The IRSF Magellanic Clouds Point Source Catalog

- Near-IR Point Source Catalog for the MCs
- A joint program of Nagoya University,
  National Astronomical Observatory of Japan,
  The University of Tokyo,
  and South African Astronomical Observatory (SAAO)

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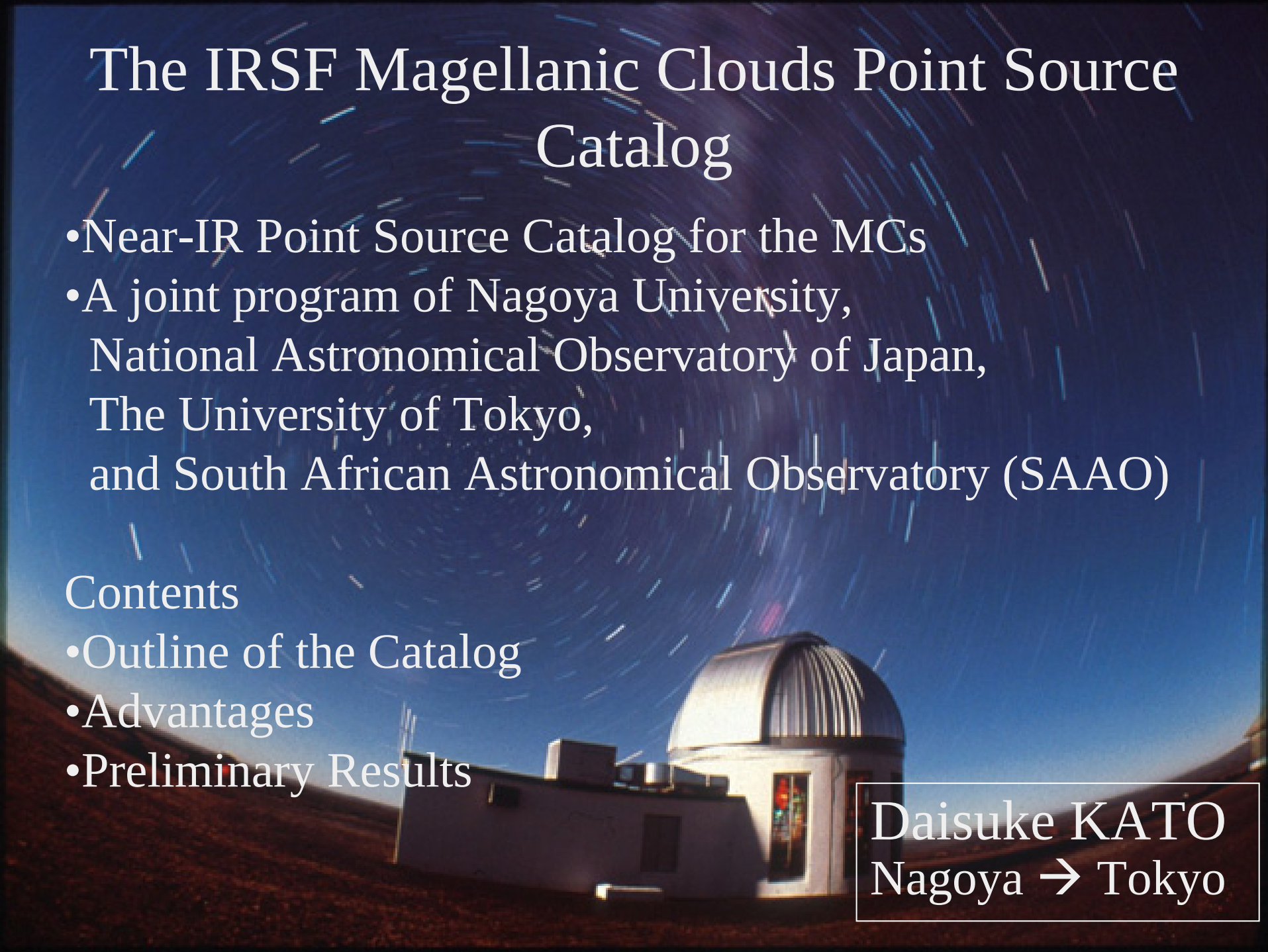

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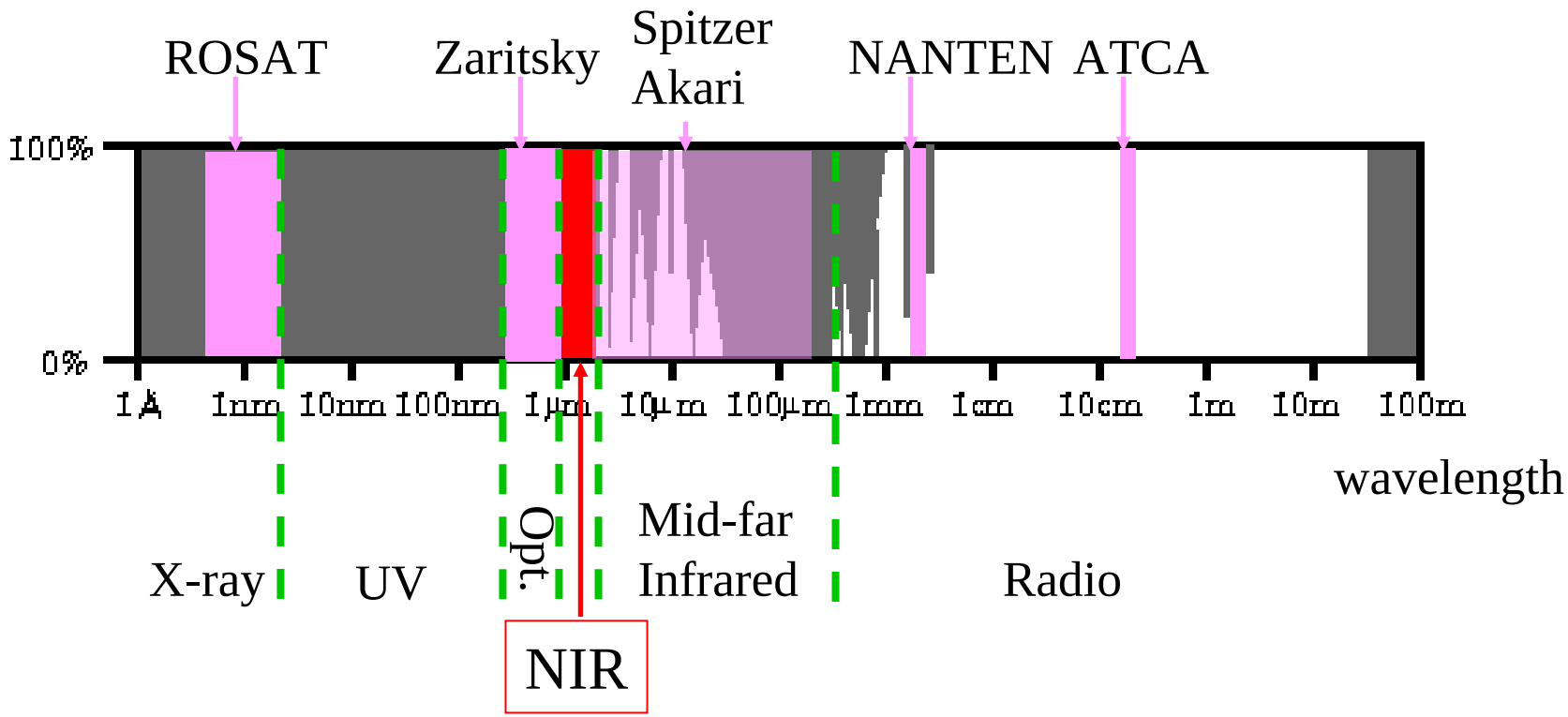
Nagoya → Tokyo

