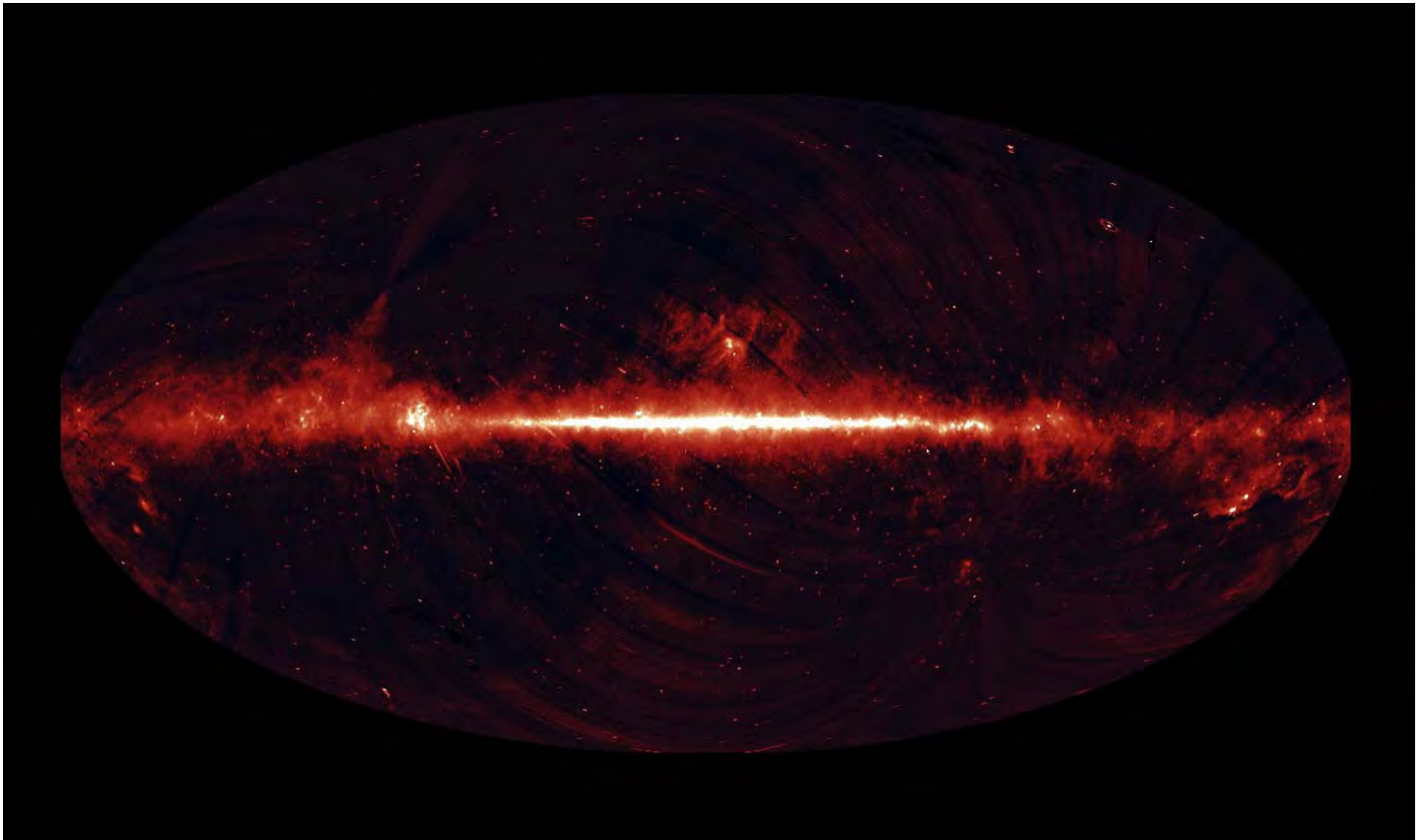


AKARI All-sky Survey Catalogues

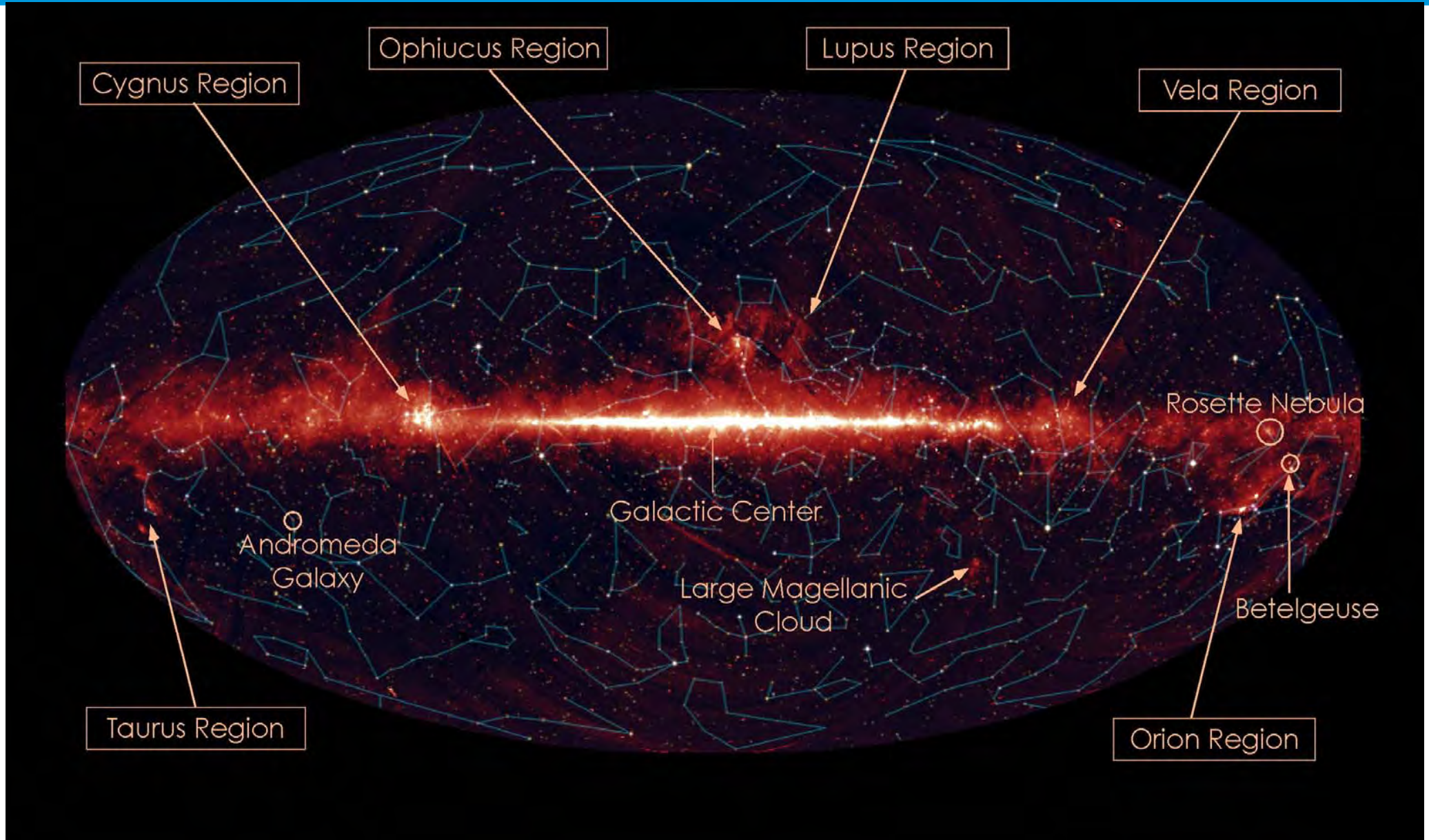
Alberto Salama & Angelo Cassatella

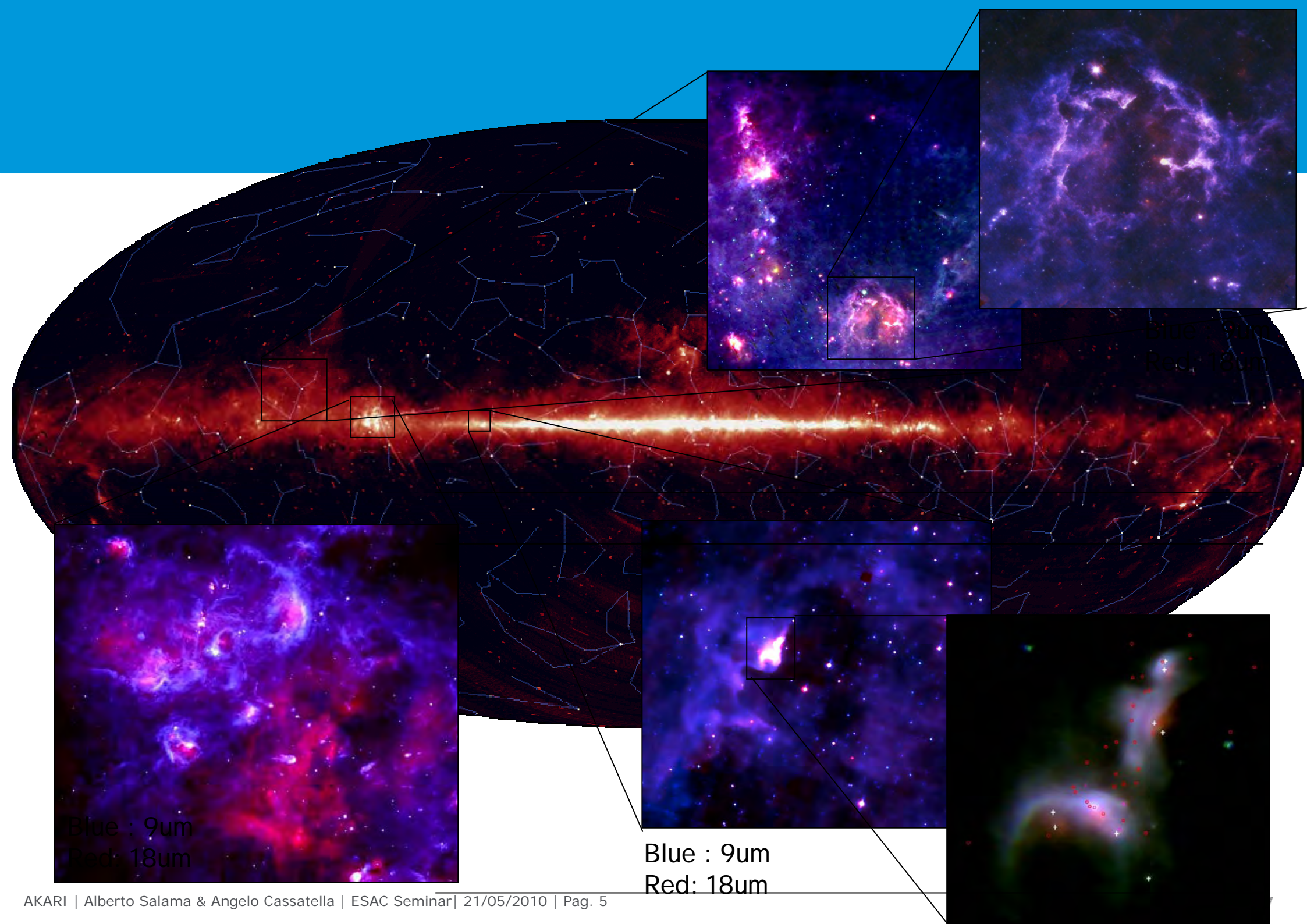
- Introduction
- Mission Overview
- ESA contribution
- The All-sky Survey Catalogues
- Science highlights from the literature
- Science with AKARI at ESAC

All-sky Survey Image (9 micron)



All-sky Survey Image (9 micron)

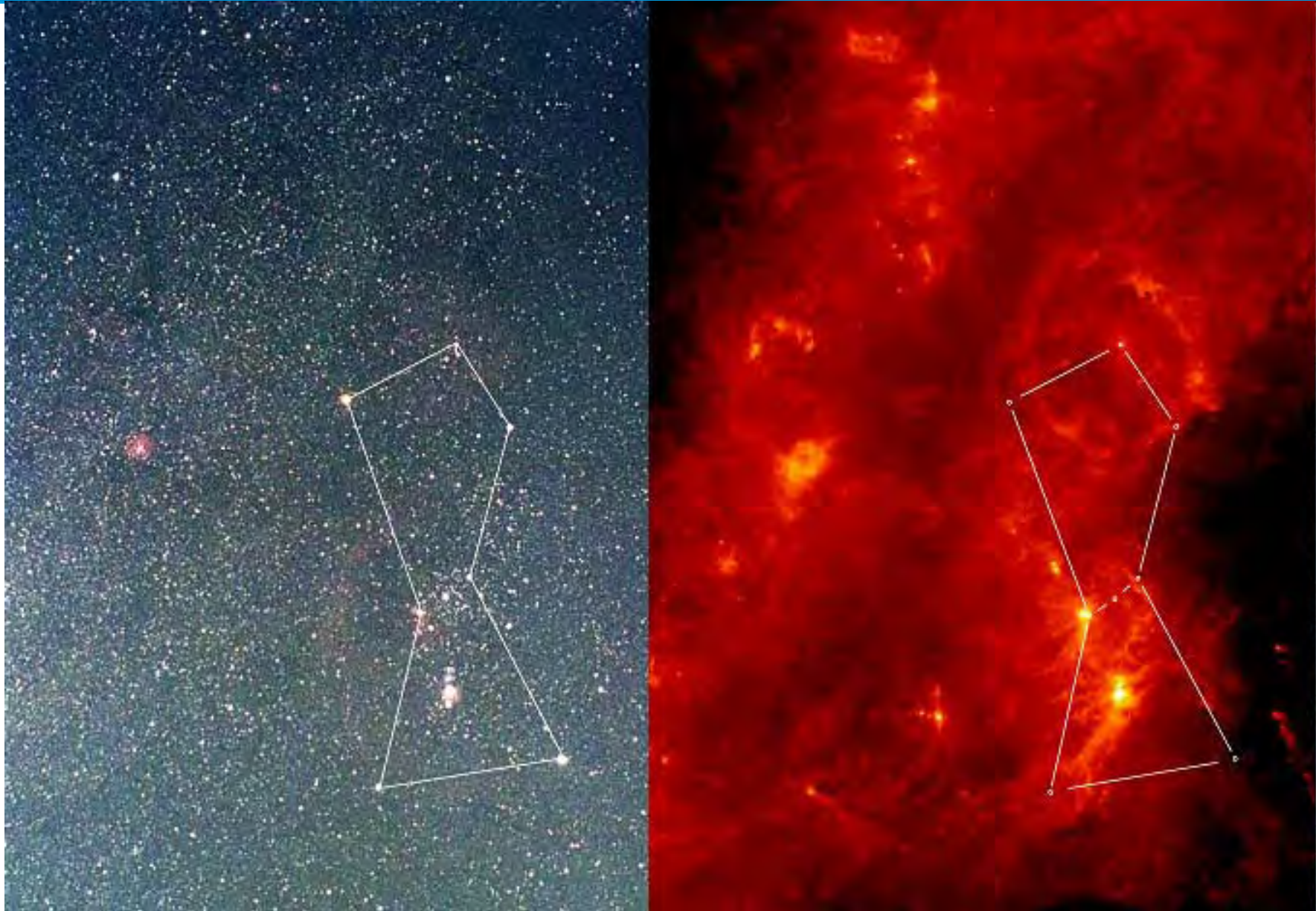


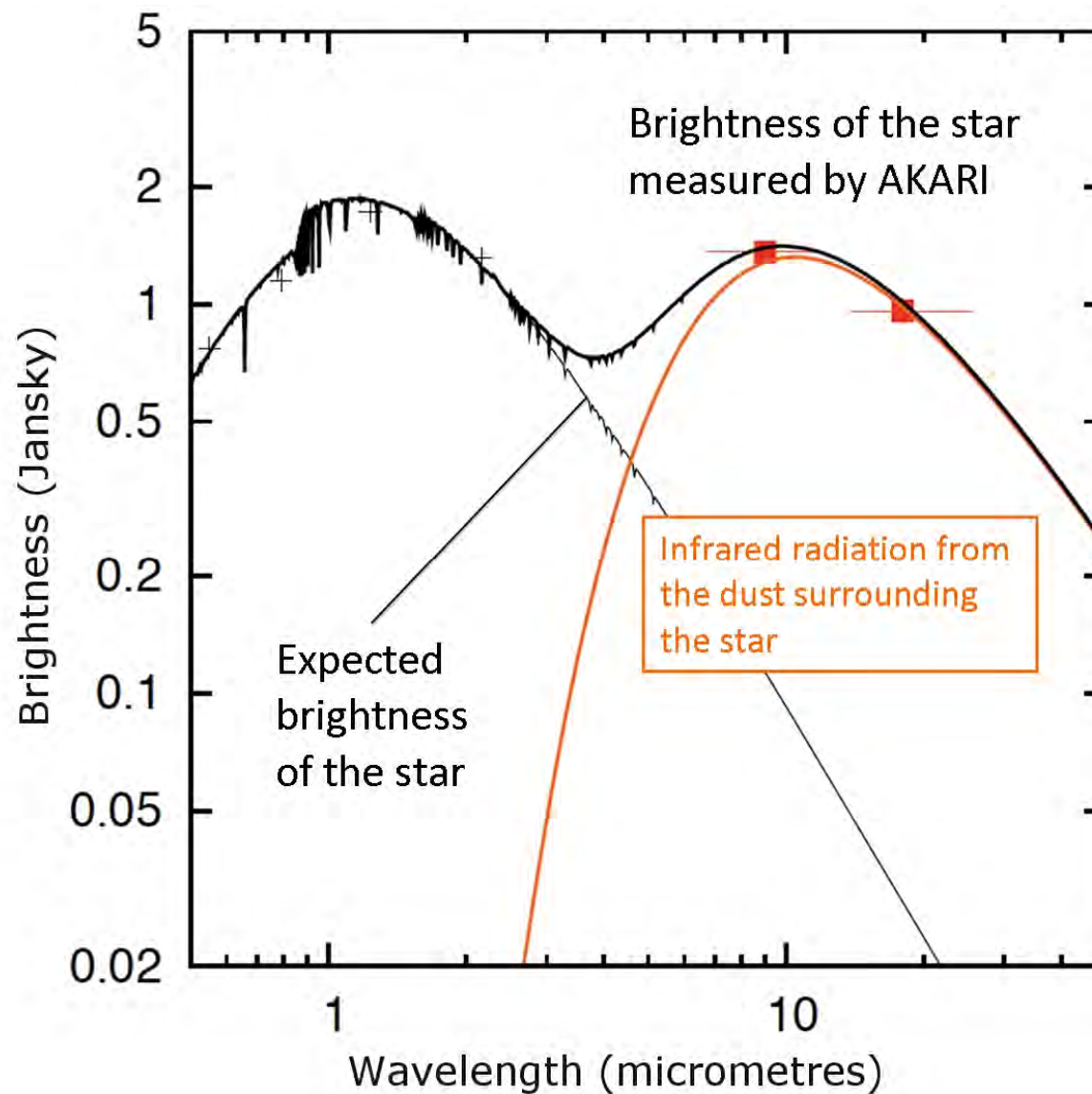


Blue : 9um
Red: 18um

Blue : 9um
Red: 18um

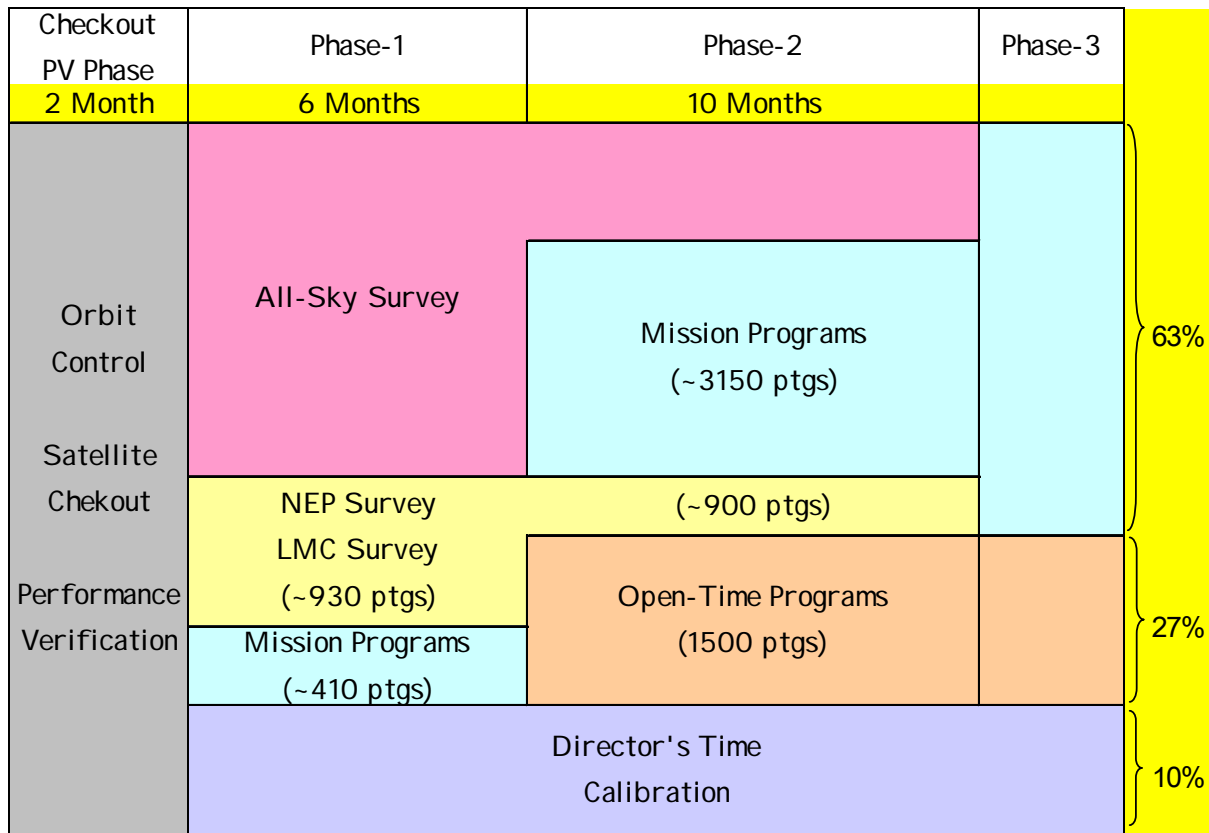
Orion (140 micron)



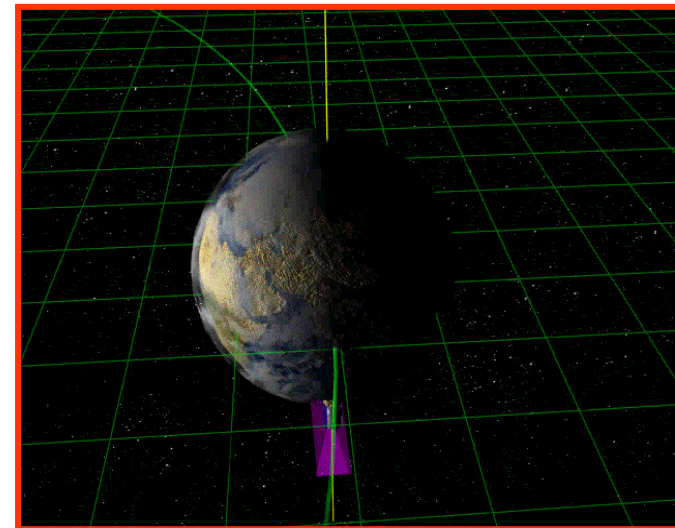


- JAXA-led project, international collaboration
- Sky survey at IR wavelengths (25 yrs after IRAS)
 - Also partly an observatory (thousands of pointed observations)
- ESA contribution
 - set up by Martin Kessler in 1999, approved by SPC in 2000 *"to accelerate the production of the sky catalogues, which will be extremely valuable in the preparation and exploitation of the FIRST and Planck missions"*.
 - Tracking support and pointing reconstruction for survey, in return for 10% of pointed observations
 - ESOC:
 - Tracking support (Kiruna), during survey (ended in Oct 07)
 - ESAC:
 - Community support
 - Pointing reconstruction
- About 4M EUR, used in 2003-2010
- Two instruments, IRC (2-26 μm) and FIS(45-180 μm)
 - 13 bands, photometry and spectroscopy

Mission Phases



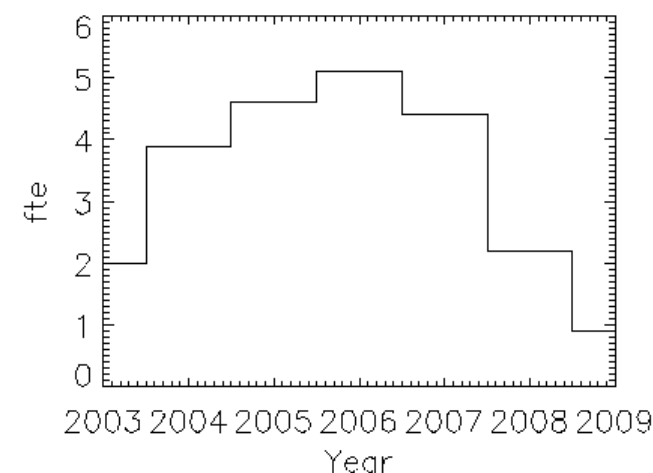
Launch	22 Feb 2006
Phase 1 (Mainly survey)	8 May 2006
Phase 2 (Mainly Pointed Observations)	8 Nov 2006
Helium depletion	26 Aug 2007
Phase 3 (Post-He - only NIR detector)	1 Jun 2008



- AKARI tasks at ESAC performed by ISO Data Centre during last phase of ISO (Active Archive Phase), from 2003-2006, then by smaller dedicated team until today, as most people moved to Herschel

- Pointing Reconstruction (improving position accuracy X10)
- IRC Survey Catalogue generation, validation, documentation

- User Support
 - 3 AO's (total=1200 observations!)
 - Proposal technical feasibility
 - Additional AO tools and documentation
 - TAC formation and aid
 - Close monitoring of observing programmes implementation
 - Scheduling is an issue for the low-earth orbit satellite
 - Additional operational constraints arose during the mission
 - Web, Helpdesk
 - Data reduction documentation (Instrument Data User Manuals: 200 pages)
 - Initially for Open Time users, then valid for the world as data become public
 - Workshops at ESAC (with Japanese experts attendance)
 - Observation planning in September 2005
 - Hands-on data reduction in September 2007
 - Outreach



➤ In 2007

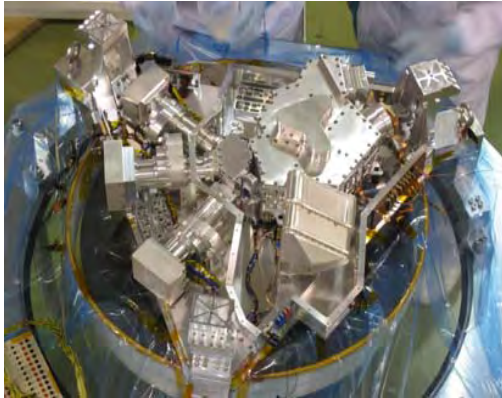
- User Support (2 fte)
 - A. Salama (ISO and AKARI Project Scientist and User Support)
 - R. Lorente (ISOCAM and IRC expert, also ramping up on Herschel)
 - E. Verdugo (ISOPHOT and FIS expert, also ramping up on Herschel)
 - C. Pearson (with AKARI since 1997, collocated at ISAS)
- Pointing Reconstruction (2 fte)
 - P. Garcia-Lario (Pointing reconstruction & Herschel Observatory scientist)
 - C. Stephenson (software engineer)
 - C. Alfageme (software engineer, also partly on User Support)

➤ In 2009 (1 fte)

