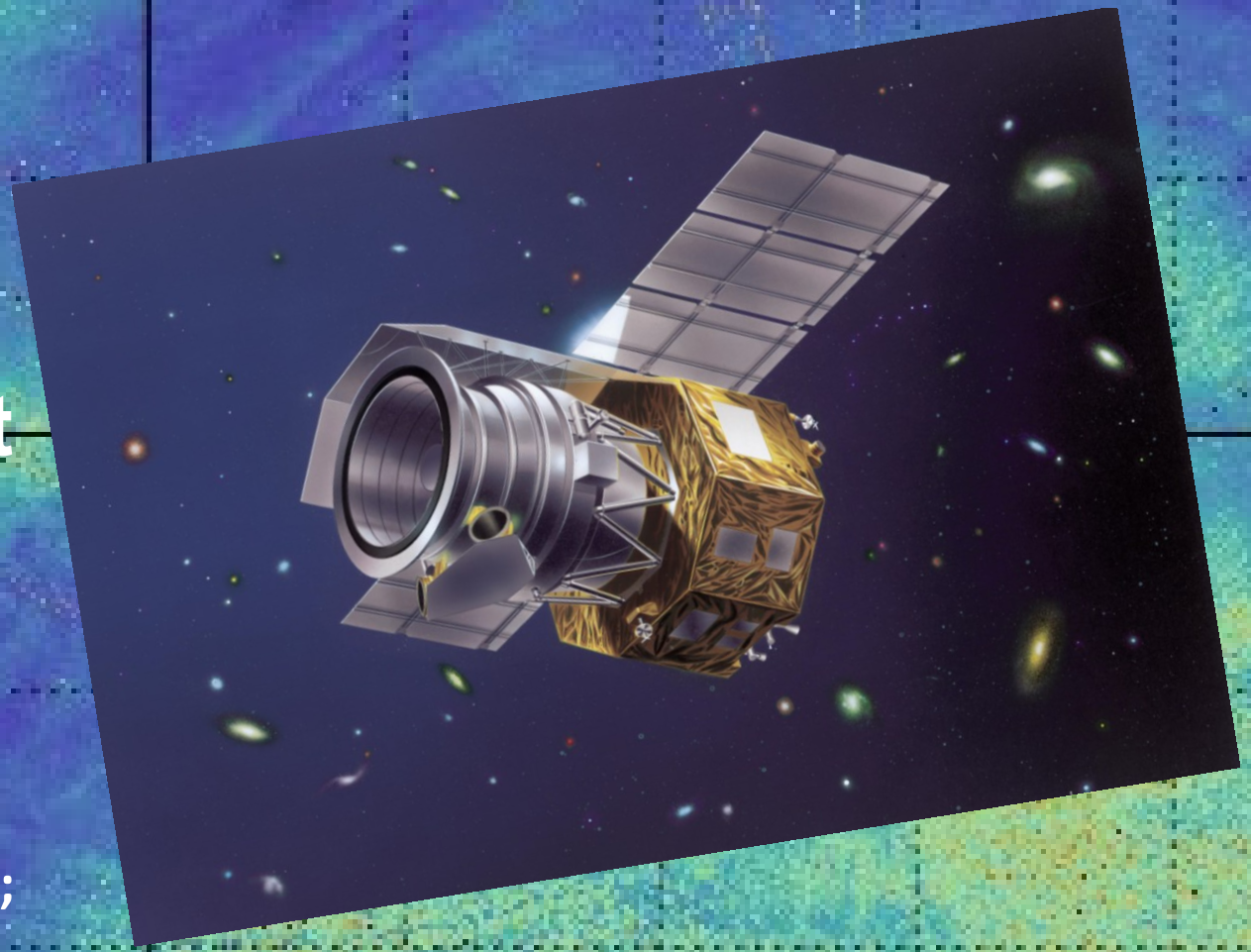
all-sky science examples with AKARI



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2016.11.10

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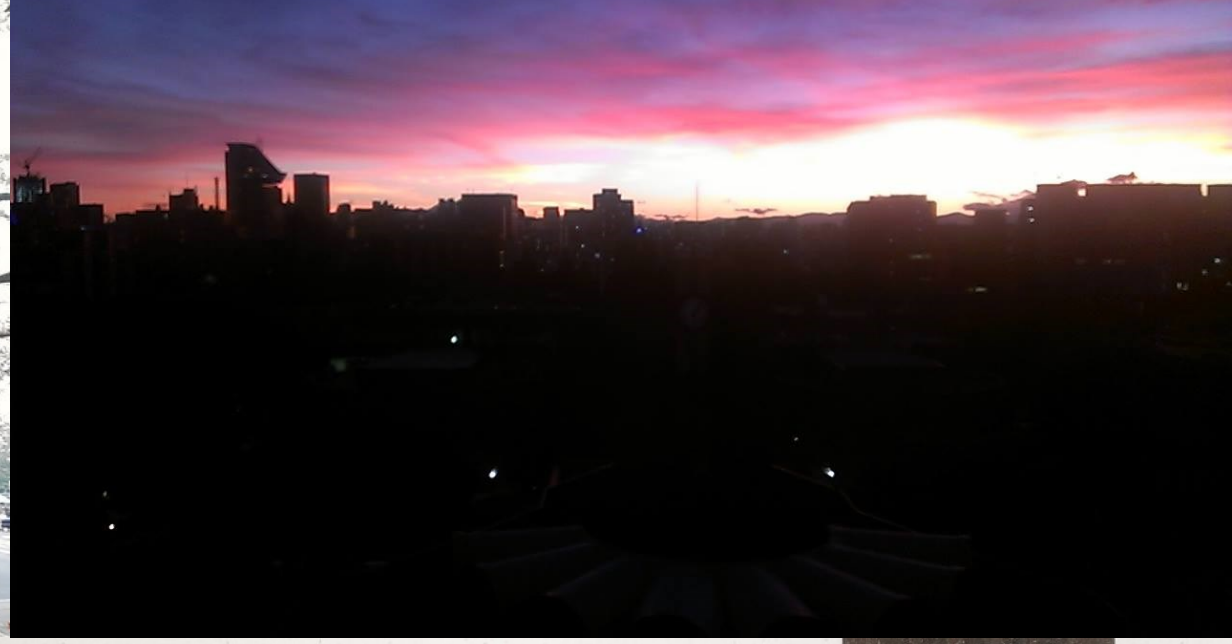
With:
T. Onaka, Y. Doi, I. Sakon, R. Ohsawa (U.Tokyo);
F. Galliano (CEA); R. Wu (Obs. Paris)
H, Kaneda, D. Ishihara, (Nagoya U.);
M. Giard, (IRAP)



What is AKARI?
（あかり）

What is AKARI?
（あかり）

What is AKARI?

- A Japanese IR space telescope:
  - 2007: Launch
  - 2010: Warm mission start
  - 2015: Far IR map release (Doi+ 2015)
  - 2016: Mid IR Zodi-subtraction (Kondo+ 2016)
  - ?2017?: Mid IR map release (Ishihara+ in prep.)