MCs surveys at a wide range of wavelengths

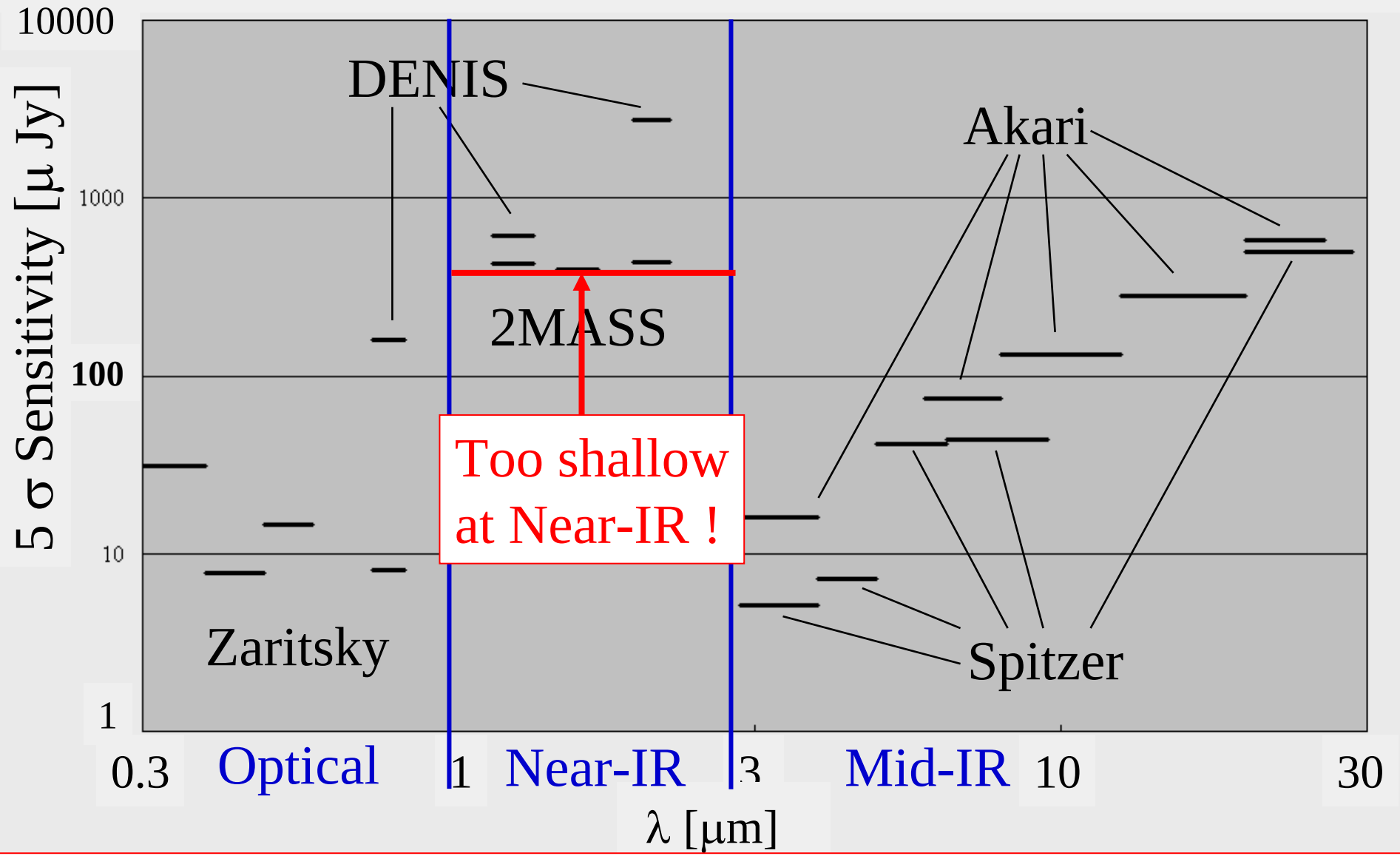


The MCs have been covered from X-ray to Radio wavelengths

NIR: 2MASS and DENIS cover the whole MCs.

→ Their sensitivities are relatively shallow

Comparison of Sensitivity



We have carried out deep NIR survey with IRSF/SIRIUS.

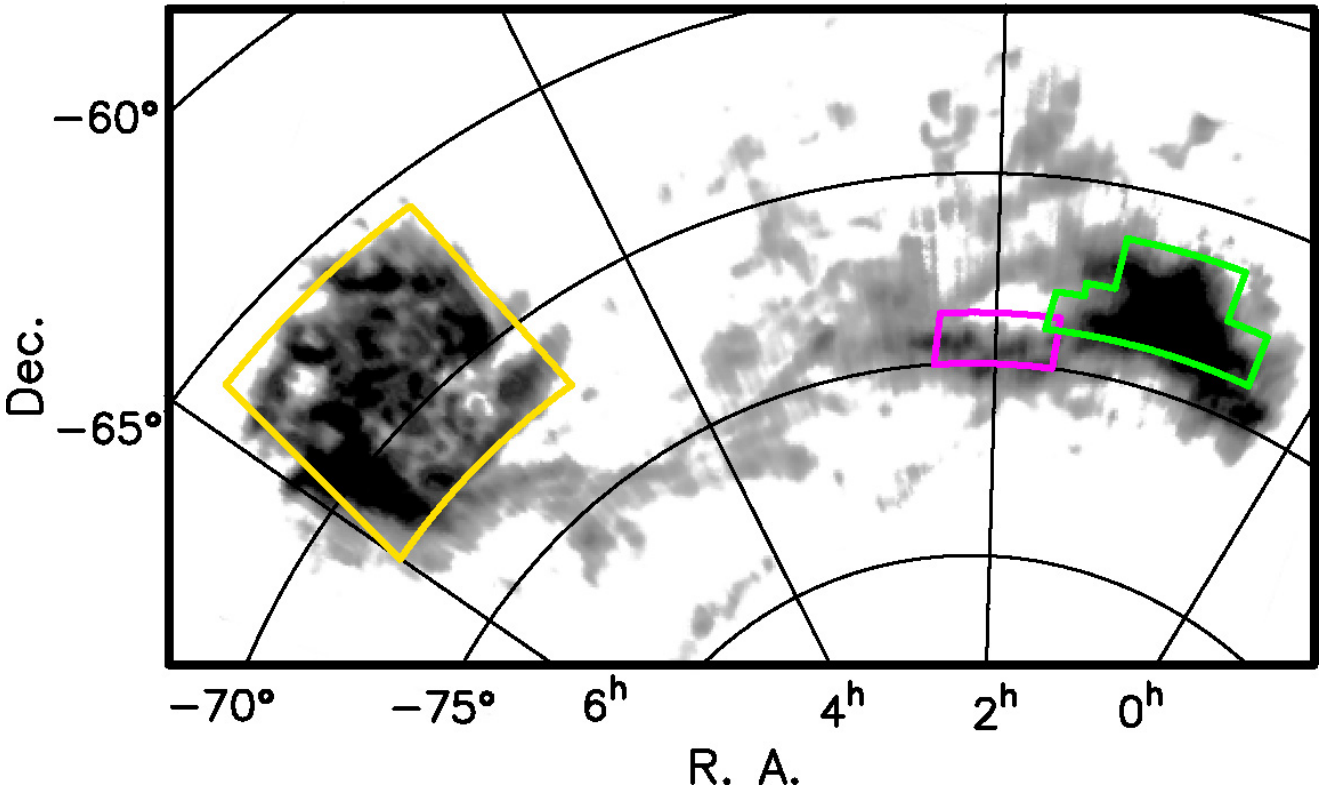
IRSF (InfraRed Survey Facility)

- IRSF 1.4 m telescope
  +Near-IR camera “SIRIUS”
- Developed at SAAO
- Simultaneous Imaging at
  - J -band (1.25 μm)
  - H-band (1.63 μm)
  - Ks-band (2.14 μm)
- FoV: 7 '.7 x 7 '.7
- Pixel scale: 0".45 / pix
- Exposure time: 300 sec

Observations were made from Oct. 2001 to Mar. 2006.

