The points of caution on the FIS data

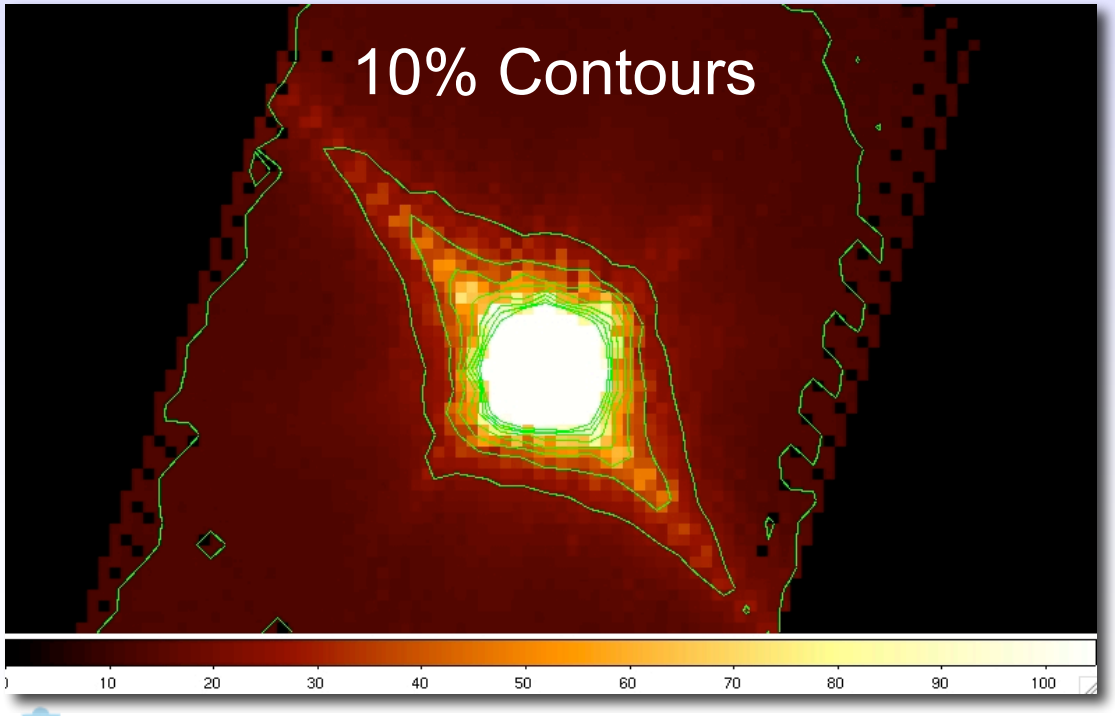
ESAC, Madrid, 18-19 September 2007
AKARI Data Reduction Workshop

Mai Shirahata (ISAS/JAXA)
Shuji Matsuura (ISAS/JAXA)
Sin'itirou Makiuti (ISAS/JAXA)
Issei Yamamura (ISAS/JAXA)

Output Image : N60 / Wide-S

Cross-talk

- Cross-talk between the array pixels appears only in the SW detector.
  - Cause: Photons diffuse into the monolithic Ge:Ga substrate.
  - The strength of the cross-talk is about 10%.



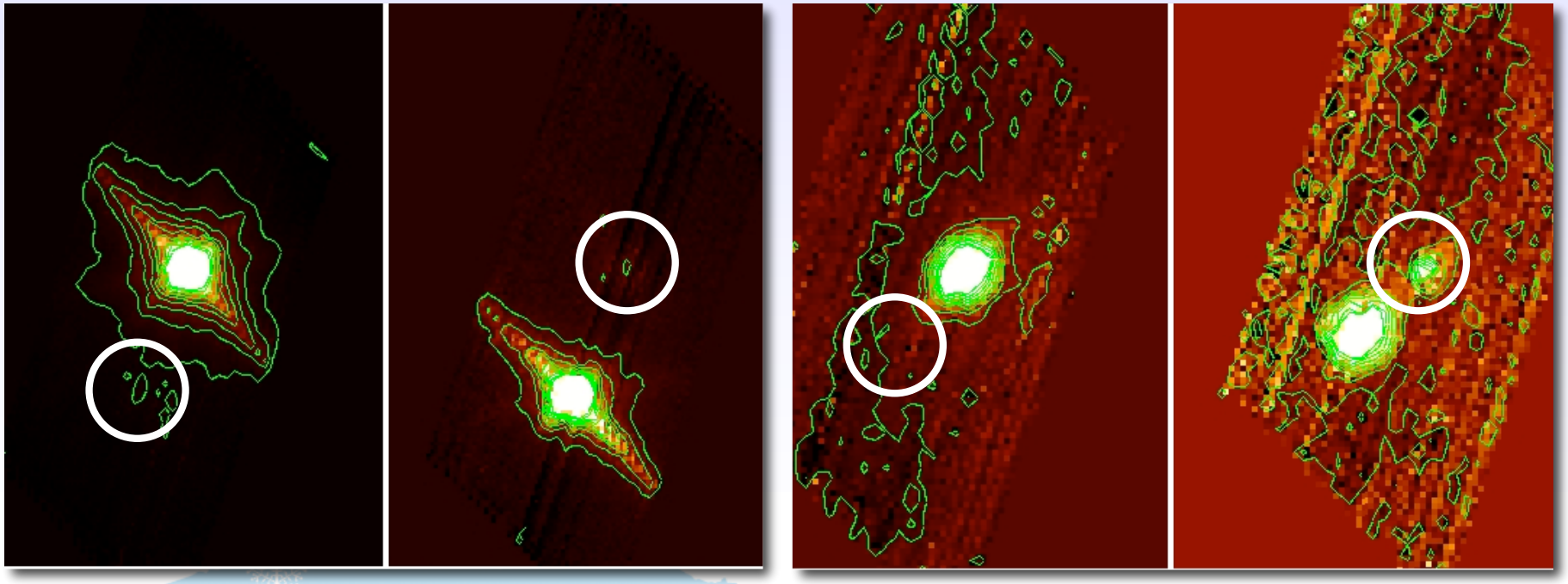
  - LW detector does not have the monolithic structure.
    → The cross-talk does not appear.