- Bright example of international collaboration:
  - Japan, EU, Korea

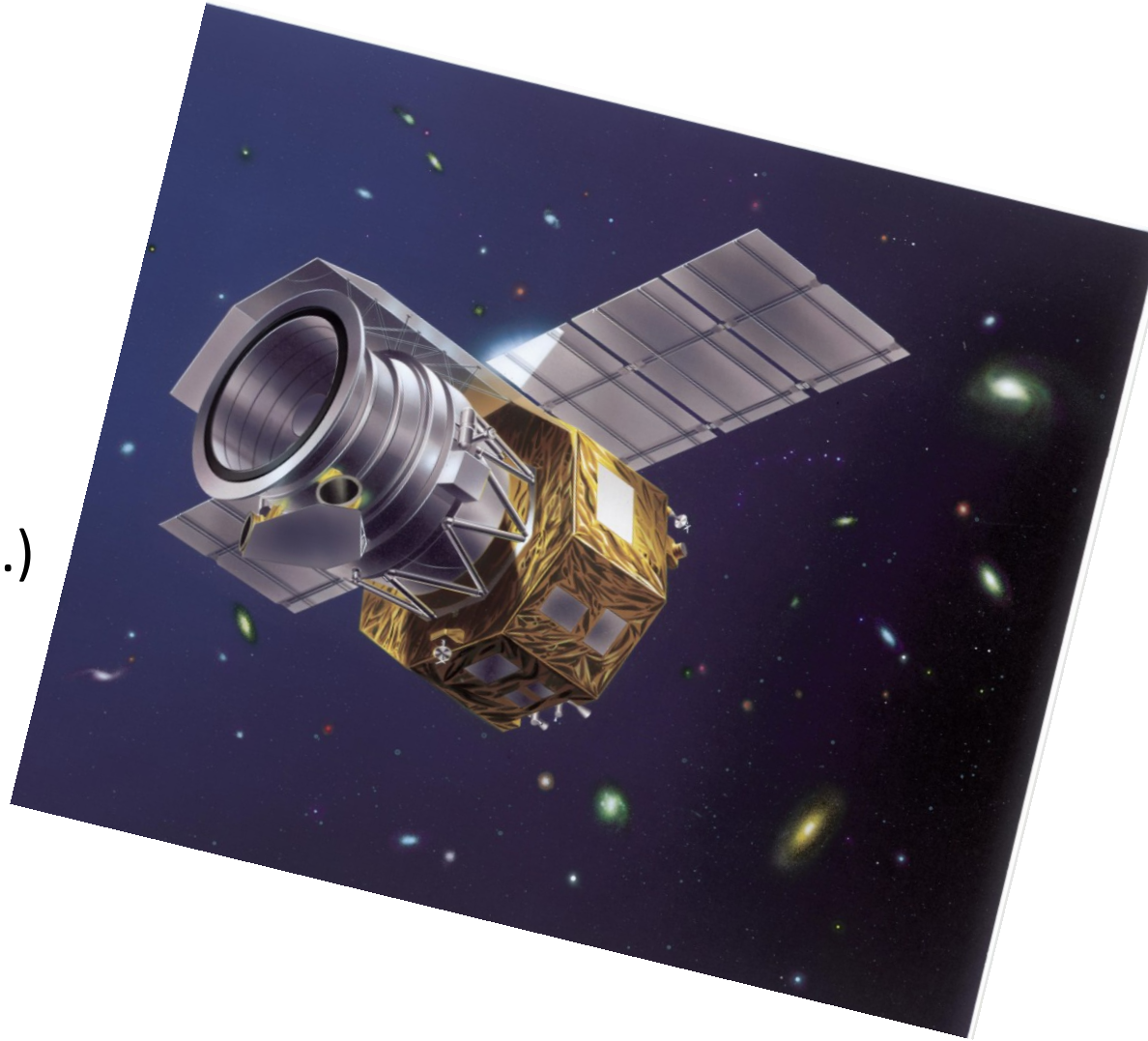
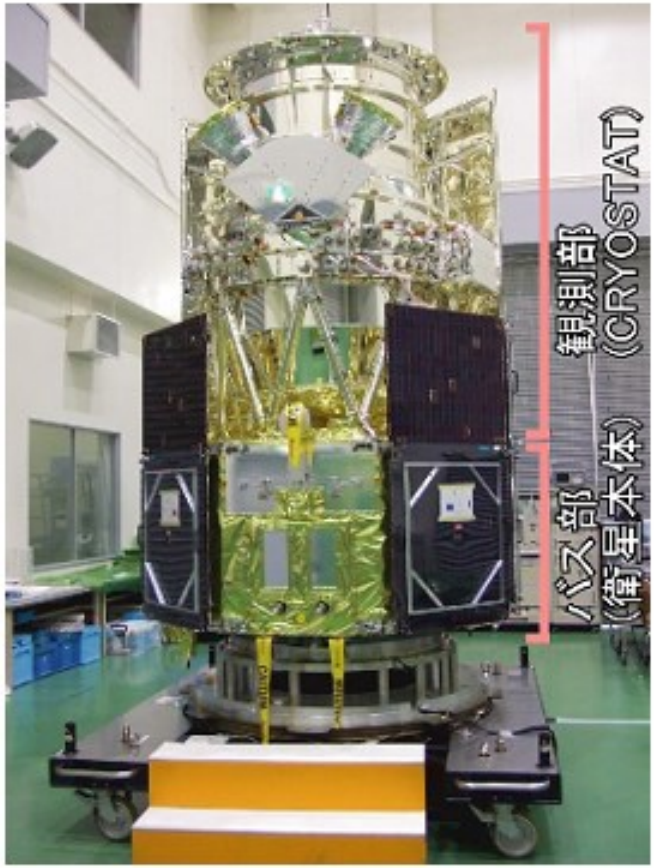


Image politely stolen from the JAXA/ISAS web page.
See http://global.jaxa.jp/press/2006/05/20060522_akari_e.html for more information.

What is AKARI?

- A Japanese IR space telescope:
  - Near IR to Far IR Coverage
  - (~ 3 to 170 microns)
  - Near IR spectroscope
  - 70 cm aperture
  - Liquid He Cryocooled
  - Geocentric orbit



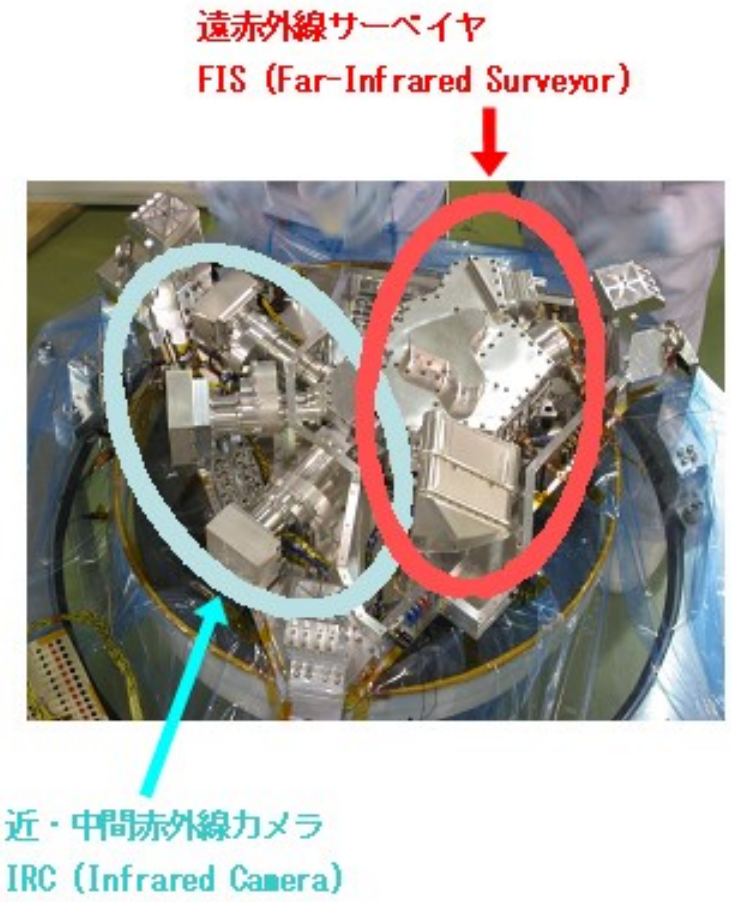


Image politely stolen from the JAXA/ISAS web page.
See http://global.jaxa.jp/press/2006/05/20060522_akari_e.html for more information.

What is AKARI?

- A kind of “Super IRAS”*
  - All sky IR surveys with:
    - Higher resolution:
      ~ 10 to 60 arcsec
    - Improved zodiacal
      light subtraction (Kondo+ 2016)
    - Two more bands than
      IRAS