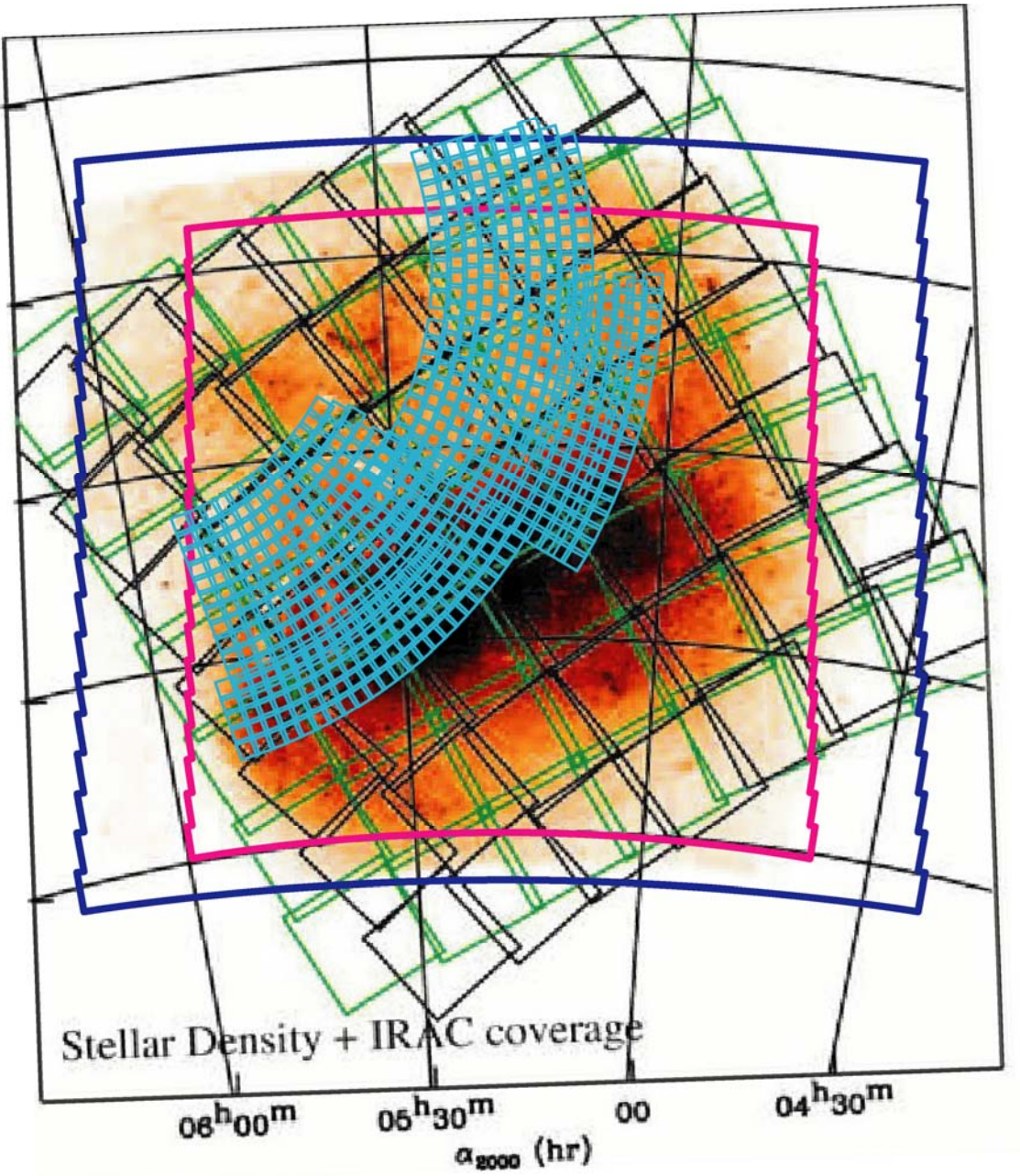
Coverage

- 55 deg^2 of LMC, SMC, and a part of the Bridge



HI gas (Putman et al. 1998)

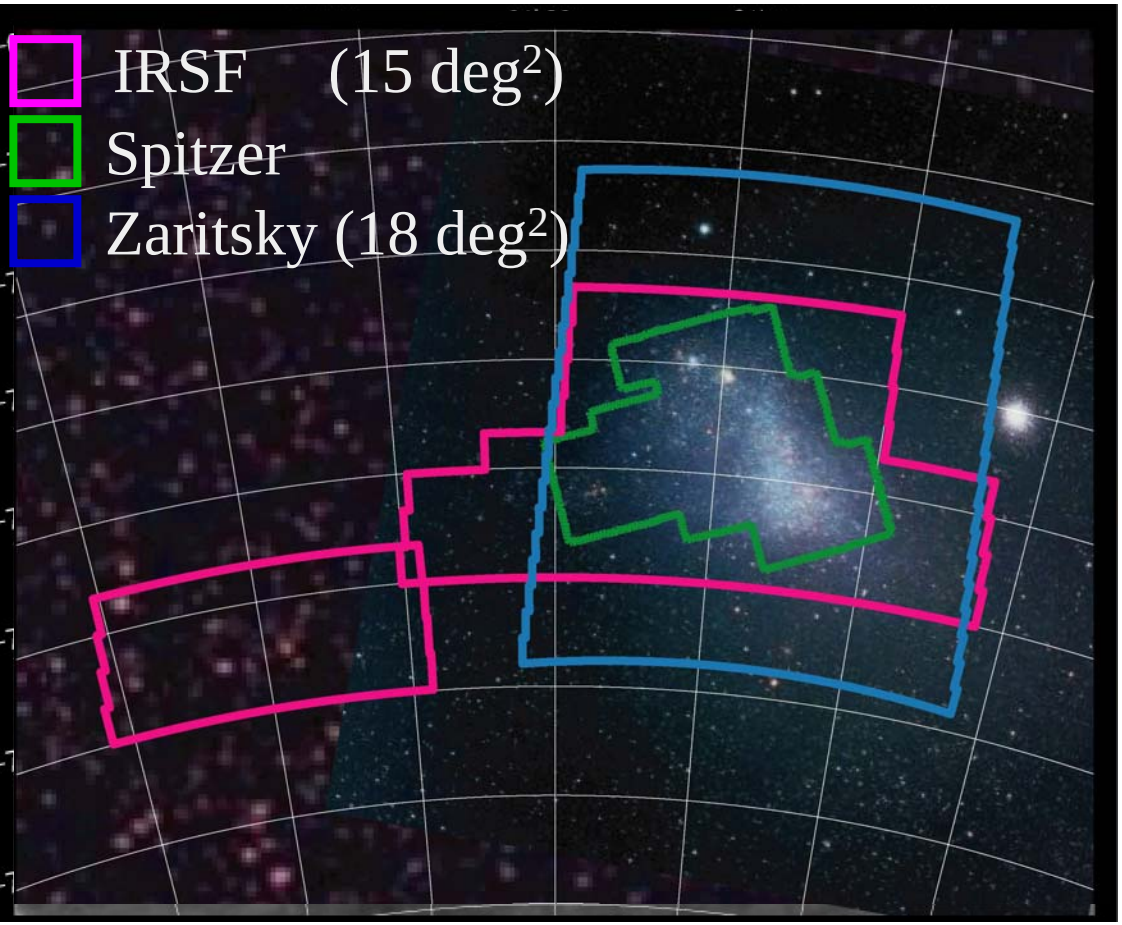
Coverage



- 55 deg^2 of LMC, SMC, and a part of the Bridge
- LMC 40 deg^2 (3,249 fields)

IRSF (40 deg^2)
Zaritsky (64 deg^2)
Spitzer (50 deg^2)
Akari (10 deg^2)

