calibration of FTS FIS03 measurements from FIS01 calibrated images: first results for LW band

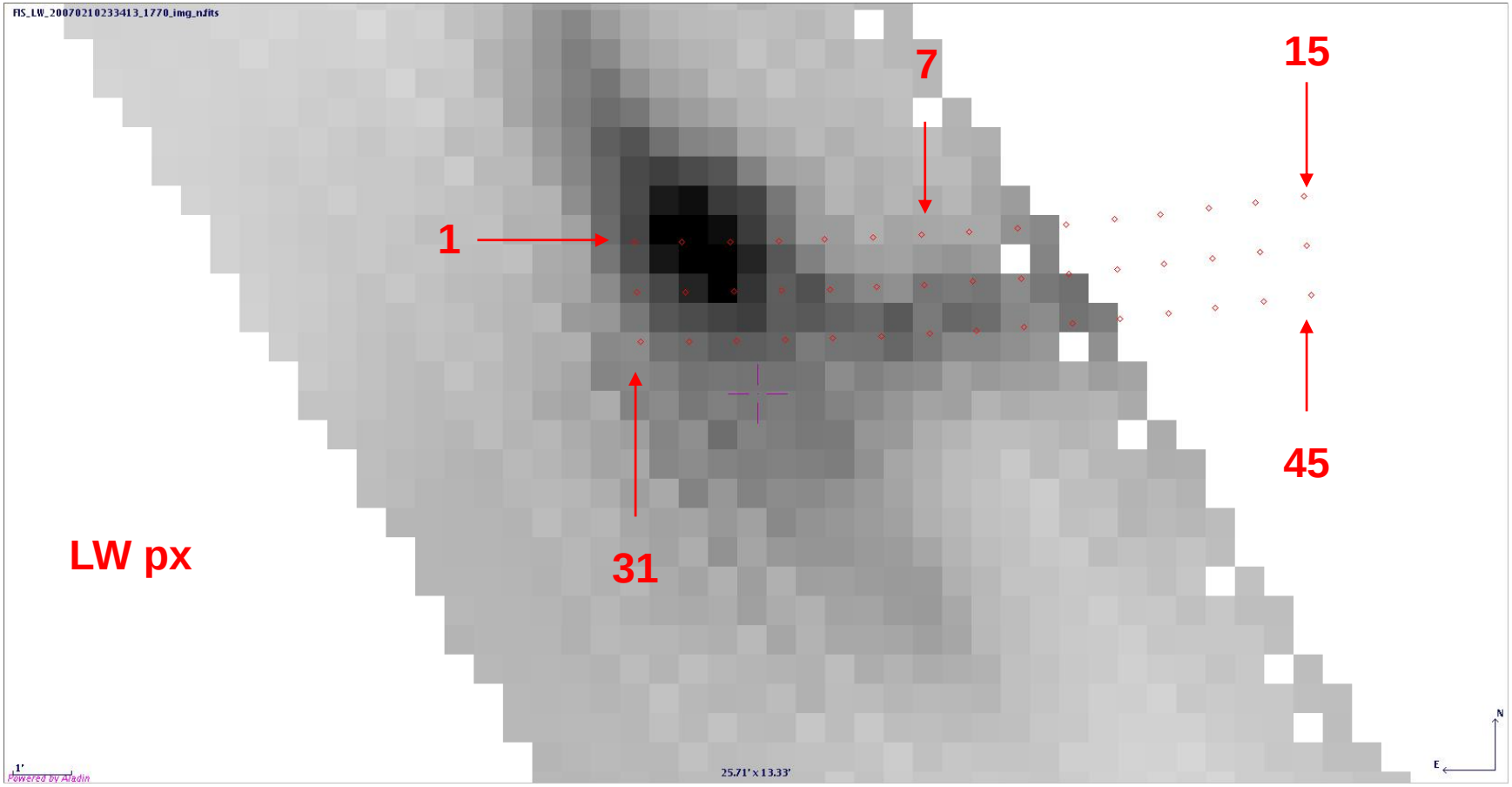
Jean-Paul Baluteau

& Annie Zavagno

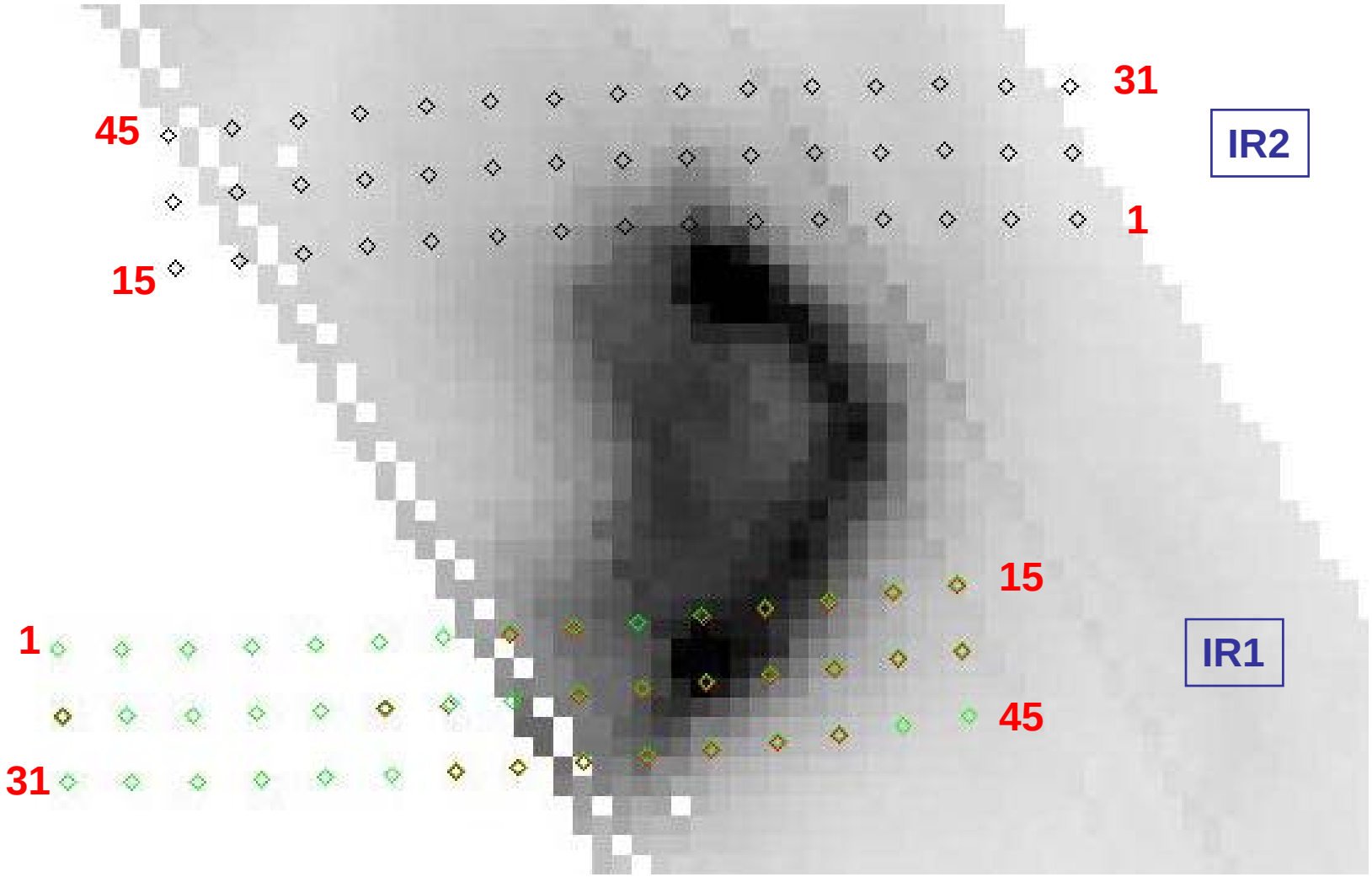
(LAM/OAMP)

OT source: RCW79IR1

FIS/FTS positions overlayed on LW-wide image



OT source RCW79: FTS positions for IR1 & IR2



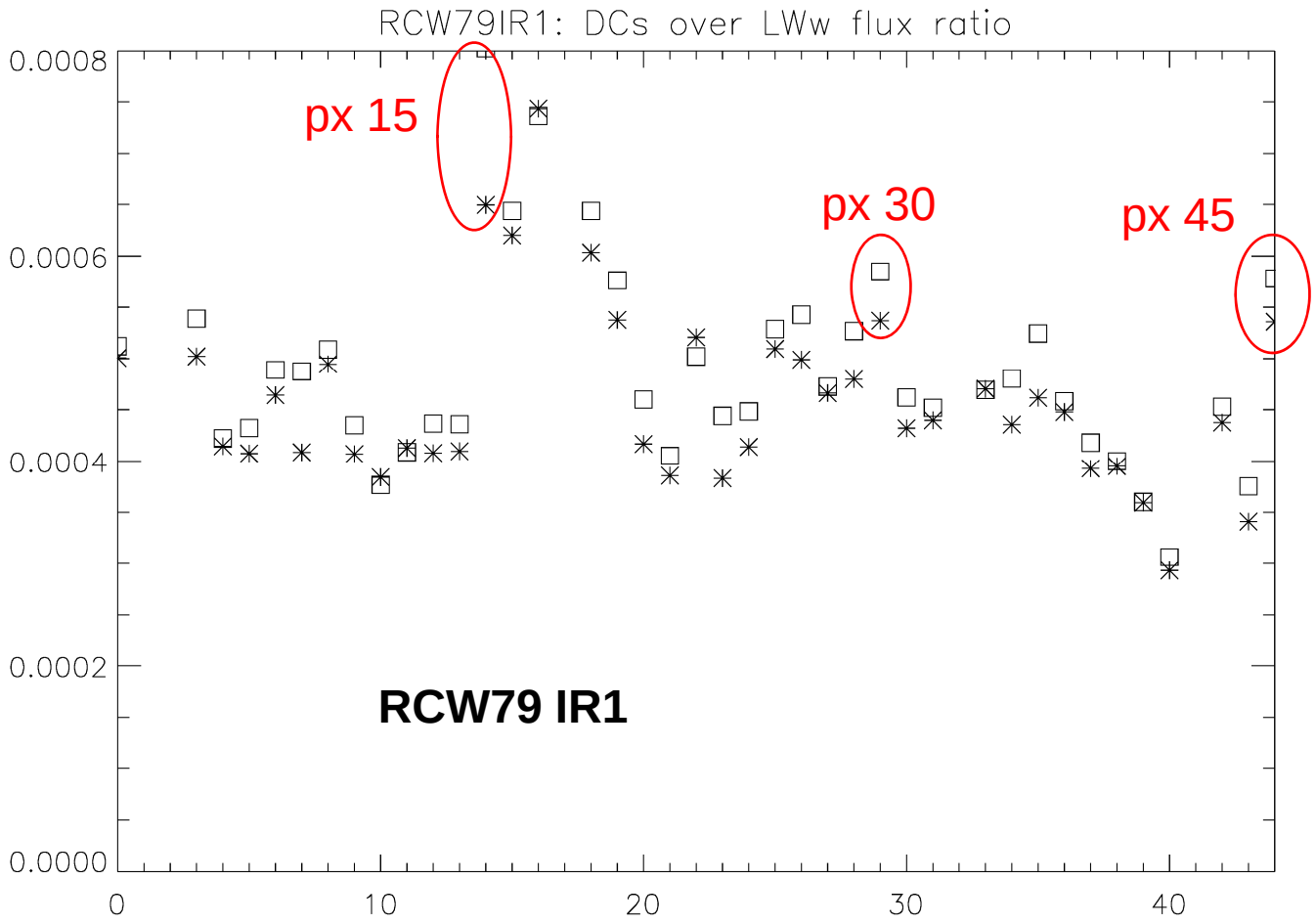
- **the results presented here are for RCW79 IR1 (2 FIS03 observations) only**
- **for each pixel the pointing coordinates (from radec_A in _part1.fits files provided by Yoko-san) is used to get the calibrated fluxes from FIS01 images**
- **only the FIS01 image pixel which includes the FIS03 pixel coordinates is used (i.e. no correction is done to take account of the different pixel sizes, 30" & 50" for FIS01 & FIS03 respectively, and of the PSFs)**
- **where two FIS03 images are available the averaged value is used**