Output Image : Wide-L / N160

Ghost

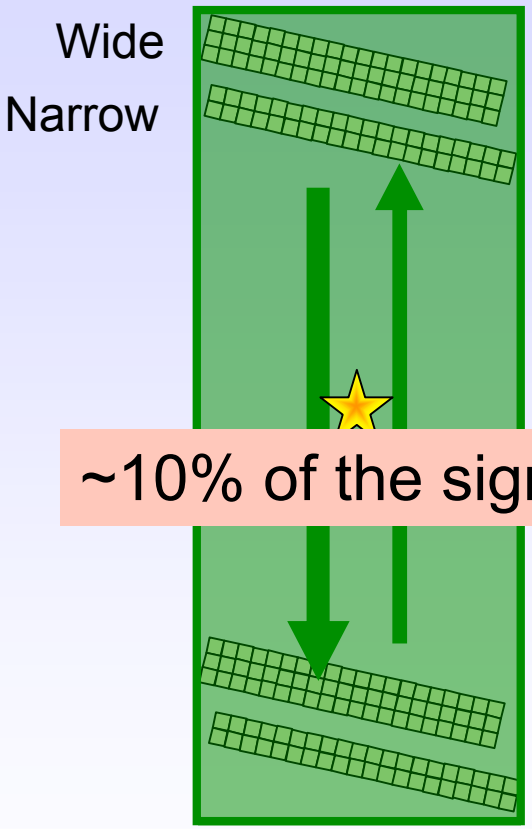
- The ghost image appears in all bands.
  - Cause: Electrical cross-talk in the MPX of the CRE.
  - The ghost signal appears in wide(narrow) band, when the narrow(wide) band observes a target.

    Wide-S ⟷ N60 Wide-L ⟷ N160

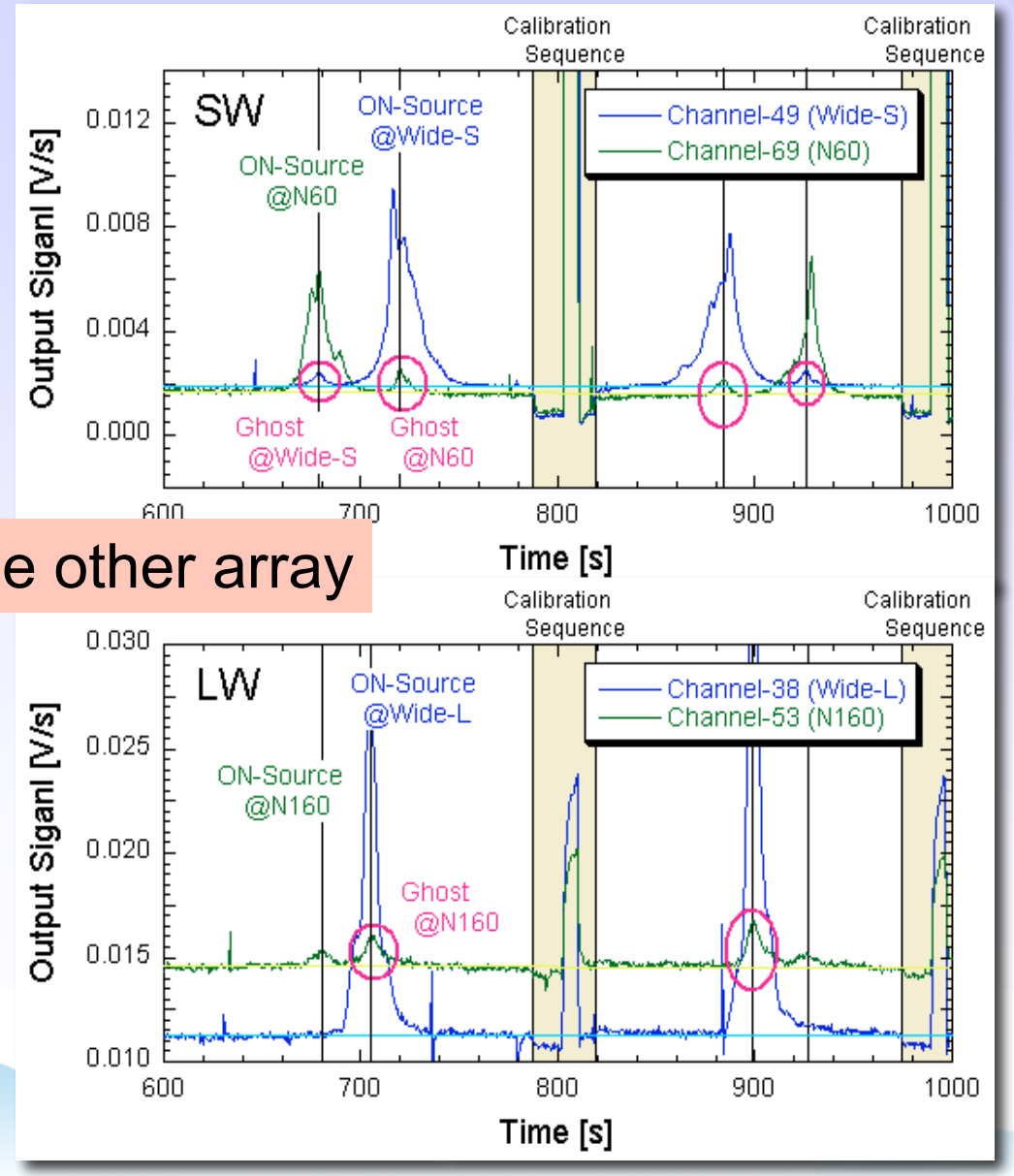


Ghost

SW/LW detector have two arrays.