**IRAS:*

An IR space telescope

launched in 1983 by US, UK,

and the Netherlands

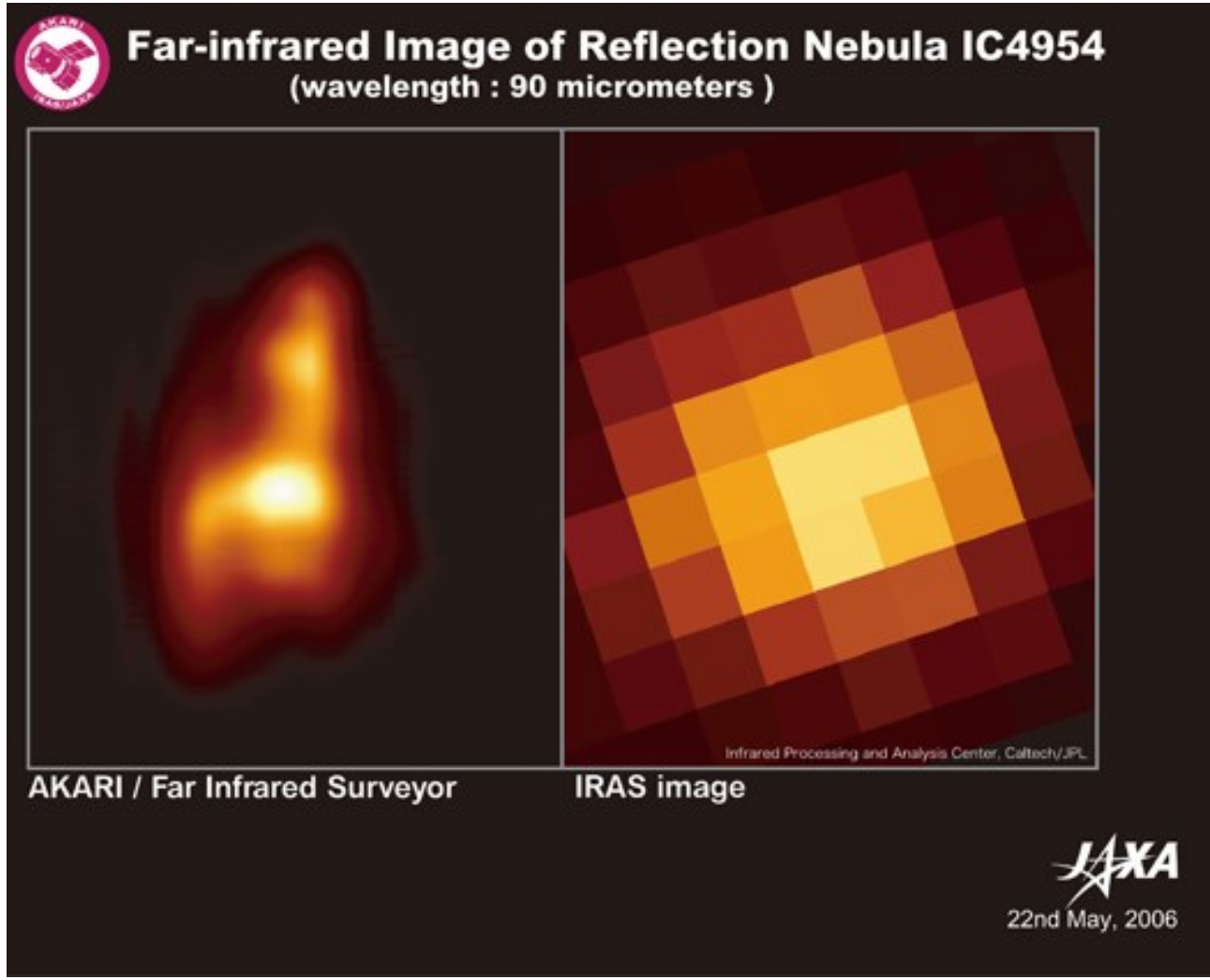
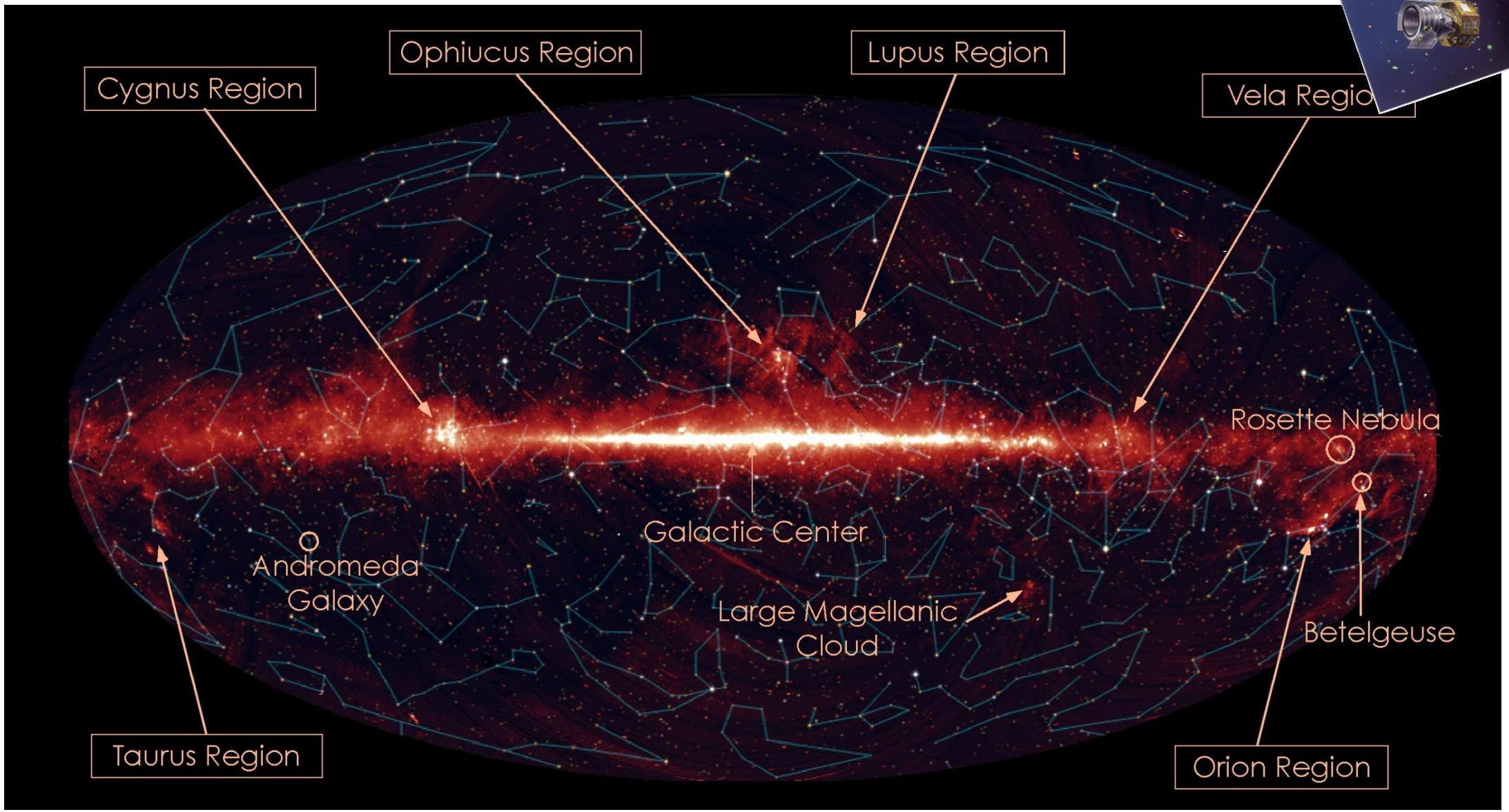
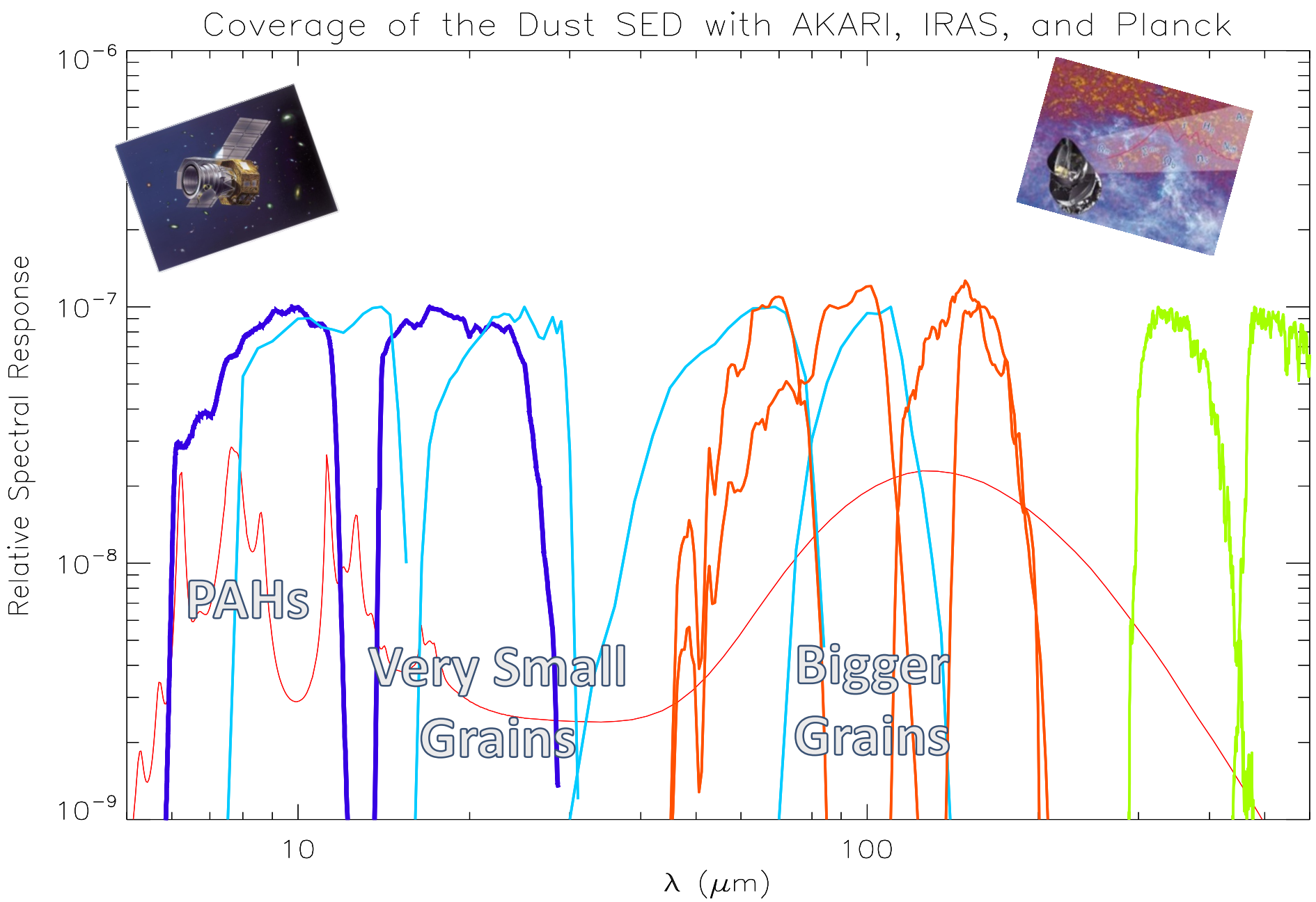