➔ **uncertainties in FIS03 images photometric calibration ?**

➔ **the next plots compared the DC values from FIS03 data to LWw FIS03 image calibrated fluxes**

[here DC value means source DC (from _part1.fits file) minus Dark normalized with DC(calibration) minus Dark]

FTS DC values compared to LWw image fluxes (I)



plot of DC values over LWw fluxes vs pixel number

first conclusions:

- **except for very few pixels the jitter in the ratio values is about +/- 30%**
- **the plot is done assuming a uniform illumination of the calibration source over the whole array**

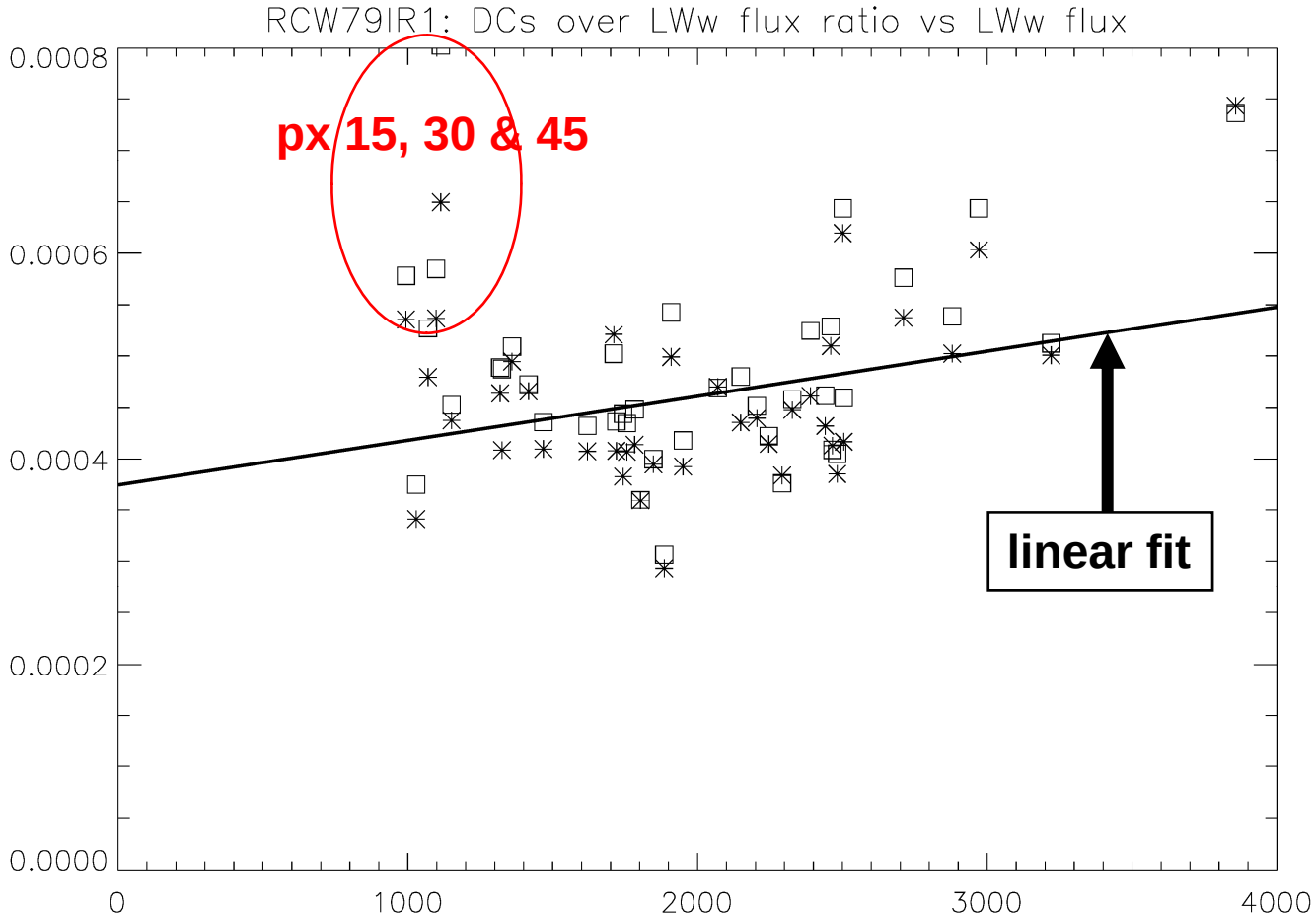
  (this is likely not the case)
- **funny results for the last pixel in each detector row (?) :**