Coverage

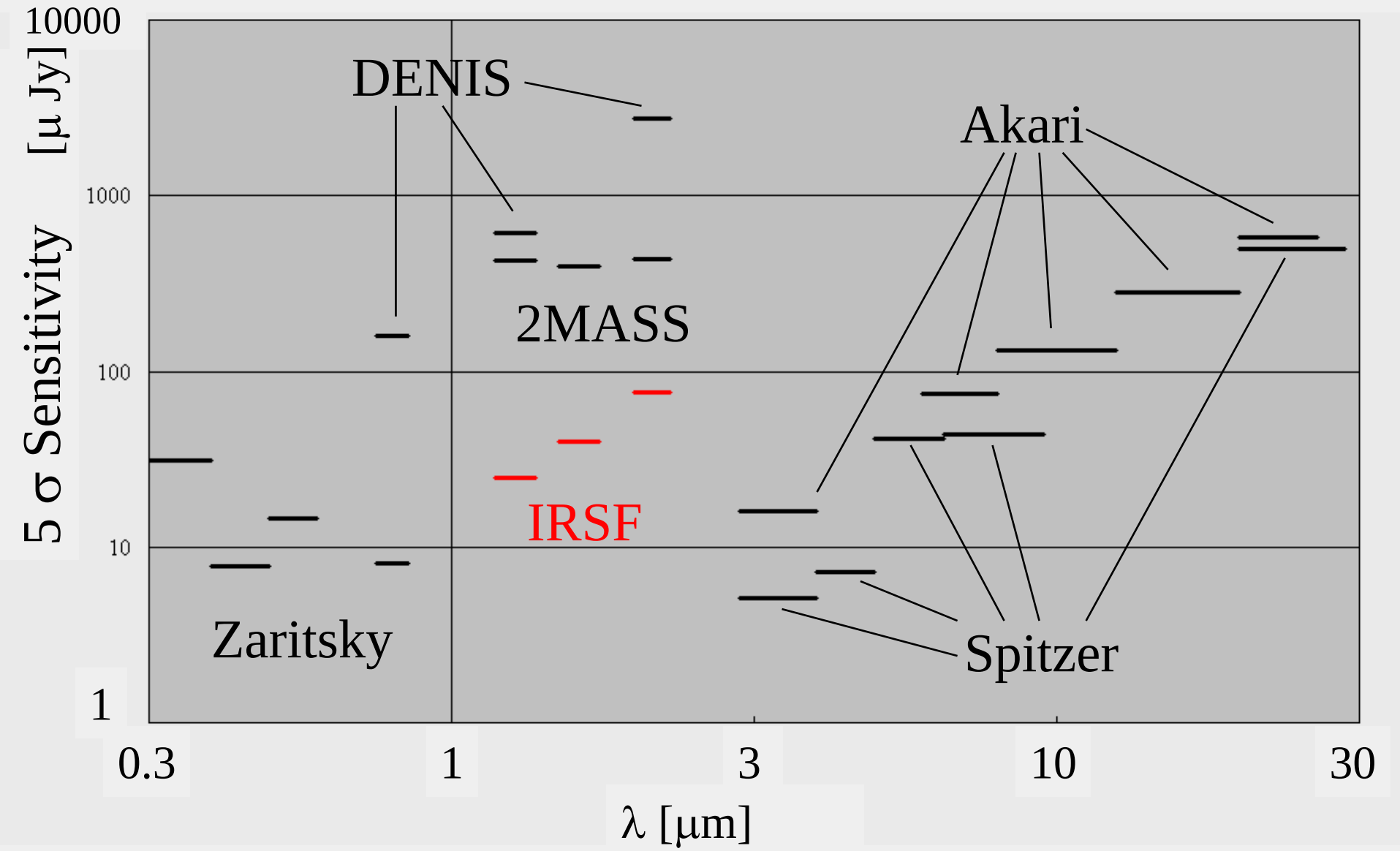


- 55 deg² of LMC, SMC, and a part of the Bridge

- LMC 40 deg² (3,249 fields)
- SMC 11 deg² (882 fields)
- Bridge 4 deg² (324 fields)
- Total 55 deg² (4,455 fields)

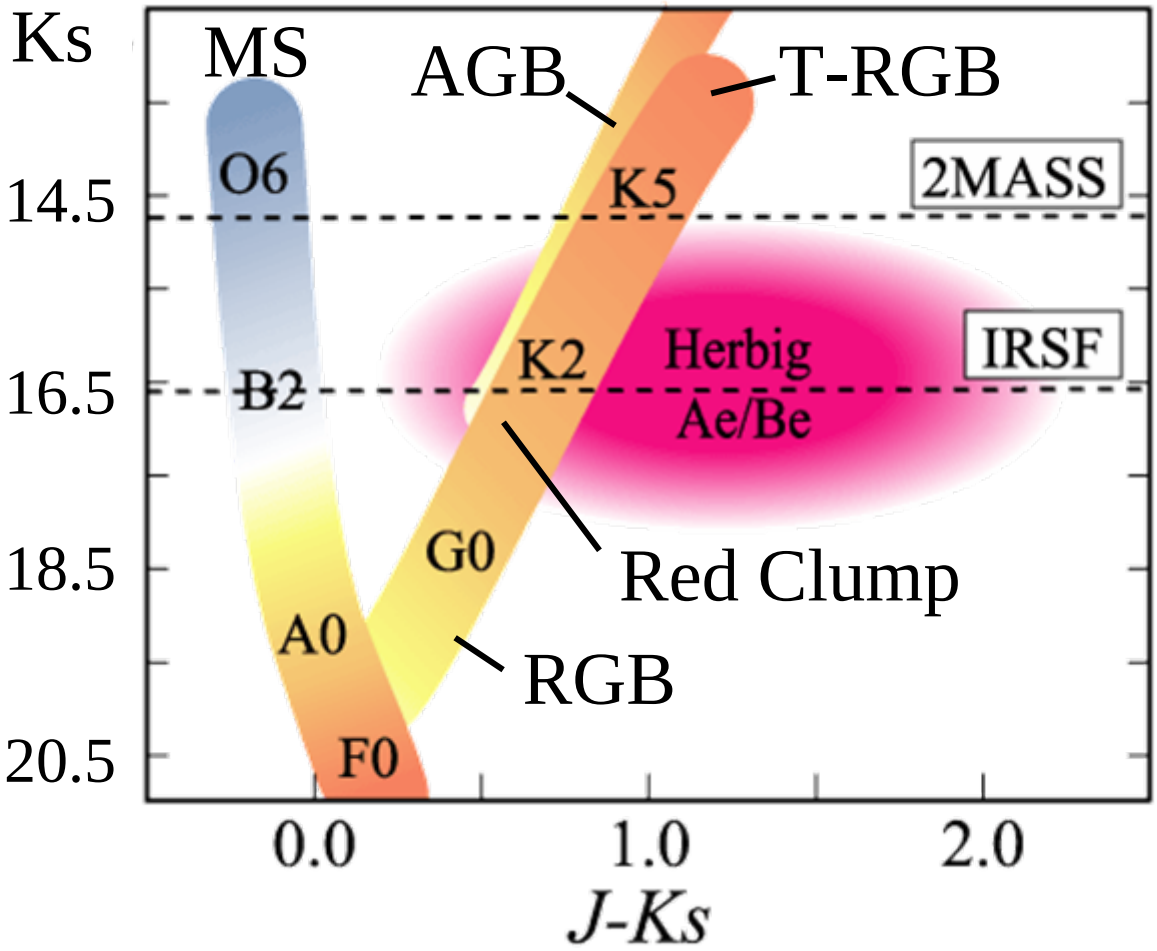
What are our advantages?