Image politely stolen from the JAXA/ISAS web page.
See http://global.jaxa.jp/press/2006/05/20060522_akari_e.html for more information.

What is AKARI? *All sky maps overview*



AKARI all-sky map demonstration. This map is the AKARI FIS 140 micon map: Image courtesy of JAXA/ISAS and ESA



AKARI/IRC:
9 and 18 μm

AKARI/FIS:
65, 90, 140, 160μm

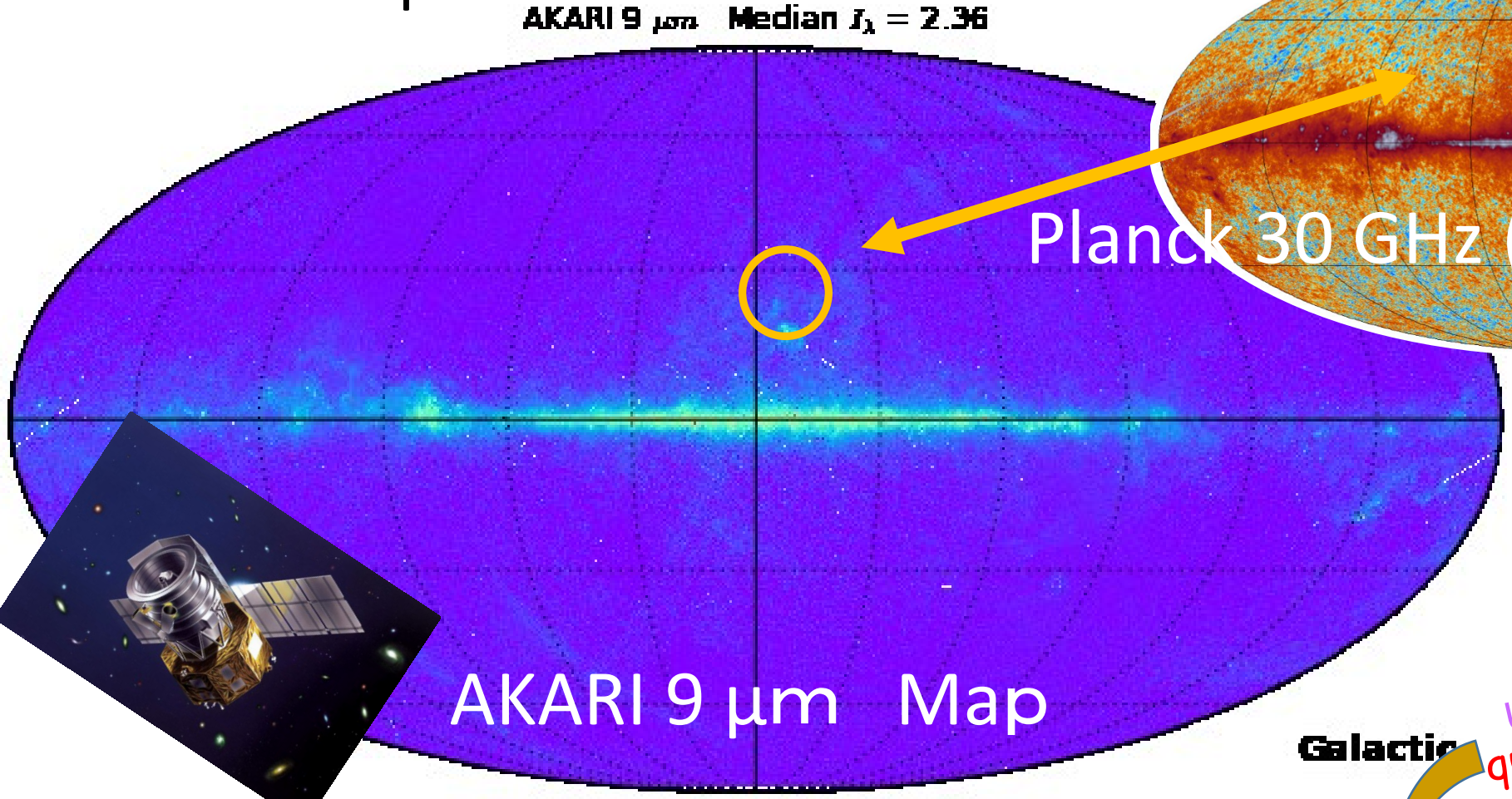
- Typical thermal peak

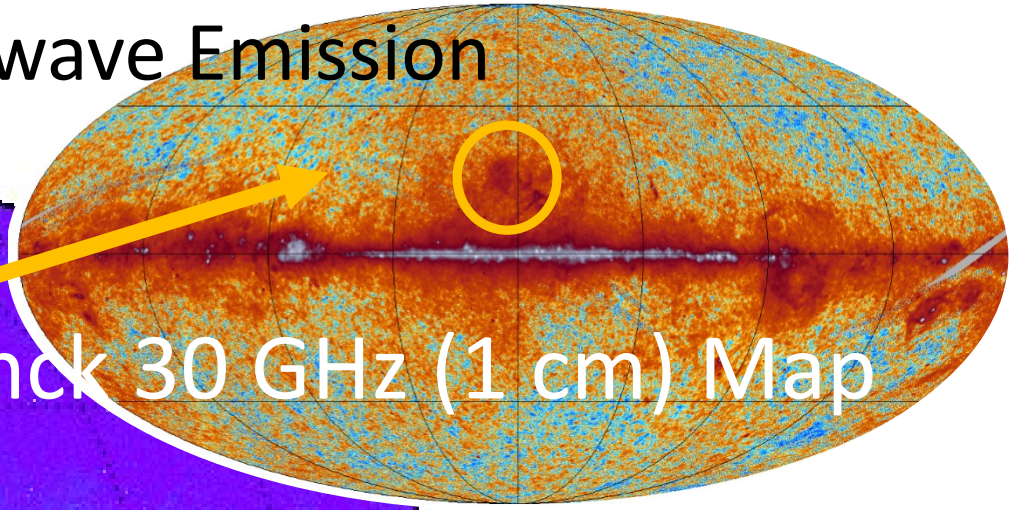
Planck/HFI:
345 and 550 μm

- Constrains the FIR

Dust SED:
DustEM, Compiegne+11

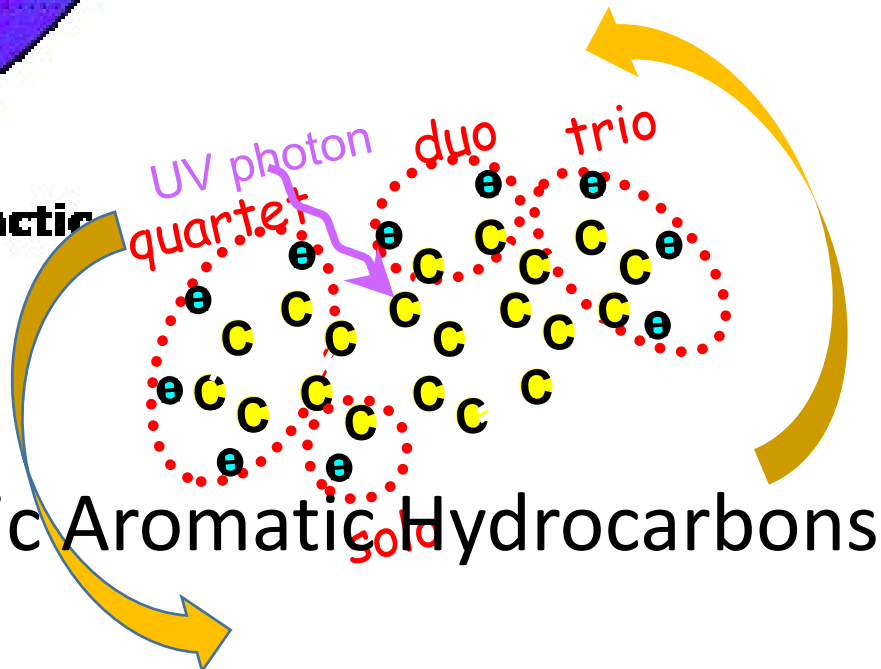
Science Example 1: Anomalous Microwave Emission





Planck 30 GHz (1 cm) Map

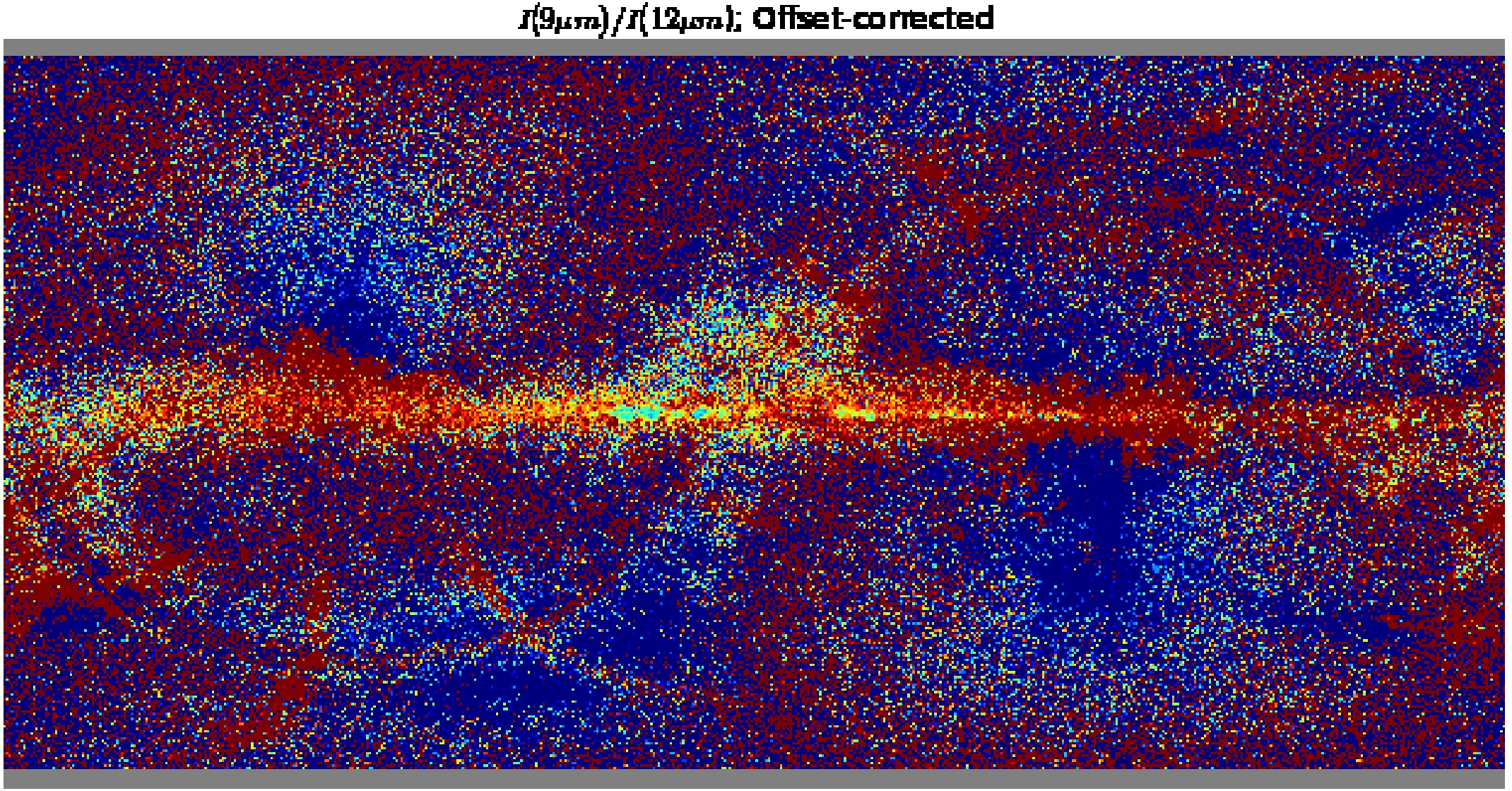
AKARI 9 μm Map



Polycyclic Aromatic Hydrocarbons

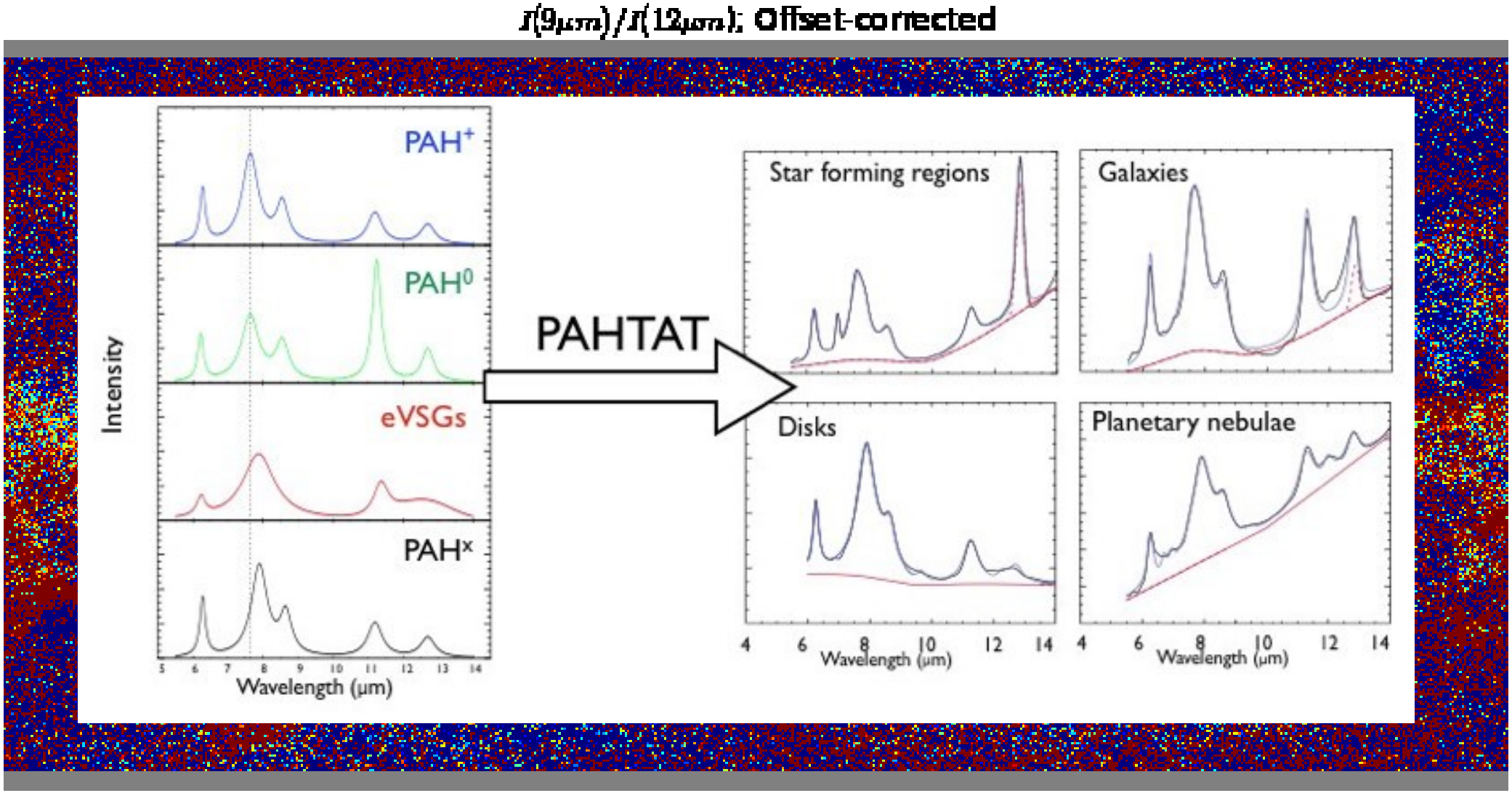
- AKARI all-sky map by Ishihara+ (in prep.)
- Zodi-subtraction by Kondo+ (2016)
- 30 GHz map from Planck Collaboration
- PAH Diagram courtesy of I. Sakon.