- A. Salama
- C. Alfageme
- N. Cox
- A. Cassatella

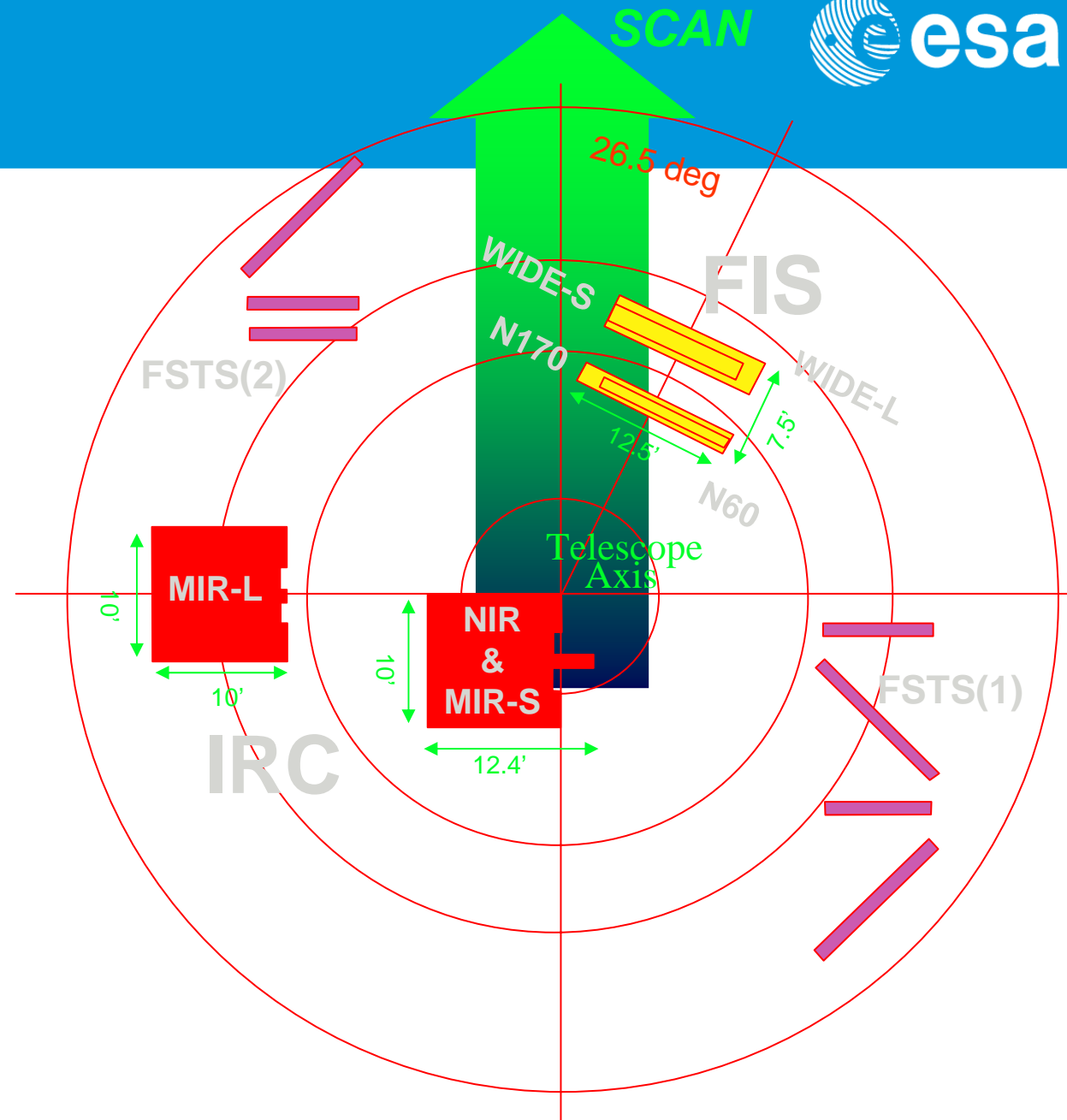
FIS (Far-Infrared Surveyor)

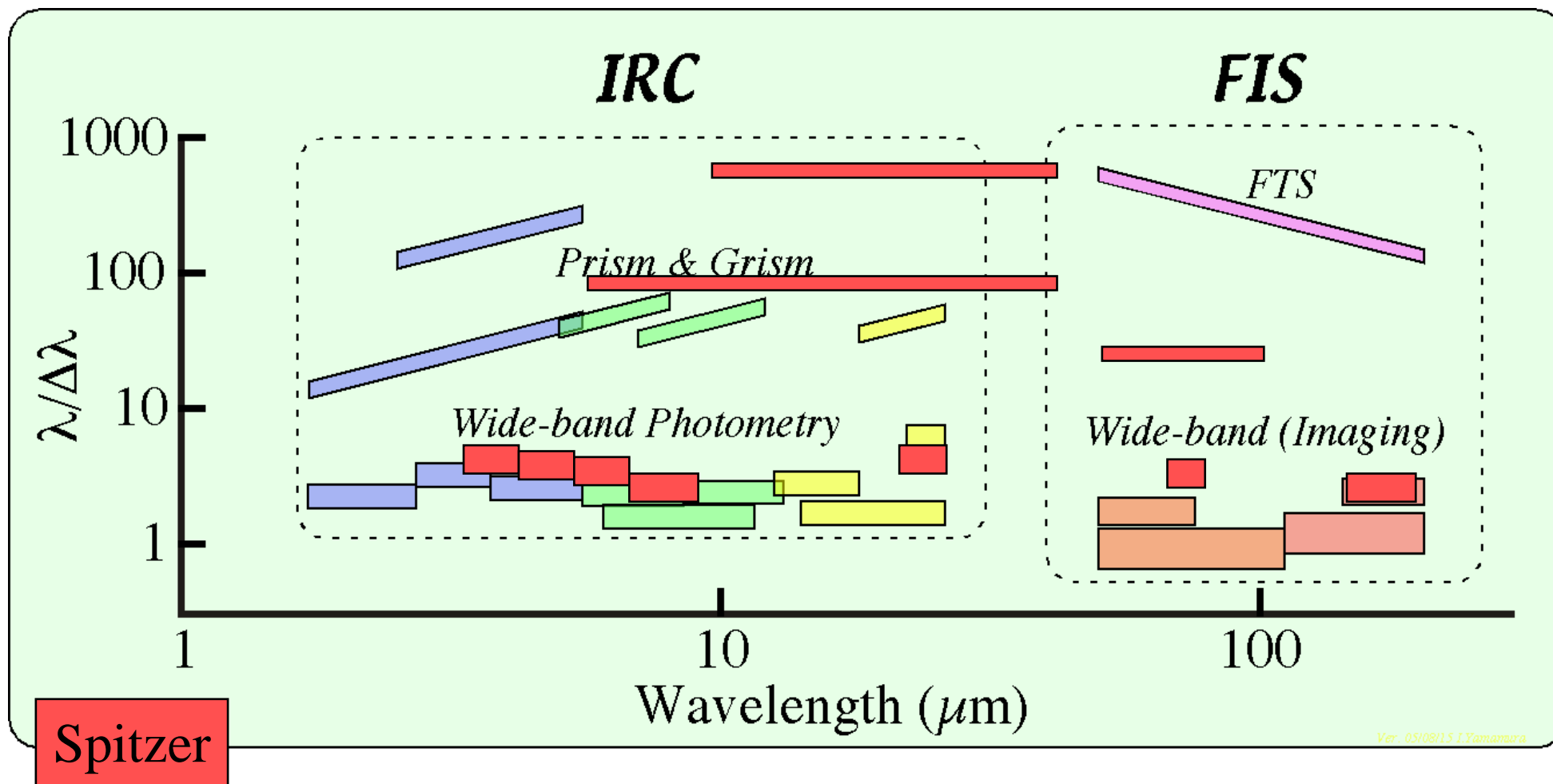
- 50 – 180 μm (4 photometric bands)
- All-Sky Survey (4 bands)
- Deep imaging and spectroscopy



IRC (Infrared Camera)

- 1.7 – 26 μm (9 bands, 3 cameras)
- All-Sky Survey in 2 bands
- Imaging and spectroscopy



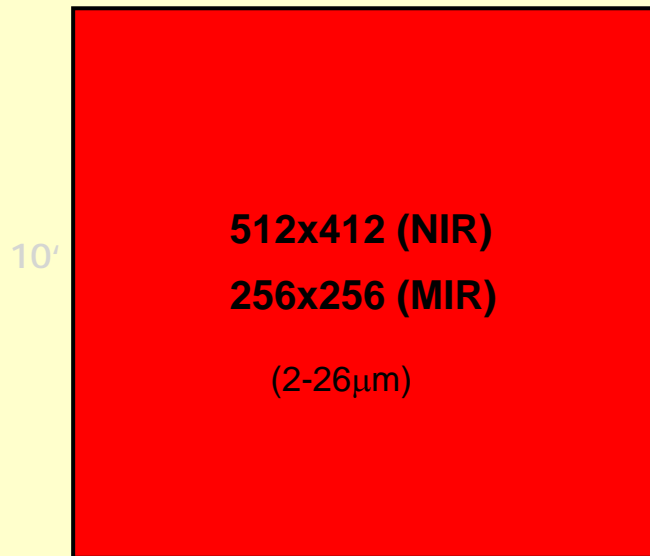


Detector sizes

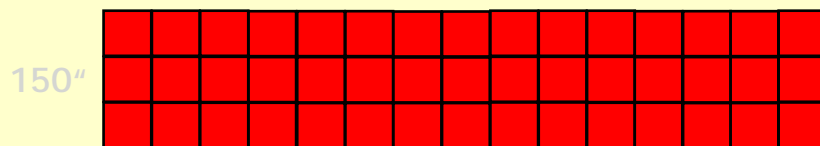
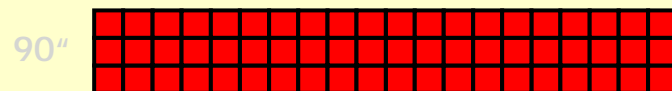
AKARI

IRC

10'



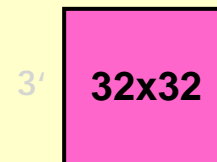
FIS



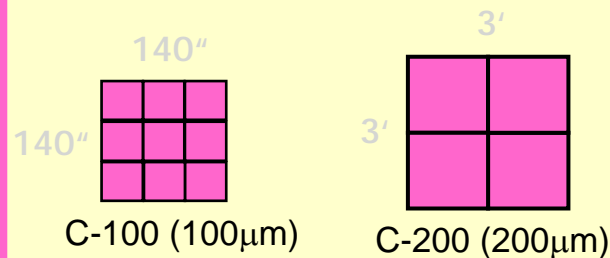
ISO

ISOCAM

3'



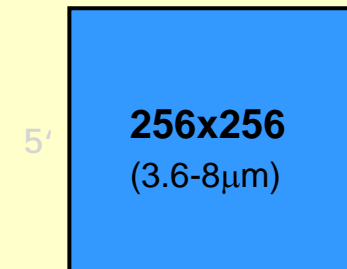
ISOPHOT



SPIITZER

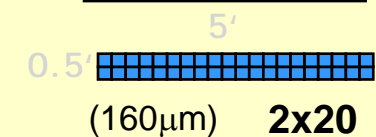
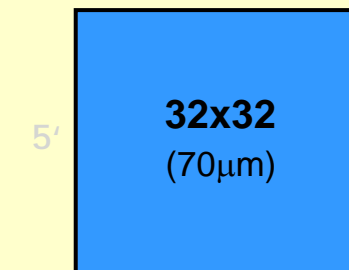
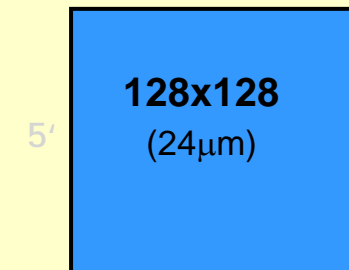
IRAC

5'



MIPS

5'



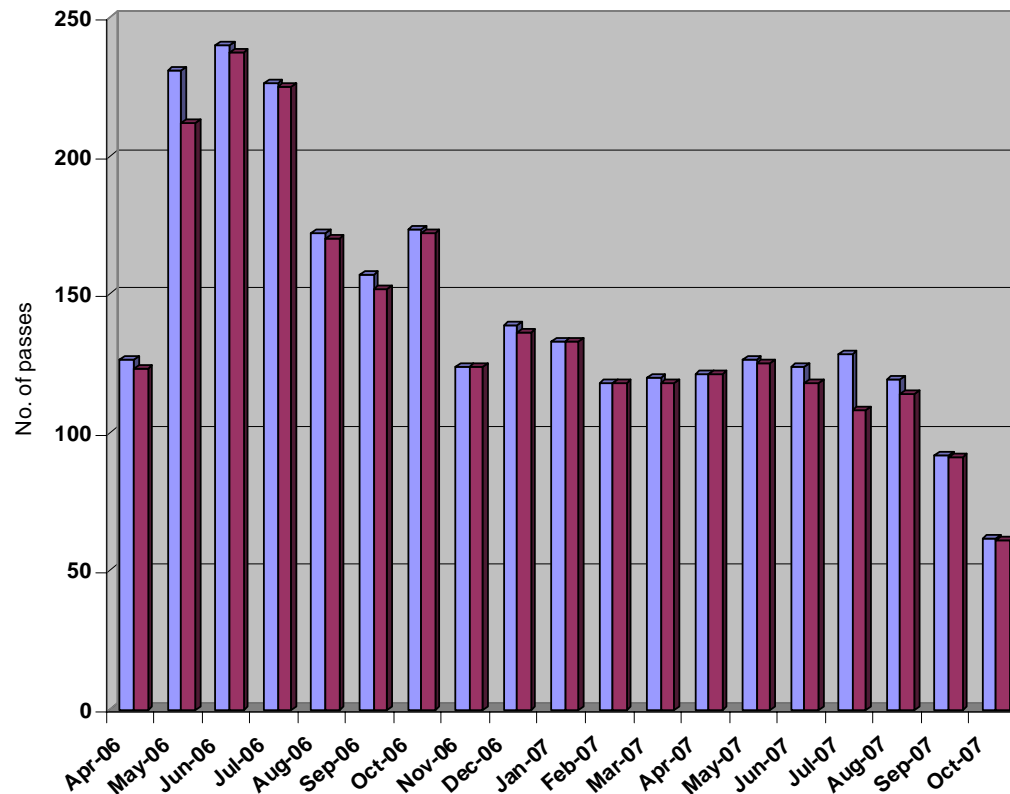
ESOC Ground station support



- Ground station (downlink) support with the Kiruna Antenna
 - in the X-band
 - for several passes per day.

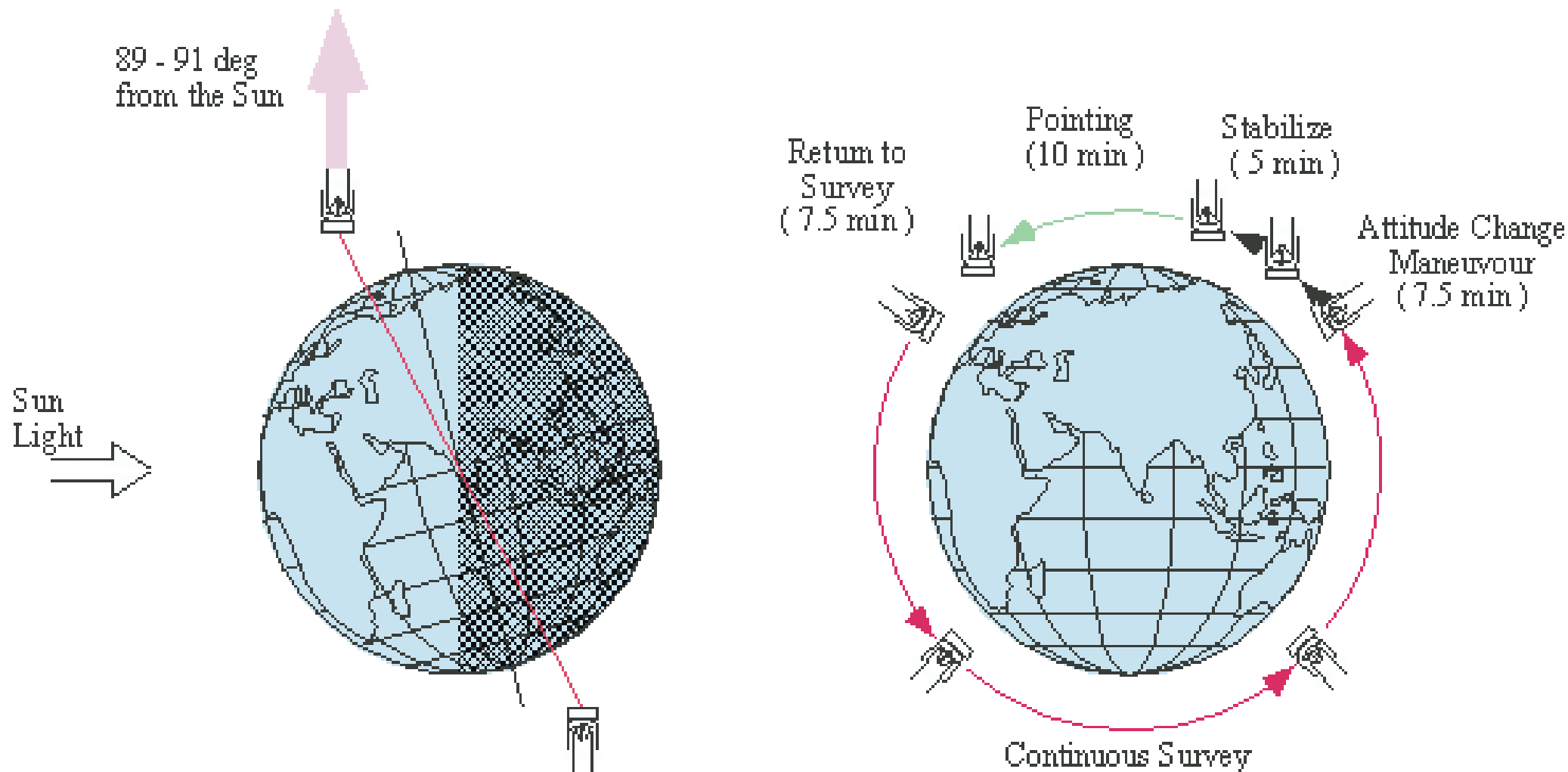


Requested (blue) and Successful (red) passes per month

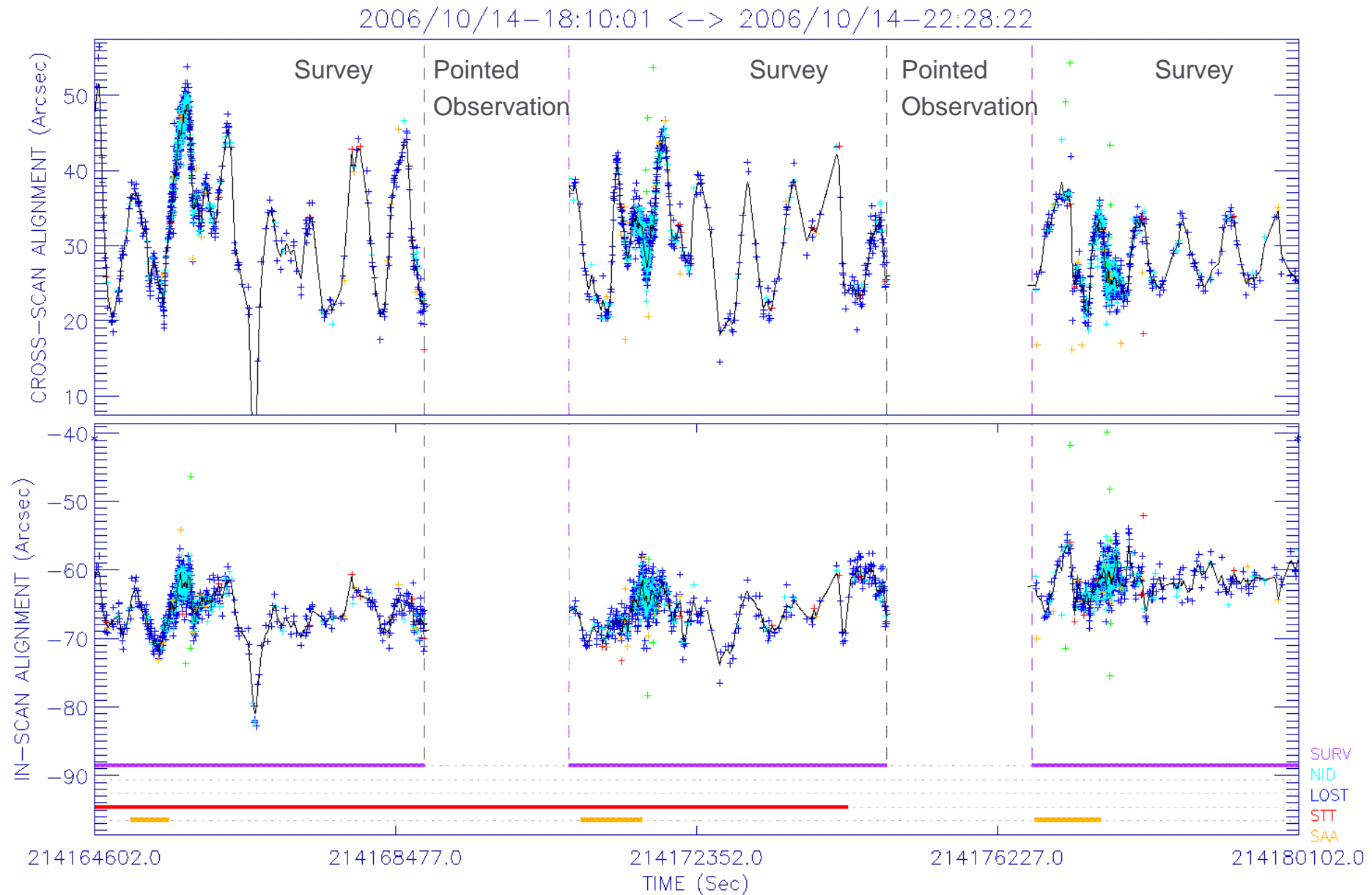


The rate is 97% overall
(vs. 95% required).

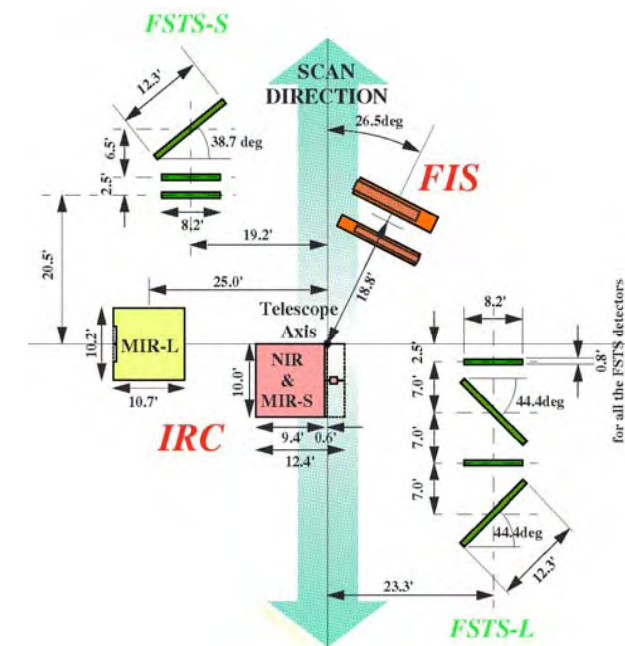
Survey mode and pointed mode



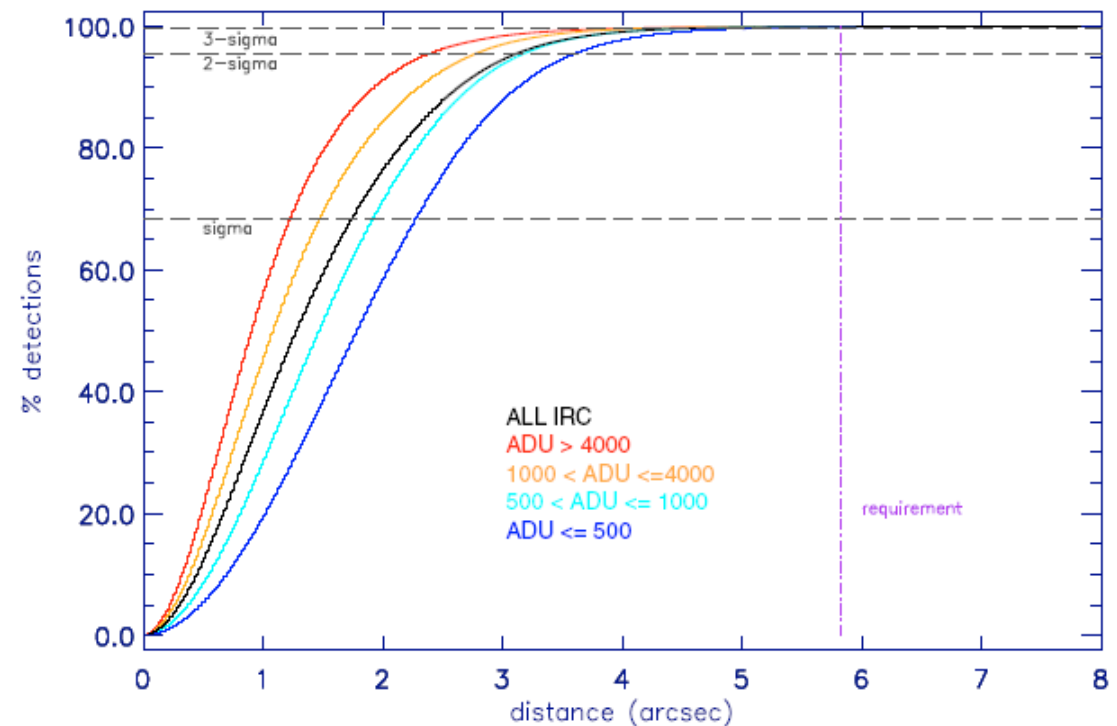
ESAC Pointing Reconstruction

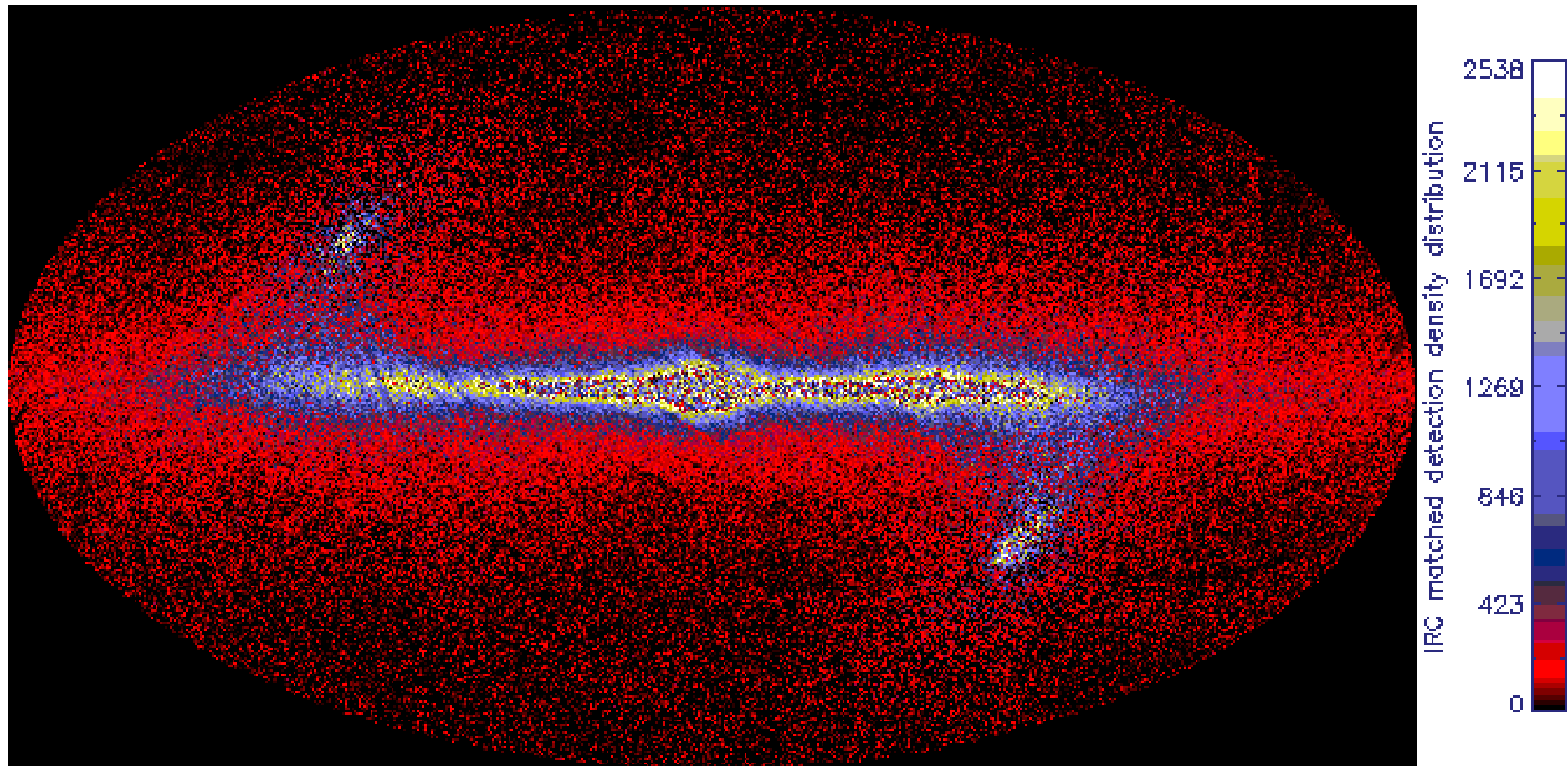


- Actually a collection of two completely independent astrometric catalogues constructed to support AKARI pointing reconstruction
 - **FSTS Reference Catalogue** (2,862,152 sources)
 - **IRC Reference Catalogue** (670,995 sources)
- Containing astrometric information (+proper motion if known) and photometric information (predictions or real measurements)