  a jump is seen between the last pixel and the preceeding one

- **could other features be due to a source strength effect ?**

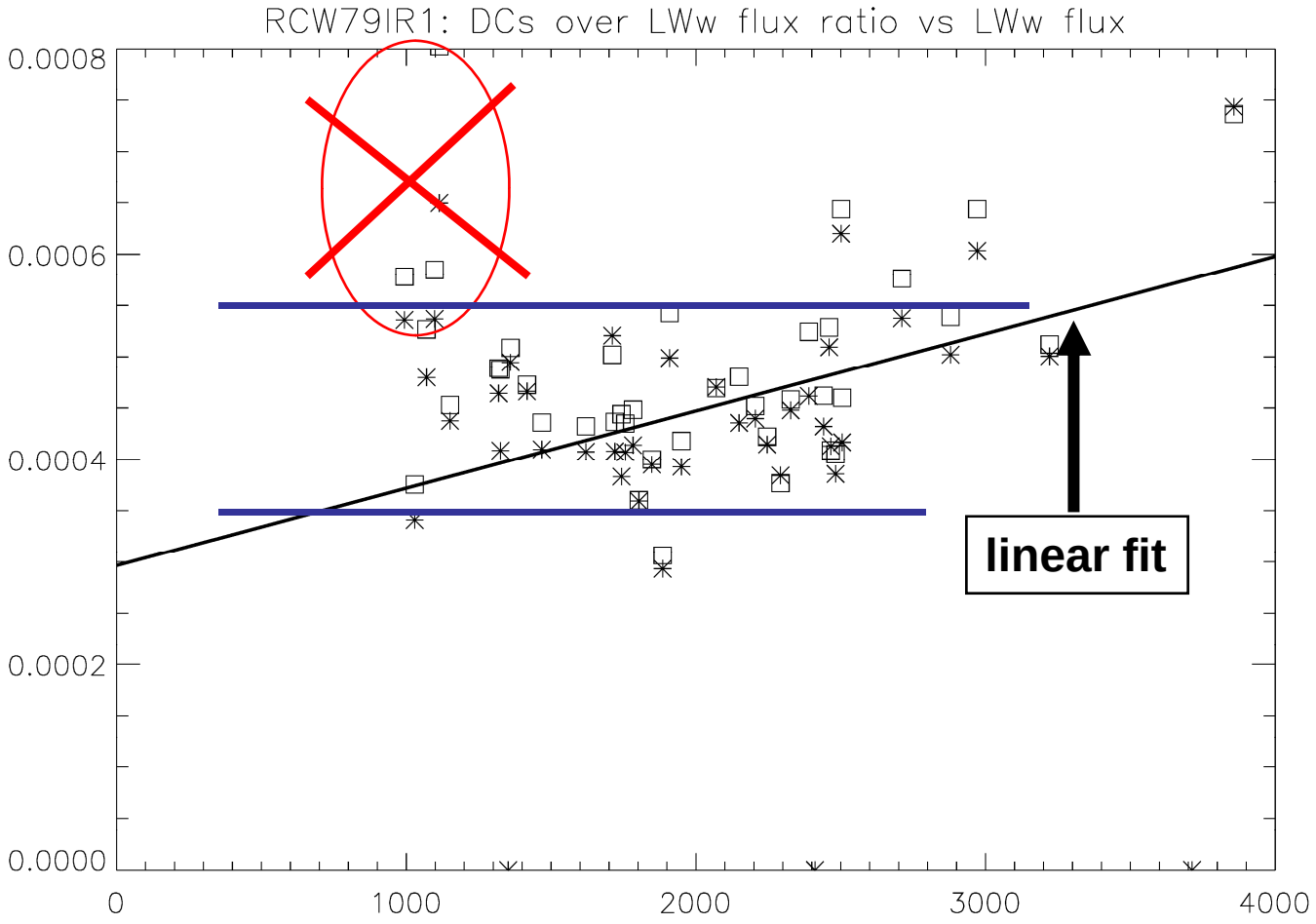
  ➔ we investigated this question (results in next plots)

FTS DC values compared to LWw image fluxes (II)



plot of DC values over LWw fluxes vs LWw fluxes

FTS DC values compared to LWw image fluxes (III)



plot of DC values over LWw fluxes vs LWw fluxes
with pixels 15, 30 & 45 excluded

second conclusions:

- **a trend seems to be seen from low to high source strength**

  ➔ is this trend due to some non-linearity effect in LWw data ?
- **again the last pixel in each row looks to depart significantly from the general trend (?)**
- **need to correct for "not uniform illumination" to get better insight on the trend *(how to get this information ?)***
- **final jitter looks much better (+/-20% or better)**

➔ reduction of the data from the 5 other observations would provide a better knowledge of this apparent trend (TBD soon)

➔ what to do to improve this analysis ?

calibration strategy

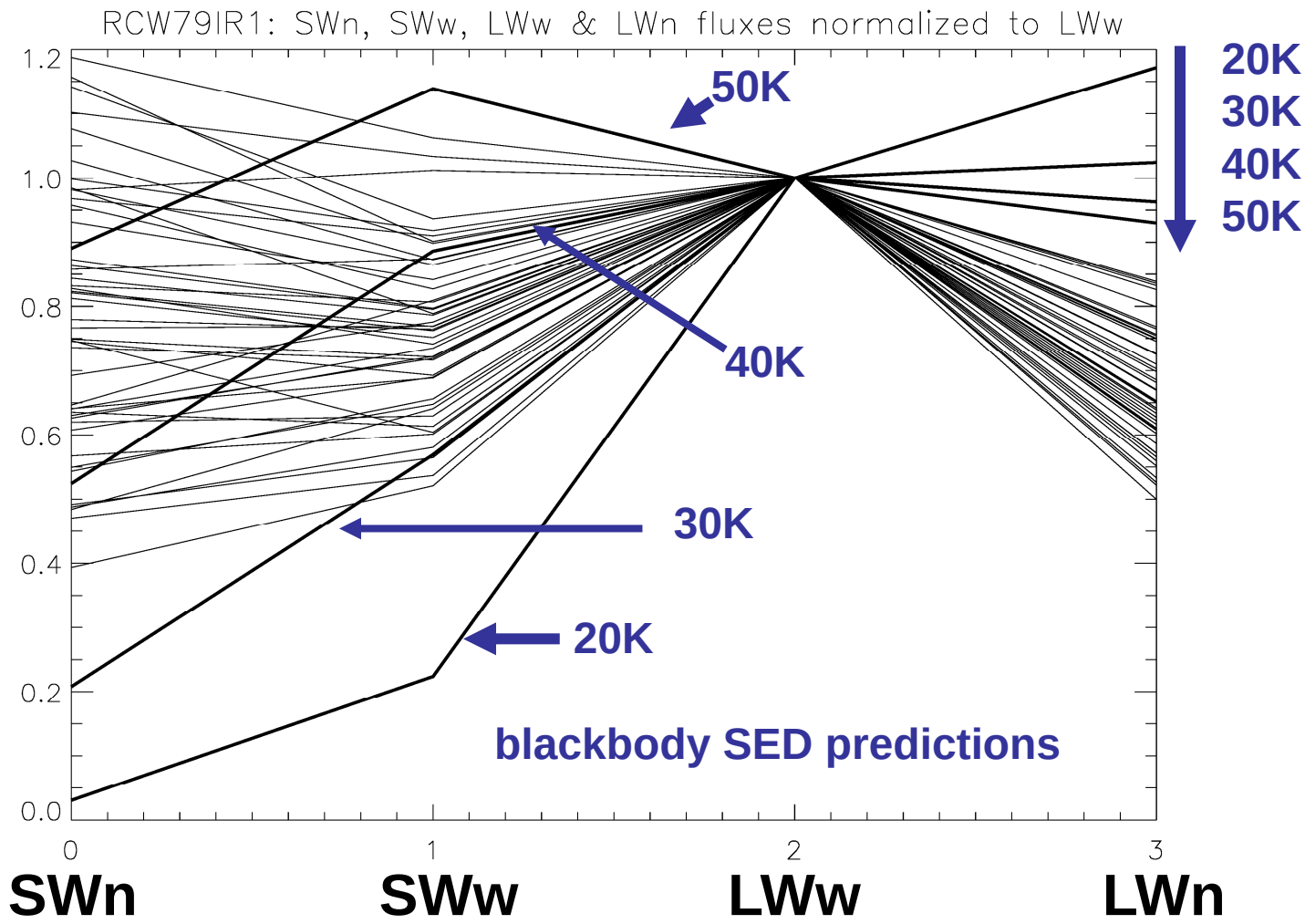
- **our calibration scheme/strategy requires to know the source SED for each FIS03 pixel pointing**
- **we use the 4 FIS01 images/bands to derive dust temperature (source spectra assumed to be blackbody SED)**
- **in this first analysis we have assumed that the image flux density is that of the spectral centre position for the 4 bands:**

  SWn 67 µm (149 cm-1) / SWw 93 µm (108 cm-1)

  LWw 146 µm (68 cm-1) / LWn 162 µm (62 cm-1)

➔ **results in following plot**

spectral index for RCW79 IR1 positions



plot of SWn, SWw, LWw & LWn fluxes normalized to LWw

preliminary conclusions:

- **there is some apparent mismatch of the results between "wide" and "narrow" band images (although the spectral centre of the bands are very close to each other)**