Science Example 2: All-sky variations of PAH Ionization



- 9:12 micron ratio map (AKARI and IRAS

Science Example 2: All-sky variations of PAH Ionization

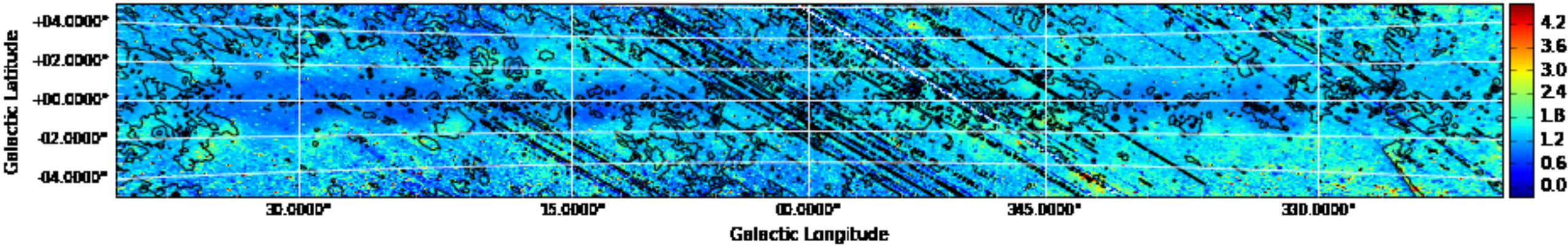


9:12 micron ratio map (AKARI and IRAS

IRAP-Toulouse PAH templates (Joblin+ 2015)

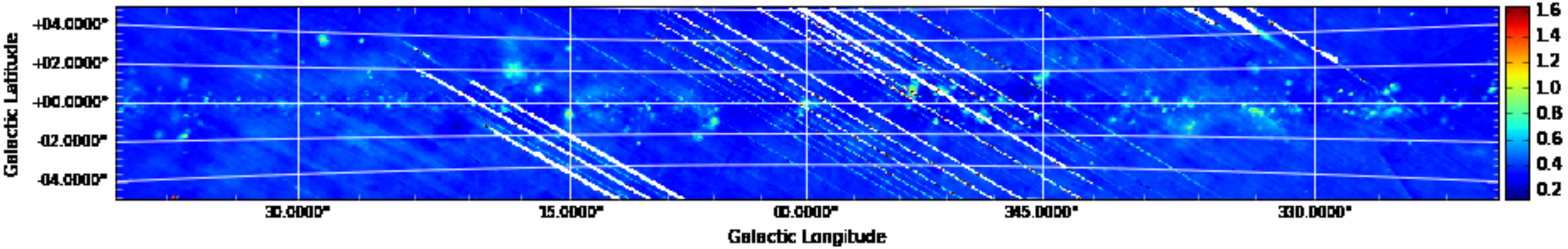
Science Example 2: All-sky variations of PAH Ionization (In the Galactic Plane)

9:12 micron ratio map:



60:90 micron ratio map:

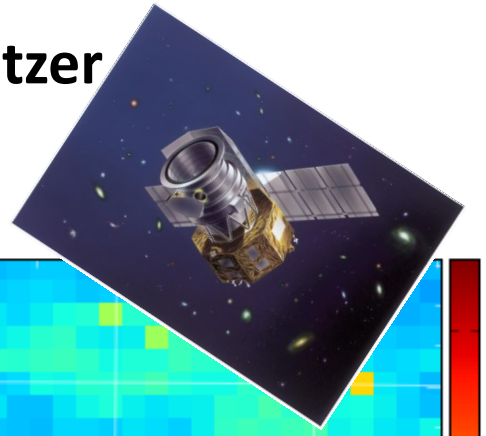
Indicating regions of stronger interstellar radiation