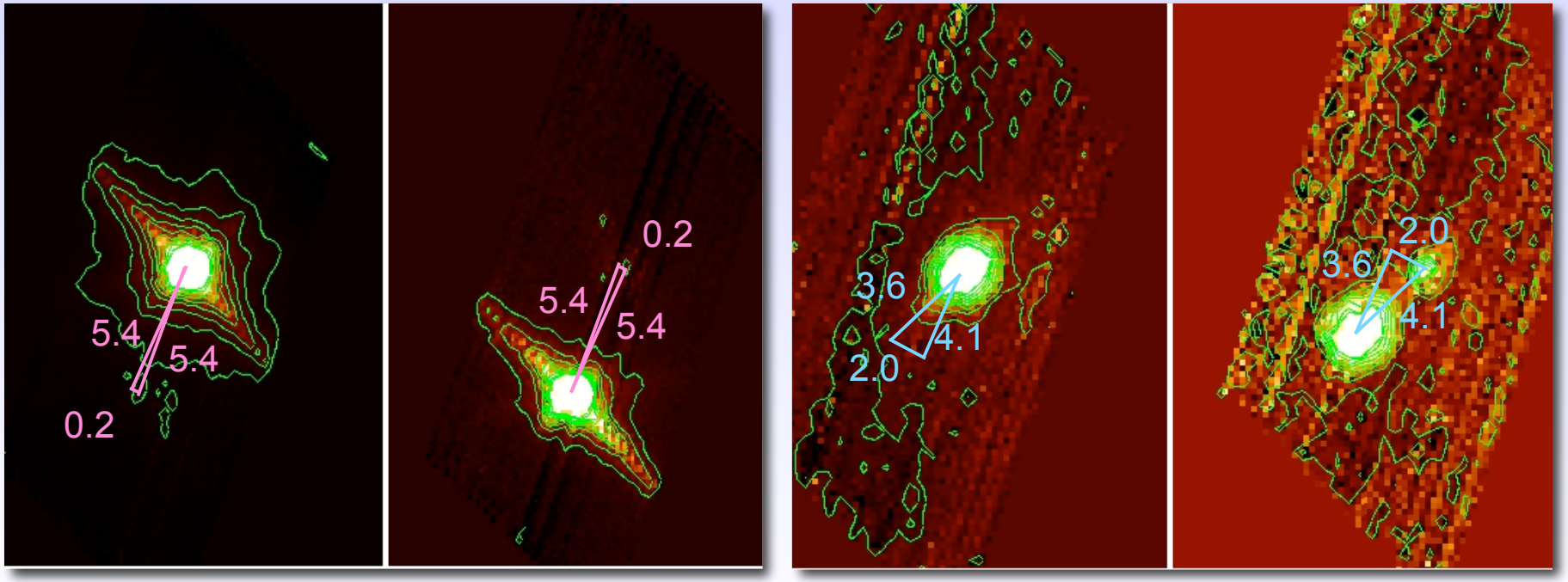
~10% of the signal in the other array



The ghost signal appears in one array when the other array observes a target.

Ghost

- The ghost image appears in all bands.
  - Cause: Electrical cross-talk in the MPX of the CRE.