1. Run the pointing reconstruction software with randomly selected sources amounting to half of the catalogue
2. Determine the positions of the sources from the other half catalogue, which thus result unmatched.
3. Calculate distance between the two quantities

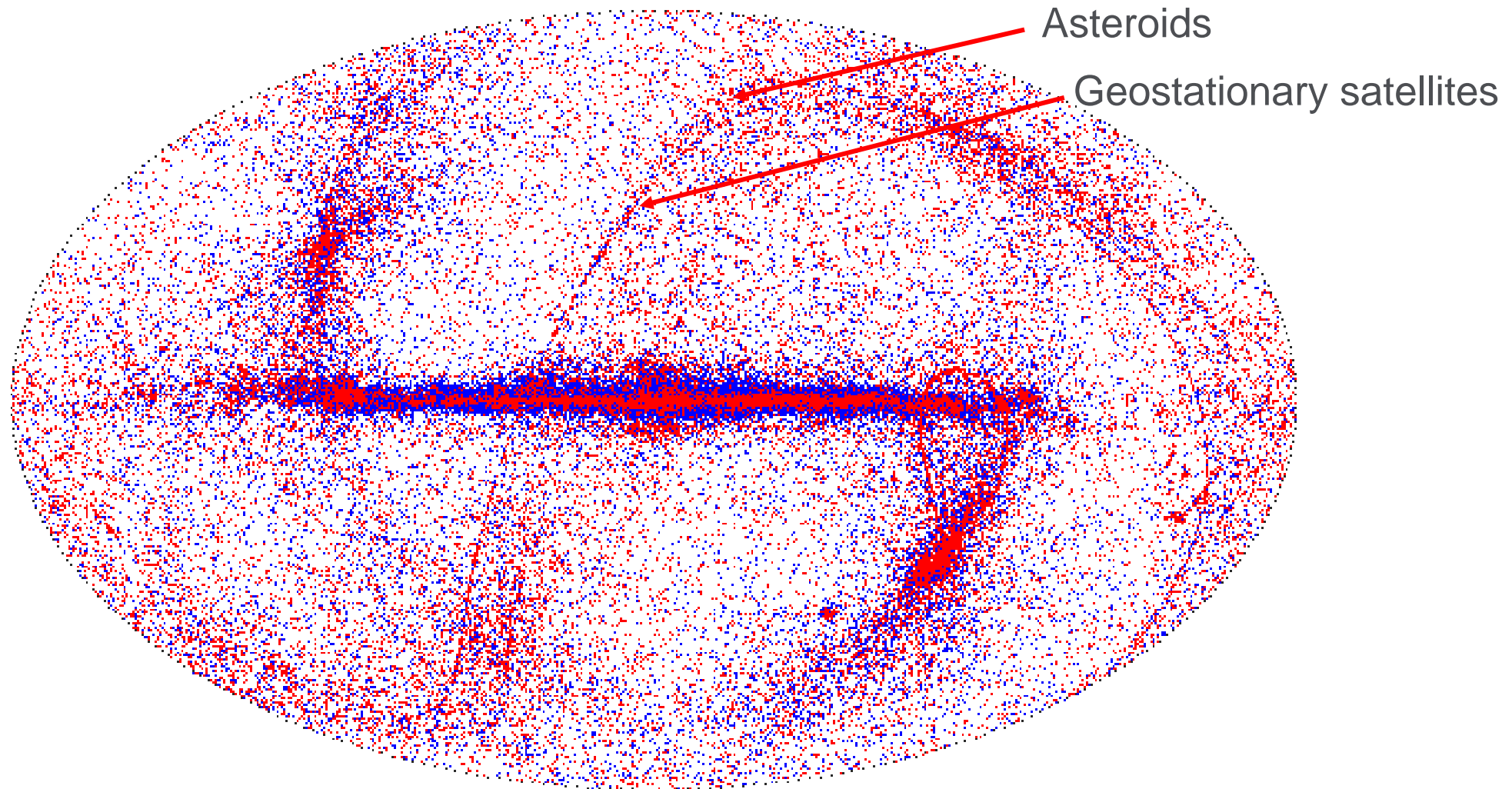




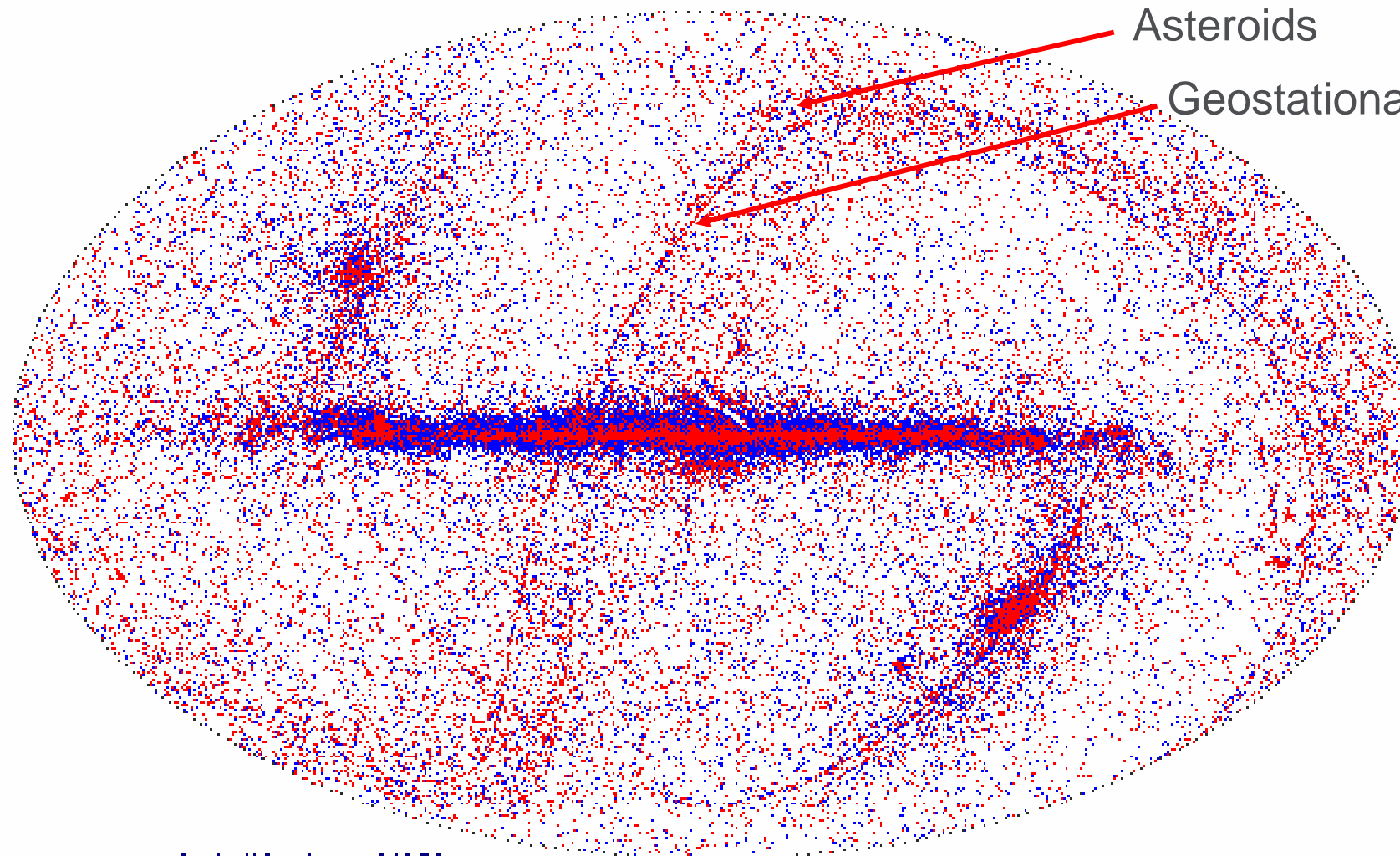
90% matches of the 6 millions events over the mission

Unmatched detections 1st scan

AKARI first scan unmatched: 162669 det.



AKARI second scan unmatched: 127597 det.

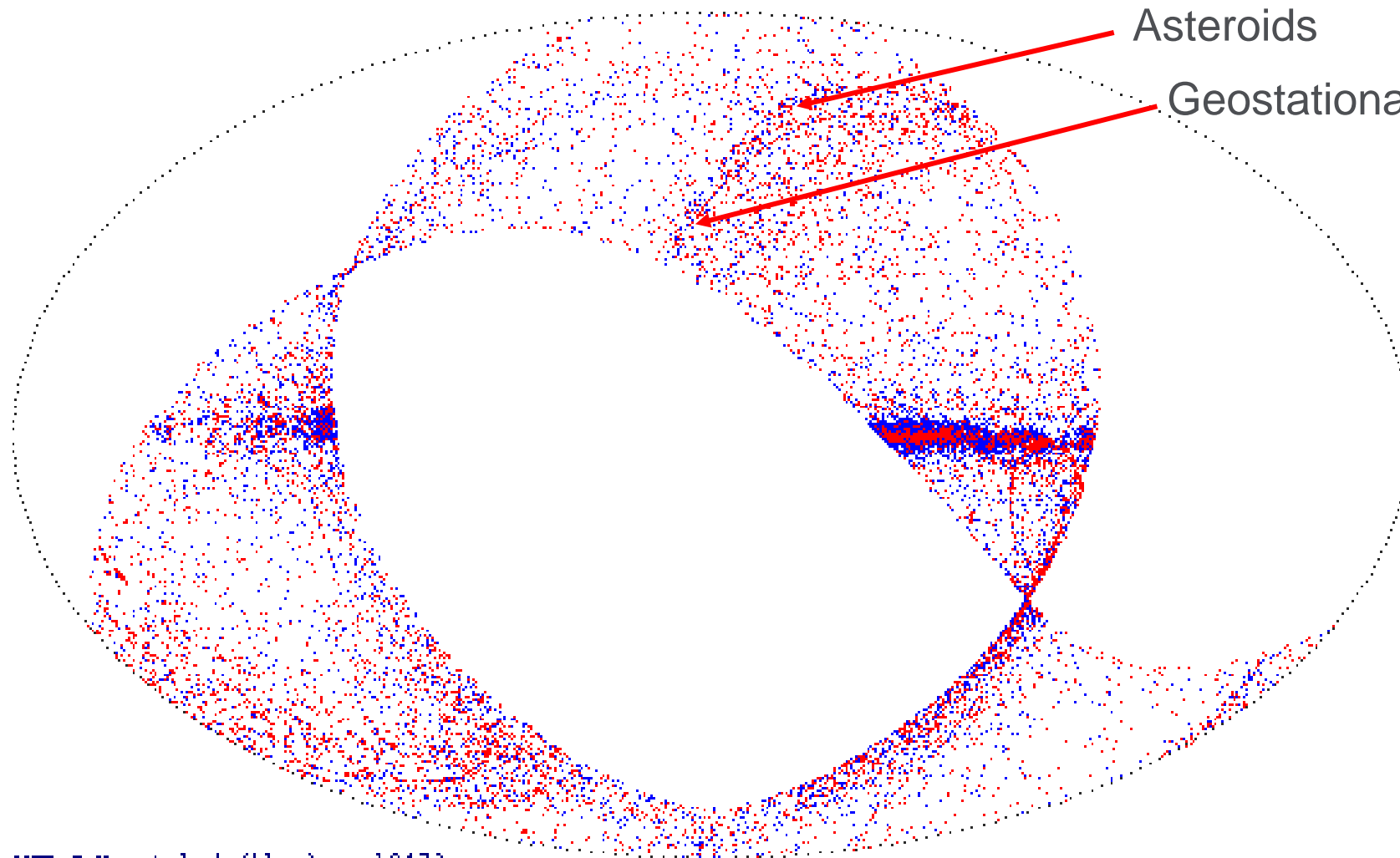


Asteroids

Geostationary satellites

MIR-S Unmatched (blue): 94170
MIR-L Unmatched (red): 33442

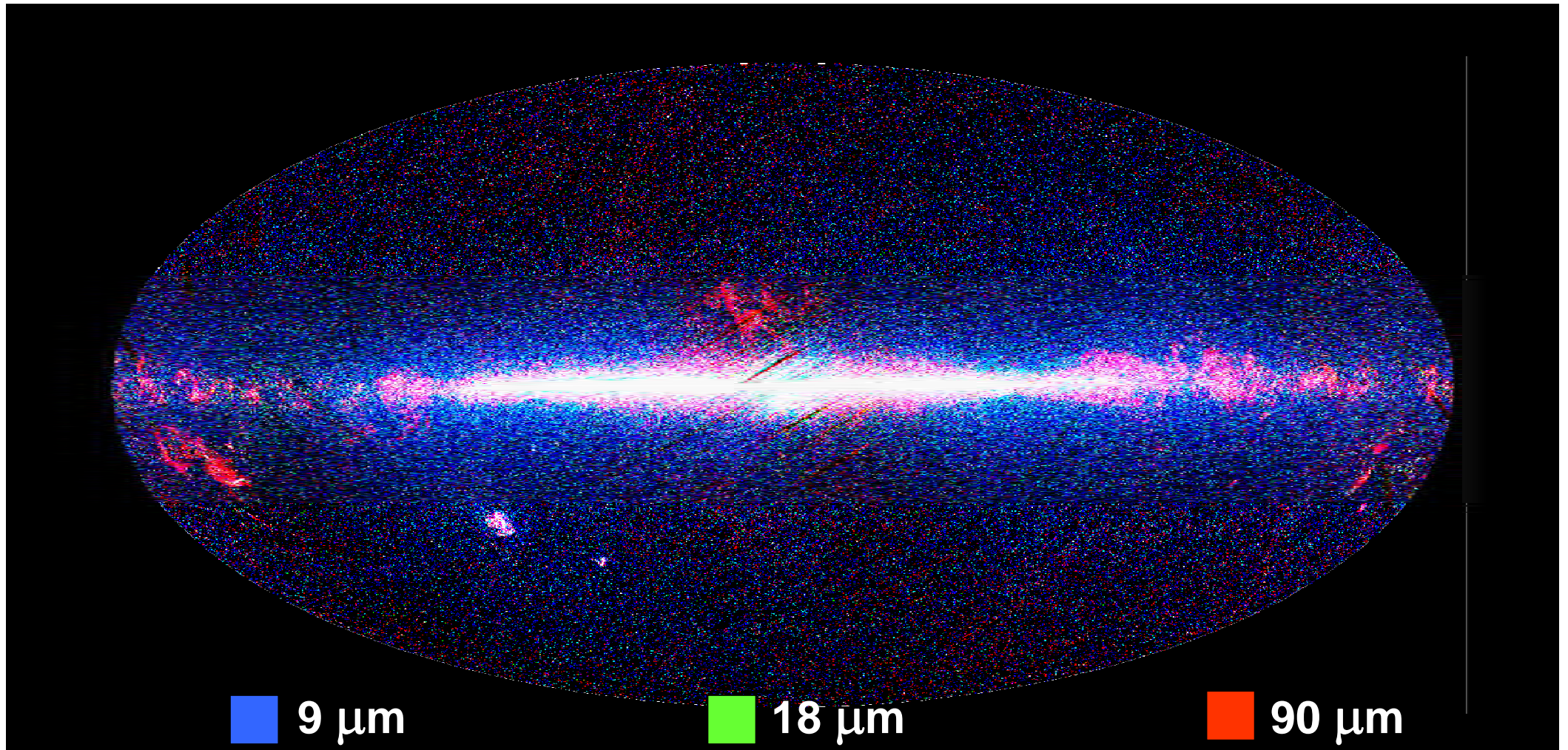
AKARI third scan unmatched: 28954 det.



Asteroids

Geostationary satellites

MIR-S Unmatched (blue): 18473
MIR-L Unmatched (red): 10481



IRC Point Source Catalogue (9,18 μm): 870,973 sources

FIS Bright Source Catalogue (65,90,140,160 μm): 427,071 sources

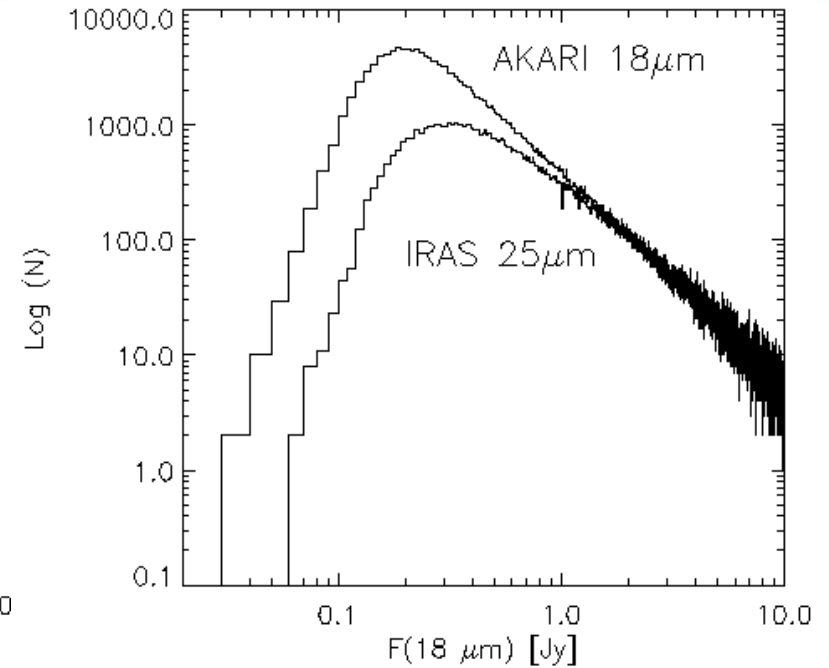
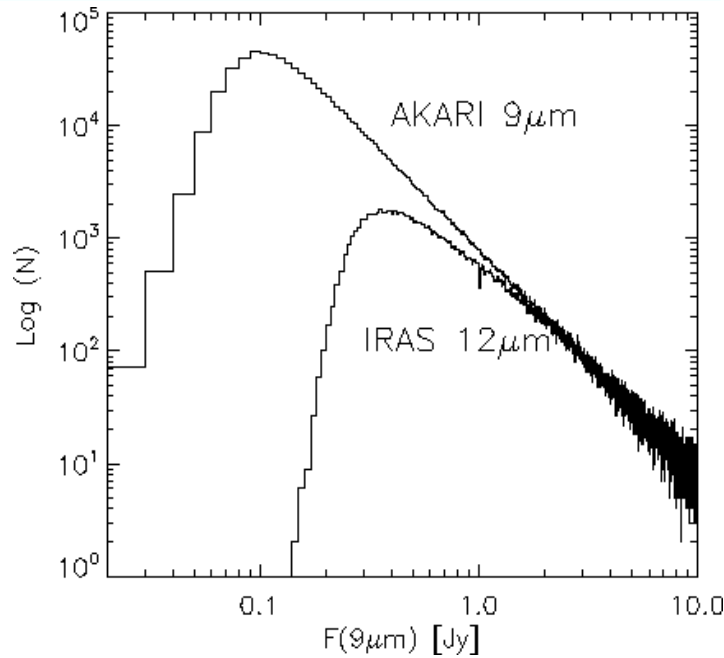
- FIS Catalogue
 - Main output of the AKARI mission
 - Pipeline developed by a consortium including Imperial College University of London, Open University, University of Kent, Sussex University, and SRON-Groningen with University of Groningen and Seoul National University, Korea.

- IRC Catalogue
 - Two MIR bands added later in the development phase
 - Catalogue derivation in the hand of one Japanese post-doc, no public schedule
 - ESAC supported the catalogue production with parallel derivation and validation

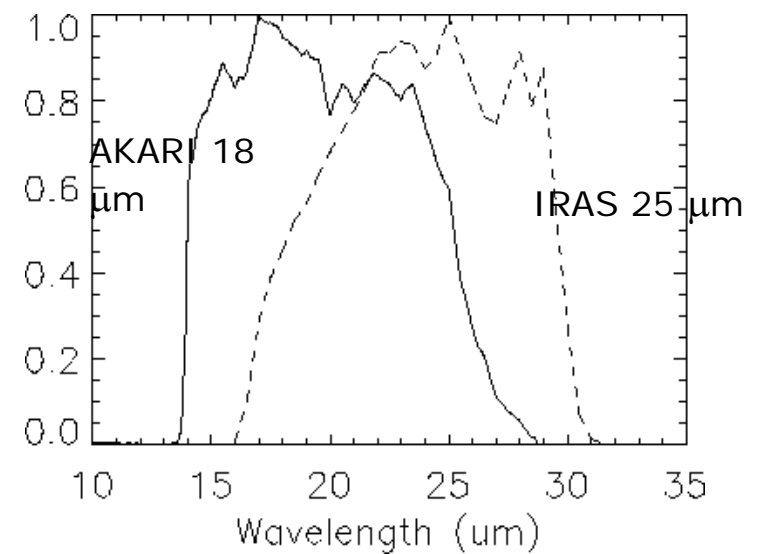
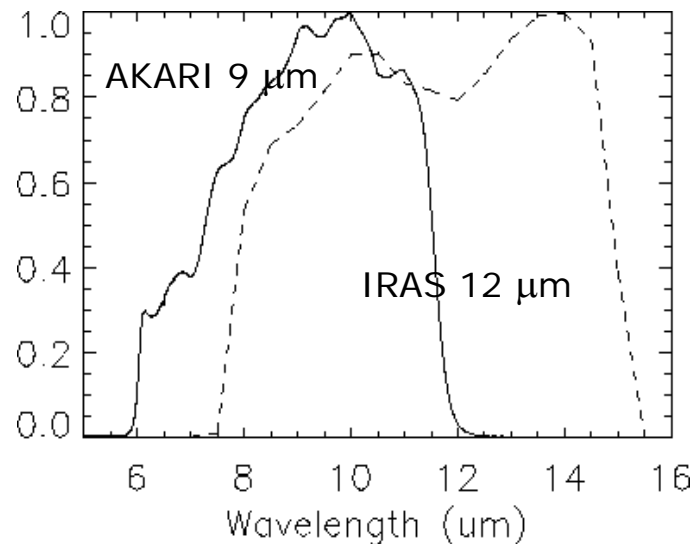
AKARI Survey Catalogues Sensitivities (vs IRAS)



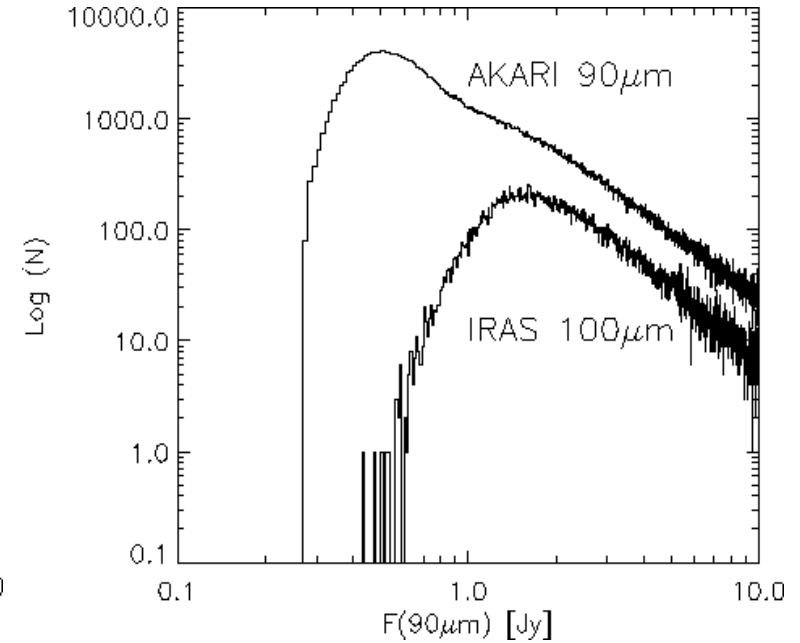
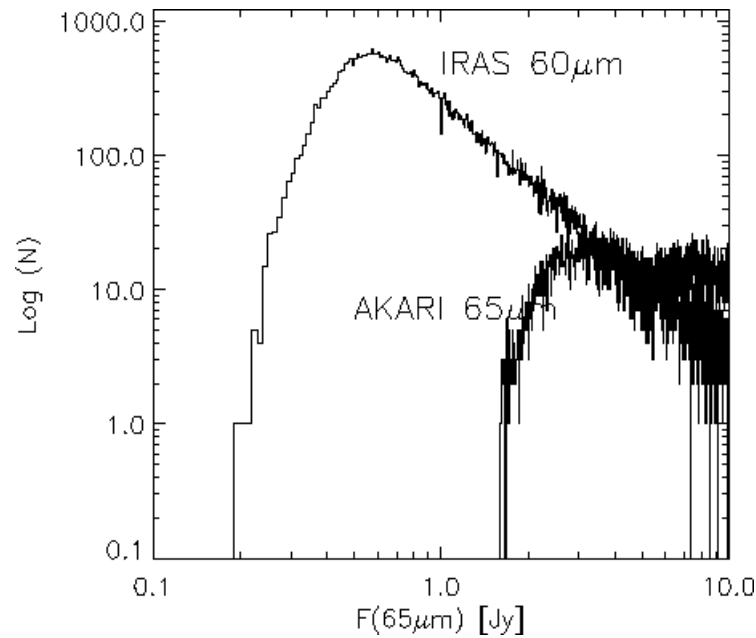
Differential Source counts