Sensitivity



IRSF: comparable to Zaritsky, Spitzer, and Akari

Pre- and post-MS stars can be detected



Schematic CMD

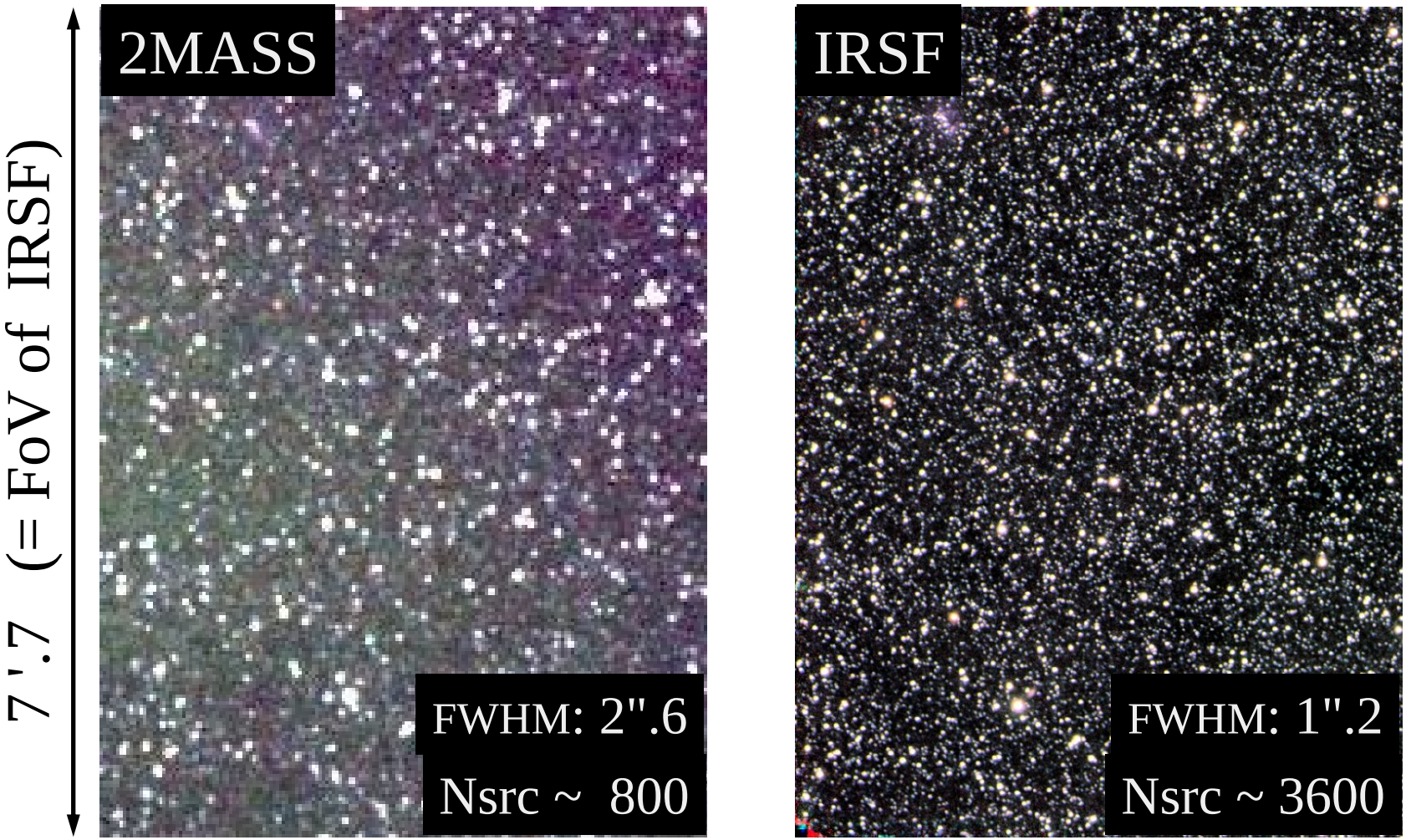
(J-Ks) vs. Ks

Detectable Objects

- dwarfs earlier than B2
- giants later than K2
- AGB stars
- Herbig Ae/Be stars with more than 3Mo
- red clump stars

Spatial Resolution

In a field of the LMC bar



Our higher resolution enables to detect many sources

Based on the survey data (~2TB), we constructed a point-source catalog

Outline of the IRSF catalog

- NIR point-source catalog for the LMC, SMC and Bridge
- Source Counts (more than 4σ at least one band)

LMC : 14,822,341
SMC : 2,769,682
Bridge : 434,145
Total : 18,026,168

- 10σ limiting magnitudes

J: 18.8 mag, H: 17.8 mag, Ks: 16.6 mag

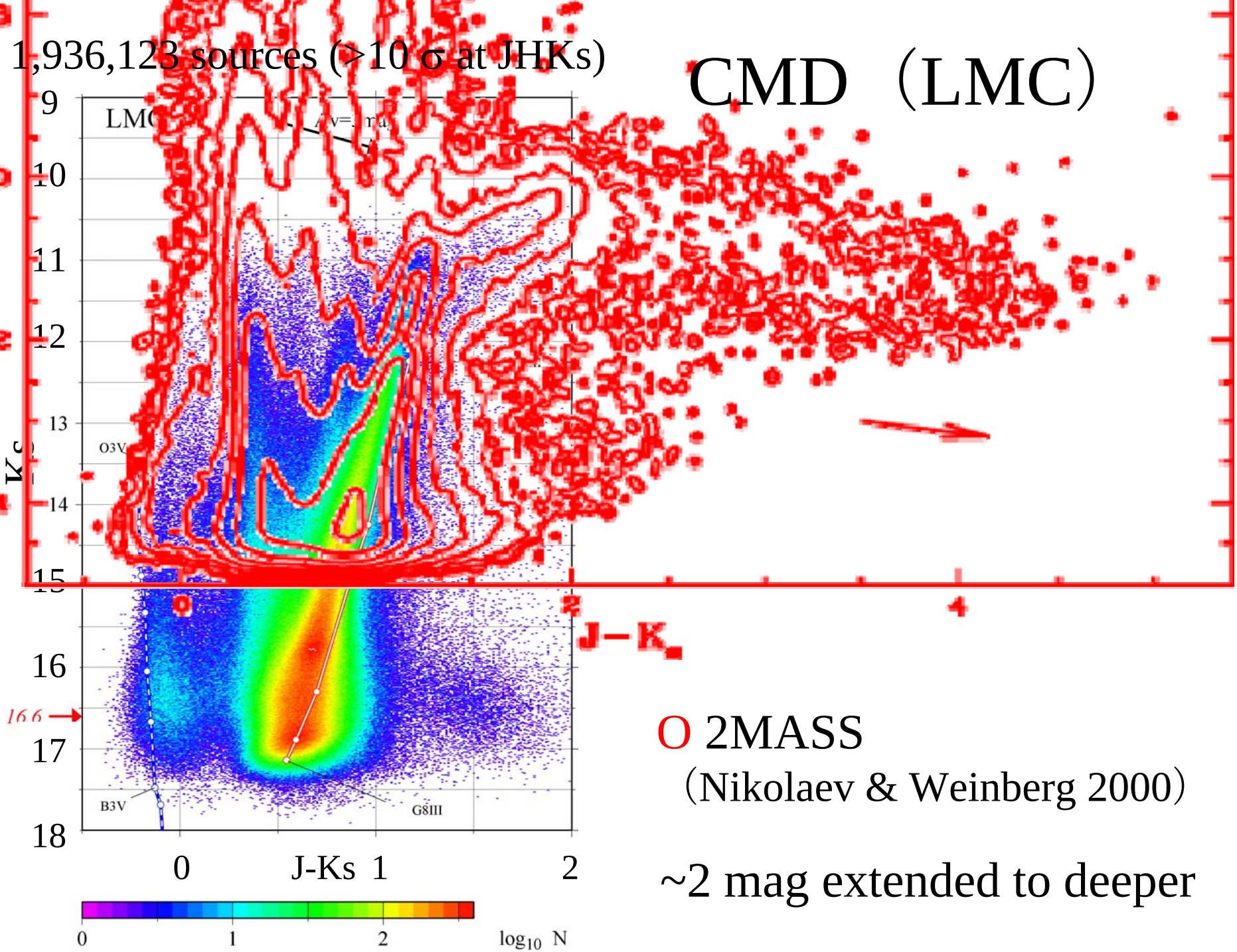
(cf. 15.7 15.3 14.7 for 2MASS)

- Accuracies
  - –Photometric accuracy : 0.03 - 0.04 mag
  - –Astrometric accuracy : 0.1 arcsec

→ What appear?