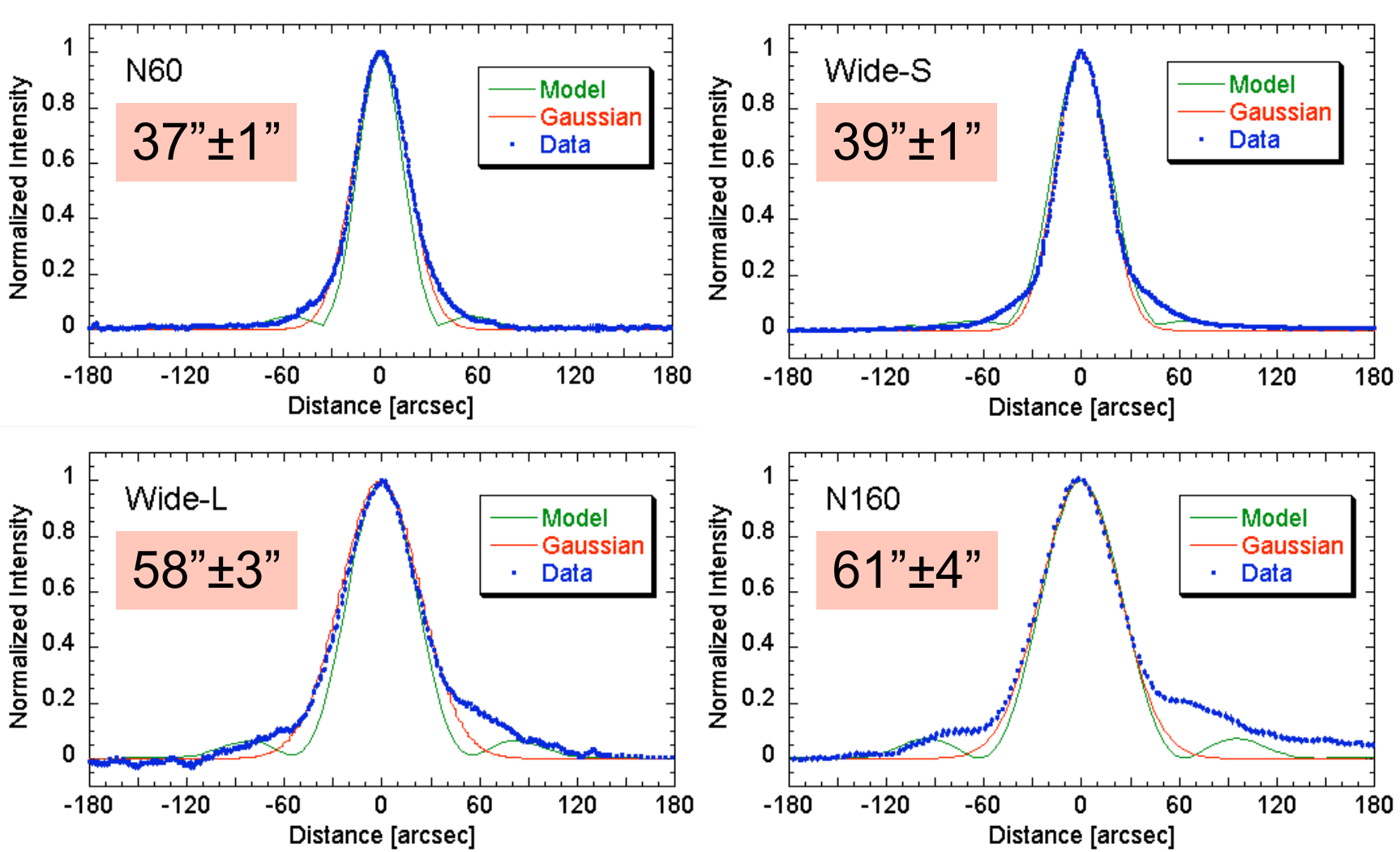


  - The position where the ghost appears can be calculated.
  - The position and strength are stable.

    → possible to remove it. (will be developing)

Point Spread Function (PSF)

- The PSF of each band measured by the asteroids observations.



- There are significant excesses around tails of the PSFs.
- The contributions are about 30% of the total power.

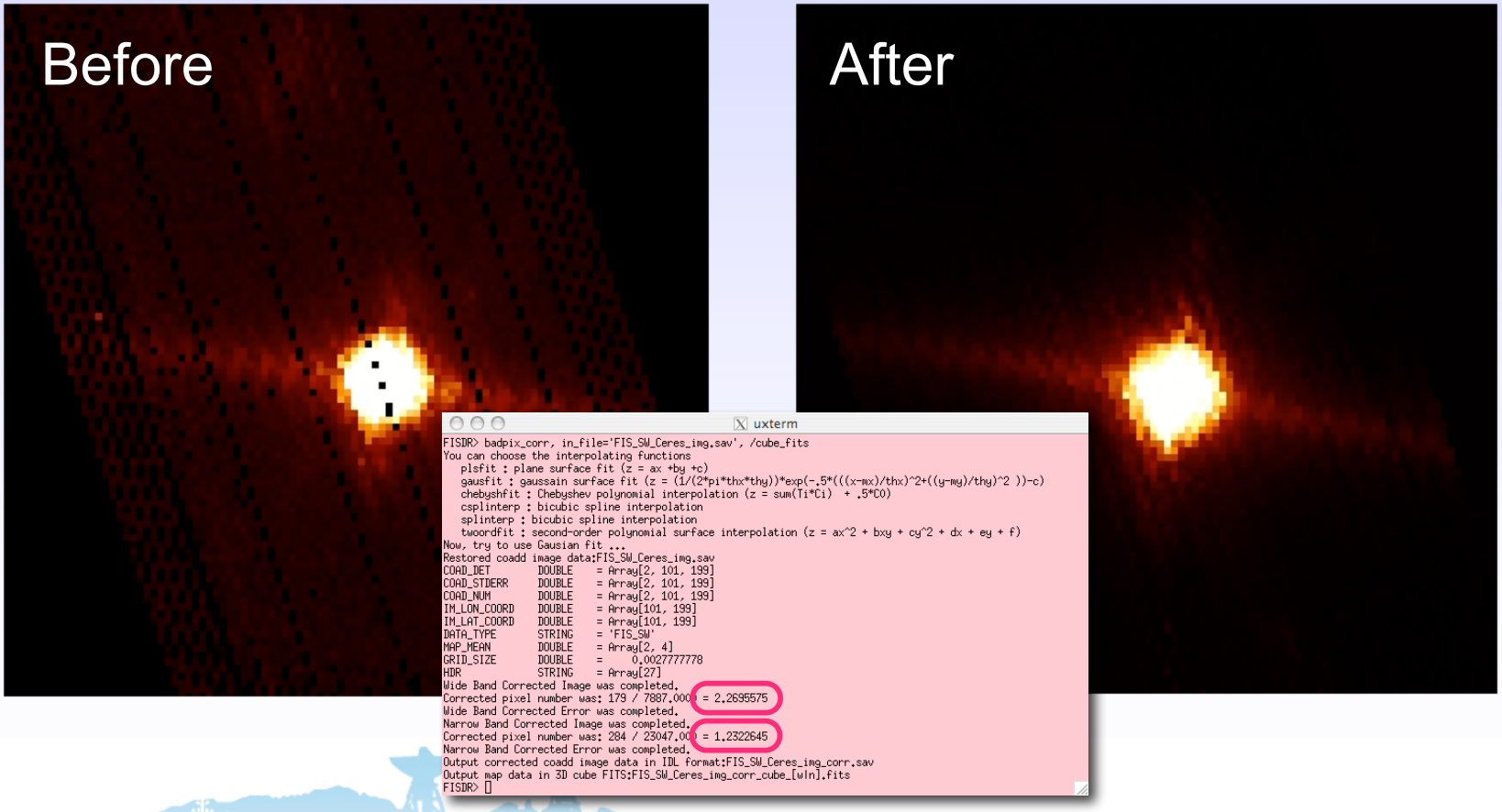
The advanced tools

ESAC, Madrid, 18-19 September 2007
AKARI Data Reduction Workshop

Mai Shirahata (ISAS/JAXA)
Shuji Matsuura (ISAS/JAXA)
Sin'itirou Makiuti (ISAS/JAXA)
Issei Yamamura (ISAS/JAXA)