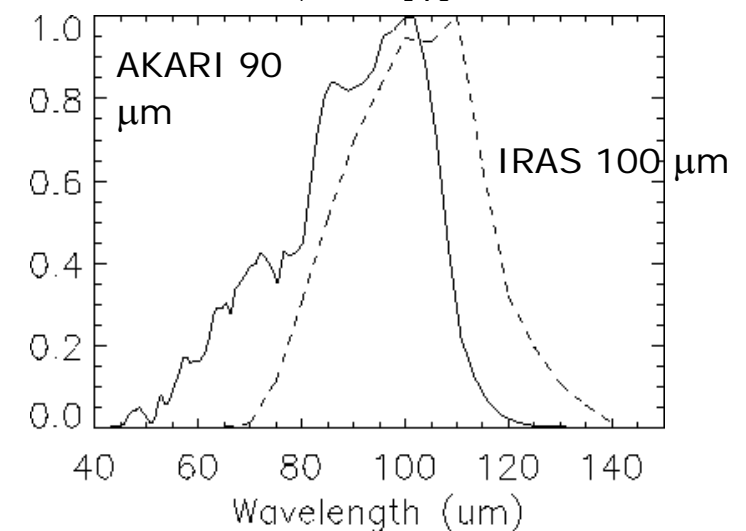
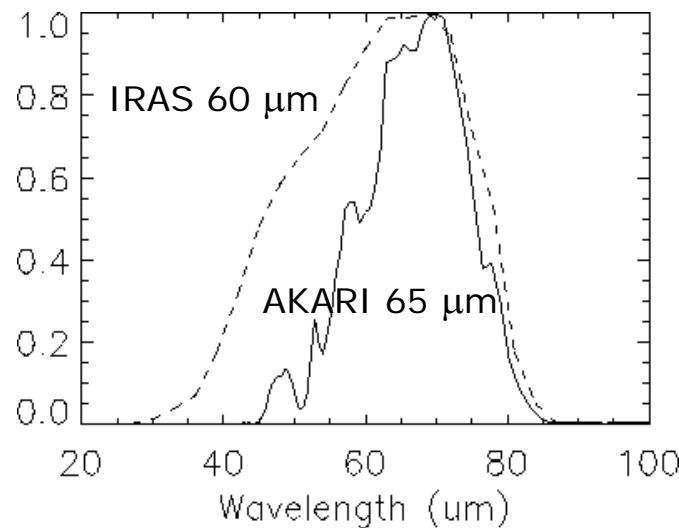
System Transmissions (RSFR)



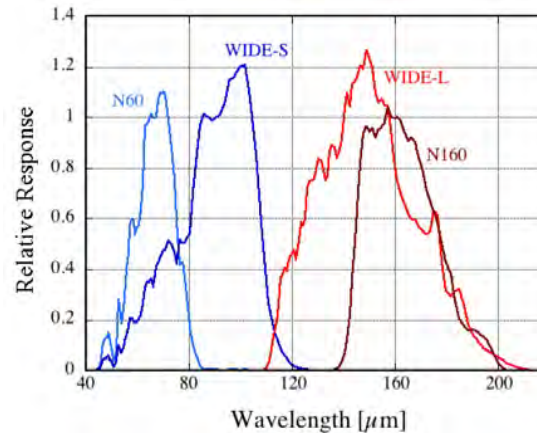
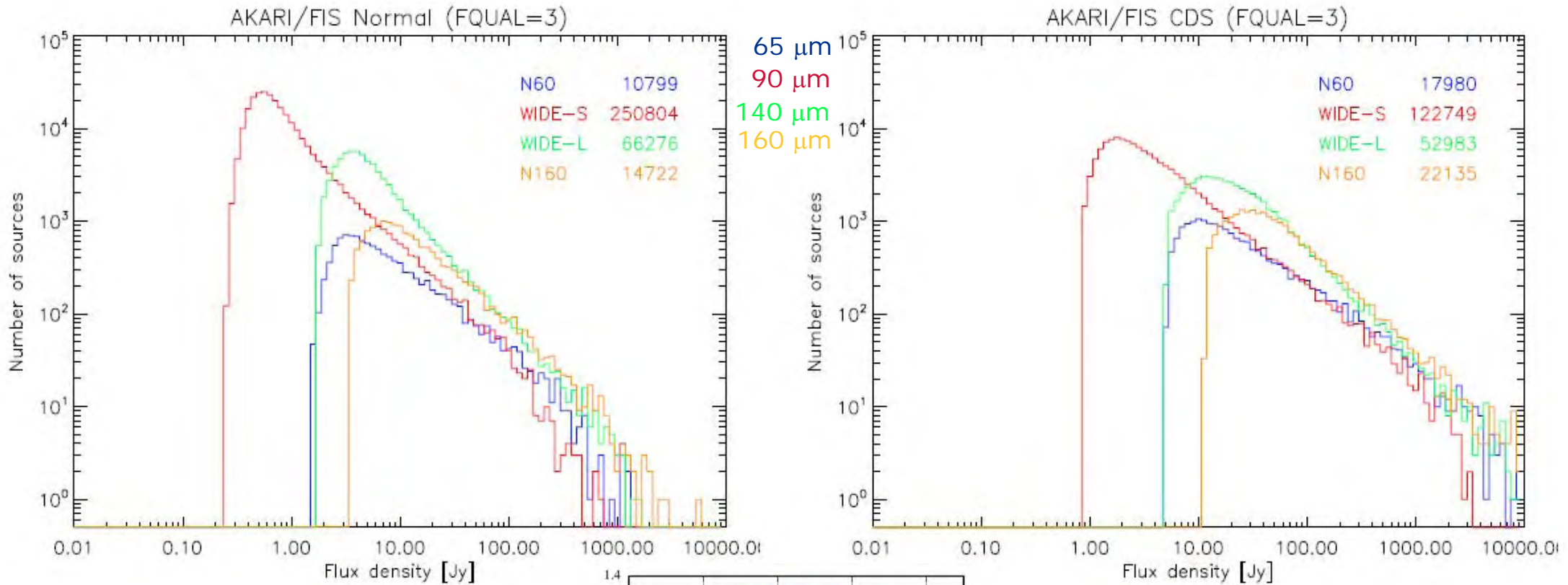
Differential Source counts



System Transmissions (RSFR)



AKARI Survey Catalogues Sensitivities (vs IRAS)



	IRC PSC V1		FIS BSC V1			
Band	9 μm	18 μm	65 μm	90 μm	140 μm	160 μm
Number of sources	844,649	194,551	29,336	373,819	117,994	36,646
	870,973		427,071			
Detection Limit	50 mJy	130 mJy	3.2 Jy	0.55 Jy	3.8 Jy	7.5 Jy
Flux Uncertainty	5~20 %	7~20 %	20 %			
Spatial Resolution	~7 arcsec		~48 arcsec (source extraction)			
Position Uncertainty	1~3 arcsec		~ 6 arcsec			

FIS Bright Source Catalogue: 427.071 sources @ 25, 60, 60 and 160 um

MIR Point Source Catalogue: 870.973 sources @ 9, and 18 um

There are only 24700 common sources within 20"

- The MIR PSC contains mostly "Normal" stars which are not detectable in the FIS survey (they behave approx. as BB and fall below the FIS sensitivity limit)
- The FIS BSC contains very many "Galaxies" and stars with infrared excess.

FIS Bright Source Catalogue V2: Upgraded version
FIS Faint Source Catalogue V1 : Fainter detection limit

Expected in a few months

The ISAS Catalogue server



DARTS/Akari at ISAS/JAXA

Data Archives and Transmission System
DARTS

ASODA ISAS JAXA Google

Astrophysics Solar Physics Solar-Terrestrial Physics Lunar and Planetary Science

AKARI SUZAKU HALCA ASCA IRTS GINGA TENMA JUDO

Instruments
Pointing Data Archives
Observation log
Query
Tables
Data
FTP
HTTP
Catalog Archives (CAS)
Search Tools
Radial Search
Rectangular Search
Object Cross-ID
SQL Search
Command Line Tool
Visual Tools
Explore
Image List
Database Documents
SQL Schema
Tables
Views
Functions
Help
SQL Tutorial
SQL General Reference
Query Limits
Web API
Data Archives (DAS)
Links
JUDO

Radial Search

This page provides an easy interface to search FIS or IRC objects within a radius(arcmins) of a point. The point (lon,lat) can be set by J2000, B1950, Ecliptic or Galactic coordinates.

Coordinate conditions:

<input type="radio"/> Coordinate	longitude* [deg or 'hh:mm:ss.ss]	266.0
	latitude* [deg or '[-]dd:mm:ss.ss]	-28.0
<input type="radio"/> Object Name	Name to identify by SIMBAD(e.g., M101, NGC4900, etc.)	
Radius	10	arcmins

* '[z]12:34.56', '[z]12 34 56.78' and '[z]12 34.56' styles are also allowed.

Instruments and Quality:

	Enable?	Min		Max
<input type="radio"/> FIS	<input type="checkbox"/>	3	fQual_65	3
	<input type="checkbox"/>	3	fQual_90	3
	<input type="checkbox"/>	3	fQual_140	3
	<input type="checkbox"/>	3	fQual_160	3
<input type="radio"/> IRC				

Note: Qualities are connected by 'AND'.

Database: EDR2 (FIS-b2.0 irc-b1.0.z) Columns: all digest Rows: all max 10

Format: HTML TEXT delimiter: newline: LF reset submit

You can select version of FIS and IRC catalogs by Database selector. Default setting is for latest version of catalog set.

A table [FisObjALL, IrcObjALL] or a view [IrcObj, IrcObj] is selected, when you select 'all' or 'digest' on the Columns section, respectively. Distance column is appended to selected columns.

This SQL call is equivalent to using this page with a default setting:

```
SELECT o.*, n.distance
FROM fGetNearbyObjCel('Fis', 'j2000', 266.0, -28.0, 10) n, FisObj o
WHERE n.objID = o.objID AND
0 <= o.fQual_65 AND o.fQual_65 <= 3 AND
0 <= o.fQual_90 AND o.fQual_90 <= 3 AND
0 <= o.fQual_140 AND o.fQual_140 <= 3 AND
0 <= o.fQual_160 AND o.fQual_160 <= 3
ORDER BY n.distance
LIMIT 10
```

There are also functions for B1950, Ecliptic and Galactic coordinates. SQL functions page describes them. For the selections with more complex conditions, use SQL Search page.

See the SQL schema page to find out more about structure or function of the SQL.

Send questions or comments to "darts-admin AT ML.isas.jaxa.jp".
DARTS is maintained by C-SODA (former PLAIN center) at ISAS, JAXA in Japan.
Last Modified: Friday, 11-Dec-2009 00:33:18 JST

DARTS/Akari at ISAS/JAXA

AKARI-FIS-b2.0 J1208113+025244 Shrink Enlarge AKARI-CAS Explore Tool

Database=EDR2, Instrument=FIS, objID=2080170
Requested coordinate: Lon=182.0450708, Lat=2.8797240 (J2000)

ra	182.04711396 [12:08:11.31]	dec	2.87884015 [+02:52:43.8]
ra1950	181.40690347 [12:05:37.66]	dec1950	3.15710646 [+03:09:25.6]
lambda	180.73211670 [12:02:55.71]	beta	3.45536160 [+03:27:19.3]
l	277.97755824 [18:31:54.61]	b	63.63536744 [+63:38:07.3]

var 0 extended 0
nNeighbours 1 cirrus 0

FIS image Under construction
IRC image Under construction
Optical image (SDSS)

SkyView IRIS (100μ,60μ,25μ) SkyView 2MASS (K,H,J) SkyView DSS2 (R,R,B)

Zoom: Image scale: 1.0 "/pix Draw grid Invert image update

flux_65	flux_90	flux_140	flux_160
4.55963	6.36688	6.82651	4.61554
fErr_65	fErr_90	fErr_140	fErr_160
0	0	0	0
fQual_65	fQual_90	fQual_140	fQual_160
3	3	3	1
flags_65	flags_90	flags_140	flags_160
0	0	0	0
nScanC_65	nScanC_90	nScanC_140	nScanC_160
4	4	6	4
nScanP_65	nScanP_90	nScanP_140	nScanP_160
4	4	7	6

Search other catalogs on the CAS database

FIS	IRC
-----	-----

External links

SDSS search	NED search	SIMBAD search	ADS search
SkyView DSS	SkyView DSS1 Blue	SkyView DSS1 Red	

Input form:

Database: EDR2
Instrument: FIS
Search radius: 1.0 arcmins
Coordinate system: J2000
Longitude [deg or 'hh:mm:ss.ss']
Latitude [deg or '[-]dd:mm:ss.ss']
Name to identify by SIMBAD (e.g., M101, NGC4900, etc.)
ObjID:
submit

You can select version of FIS and IRC catalogs by Database selector.

Optical image is provided by SDSS SkyServer of the SDSS project.

SkyView has been developed by HEASARC at the NASA / GSEC Astrophysics Science Division.

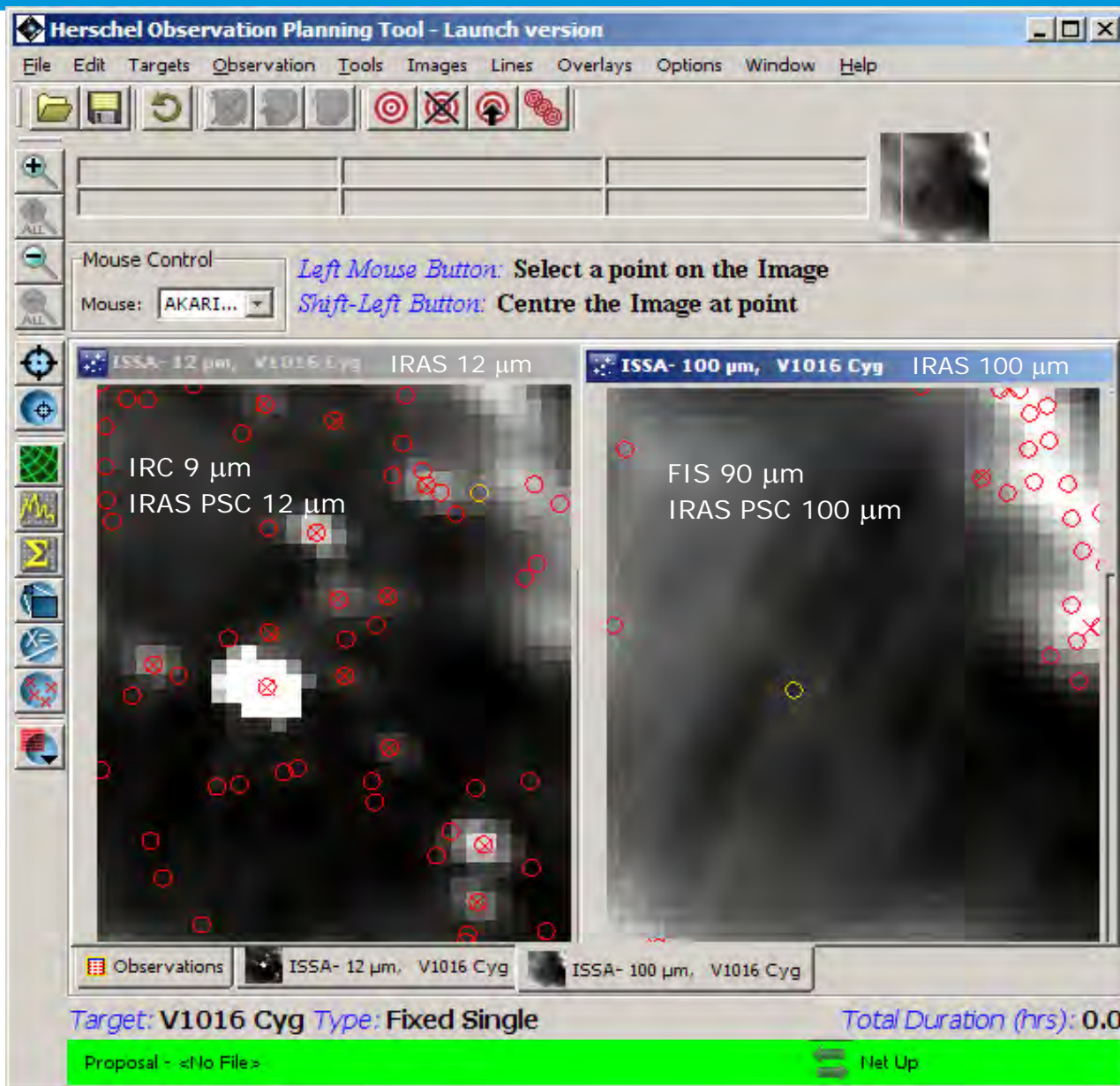
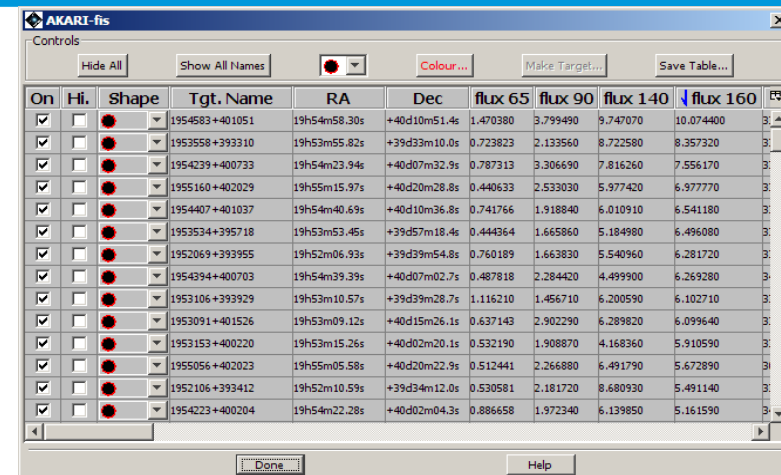
The Catalogues are in Vizier, Aladin, Topcat...



The screenshot displays the Vizier web interface in a Mozilla Firefox browser. The main window shows the 'Catalogue Selection Page' with a search bar and various options. The 'Query Setup' section includes fields for 'Maximum Entries per table' (set to 50), 'Output layout' (HTML Table), and 'Output Order'. The 'Query by Position on the Sky' section has fields for 'Target Name' (resolved by Simbad) and 'Position' (J2000), with a 'Submit Query' button. The 'Output preferences for Position' section includes checkboxes for 'Compute' and 'Sort by'. The 'Query by Constraints applied on Columns' section shows a table with columns for 'Show', 'Sort', 'Column', 'Clear', 'Constraint', and 'Explain (UCD)'. The table lists constraints for 'objID', 'objName', and 'S65'. The 'Spherical Plot' window shows a 3D visualization of the data points on a sphere, with a red shaded region. The 'Row Subsets' window shows a list of subsets, including 'V1.fits'.

Show	Sort	Column	Clear	Constraint	Explain (UCD)
<input type="checkbox"/>	<input type="radio"/>	objID	<input type="text"/>		[3000001/3427071] Object ID (meta.id) (ID_NUMBER)
<input checked="" type="checkbox"/>	<input type="radio"/>	objName	<input type="text"/>	(char)	AKARI source name (HHMMSSs+DDMMSS) (Note 2) (meta.id;meta.main) (ID_MAIN:1)
<input checked="" type="checkbox"/>	<input type="radio"/>	S65	<input type="text"/>	Jy	(^(a)) Flux density in N60 (Note 1) (phot.flux.density;em IR 30-60um) (PHOT_FLUX_IR_60)

Catalogues in HSPOT

On	Hi.	Shape	Tgt. Name	RA	Dec	flux 65	flux 90	flux 140	flux 160
<input checked="" type="checkbox"/>	<input type="checkbox"/>	●	1954583+401051	19h54m58.30s	+40d10m51.4s	1.470380	3.799490	9.747070	10.074400
<input checked="" type="checkbox"/>	<input type="checkbox"/>	●	1953558+393310	19h53m55.82s	+39d33m10.0s	0.723823	2.133560	8.722580	8.357320
<input checked="" type="checkbox"/>	<input type="checkbox"/>	●	1954239+400733	19h54m23.94s	+40d07m32.9s	0.787313	3.306690	7.816260	7.556170
<input checked="" type="checkbox"/>	<input type="checkbox"/>	●	1955160+402029	19h55m15.97s	+40d20m28.8s	0.440633	2.533030	5.977420	6.977770
<input checked="" type="checkbox"/>	<input type="checkbox"/>	●	1954407+401037	19h54m40.69s	+40d10m36.8s	0.741766	1.918840	6.010910	6.541180
<input checked="" type="checkbox"/>	<input type="checkbox"/>	●	1953534+395718	19h53m53.45s	+39d57m18.4s	0.444364	1.665960	5.184980	6.496080
<input checked="" type="checkbox"/>	<input type="checkbox"/>	●	1952069+393955	19h52m06.93s	+39d39m54.8s	0.760189	1.663830	5.540960	6.281720
<input checked="" type="checkbox"/>	<input type="checkbox"/>	●	1954394+400703	19h54m39.39s	+40d07m02.7s	0.487818	2.284420	4.499900	6.269280
<input checked="" type="checkbox"/>	<input type="checkbox"/>	●	1953106+393929	19h53m10.57s	+39d39m28.7s	1.116210	1.456710	6.200590	6.102710
<input checked="" type="checkbox"/>	<input type="checkbox"/>	●	1953091+401526	19h53m09.12s	+40d15m26.1s	0.637143	2.902290	6.289820	6.099640
<input checked="" type="checkbox"/>	<input type="checkbox"/>	●	1953153+400220	19h53m15.26s	+40d02m20.1s	0.532190	1.908870	4.168360	5.910590
<input checked="" type="checkbox"/>	<input type="checkbox"/>	●	1955056+402023	19h55m05.58s	+40d20m22.9s	0.512441	2.266880	6.491790	5.672890
<input checked="" type="checkbox"/>	<input type="checkbox"/>	●	1952106+393412	19h52m10.59s	+39d34m12.0s	0.530581	2.181720	8.680930	5.491140
<input checked="" type="checkbox"/>	<input type="checkbox"/>	●	1954223+400204	19h54m22.28s	+40d02m04.3s	0.886658	1.972340	6.139850	5.161590

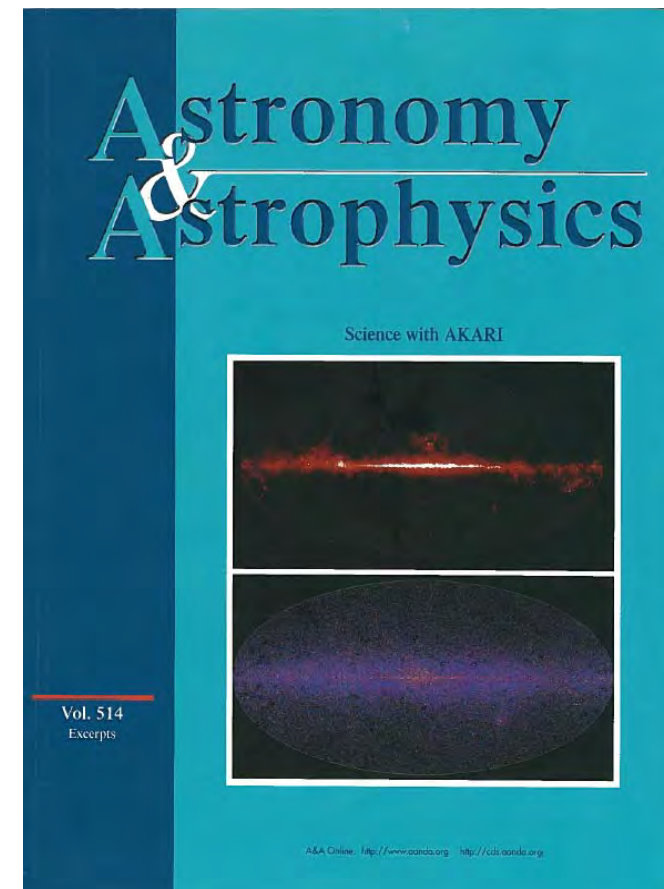
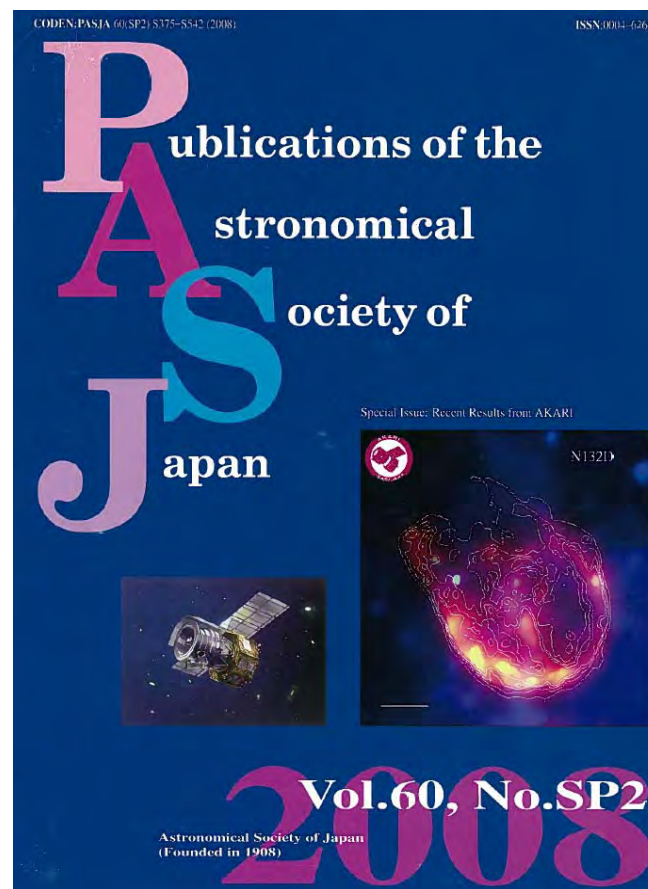
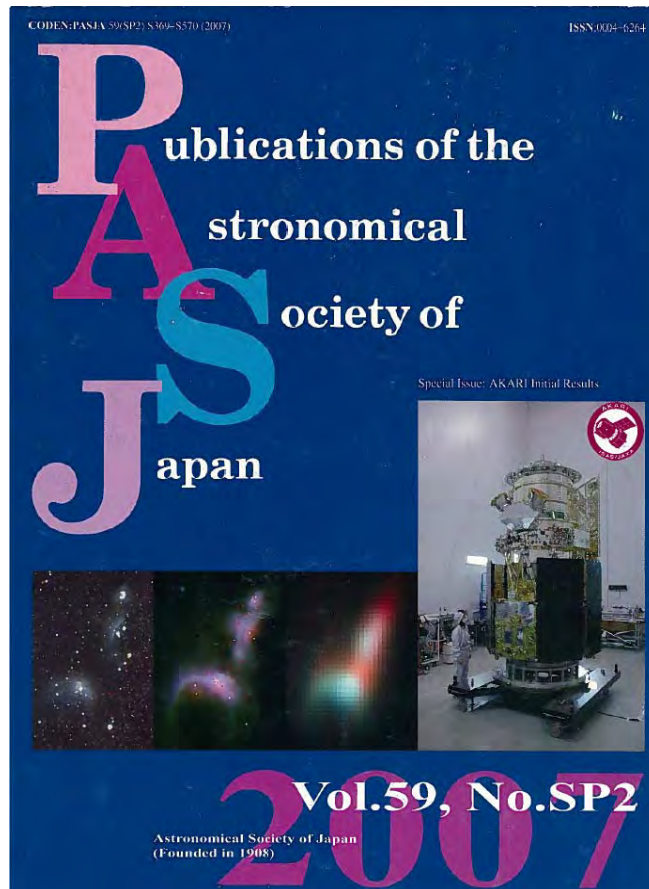
○ : AKARI
 X : IRAS PSC
 sources overlaid
 on IRAS/ISSA
 images