1,936,123 sources (>10 σ at JHKs)

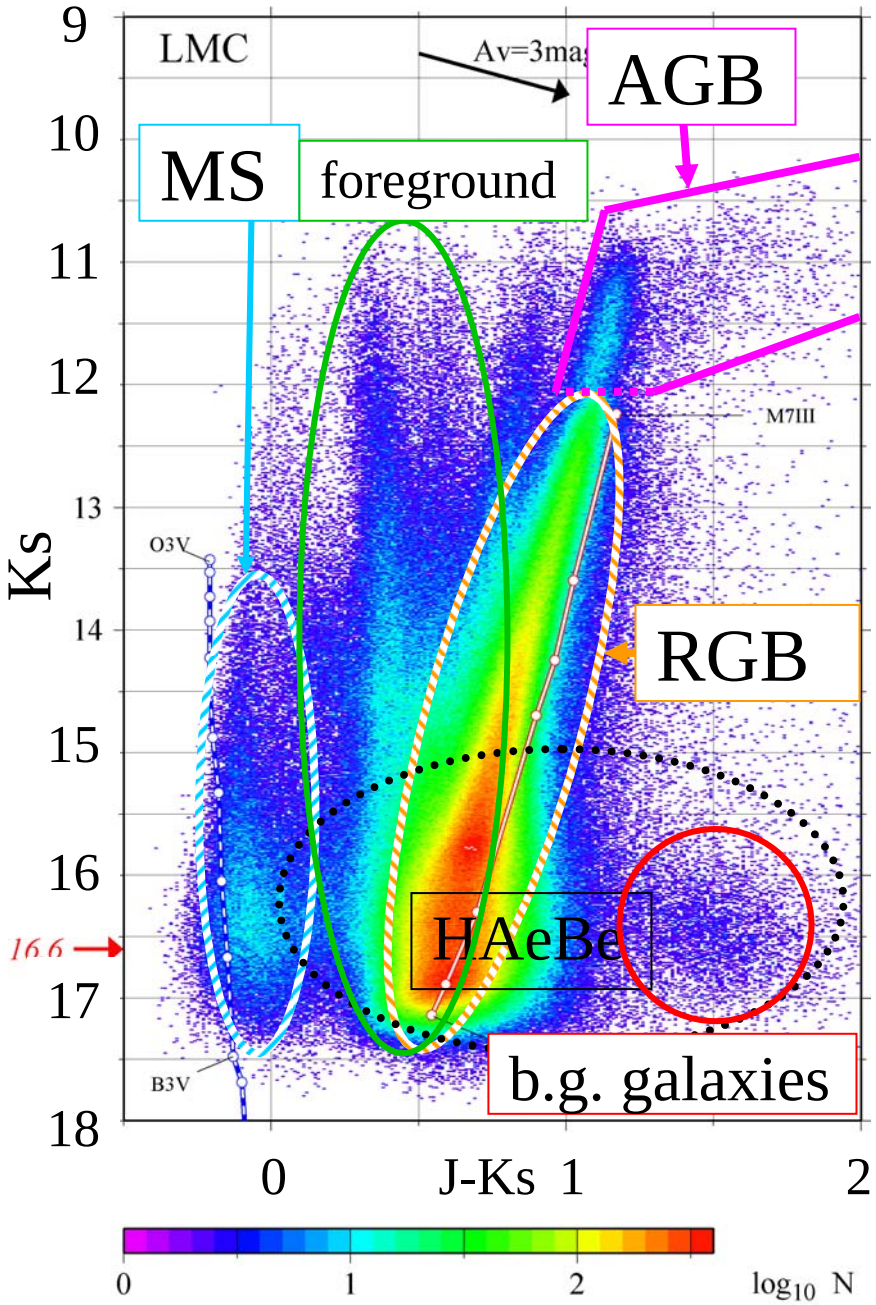
CMD（LMC）



O 2MASS
（Nikolaev & Weinberg 2000）

~2 mag extended to deeper

1,936,123 sources (> 10 σ at JHKs)



CMD（LMC）

Features

- O Main Sequence
- O RGB
- O AGB stars
- O Galactic foreground
- O background galaxies

(O HAeBe stars)

→ Color-color diagram

Color-color diagram (LMC)

Populations

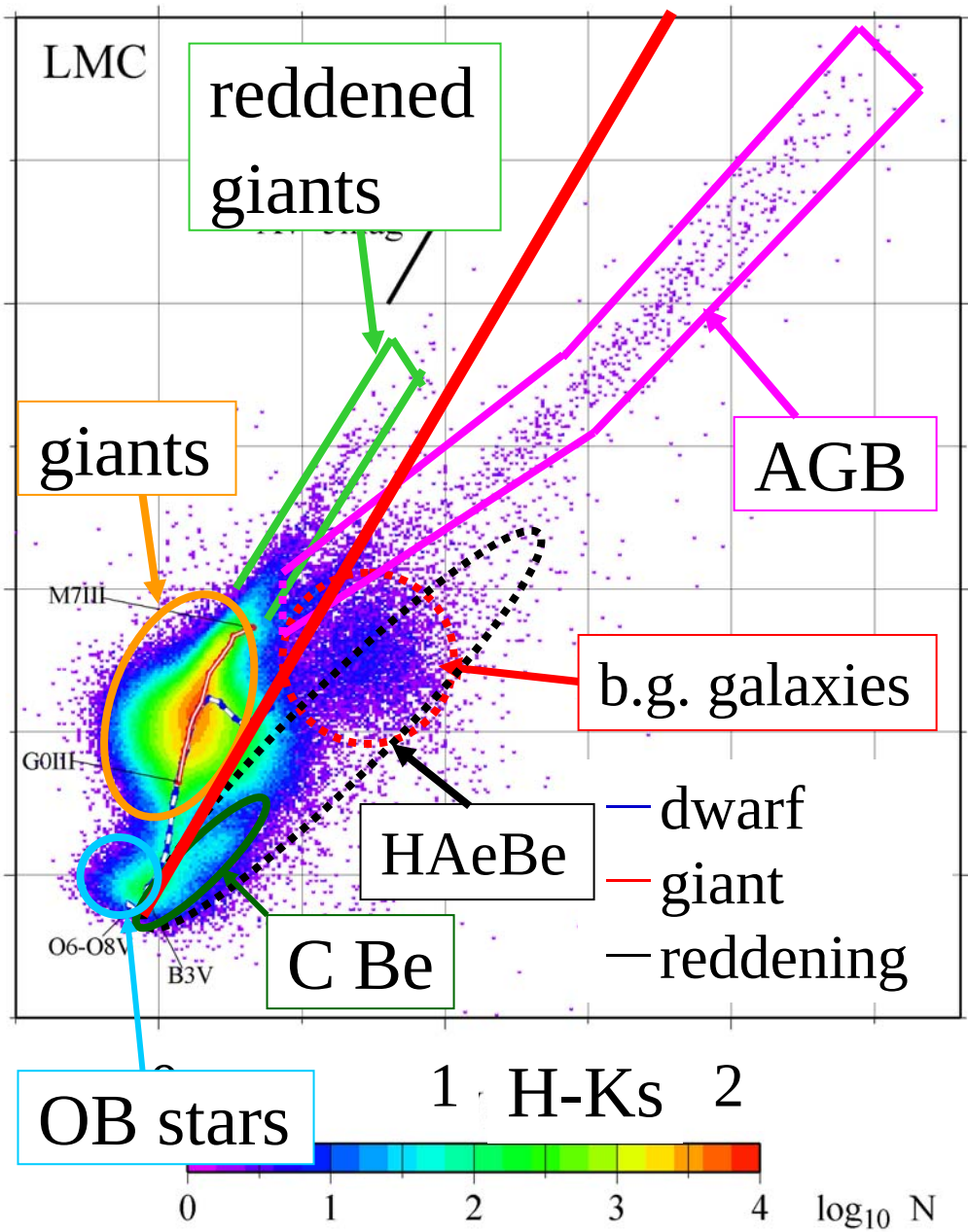
- O giants
- O AGB stars
- O O3-B2 dwarfs
- O reddened giants (Av>3)