Bad Pixel Correction Tool

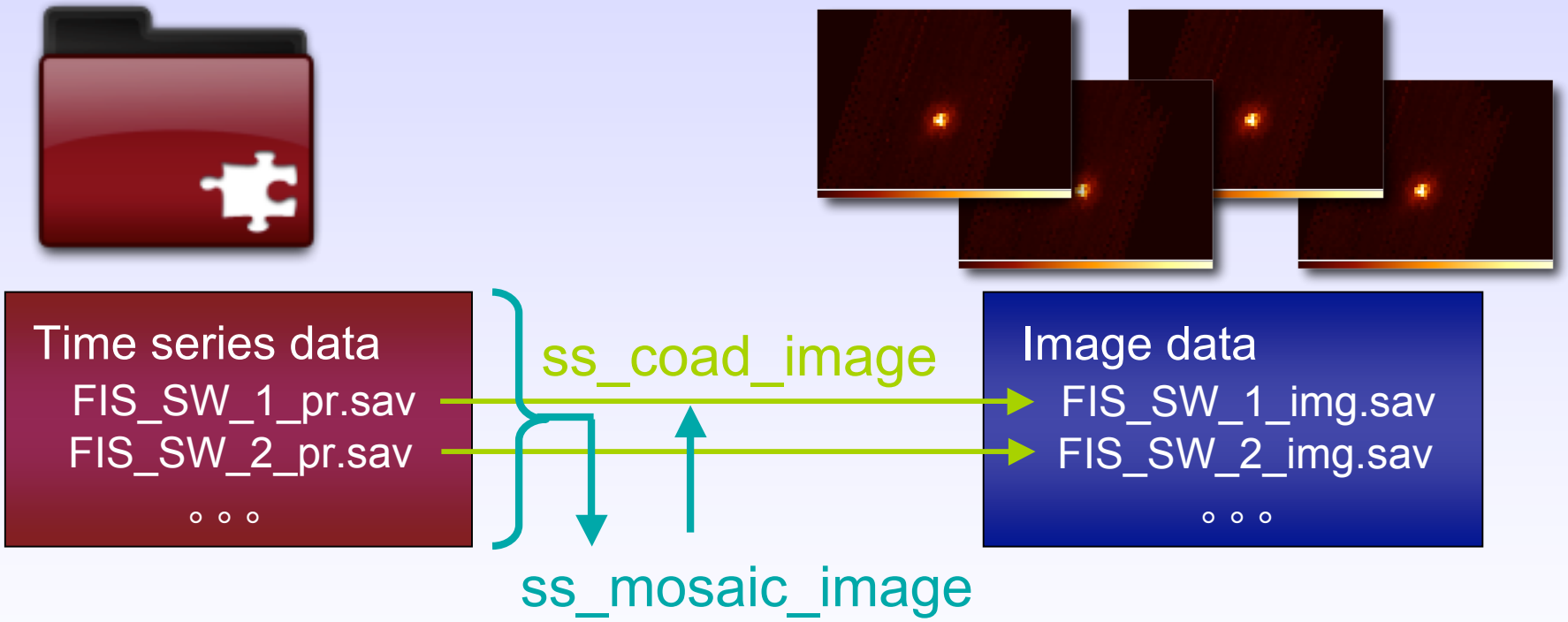
- badpix_corr, in_file='FIS_SW_**_img.sav', [func='', /cube_fits]



- Please check the fraction of the corrected pixels !!

Image Combining Tool

- **ss_mosaic_image** (previously known as ss_multi_scan_map2)
  make wide/deep image map with combining the multi-scan data



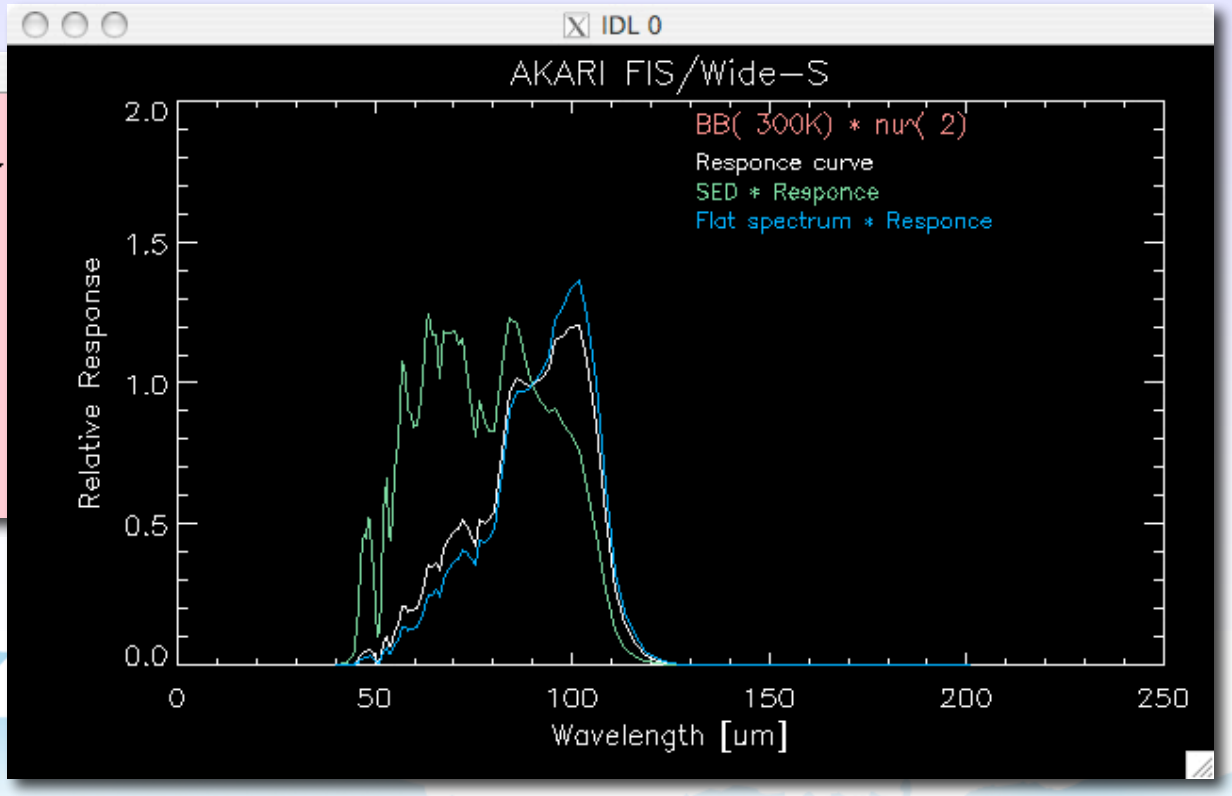
- ss_mosaic_image, targetdir, [SIGMA=sigma, T_START=t_start, T_END=t_end,
  GRID_SW(LW) = grid_sw(LW), /cube_fits, tag_name=‘ * ‘, /no_display, **/aot_mix**
  LON_CENTER = lon_center, LAT_CENTER = lat_center,
  LON_SIZE = lon_size, LAT_SIZE = lat_size,
  ECLIPTIC = ecliptic, GALACTIC = galactic,