AKARI refereed publications



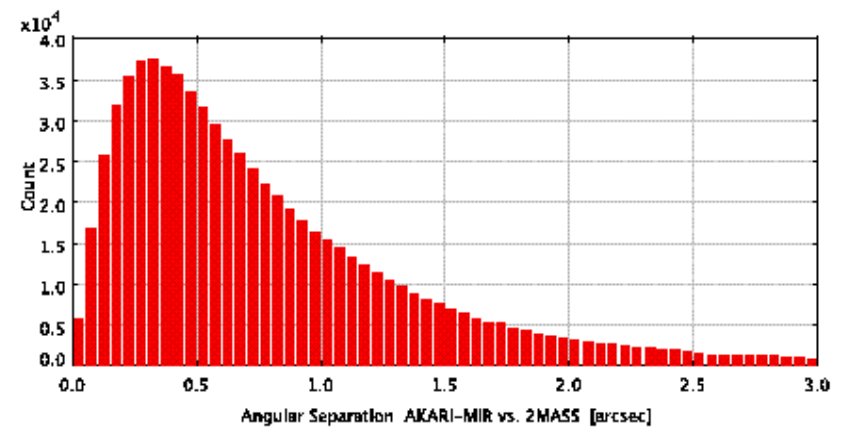
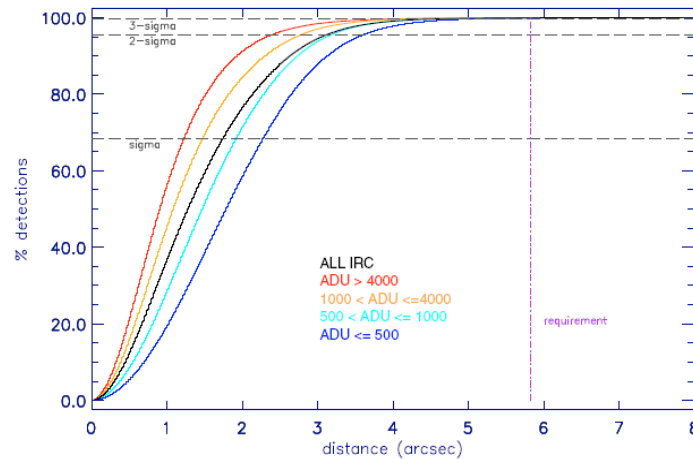
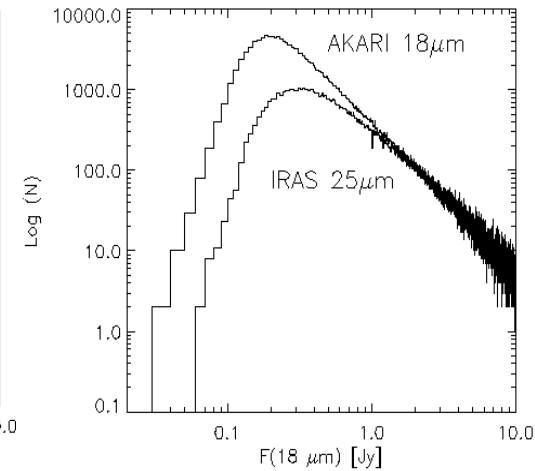
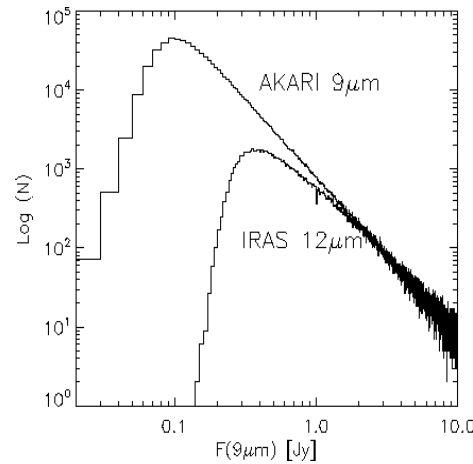
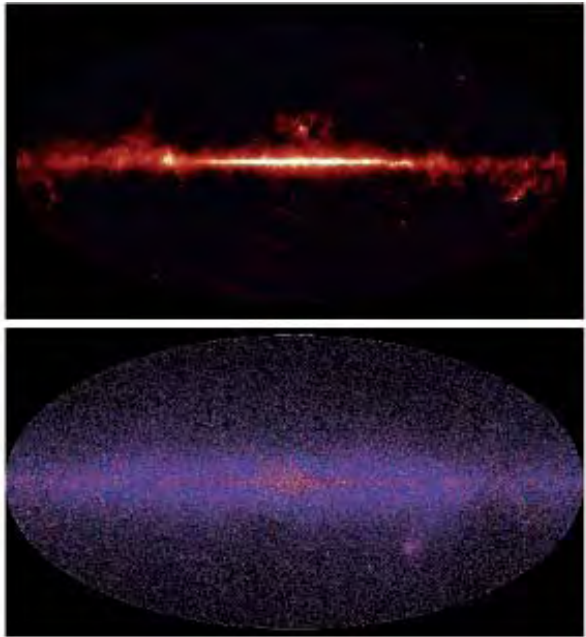
- About 100 papers in total, 24% with European participation
- 2 PASJ Special Issues, 1 A&A Special Issue

May 2010



The AKARI/IRC mid-infrared all-sky survey*

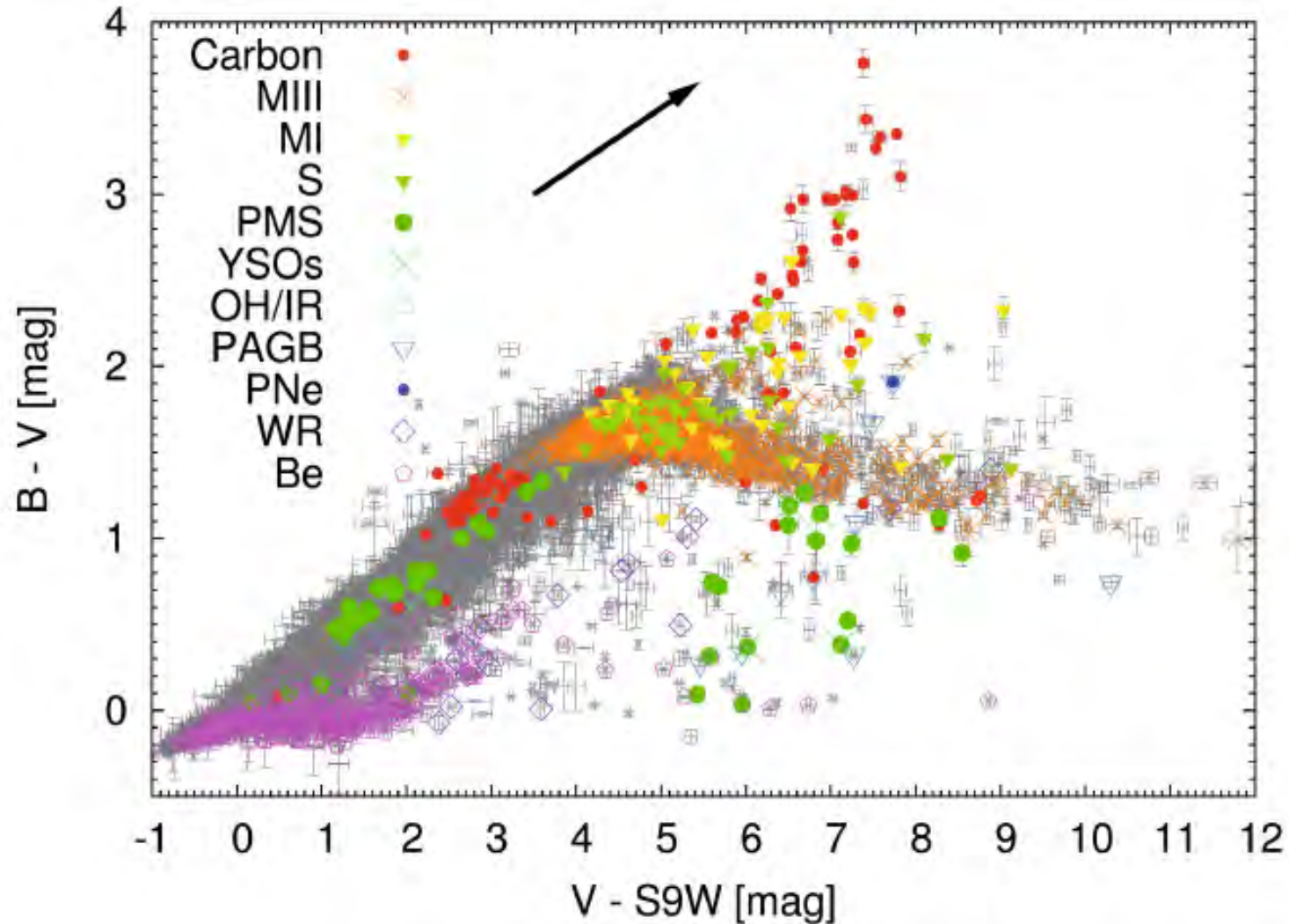
D. Ishihara^{1,2}, T. Onaka², H. Kataza³, A. Salama⁴, C. Alfageme^{4,***}, A. Cassatella^{4,5,6}, N. Cox^{4,****}, P. García-Lario⁴,
 C. Stephenson^{4,†}, M. Cohen⁷, N. Fujishiro^{3,8,‡}, H. Fujiwara², S. Hasegawa³, Y. Ita⁹, W. Kim^{3,2,§}, H. Matsuhara³,
 H. Murakami³, T. G. Müller¹⁰, T. Nakagawa³, Y. Ohyama¹¹, S. Oyabu³, J. Pyo¹², I. Sakon², H. Shibai¹³, S. Takita³,
 T. Tanabé¹⁴, K. Uemizu³, M. Ueno³, F. Usui³, T. Wada³, H. Watarai¹⁵, I. Yamamura³, and C. Yamauchi³



AKARI's infrared view on nearby stars

Using AKARI infrared camera all-sky survey, 2MASS, and Hipparcos catalogs*

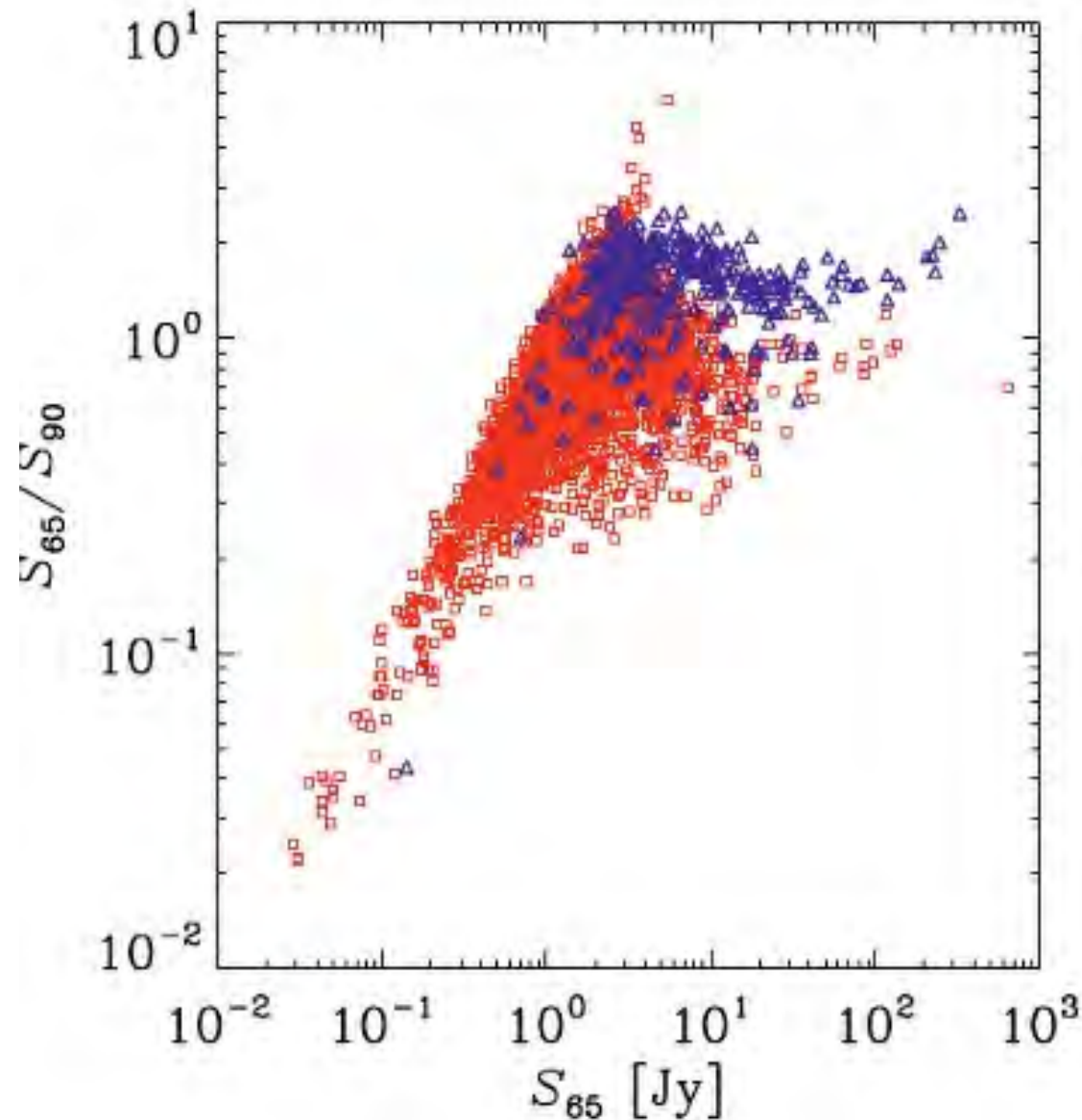
Y. Ita^{1,2}, M. Matsuura^{3,4}, D. Ishihara⁵, S. Oyabu², S. Takita², H. Kataza², I. Yamamura², N. Matsunaga⁶, T. Tanabe⁶,
Y. Nakada⁶, H. Fujiwara⁷, T. Wada², T. Onaka⁷, and H. Matsuhara²



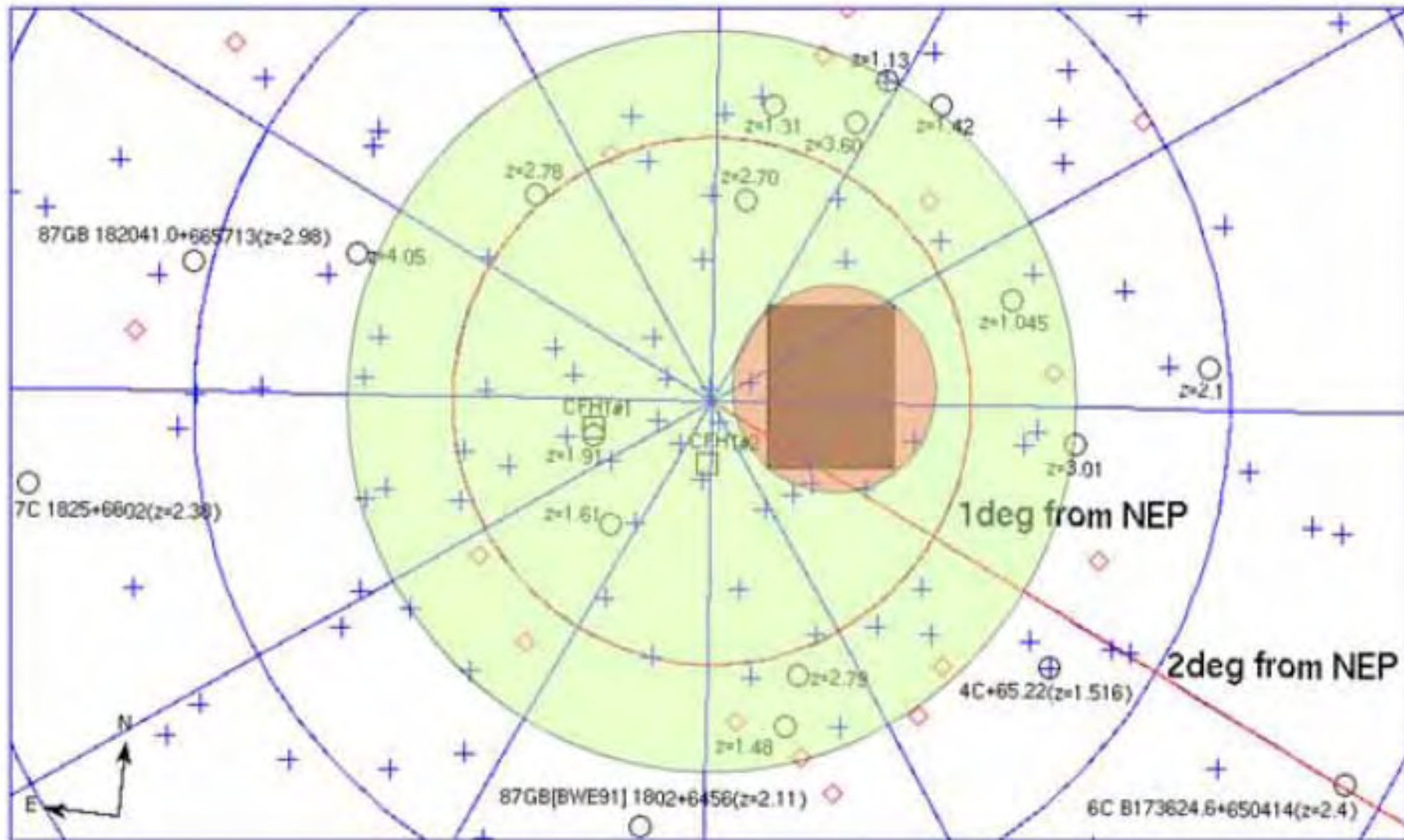
Star-galaxy separation by far-infrared color-color diagrams for the AKARI FIS all-sky survey (bright source catalog version $\beta-1$)^{*,**}



A. Pollo^{1,2}, P. Rybka², and T. T. Takeuchi³



THE NEP Deep Surveys

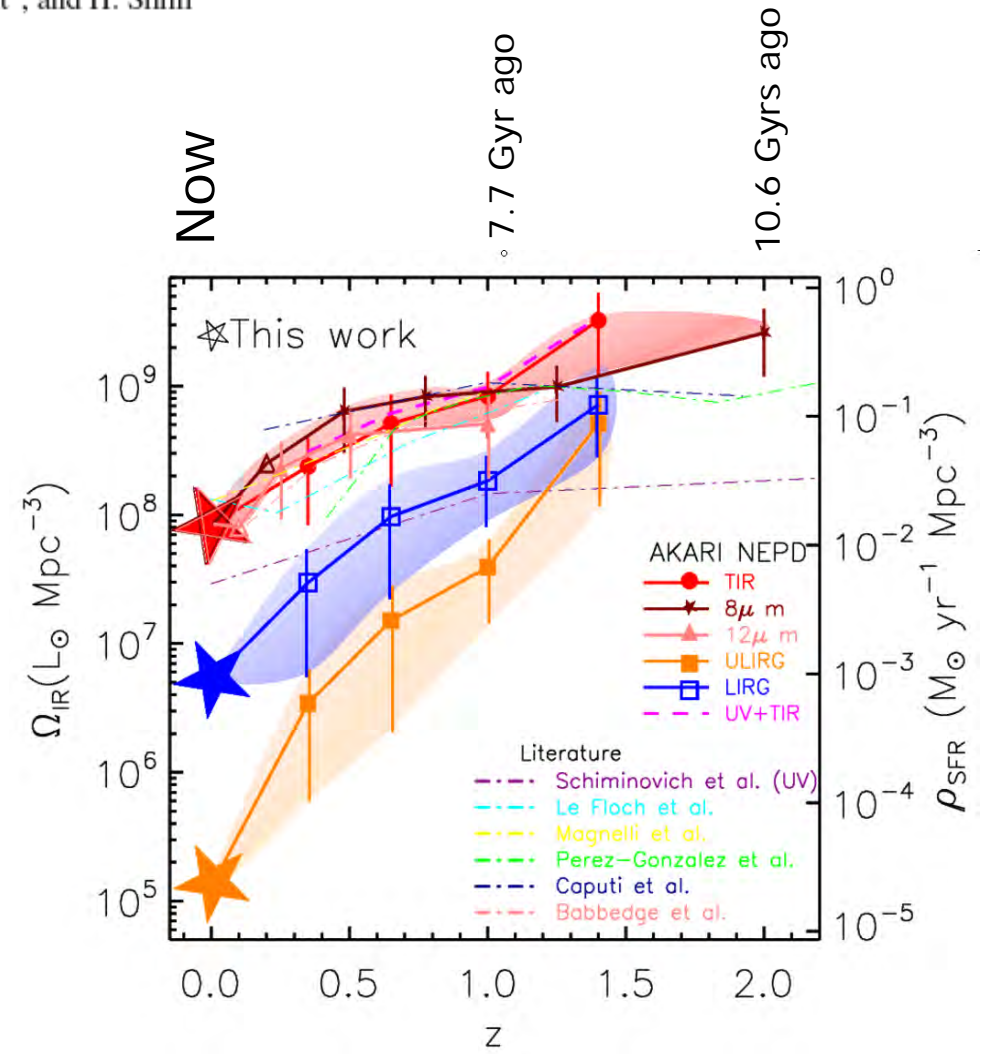
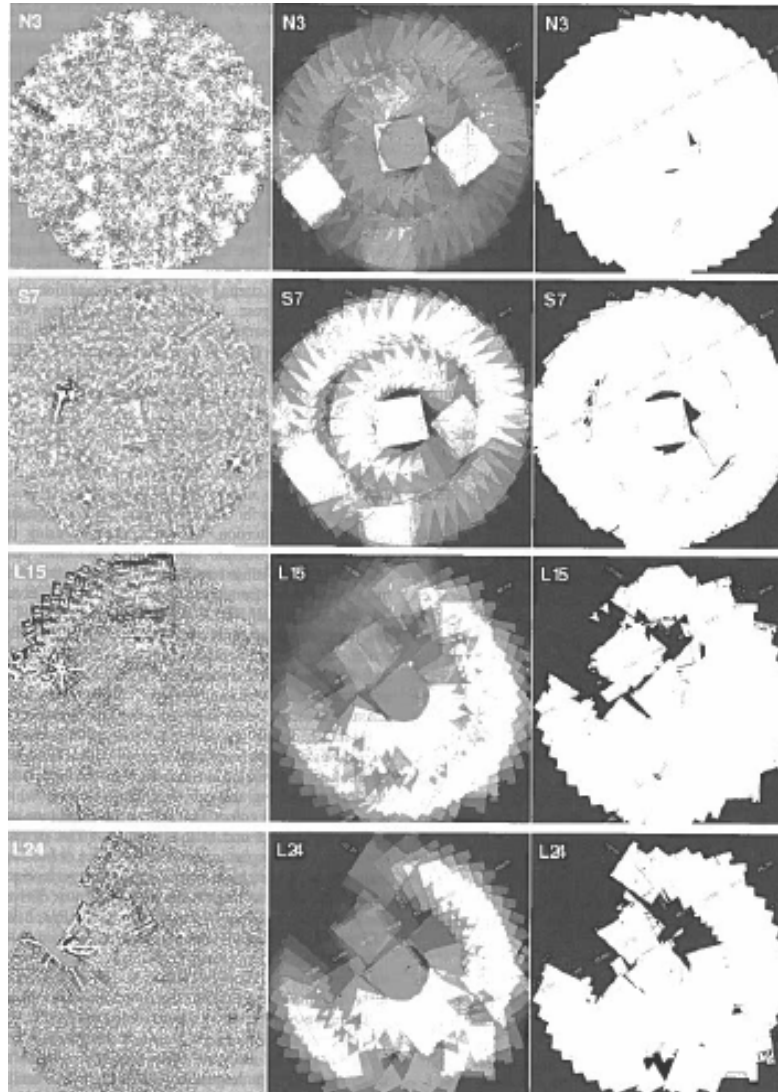


Evolution of infrared luminosity functions of galaxies in the AKARI NEP-deep field



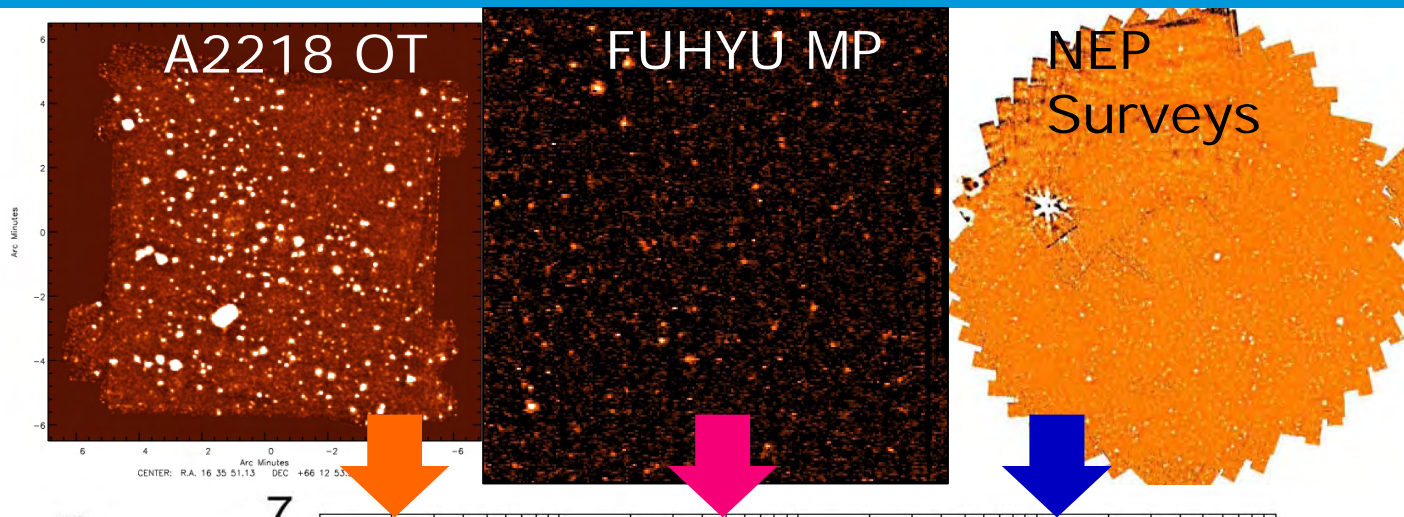
Revealing the cosmic star formation history hidden by dust^{*,**}

T. Goto^{1,2,***}, T. Takagi³, H. Matsuhara³, T. T. Takeuchi⁴, C. Pearson^{5,6,7}, T. Wada³, T. Nakagawa³, O. Ilbert⁸, E. Le Floch⁹, S. Oyabu³, Y. Ohyama¹⁰, M. Malkan¹¹, H. M. Lee¹², M. G. Lee¹², H. Inami^{3,13,14}, N. Hwang², H. Hanami¹⁵, M. Im¹², K. Imai¹⁶, T. Ishigaki¹⁷, S. Serjeant⁷, and H. Shim¹²



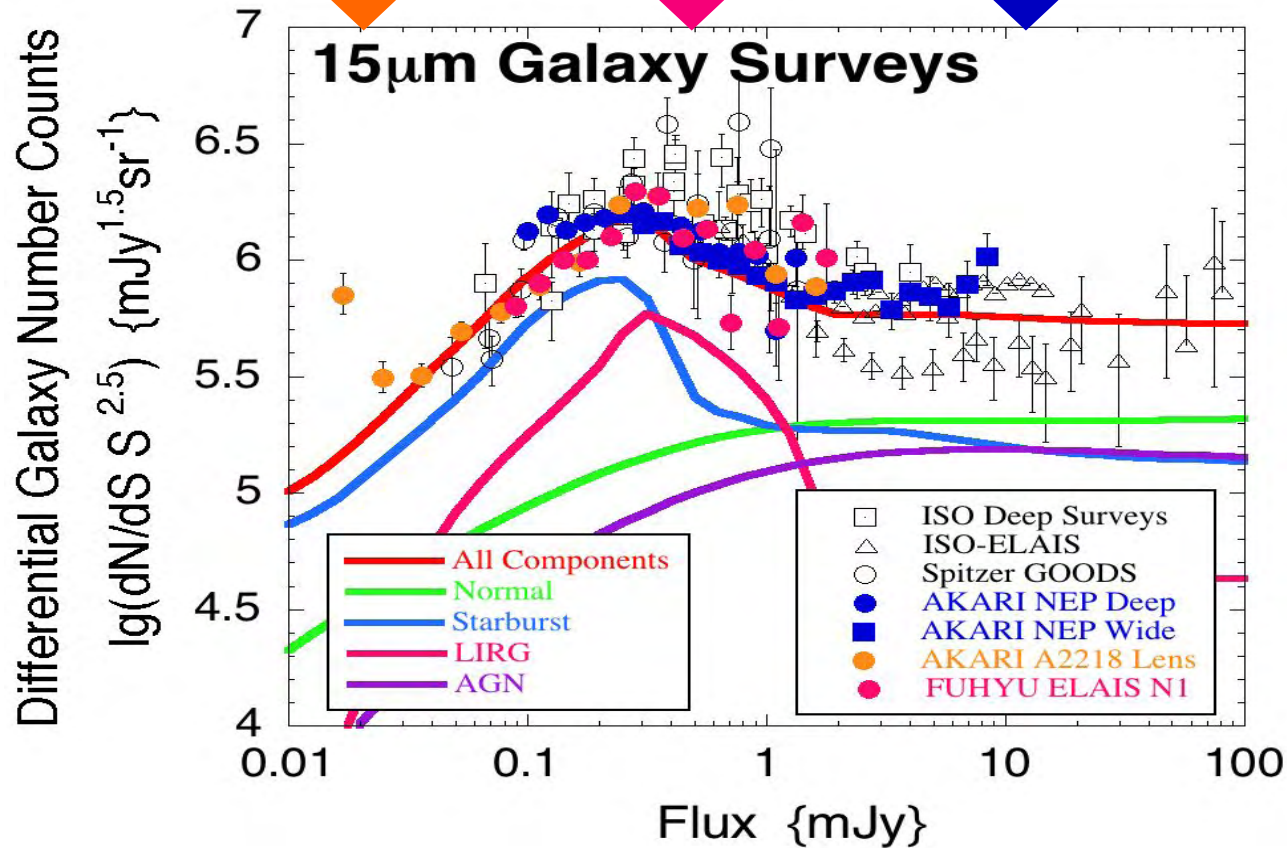
Source counts at 15 microns from the AKARI NEP survey