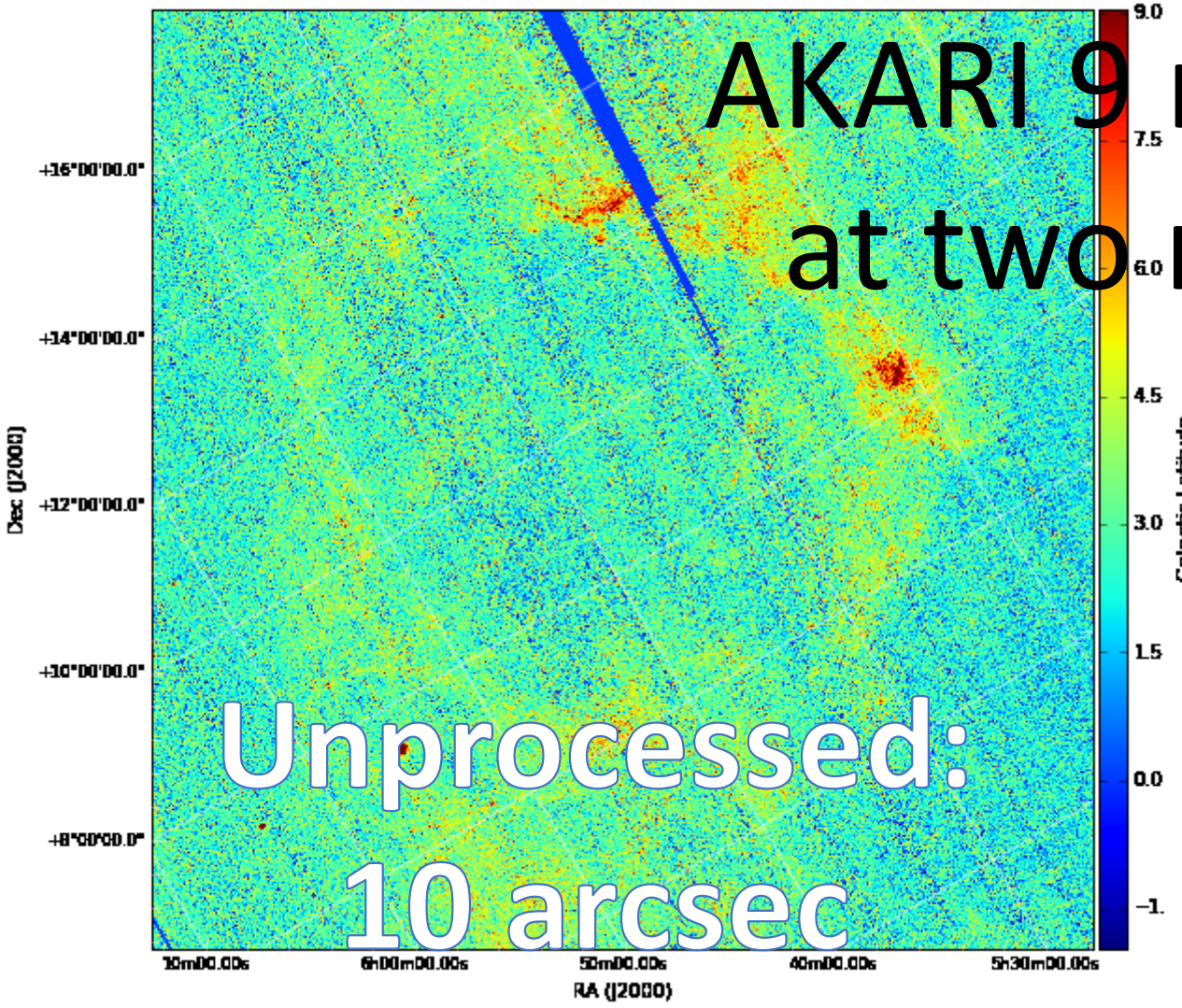


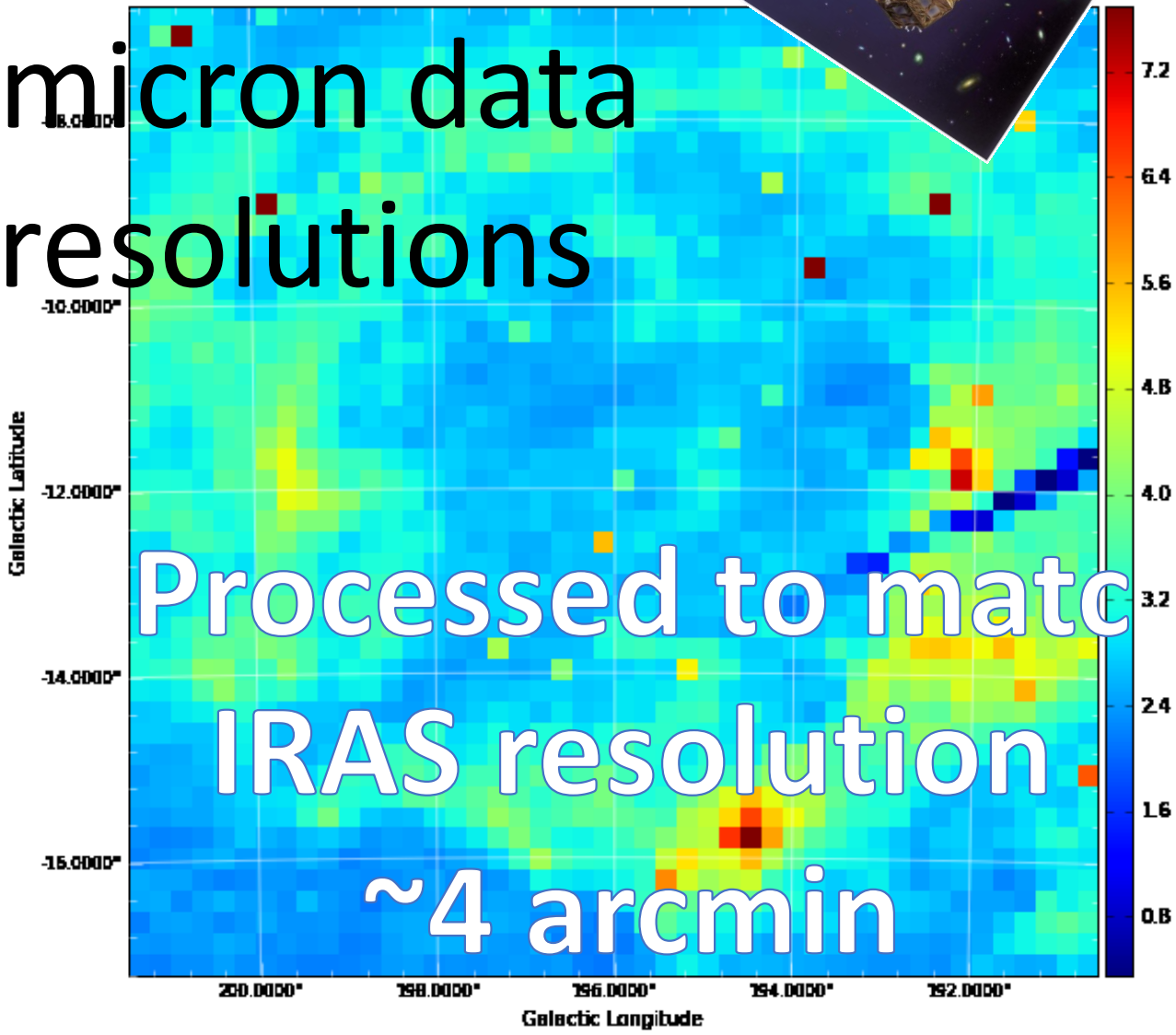
- 9:12 micron ratio map (AKARI and IRAS)
- 60:90 mircron ratio map (AKARI)

Science Example 2: Dust variations in large structures unobserved by Spitzer

Lambda Orionis Molecular Ring (The Head of Orion)

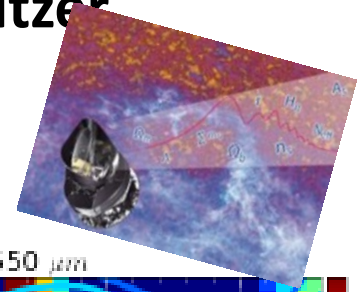


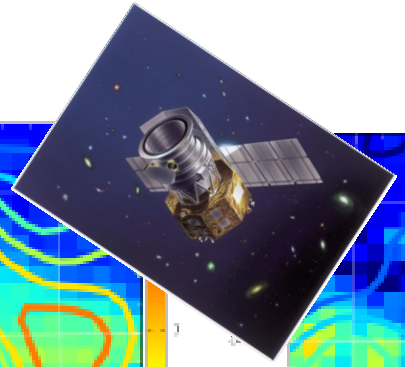


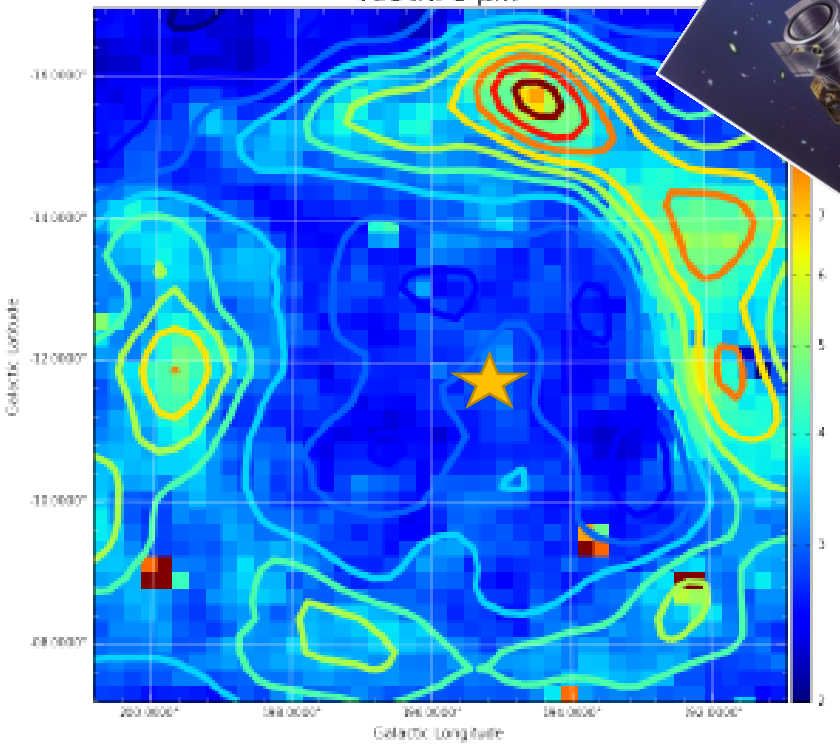


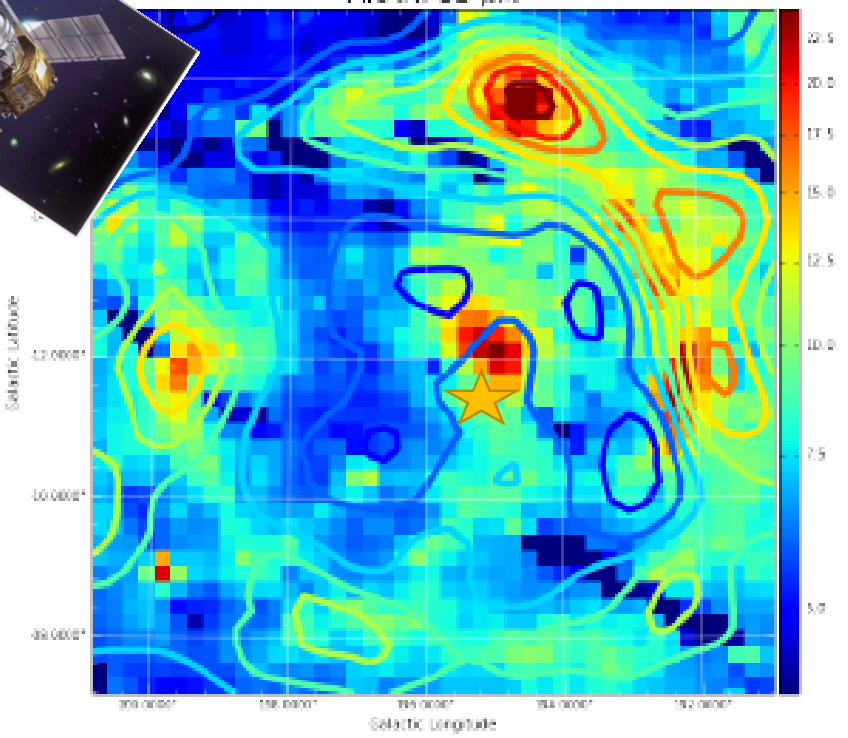
Science Example 2: PAH/Dust variations in large structures unobserved by Spitzer