Color Correction Factor Tool

- The FIS photometric flux is defined for a flat spectrum at the defined central wavelength of each band.
  → Color correction is necessary.
- Color_corr, band, factor, bb=[temp,beta] or power=[alpha], [,/check]
  (N60=0, Wide-S=1, Wide-L=2, N160=3)

uxterm

```
FISDR> color_corr
# USAGE #
color_corr, band, bb=[temp,beta] or power=[alpha] [,
band      : 1=N60, 2=Wide-S, 3=Wide-L, 4=N160
spectrum  : Blackbody or Power Law
            Blackbody  : bb=[temp,beta]
            Power Law  : power=[alpha]
factor    : color correction factor (output)
/check    : display the responce graph
FISDR> color_corr, 1, bb=[300,2], /check
Read FIS_RSRF_070122.txt file
--- Wide-S band ---
Blackbody Spectrum : temperature = 300(K), beta = 2
d_nu_flat : 1.5327850 (THz)
d_nu_SED  : 3.0759437 (THz)
Color correction factor : 2.0067678
FISDR> []
```



Aperture Photometry

Images are in brightness scale units of MJy/sr.

The absolute calibration has been done by
the zodiacal light for SW and IR cirrus for LW.

Aperture photometry should give the flux of the sources in Jy.

As the flux calibrator, 19 asteroids, 20 stars and 18 galaxies were observed.

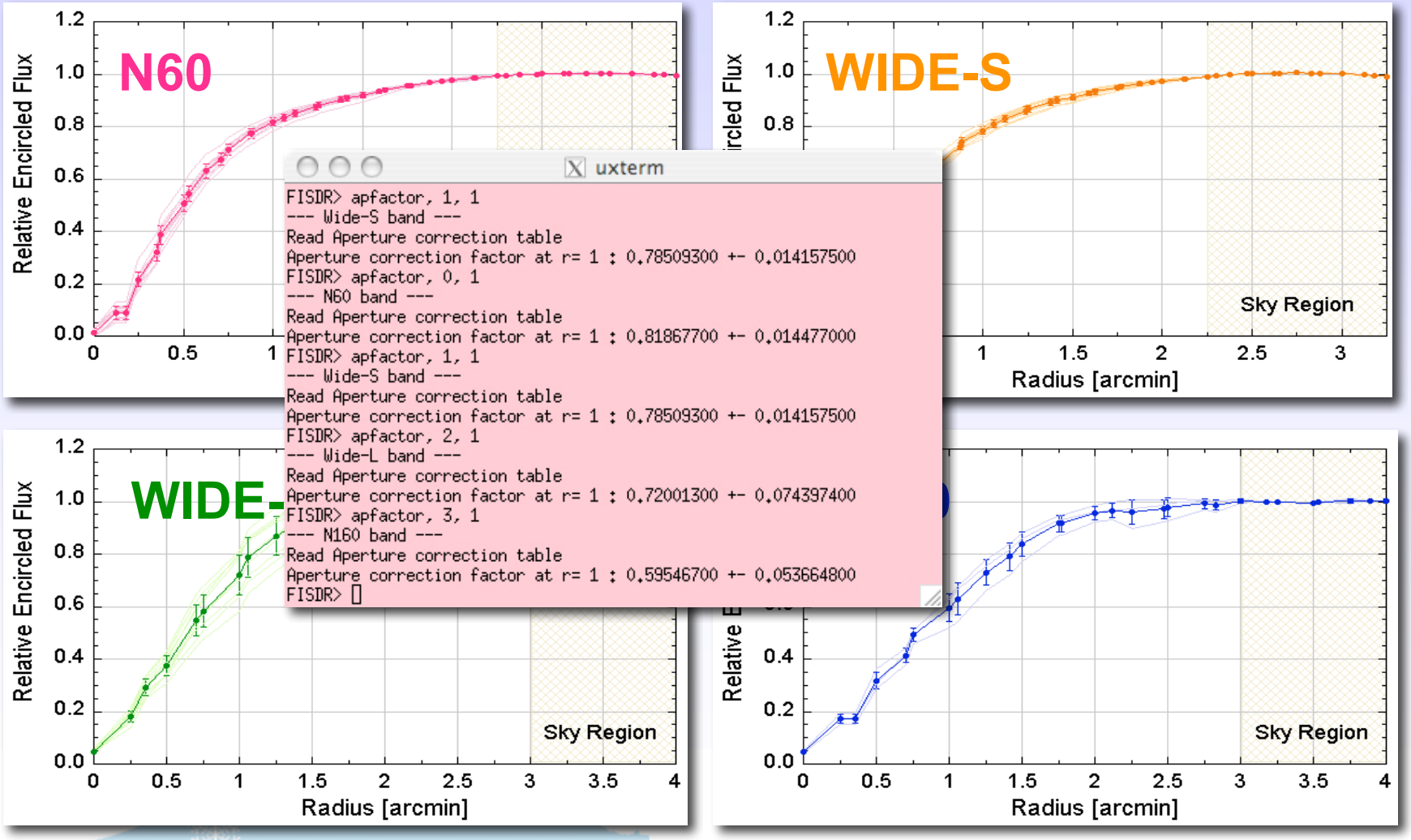
The define of the sky area

SW = 2.25-3.25 [arcmin], LW = 3.00-4.00 [arcmin]

The results of aperture photometry are …

Aperture Correction Factor Tool

- From this plot, we can get the aperture correction factor.