C. P. Pearson^{1,2,7}, S. Oyabu³, T. Wada³, H. Matsuhara³, H. M. Lee⁴, S. J. Kim⁴, T. Takagi³, T. Goto^{5,6}, M. S. Im⁴, S. Serjeant⁷, M. G. Lee⁴, J. W. Ko⁴, G. J. White⁷, and O. Ohyama⁸



Source counts in 15 micron band

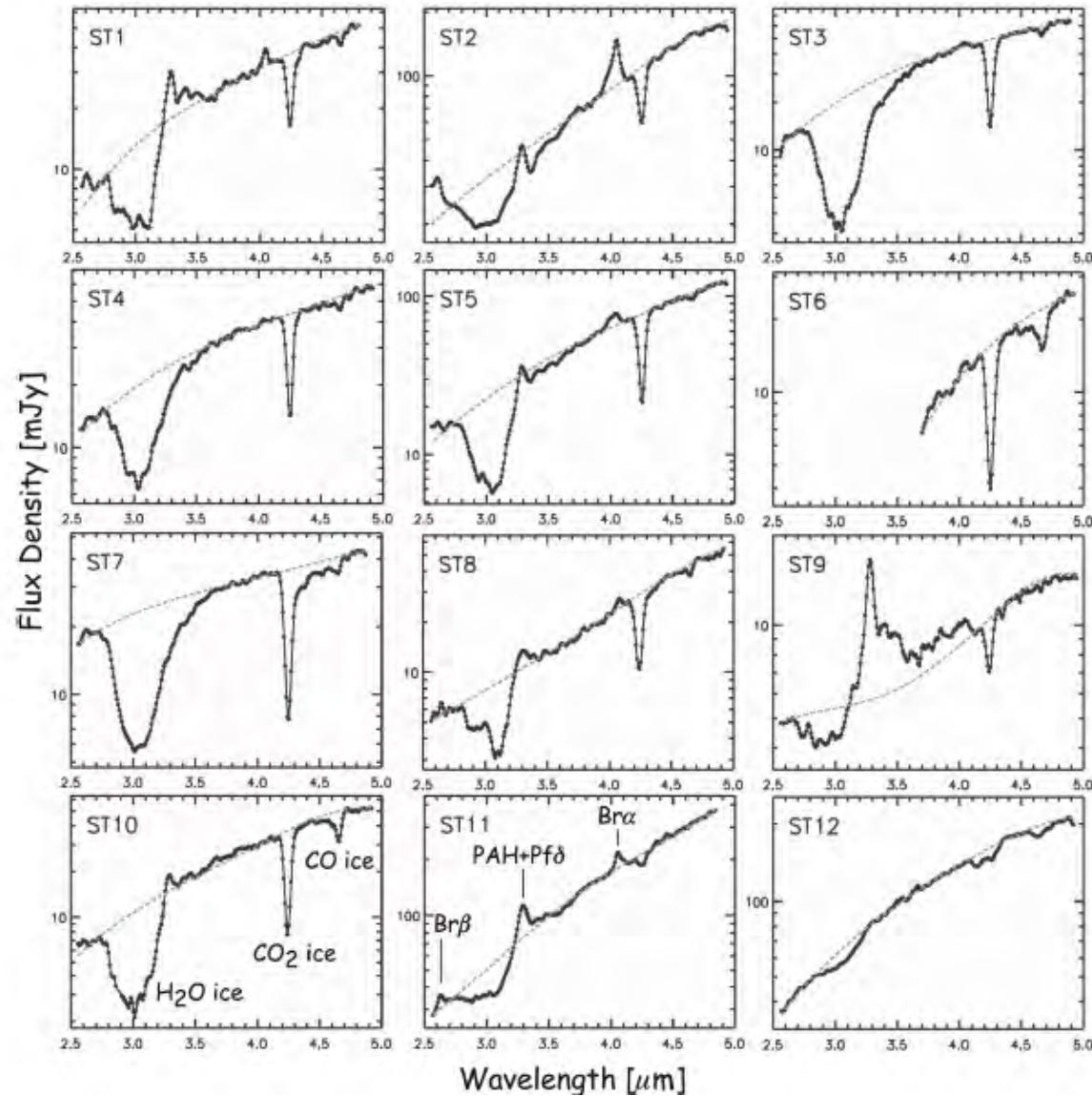
- Exhibit strong evolution
- Agree with ISO, Spitzer
- Extends previous counts to both brighter and fainter flux levels



AKARI galaxy counts point to the emergence of a population of luminous infrared galaxies that dominate the galaxy counts & star formation history of the Universe at faint flux levels

Spectroscopic observations of ices around embedded young stellar objects in the Large Magellanic Cloud with AKARI

T. Shimonishi¹, T. Onaka¹, D. Kato¹, I. Sakon¹, Y. Ita², A. Kawamura³, and H. Kaneda³



Large-scale distributions of mid- and far-infrared emission from the center to the halo of M 82 revealed with AKARI

H. Kaneda¹, D. Ishihara¹, T. Suzuki², N. Ikeda³, T. Onaka⁴, M. Yamagishi¹, Y. Ohyama⁵, T. Wada³, and A. Yasuda¹



A&A 514, A14 (2010)

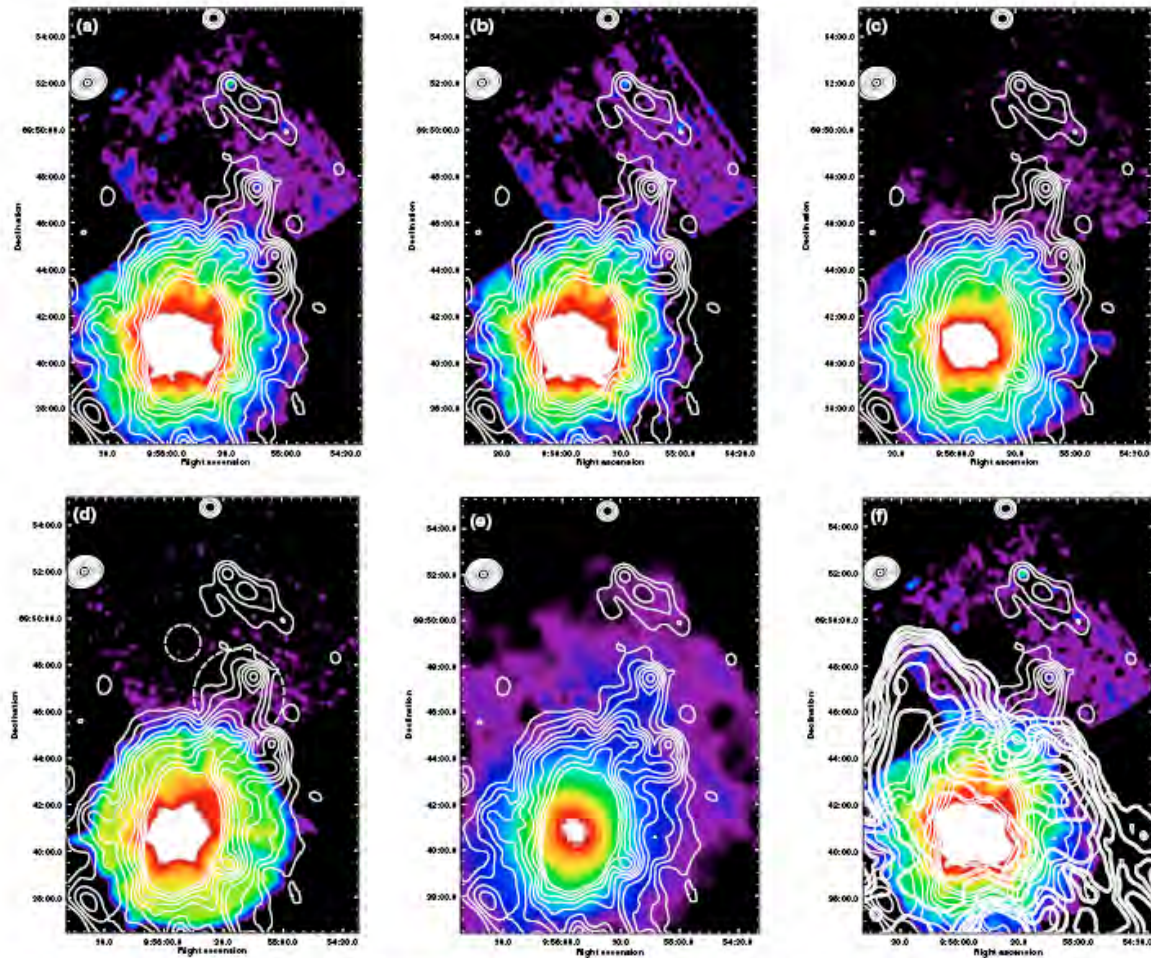


Fig. 3. Low-level MIR and FIR images of M 82 including the Cap region in the a) *S*7, b) *S*11, c) *L*15, d) *L*24, e) *N*160 bands, overlaid on the XMM/Newton X-ray (0.2–10 keV) contour map on a logarithmic scale. f) The HI contour map of M 82 in the thick lines, taken from Yun et al. (1994), is superposed on the panel a) image. The color scales of the MIR and FIR images are logarithmically scaled from 0.2% to 0.0007% of the peak surface brightness for all the panels except e) and from 80% to 0.1% for the panel e). The two circular apertures are shown in panel d), where the larger one is used to obtain the flux densities from the halo ($d \leq 4'$) regions and the smaller one to estimate the background level and its fluctuation from the darkest nearby blank sky.



Distribution of dust and PAHs

Nick Cox,¹ Arturo Manchado,^{2,3} Pedro García-Lario,¹ Ryszard Szczerba⁴

- study of all known Galactic PNe
- SEDs provide information on cold dust

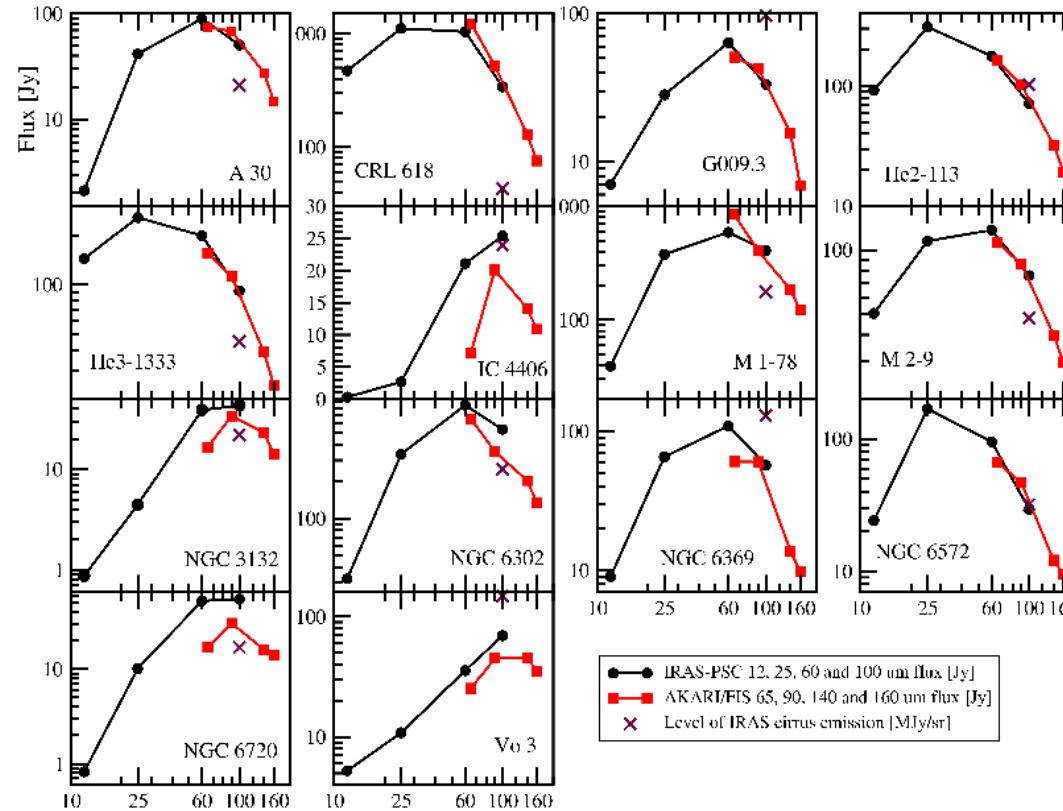
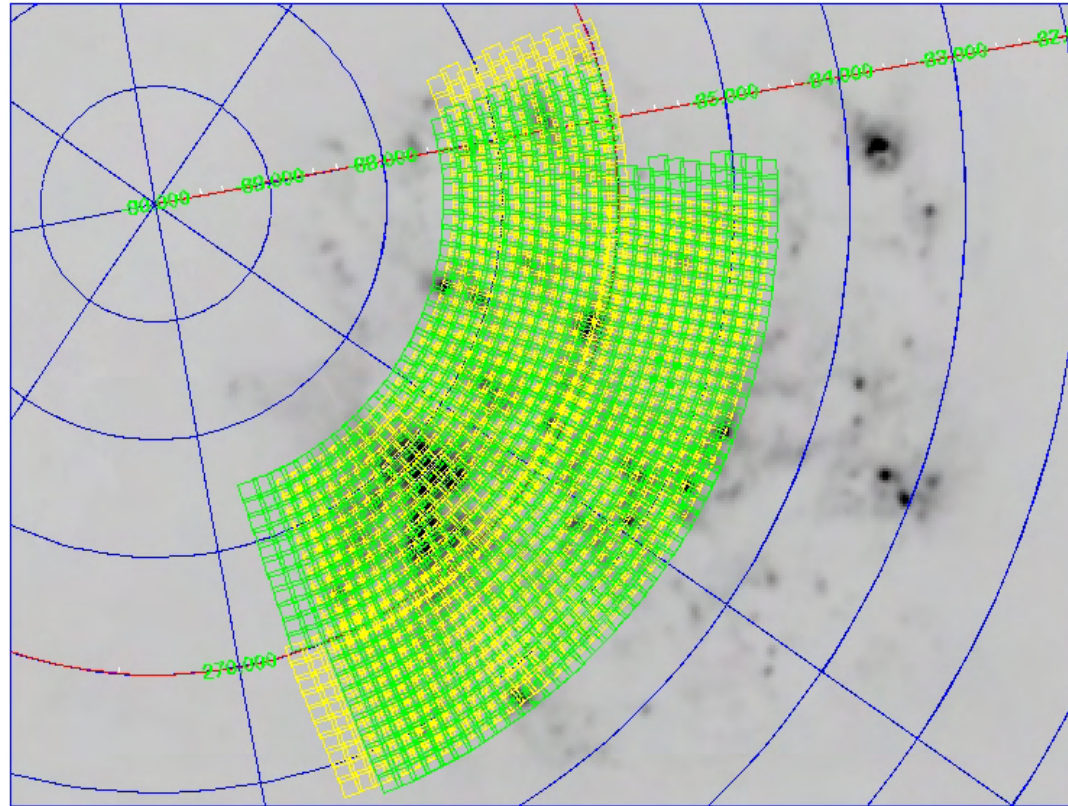


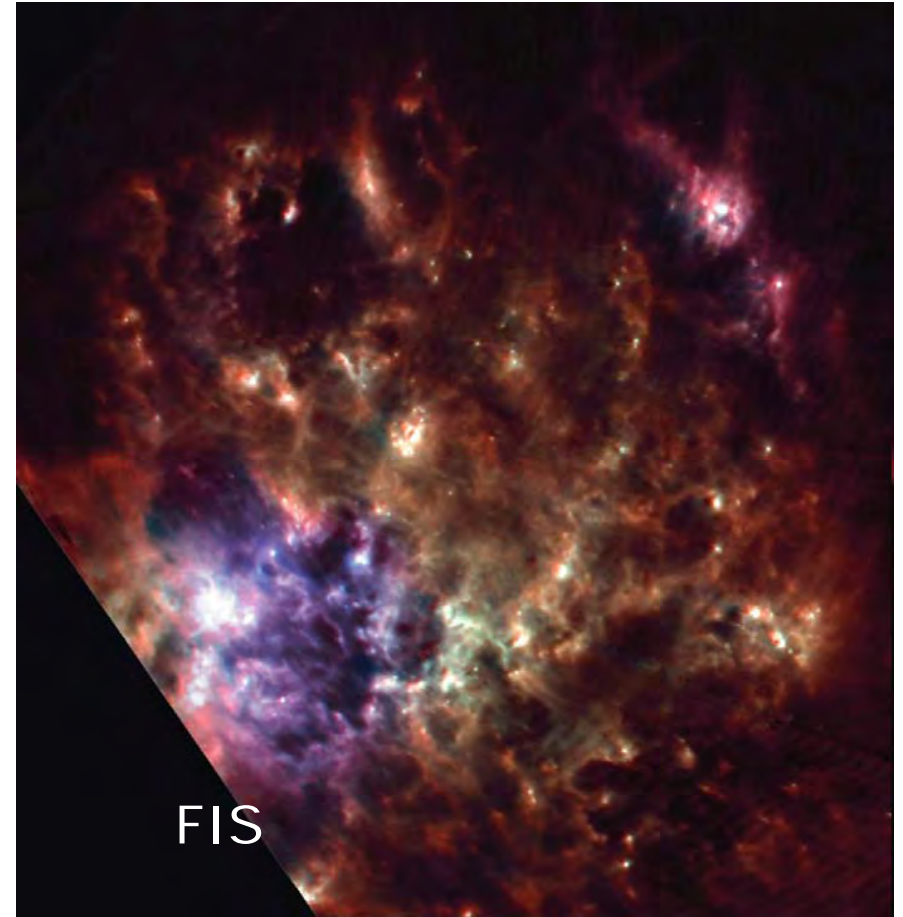
Figure 5. IRAS+AKARI spectral energy distribution of the 14 PNe detected in all bands. The cirrus emission values from IRAS (at 100 μm in MJy/sr) are also indicates (crosses).

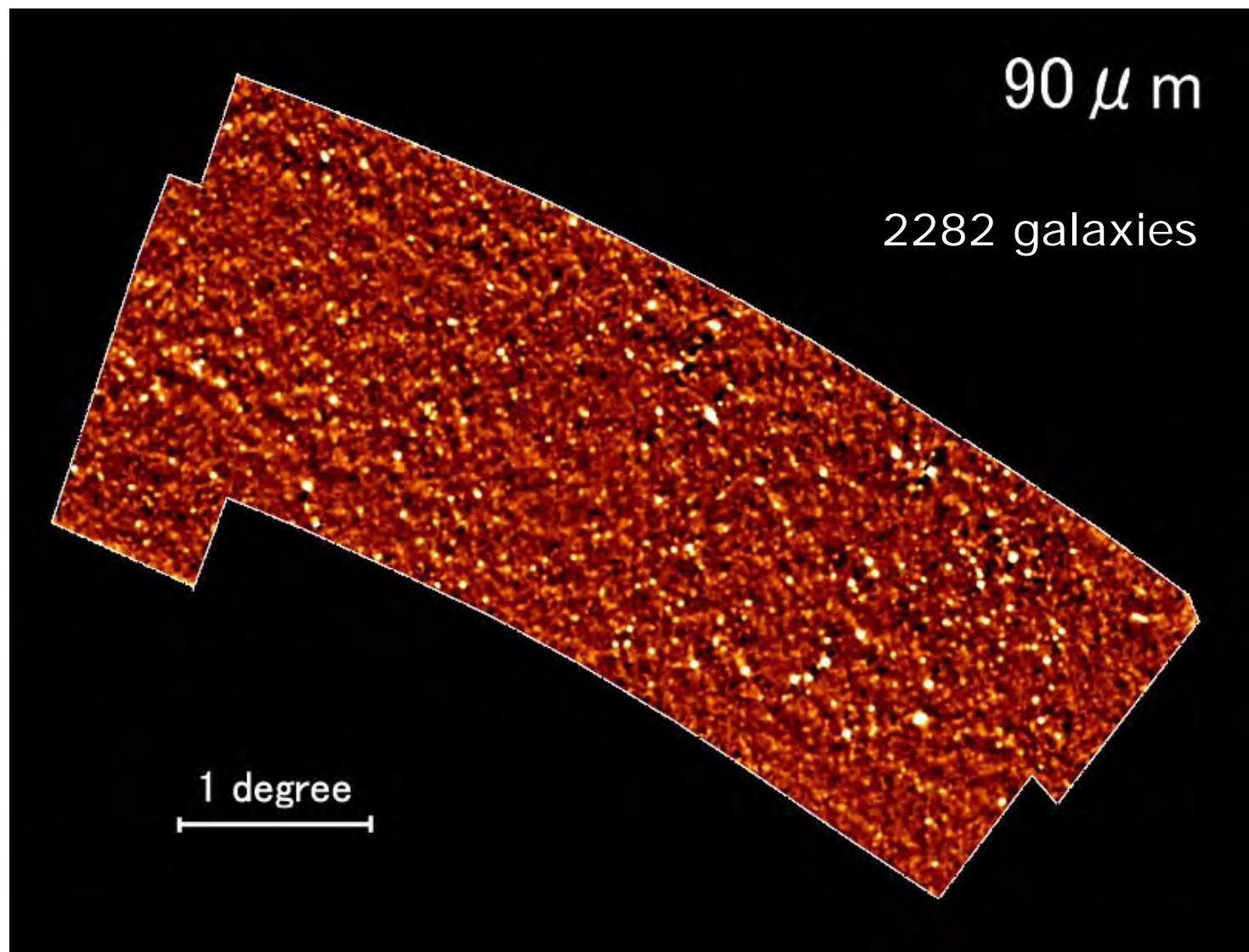
From "AKARI: a light to illuminate the dusty Universe" Proceedings (Conference held in Tokyo in Feb 2009)



~15deg² prism + 5 filters (NP, N3, S7, S11, L15, L24)
+ spectroscopy (MIR-FIR) at selected areas
~900 pointing observations

The LMC Survey





IC 1396

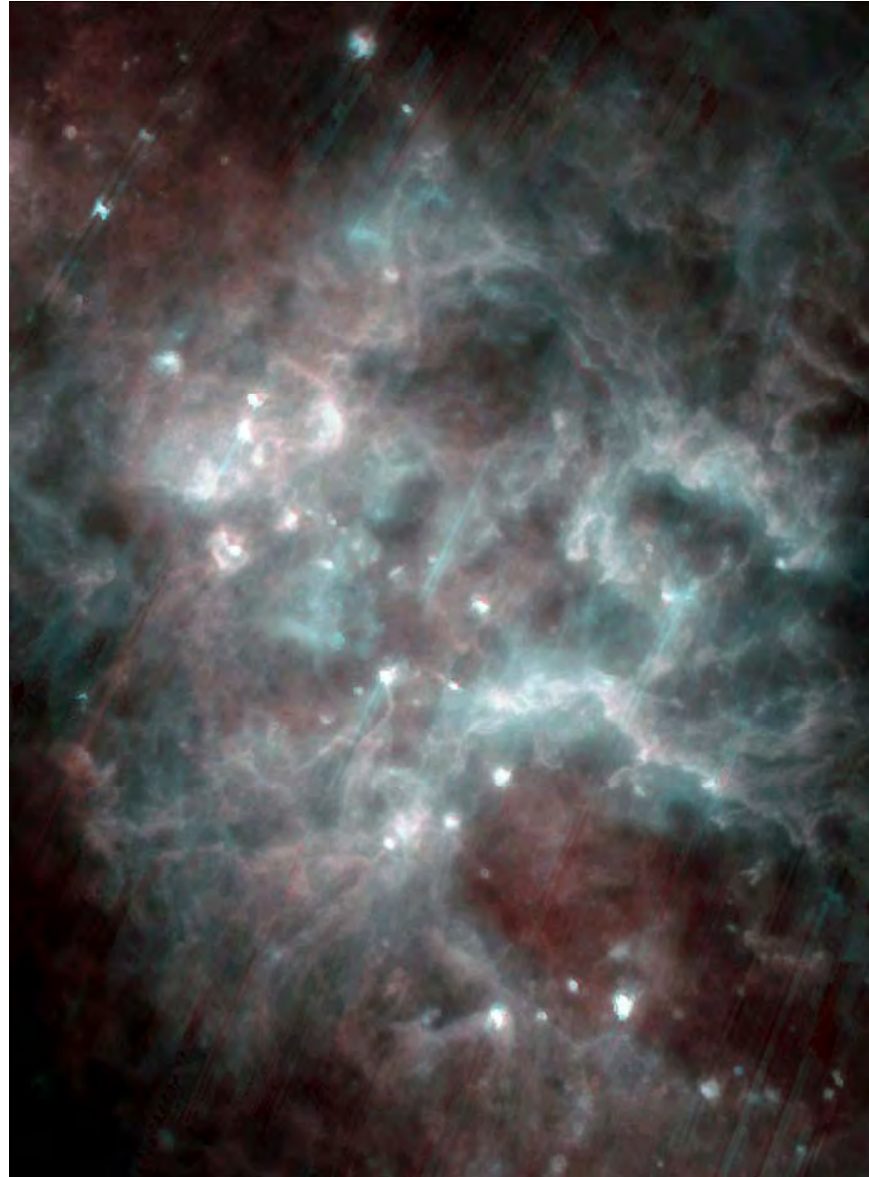


Visible

Infrared (9,18 μm)