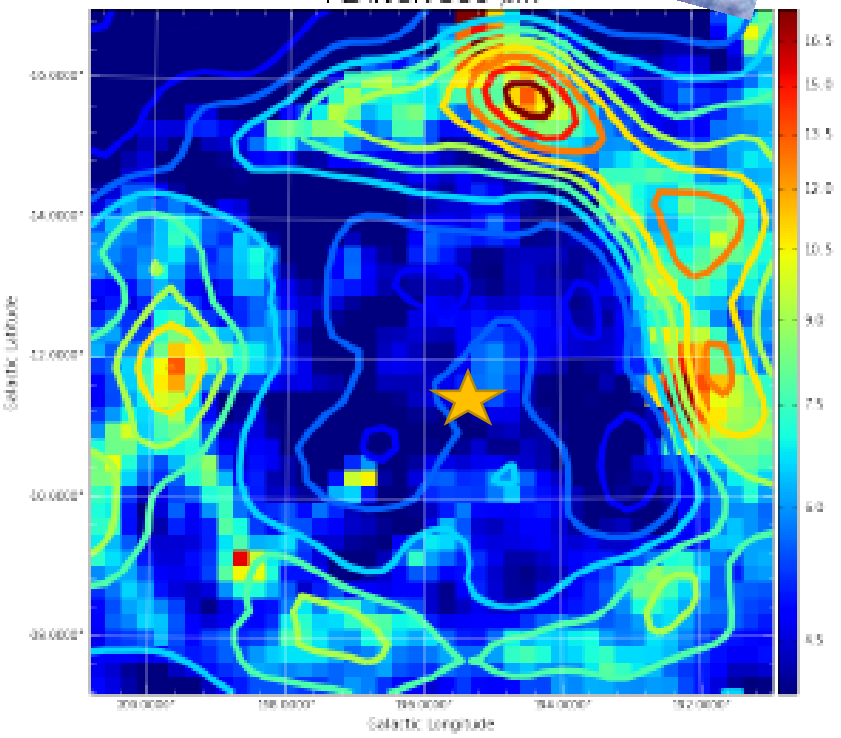
Lambda Orionis Molecular Ring (The Head of Orion)







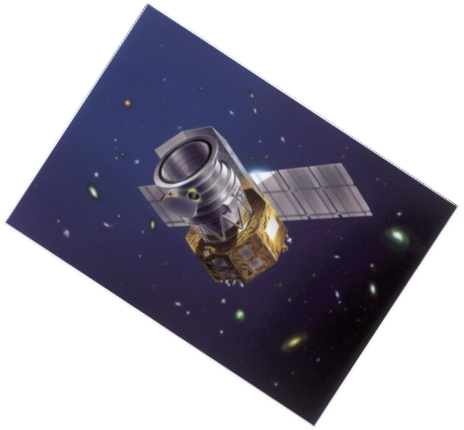




AKARI and Planck images with AME contours, all showing good structural agreement in the *Meissa ring* region, but with disagreement within the HII region around λ Orionis.

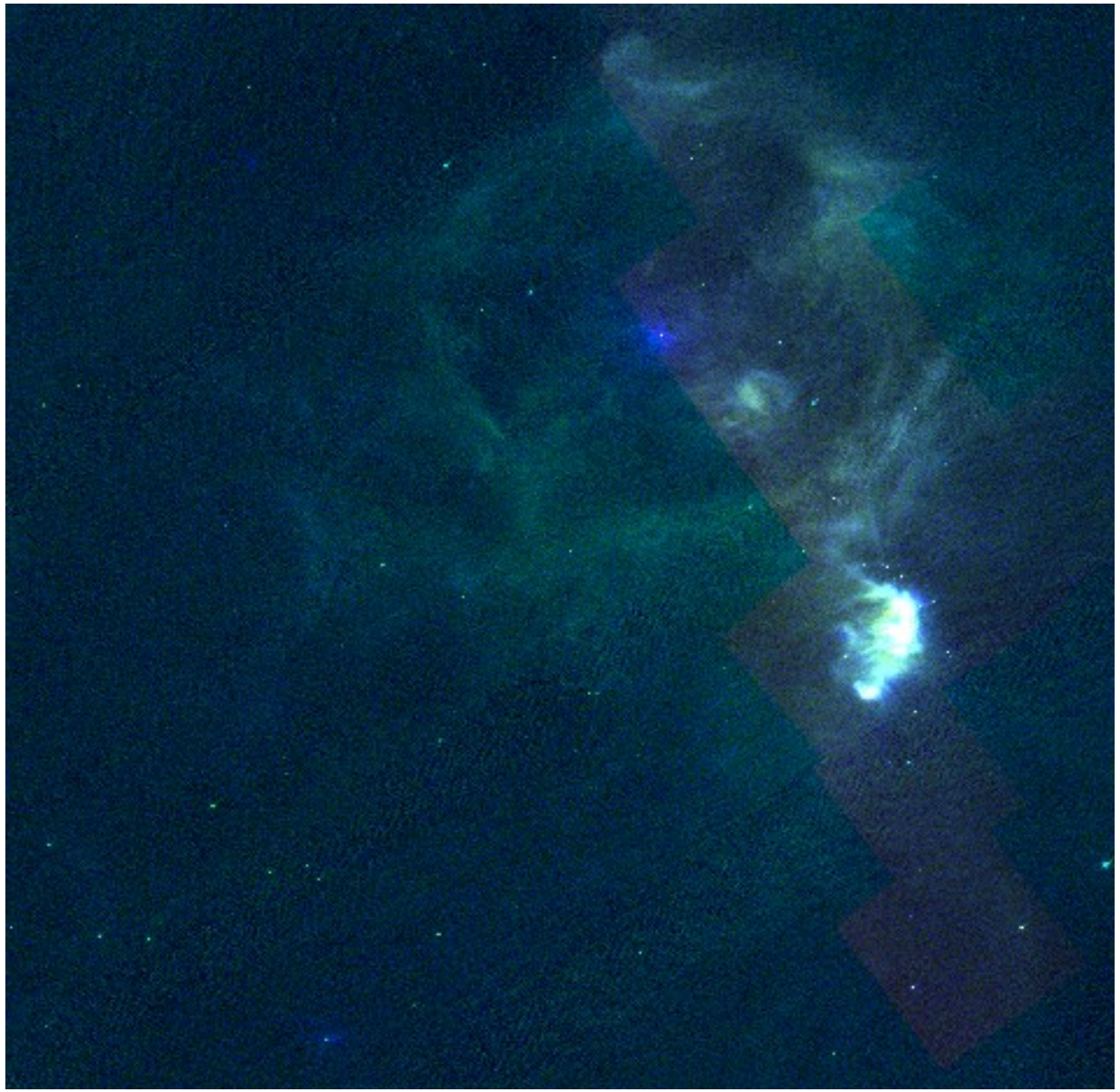
Science Example 2: Dust variations in large structures unobserved by Spitzer

Perseus Molecular Cloud Complex: Exploring PAH emission in and around molecular cores



Blue:
AKARI 9 um
Green:
AKARI 18 um
Red:
Spitzer 8 um*

*Red chosen for visibility



Conclusion:

AKARI offers all sky data offers:

- Resolution advantages over IRAS
- Spatial coverage advantage over Spitzer
- A wide range of science cases by combining archival data from:
  - IRAS
  - Spitzer
  - Planck

And in the future…

- AKARI-TAO-ALMA science?
  - Using AKARI as an general “Dust/PAH Guide” for focused TAO/ALMA observations.
- GAIA?
  - Investigating ISM around interesting GAIA stars?

Closing remark:

つづけて一緒にがんばりましょう

Let’s keep showing the world how international / intercultural friendship (through science) can flow even when other obstacles arise.