- apfactor, band, radius[arcmin], factor, factor_error

Aperture Photometry

Images are in brightness scale units of MJy/sr.

The absolute calibration has been done by
the zodiacal light for SW and IR cirrus for LW.

Aperture photometry should give the flux of the sources in Jy.

As the flux calibrator, 19 asteroids, 20 stars and 18 galaxies were observed.

The define of the sky area

SW = 2.25-3.25 [arcmin], LW = 3.00-4.00 [arcmin]

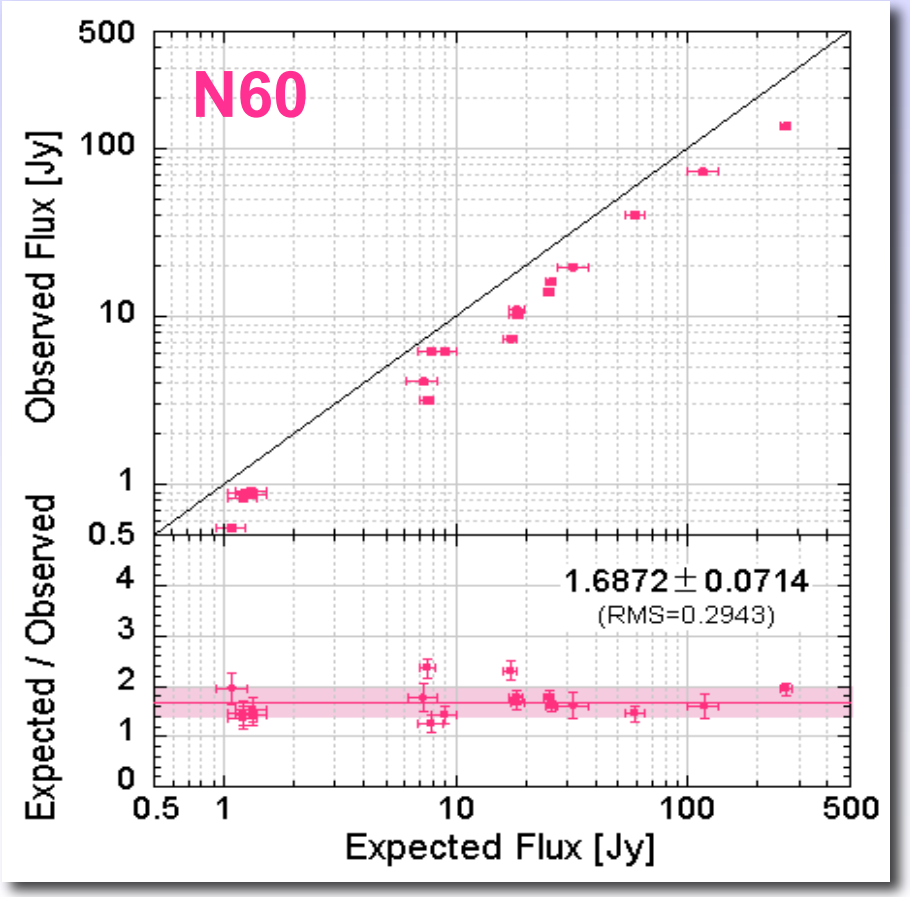
The results of aperture photometry are …

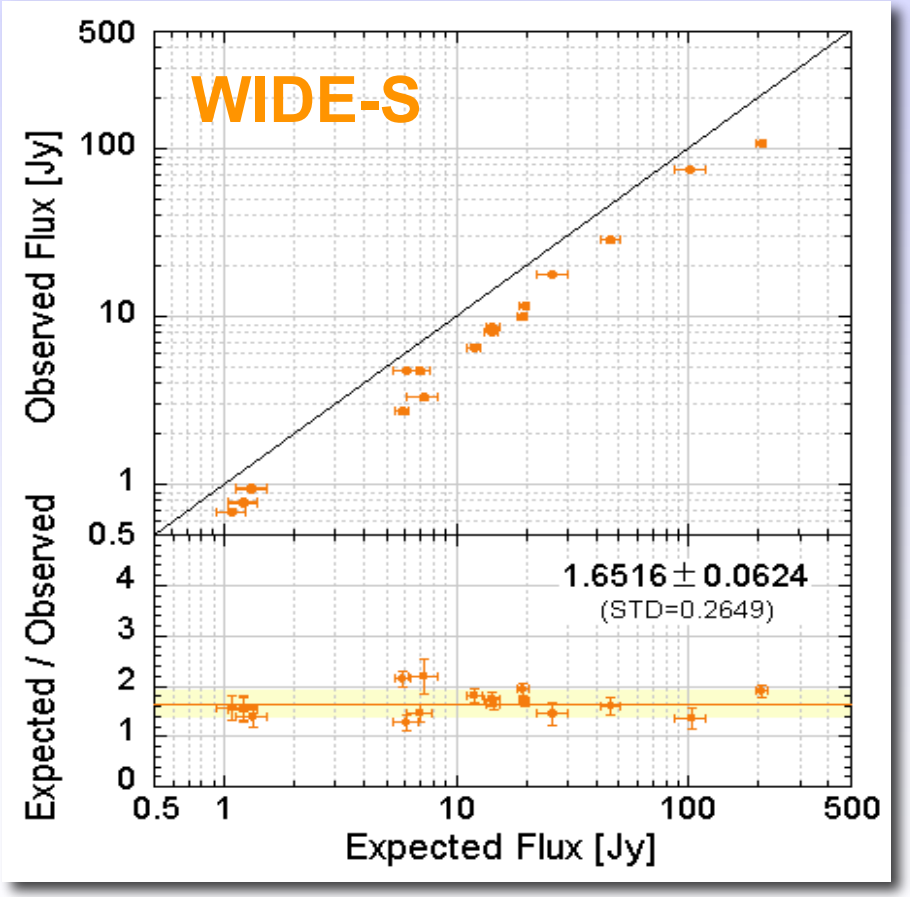
This aperture correction table may depend on
the grid size of image,
AOTs such as reset interval and scan speed,
the data reduction method (the option of the ss-tool),
the sky area.