Cygnus-X Star forming region nebula

➤ 90, 140 um

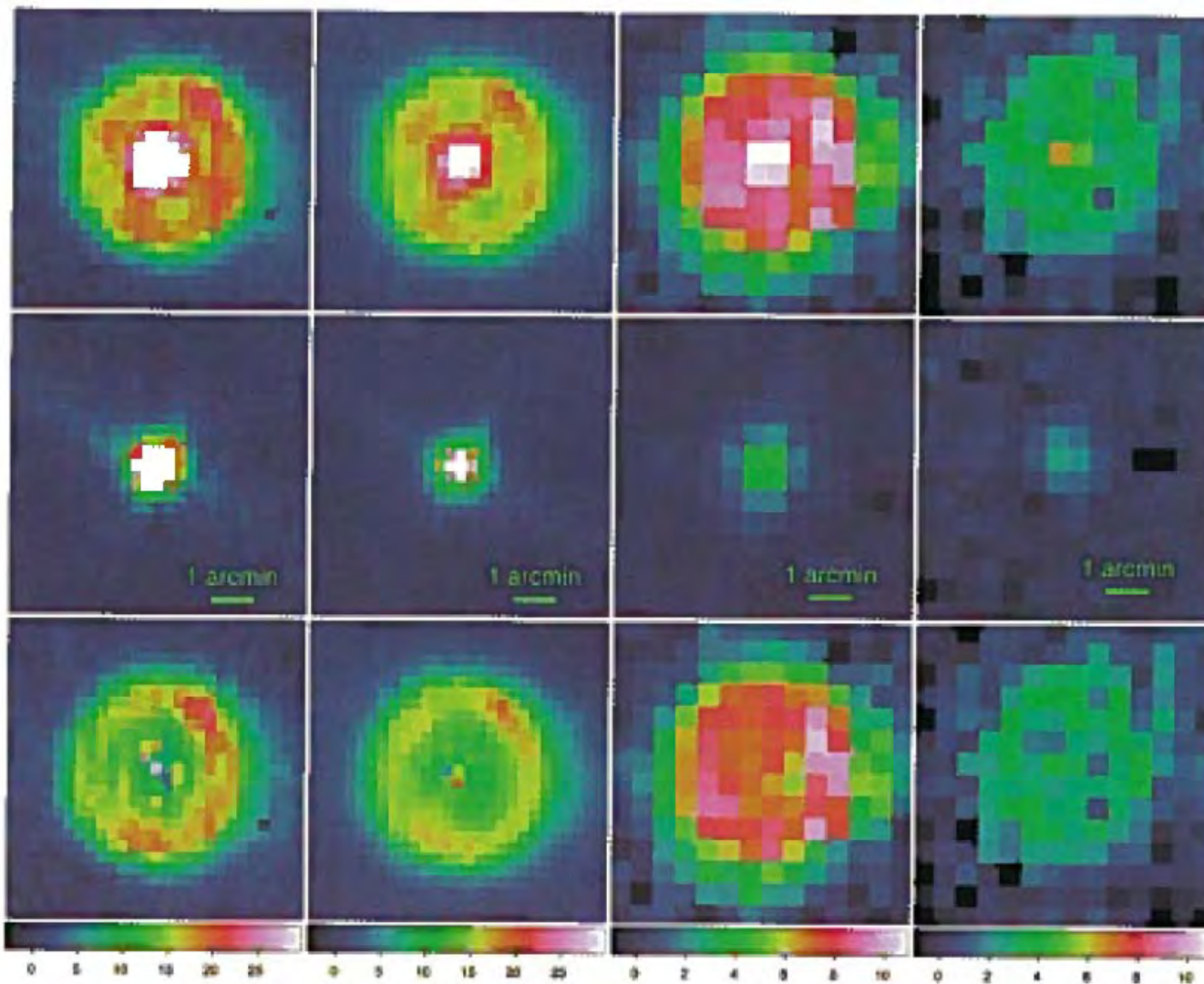


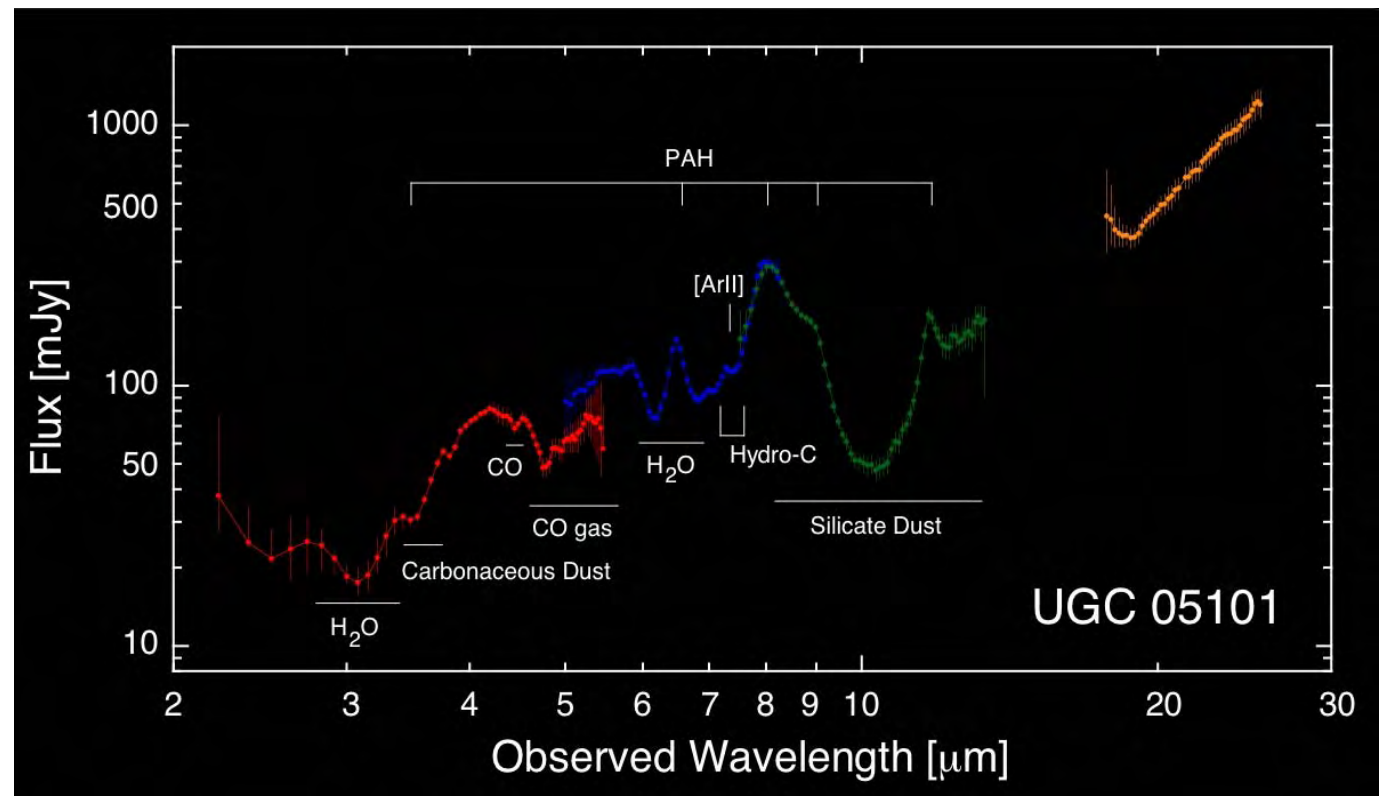
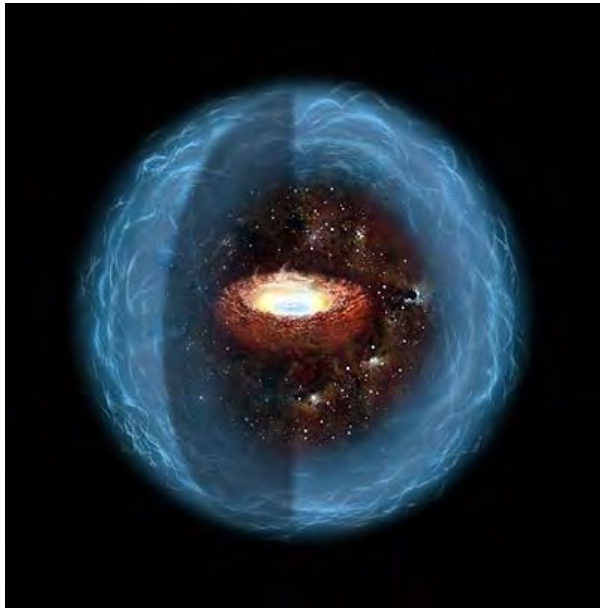
Imaging a debris disk

➤ U Hydrae, AGB star, Mass loss

star

shell





Science with AKARI at ESAC

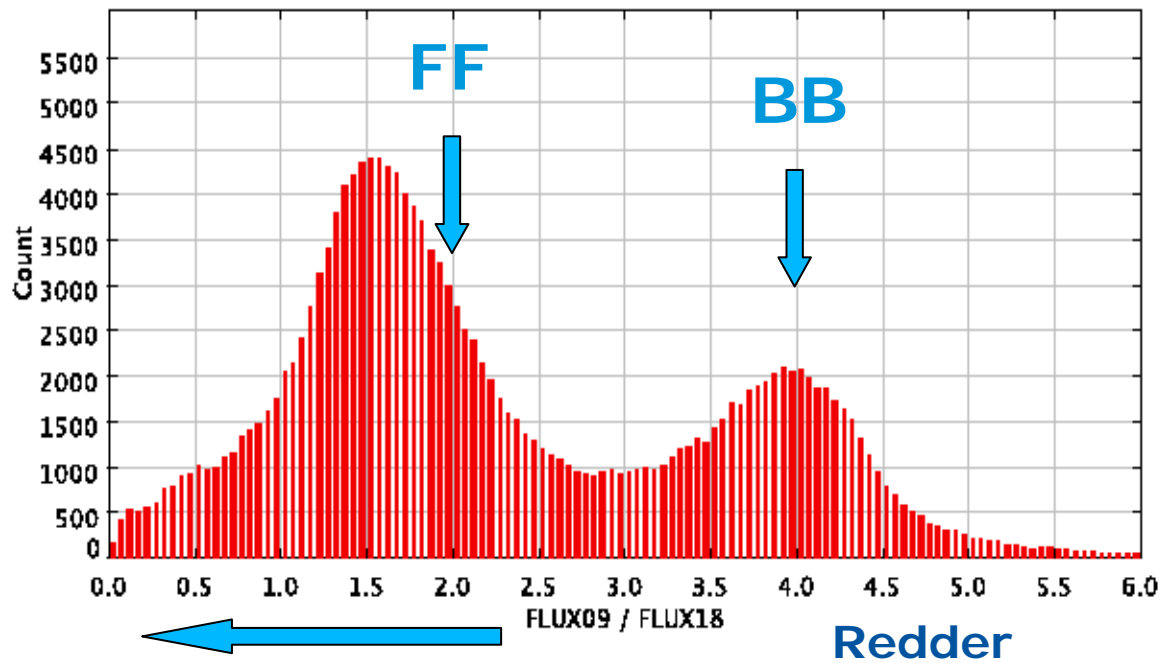
(A. Cassatella, R. González-Riestra, M. Santos-Lleò, A. Salama et al.)



What we can learn from:

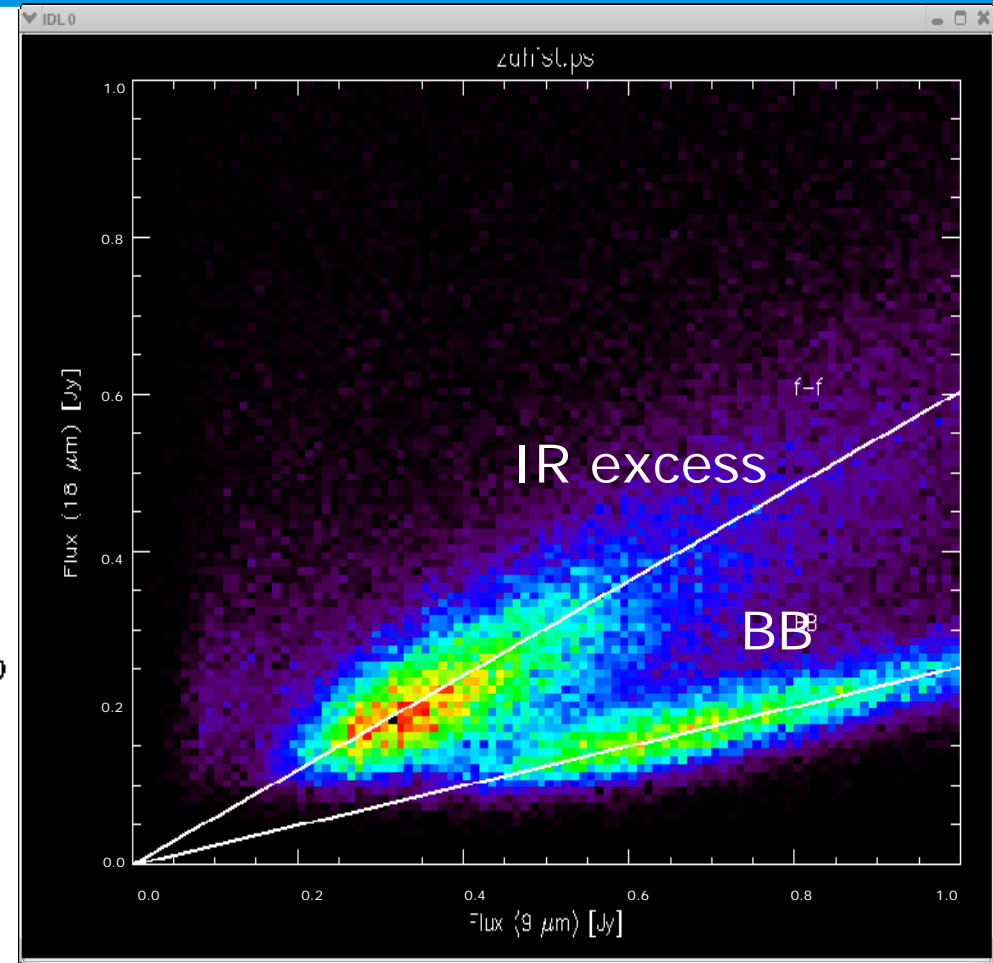
- AKARI/MIR FLUX-FLUX CORRELATIONS (9 & 18 μm)
- CROSS CORRELATION WITH XMM-OM and XMM-EPIC DATA
- CROSS CORRELATION WITH AKARI/FIS

AKARI /MIR: two population of sources



Total: N = 870 973 sources
@ 9 μm N=844 649 (97%)
@18 μm N=194 551 (22%)

Both bands: N= 168 227 (19%)



IR excess: Comparison with 2MASS colours

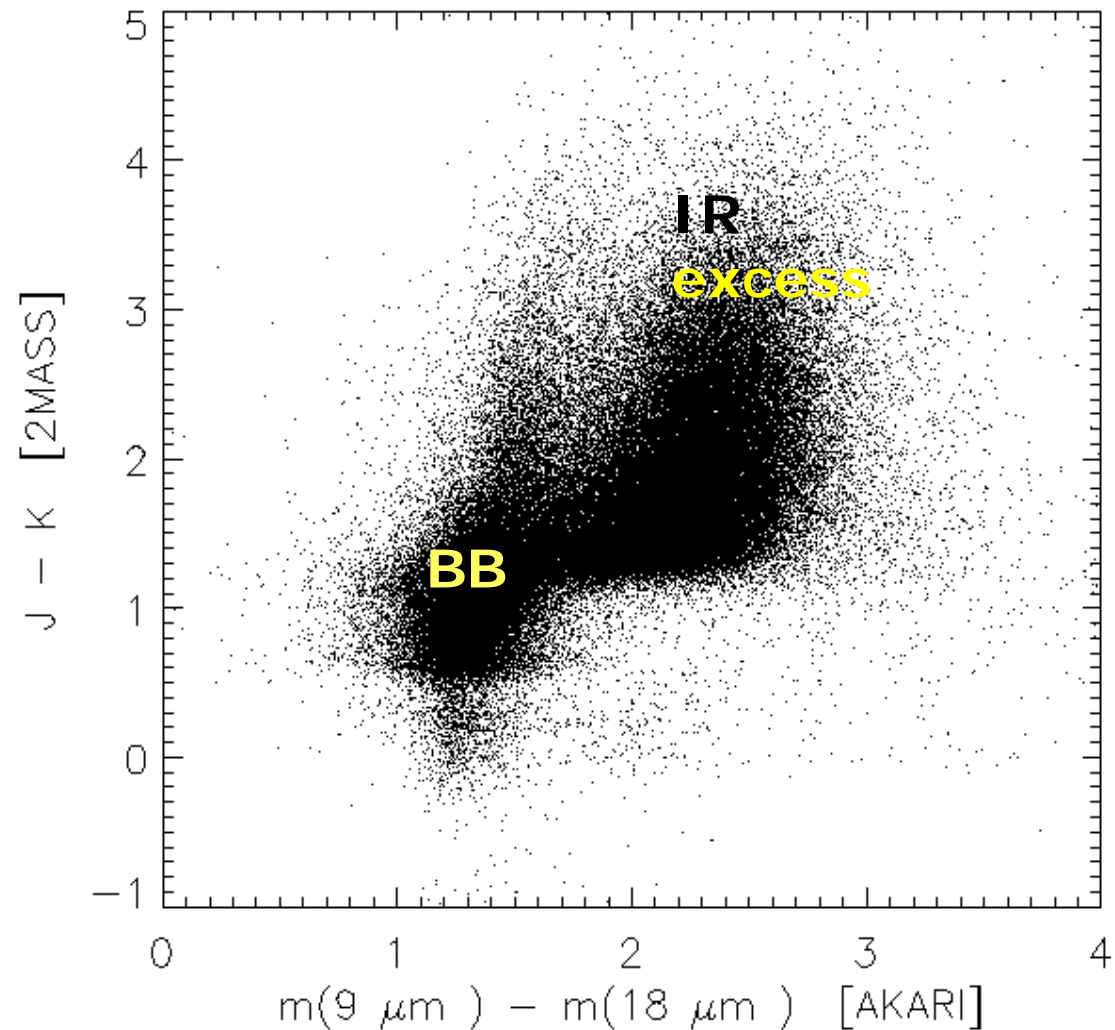
The reddest objects $J-K > 1.5$

A) galaxies

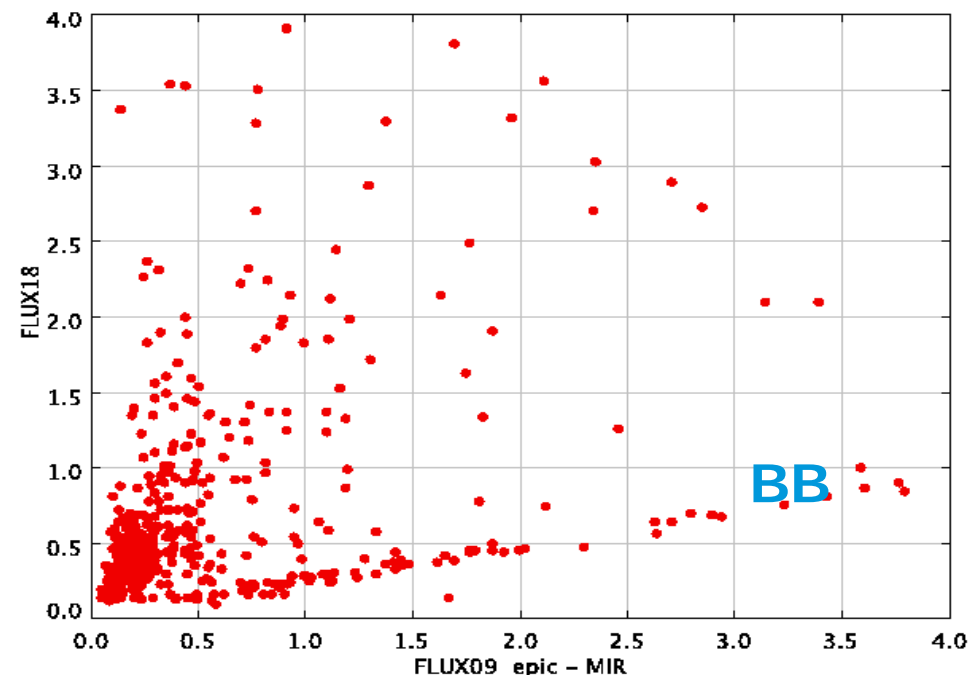
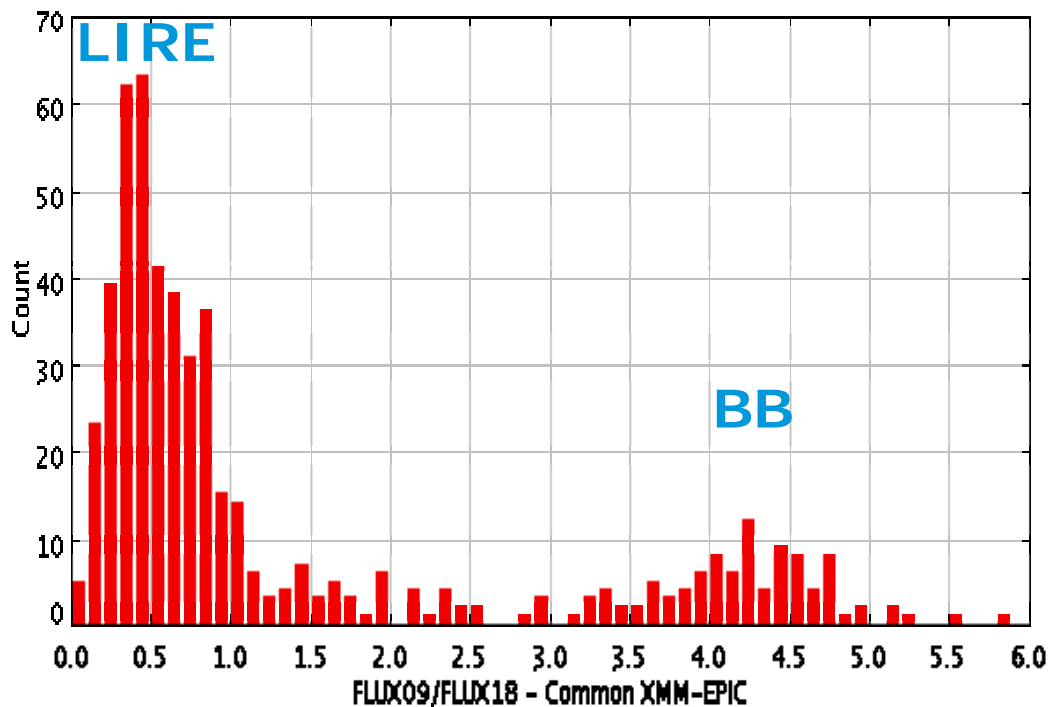
- light dominated by red bulge & core stars
- redshift
- dust absorption in Galactic plane

B) stars with

- 100-400 K dust
- large mass loss



AKARI/MIR vs. XMM/EPIC: a third population of X-ray sources with large IR excess



AKARI MIR

No. Sources = 870 973
2 bands @ 9 μm & 18 μm

XMM EPIC

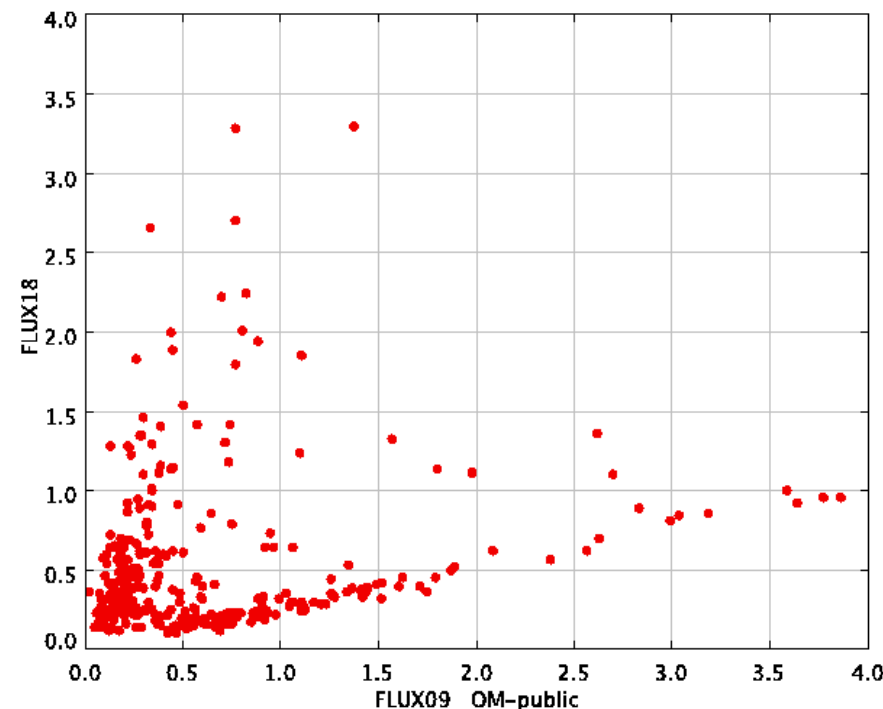
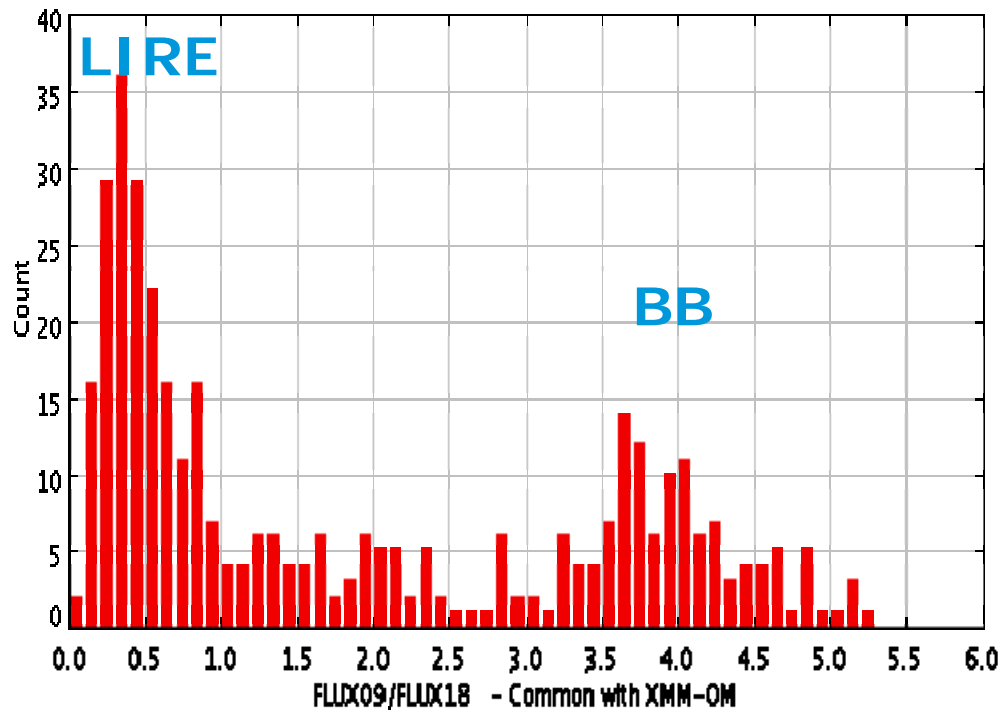
No. Sources = 221 012
8 bands 0.2 to 4.5 KeV

Common sources: 1174 ($r = 5''$)

Large IR excess: AKARI/MIR vs. XMM/OM



Common sources: 1321 ($r = 5''$)



XMM OM

No. Sources = 753 578

6 bands:

1894 Å (N= 119805)

3275 Å U (N= 177569)

2205 Å (N= 145210)

4050 Å B (N= 81119)

2675 Å (N= 618266)

5235 Å V (N= 78160)

FIS catalogue: 427.071 sources @ 25, 60, 60 and 160 μm

MIR catalogue: 870.973 sources @ 9, and 18 μm

Also observed with **XMM EPIC:** 1174

Also observed with **XMM OM:** 1321

Also observed with **XMM RGS:** 305

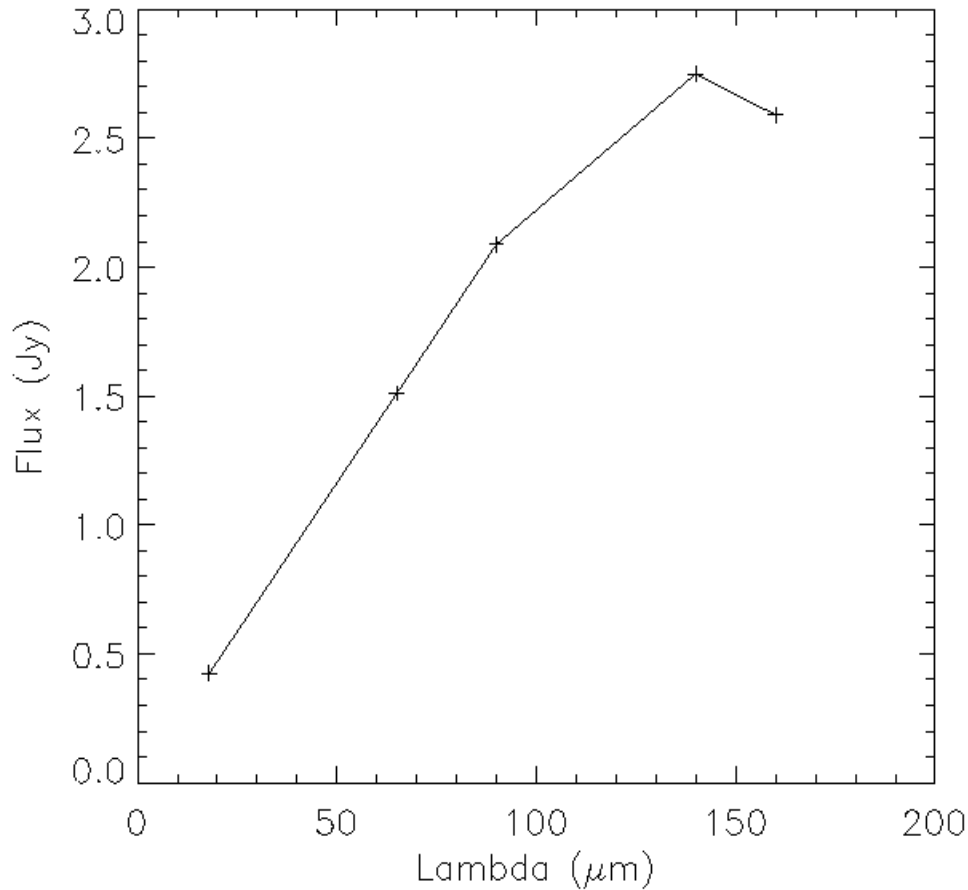
Examples of sources common to the AKARI/MIR, AKARI/FIS & XMM/RGS catalogues... Looking for correlations