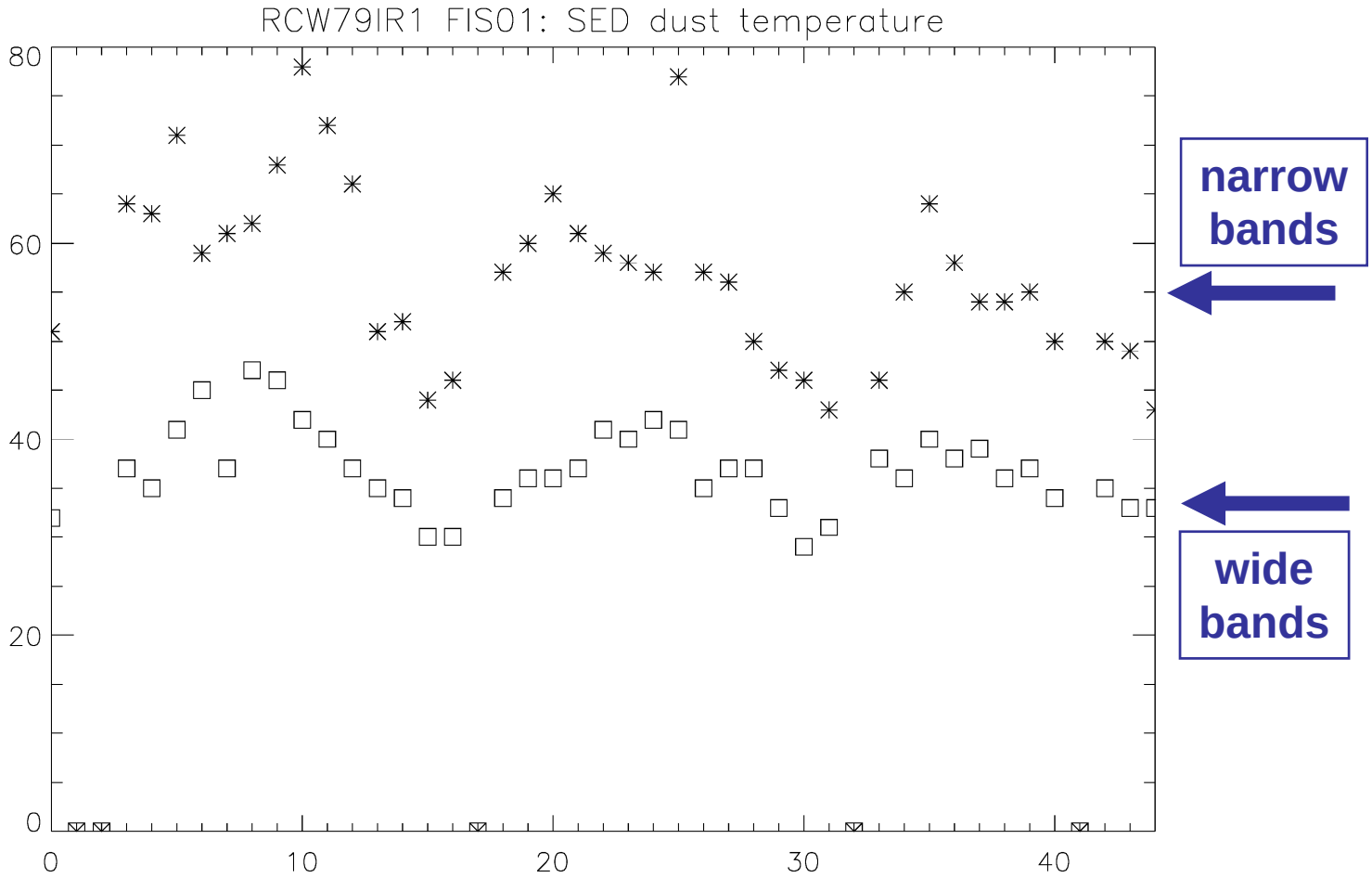
- **should be better to use the FIS01 filtering transmission of the 4 bands (not the central band position only !)**