Note: The table of the current version is not well checked.
This table will be replaced in the near future.

Point source - Diffuse Factor

- The measured flux is compared with the expected flux.



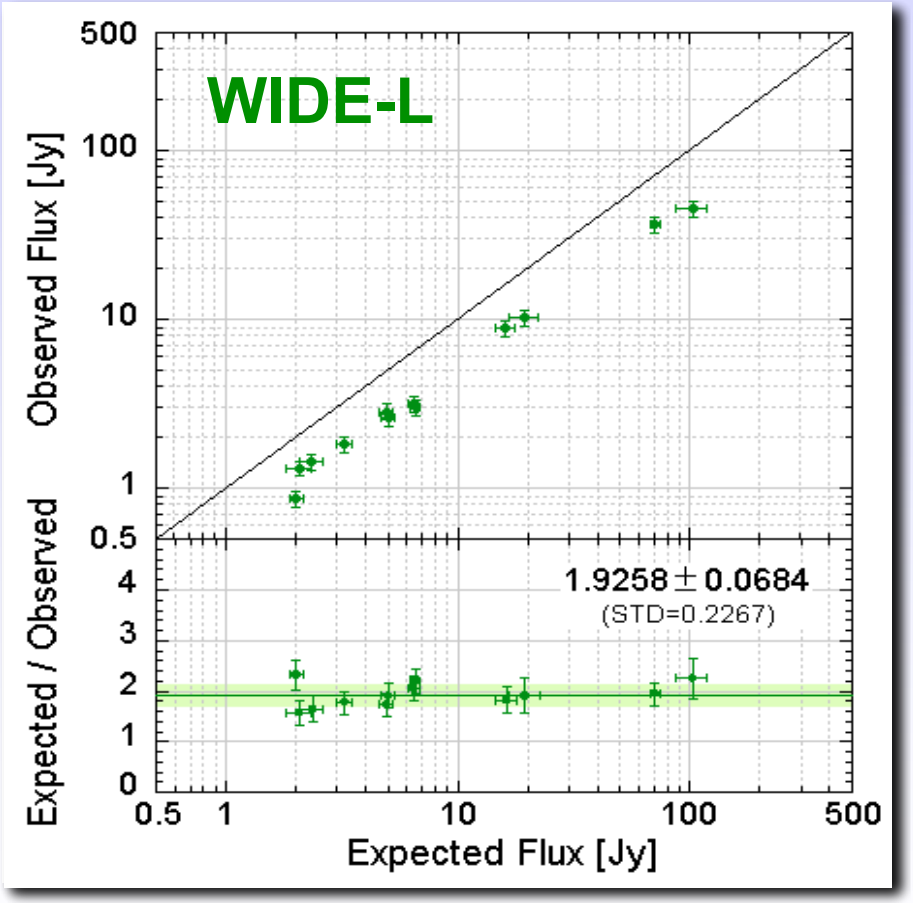


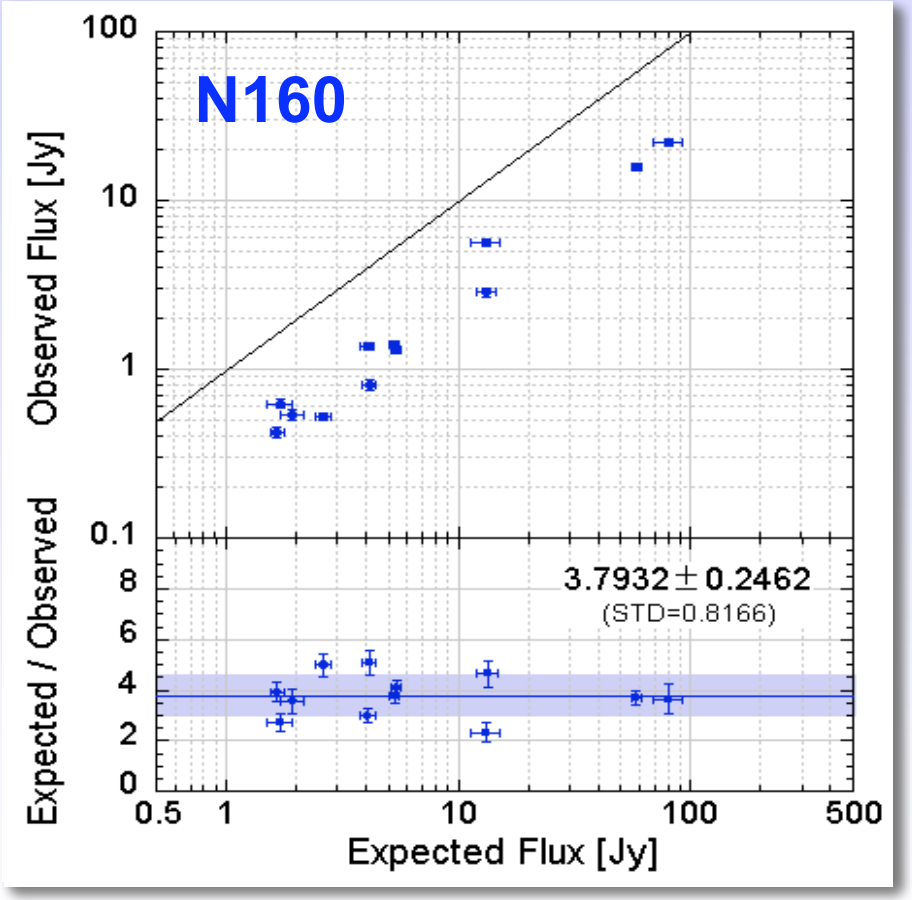
- There are systematic differences.
- This ratio seems to be constant.

  (does not depend on the source flux, the source color.)

Point source - Diffuse Factor

- The measured flux is compared with the expected flux.





- There are systematic differences.
- This ratio seems to be constant.

  (does not depend on the source flux, the source color.)