(---) NIR-excess sources

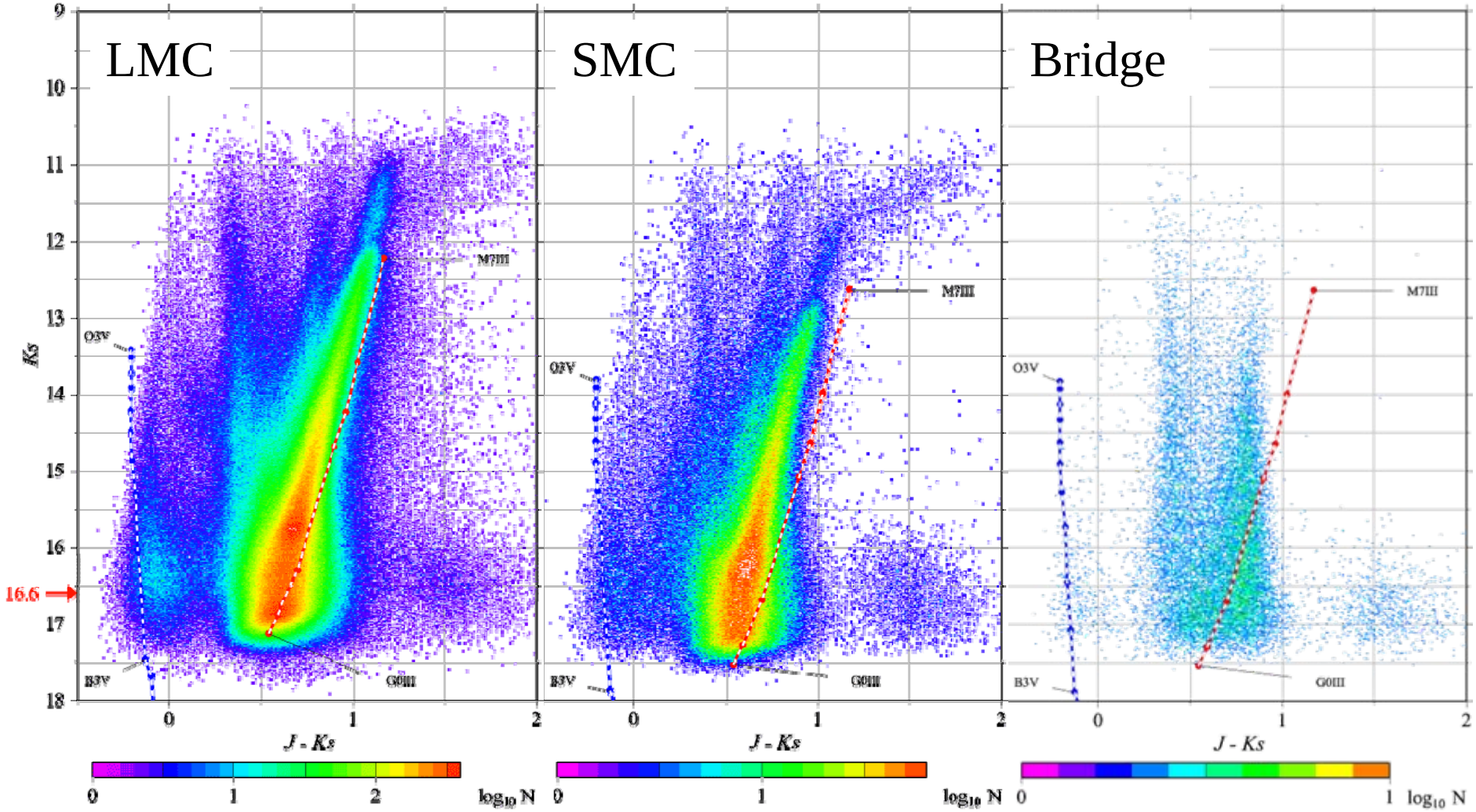
- O b.g. galaxies + HAeBe
- O Classical Be + HAeBe

(O HAeBe stars)

→How about SMC & MB?



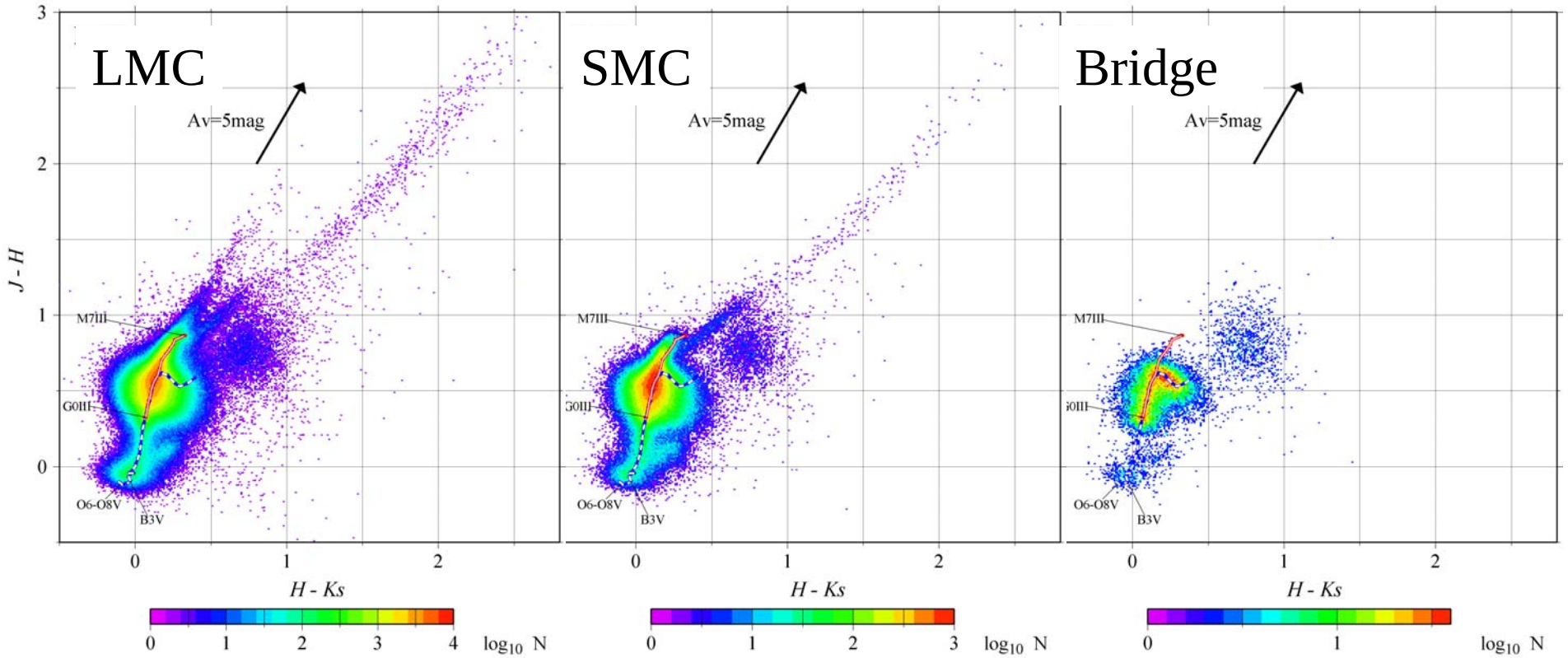
CMD : LMC, SMC, Bridge



SMC : similar to LMC

Bridge : no RGB and AGB features, Galactic foreground is dominant.