  ➔ **from where we can get this information ?**

- **present analysis investigated a bit more**

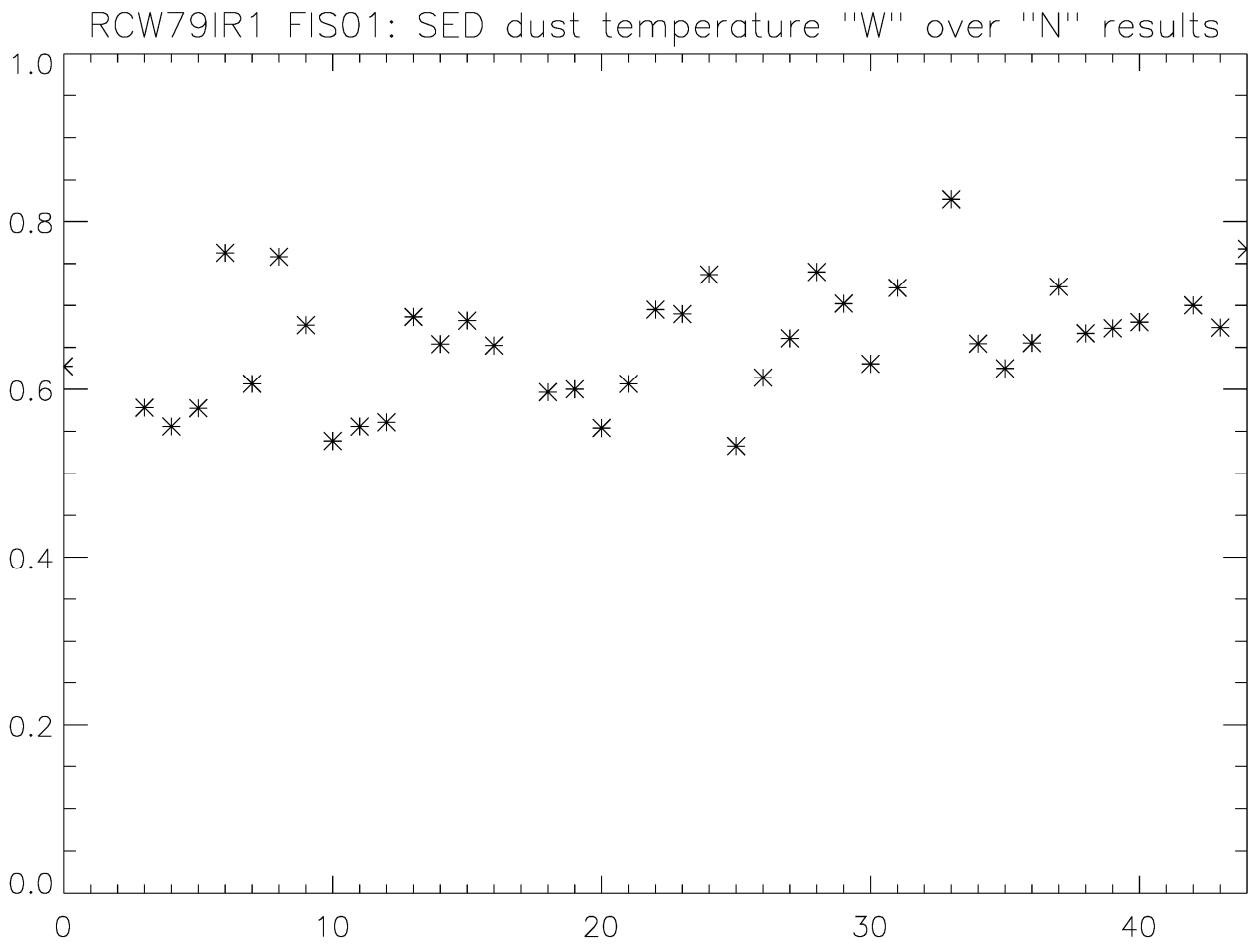
  ➔ **results in next plots**

mismatch "wide" vs "narrow" bands (I)



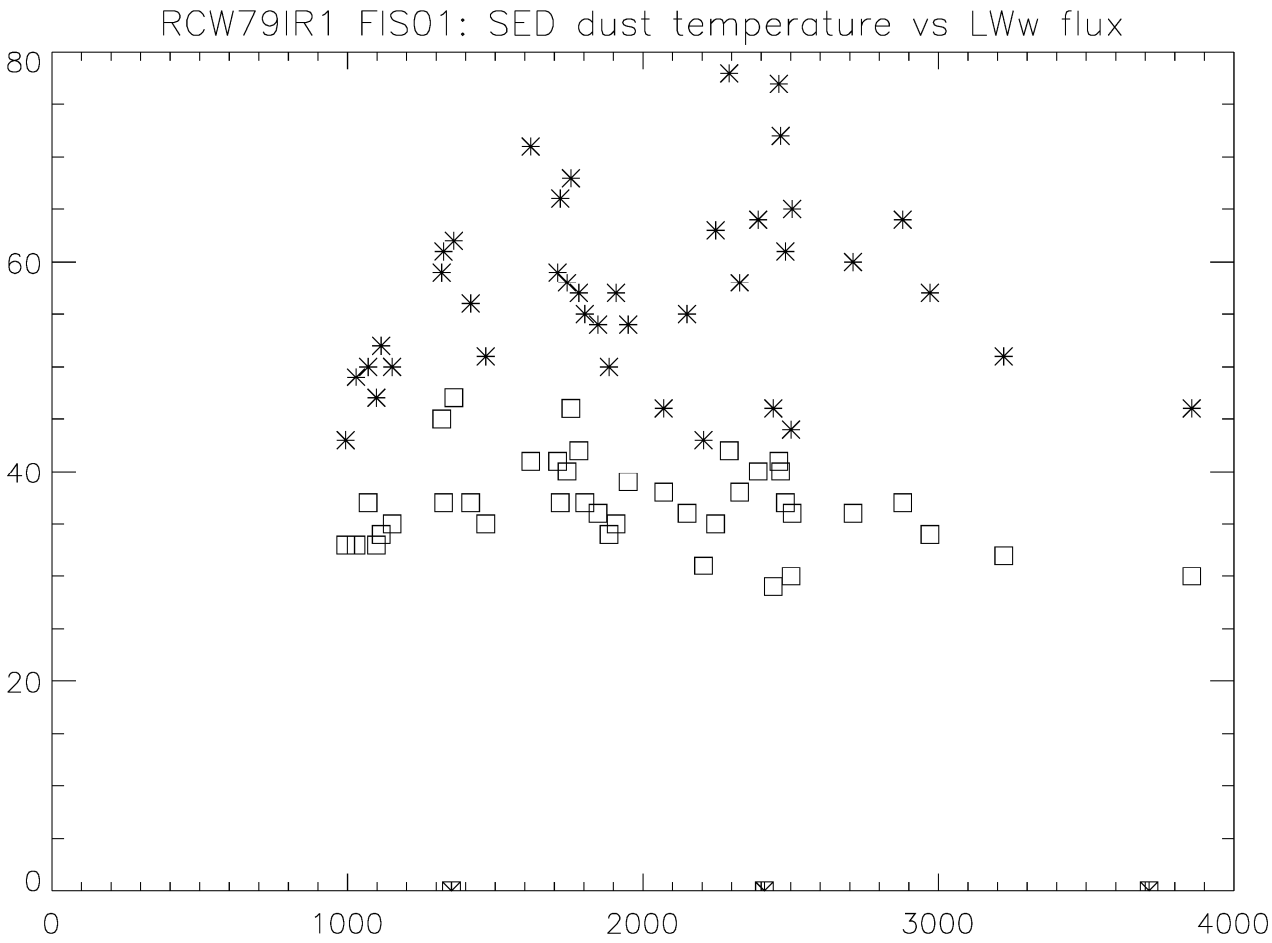
plot of SED dust Tp (K) from "wide" and " narrow" bands