Seyfert 2

15.15.02.02

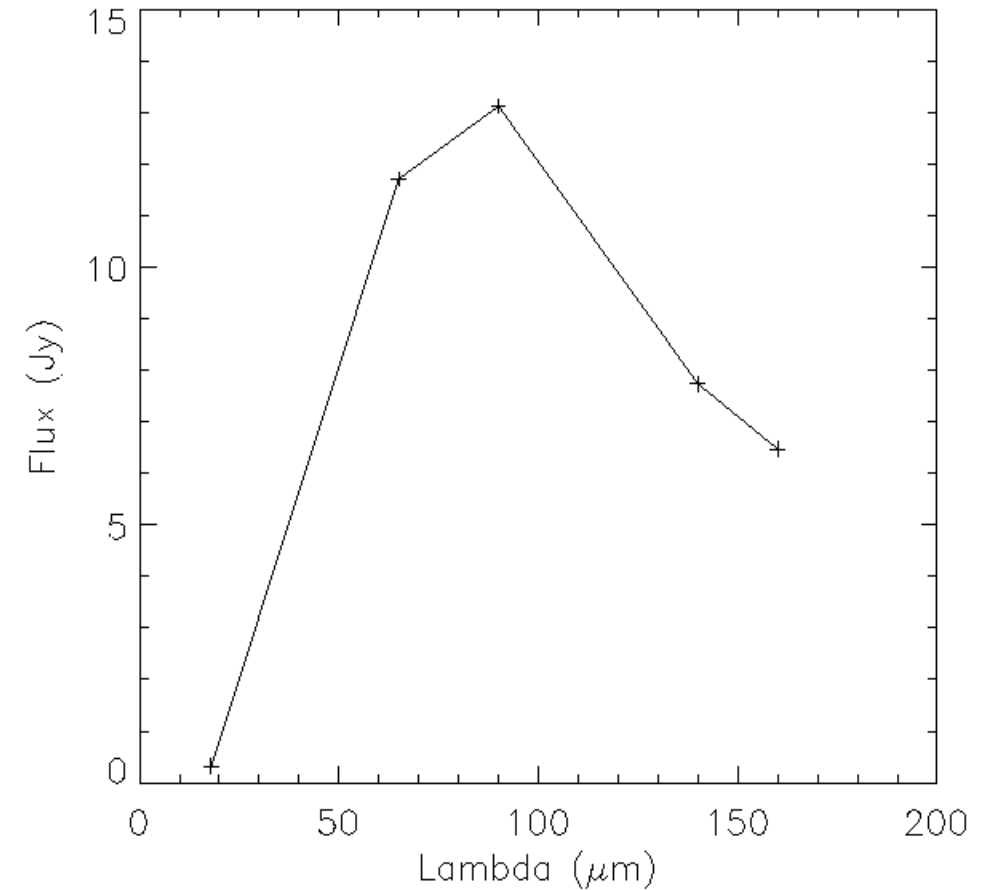
NGC 3393



Seyfert 2

15.15.02.02

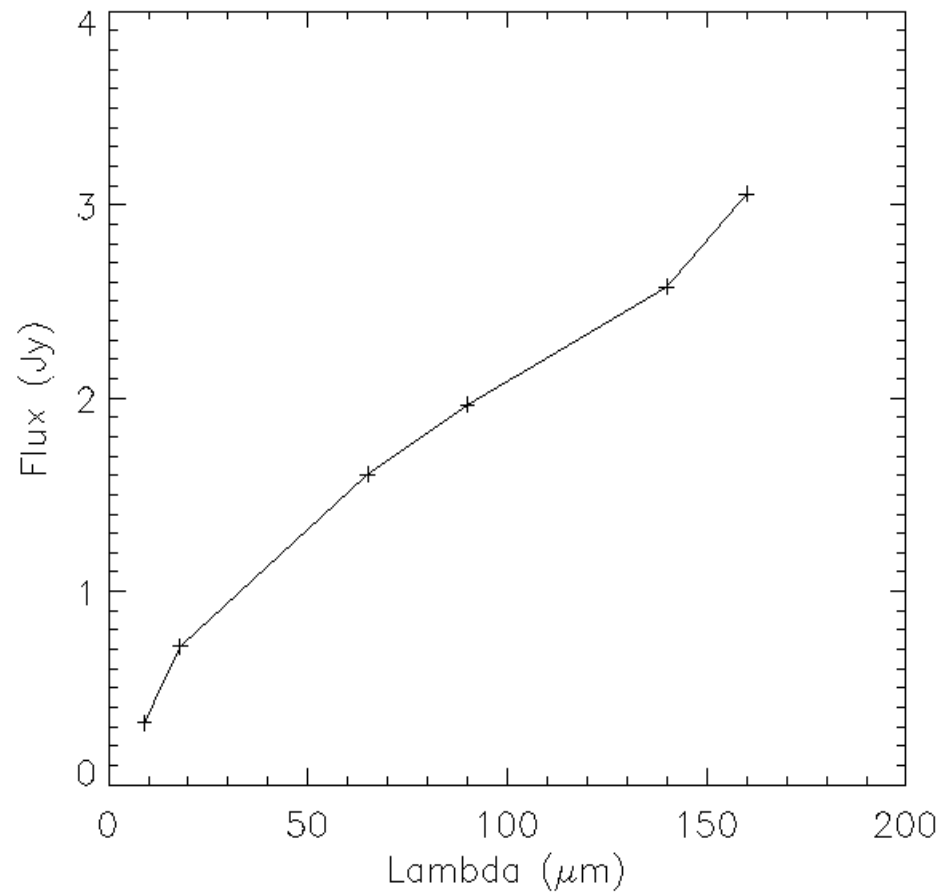
LEDA 6390



Seyfert 1

15.15.02.01

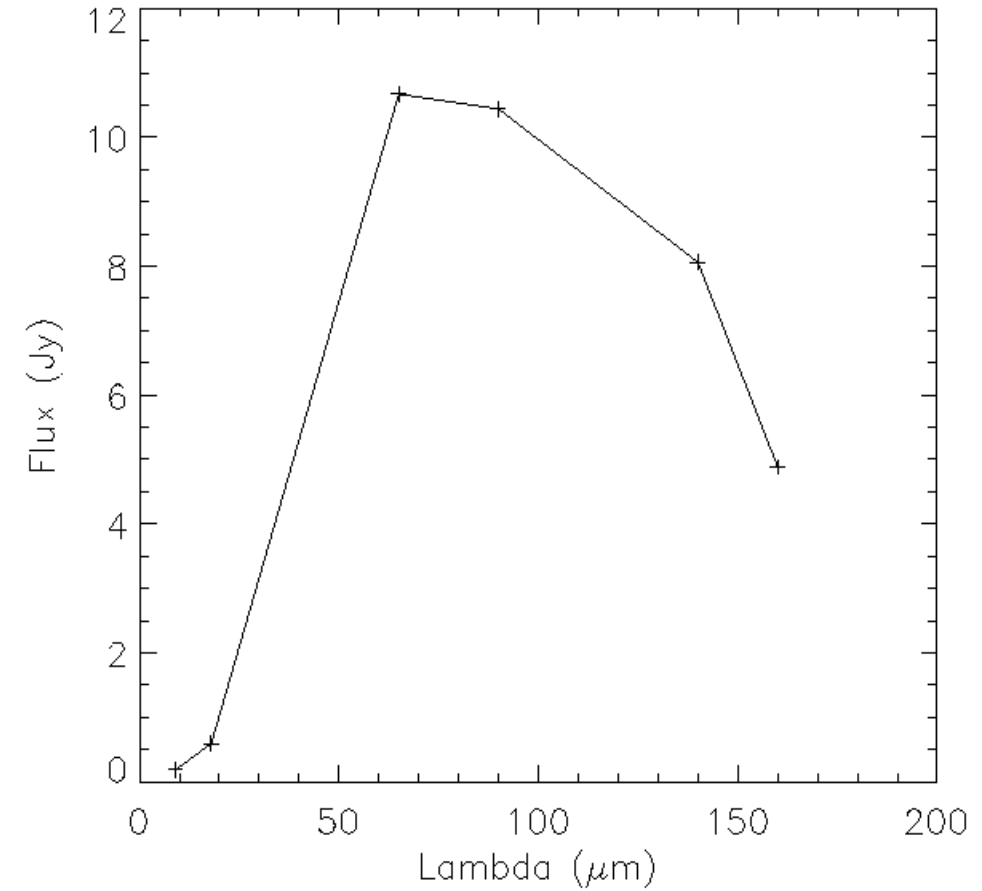
QSO B0050+124



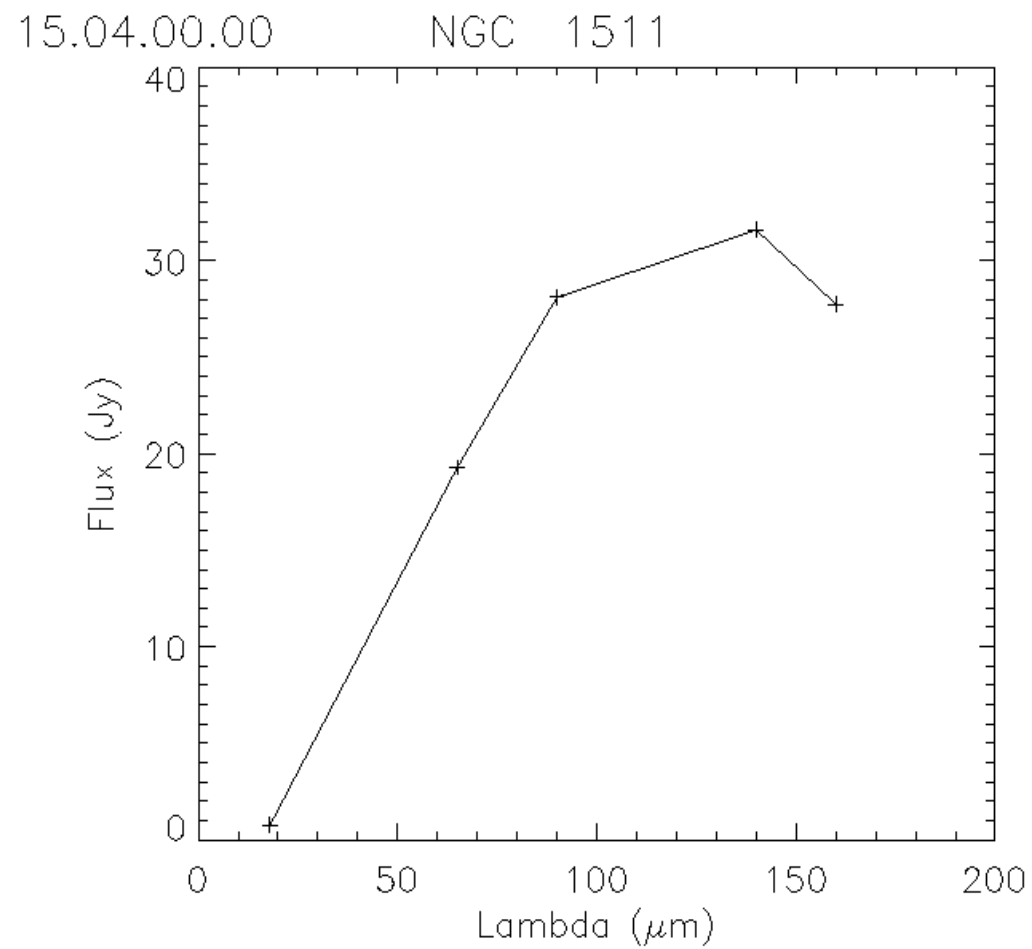
Liner

15.15.01.00

IRAS F01173+1405



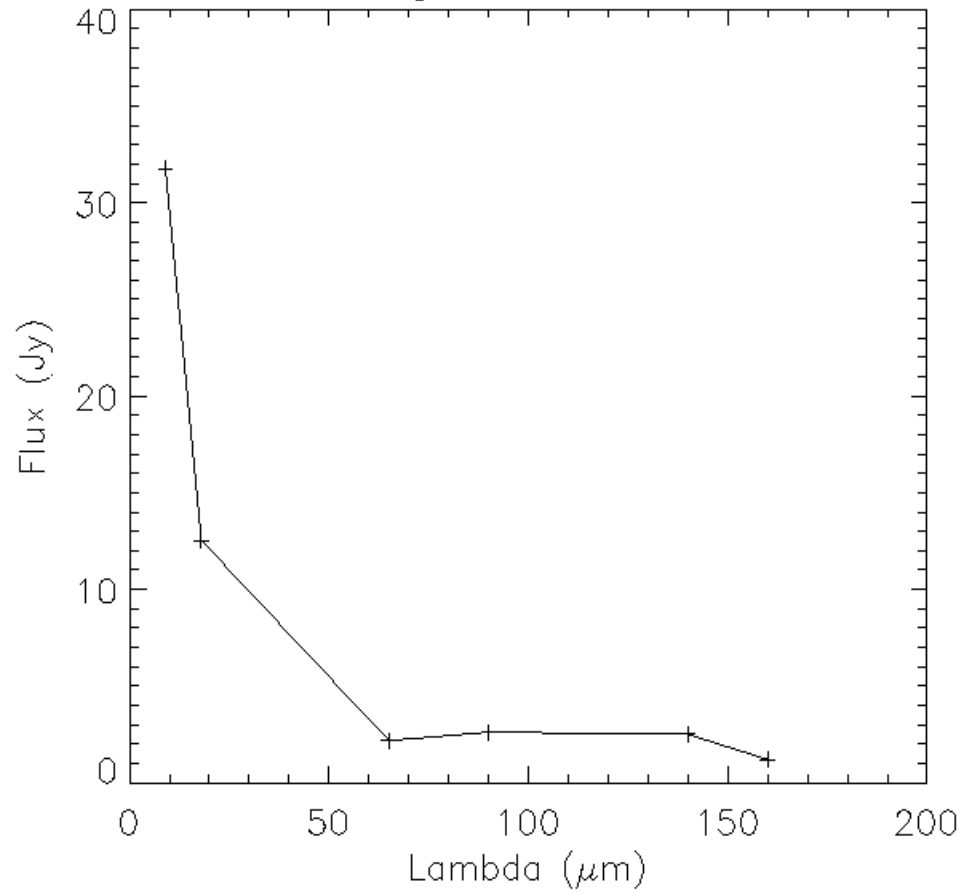
Galaxy in a pair



Be star

14.06.05.03

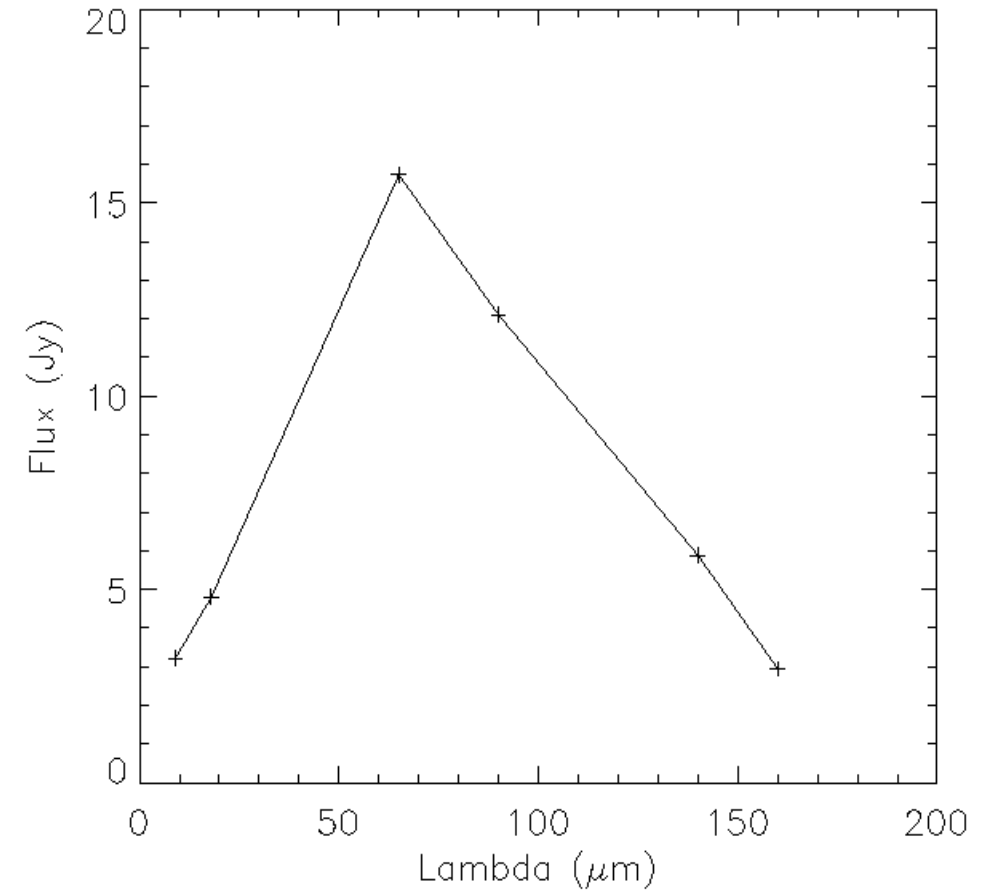
* gam Cas



Star A6V

14.00.00.00

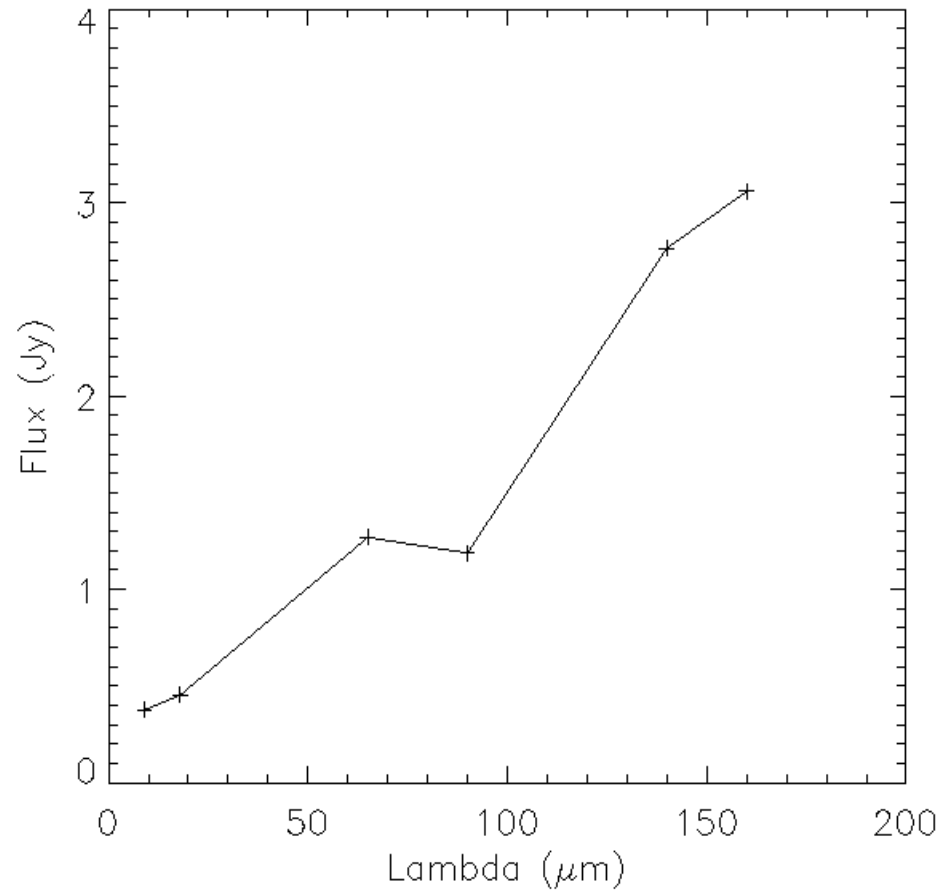
* bet Pic



MOV variable star

14.06.25.03

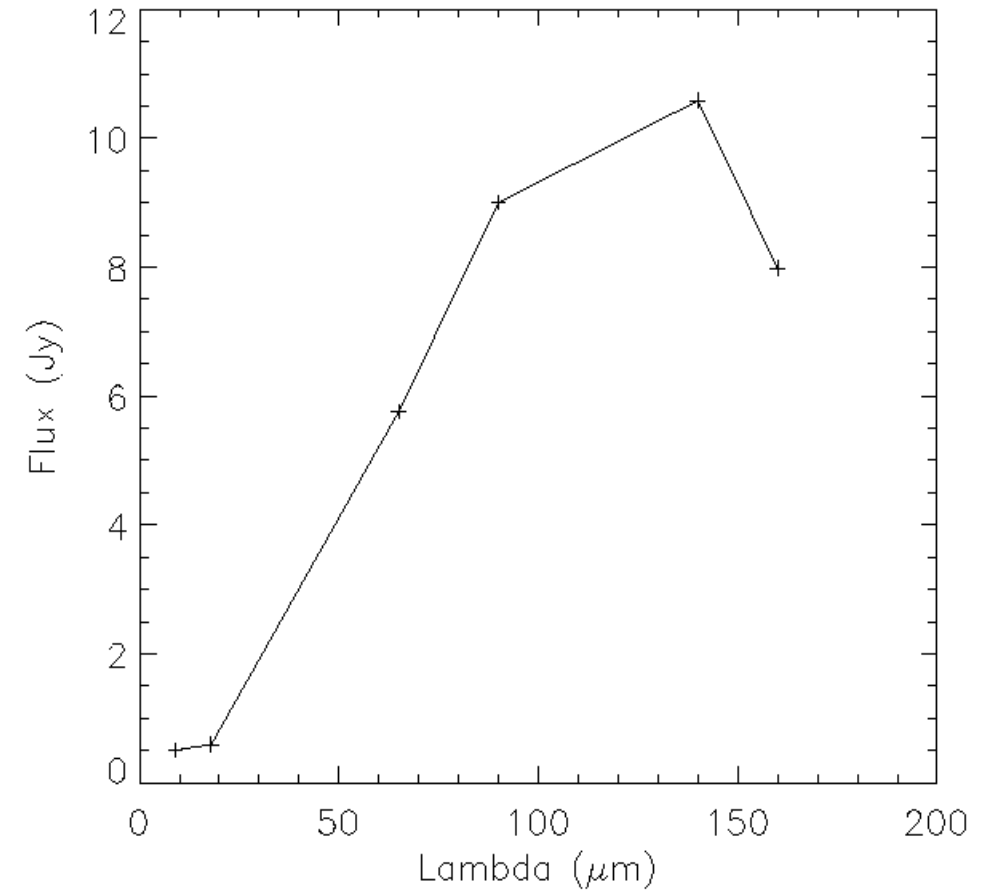
V* AA Tau



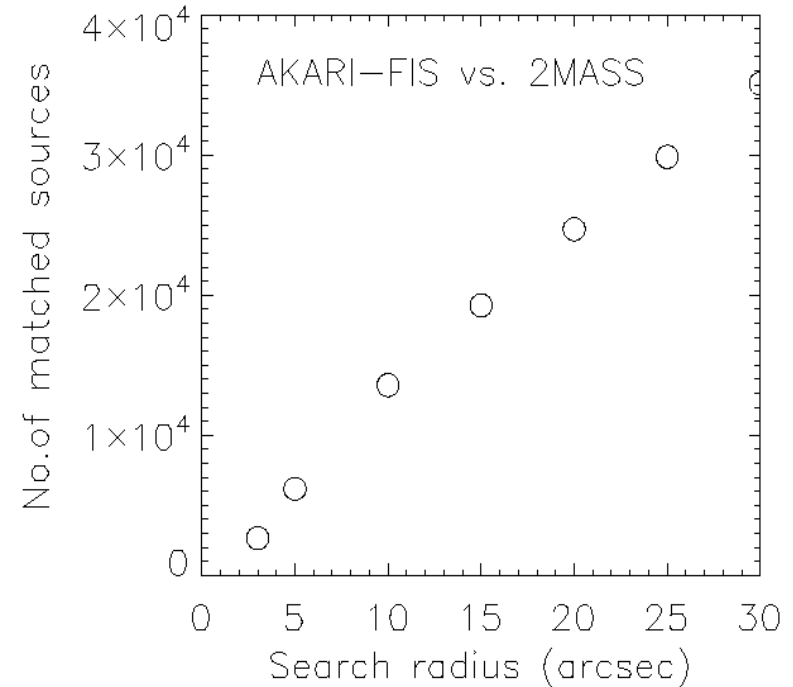
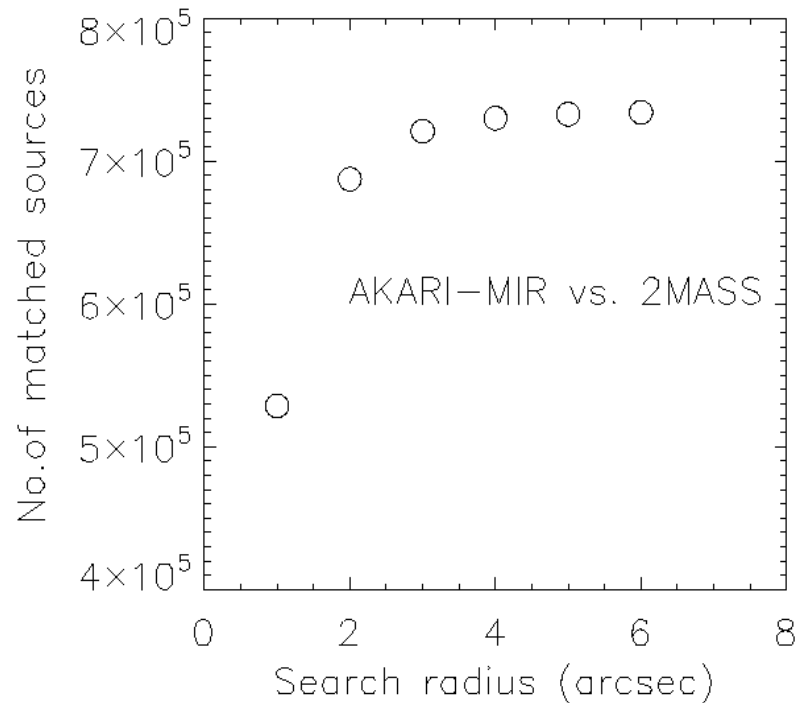
Planetary Nebula

13.10.00.00

NGC 2346



AKARI /MIR & AKARI/FIS versus 2MASS: Same sources are seen ?



Cross correlation of AKARI/MIR with 2MASS (J, H, K) saturates within 2-3 times the instrumental PFS → mostly the same objects are seen.

Cross correlation of AKARI/FIS with 2MASS (J, H, K) does not saturate → presence of a large population of FIR sources not seen in the mid infrared.

Any correlation between E(B-V) (dust absorption) and Infrared Excess (dust emission)?

Area of the 2200 Å dust absorption bump ~ E(B-V)

XMM – OM

No. Sources = 753 578

6 bands peaking at:

1894 Å		N= 119805
2205 Å		N= 145210
2675 Å		N= 618266
3275 Å	U	N= 177569
4050 Å	B	N= 81119
5235 Å	V	N= 78160

**No. Common to AKARI-MIR :
1321 sources (r = 5")**