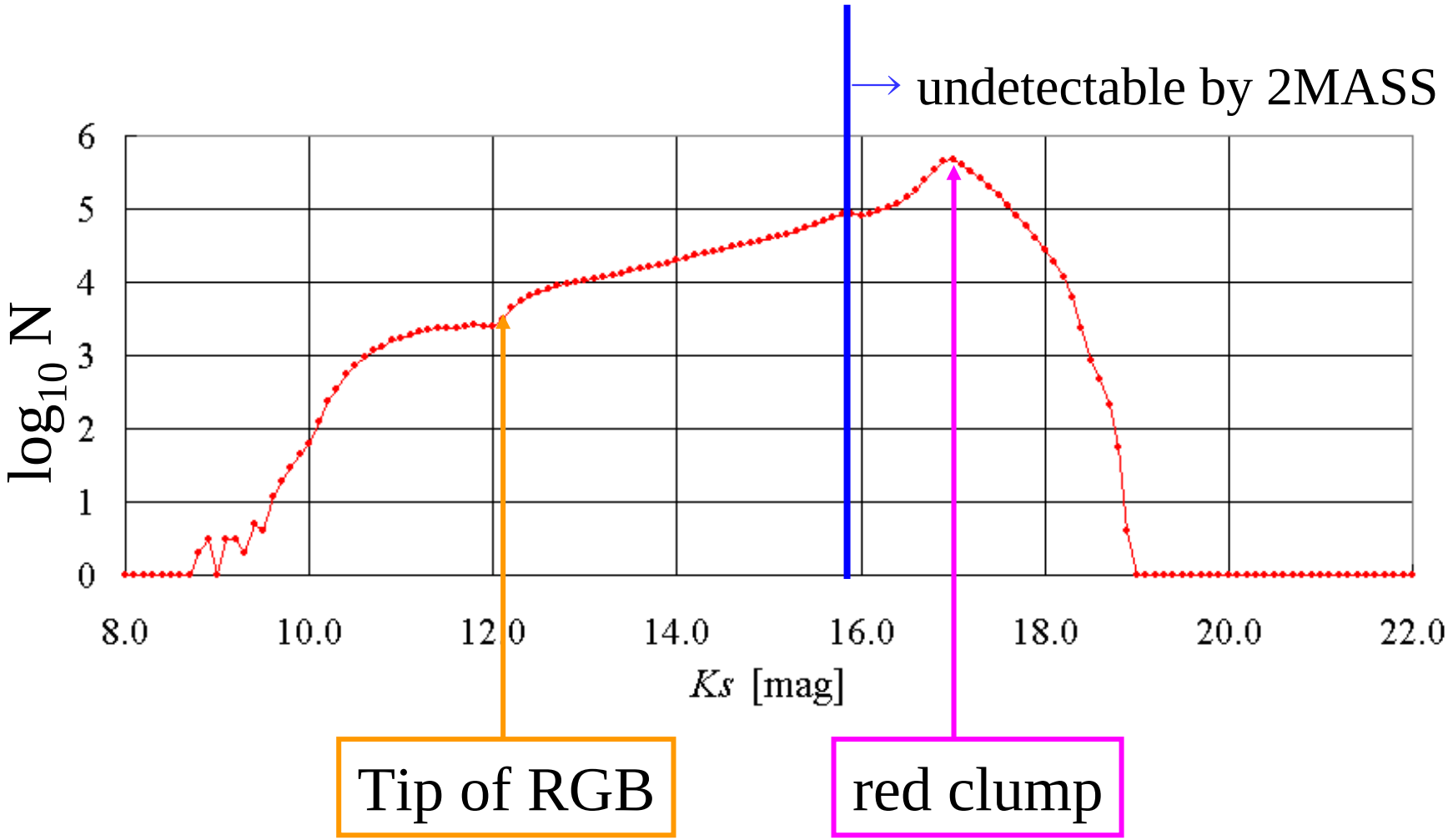
Color-color Diagram : LMC, SMC, Bridge



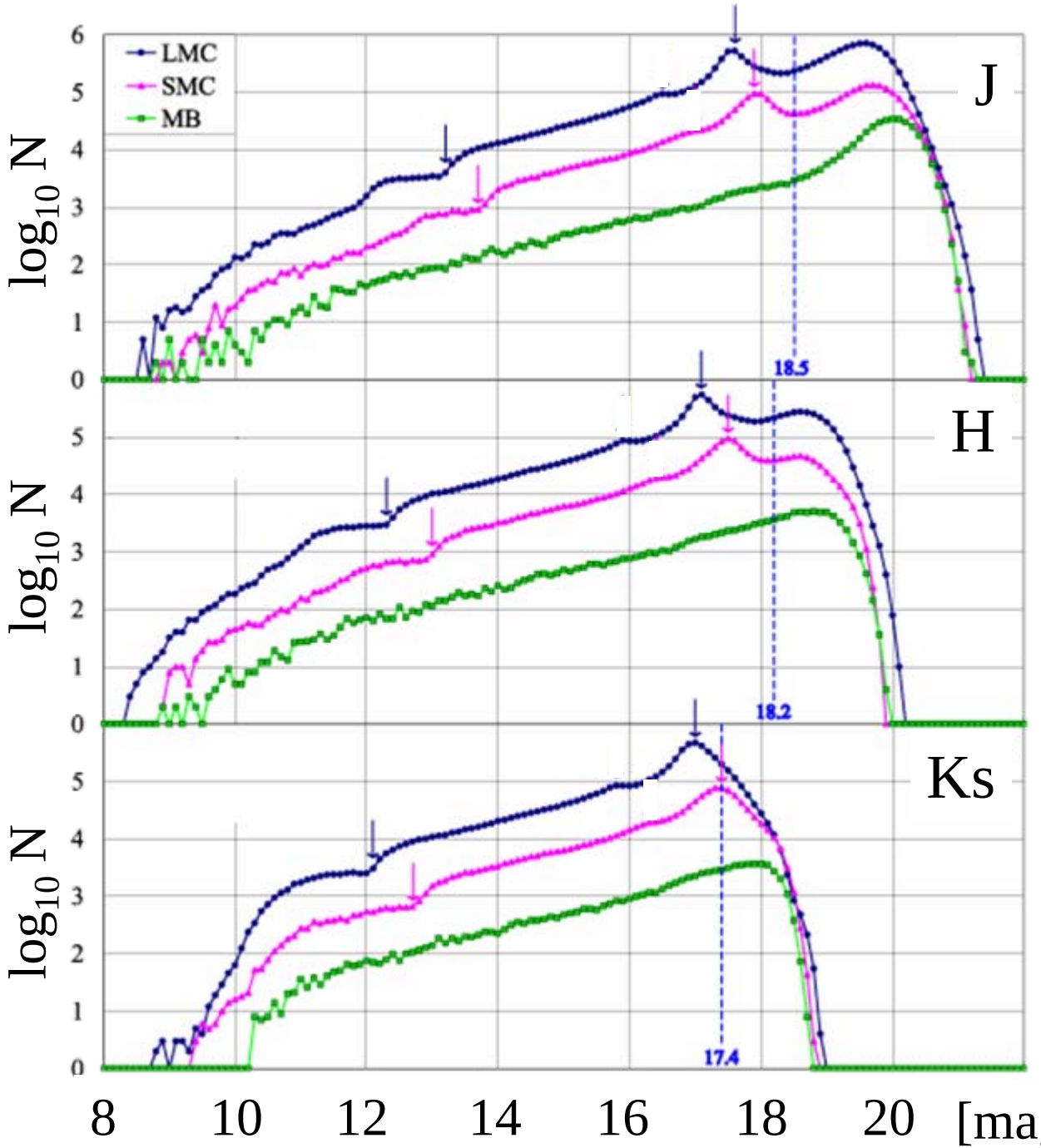
SMC： similar to LMC

Bridge：no RGB and AGB features, Galactic foreground is dominant.

Luminosity Function (LMC; Ks)



Features by T-RGB and RC



LFs

— : LMC

— : SMC

— : Bridge

RC, T-RGB:

- seen in the LMC and SMC
- not seen in the Bridge

Summary

"The IRSF Magellanic Clouds Point Source Catalog"

- a NIR point-source catalog for the MCs
- covering 55 deg^2 of the LMC, the SMC, and the MB
- ~2 mag deeper and ~2 times finer than previous surveys
- with high photometric and astrometric accuracies
  - photometric accuracy: 0.03-0.04 mag
  - astrometric accuracy: 0.1 arcsec
- including many kinds of populations

Available at web sites

ftp://dbc.nao.ac.jp/DBC/ADACnew/ or
http://pasj.asj.or.jp/v59/n3/590315

(PASJ 2007, 59, 615)