mismatch "wide" vs "narrow" bands (II)



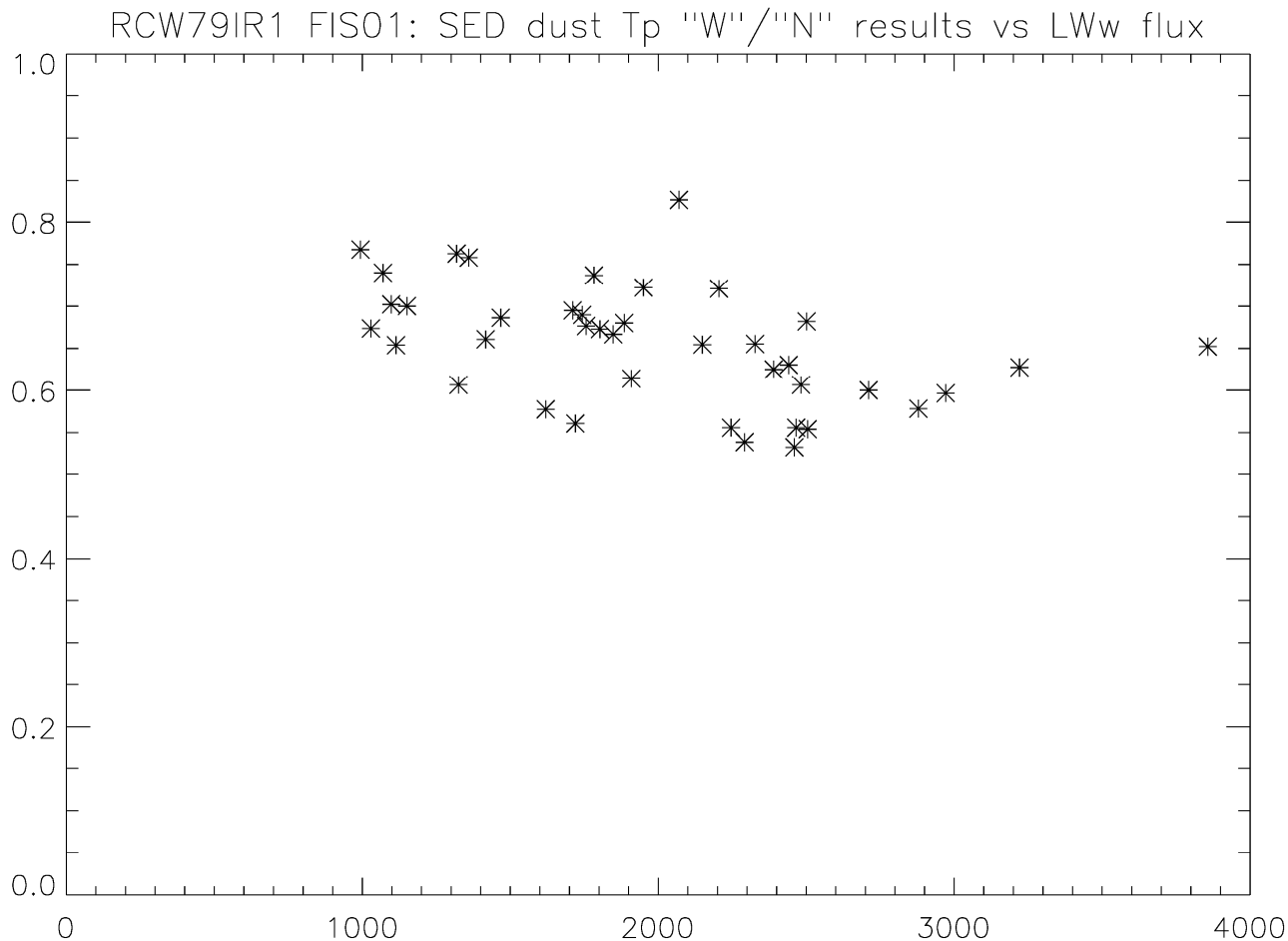
plot of SED dust Tp (K): "wide" over " narrow" bands results ratio

mismatch "wide" vs "narrow" bands (III)



plot of SED dust Tp (K) from "wide" and " narrow" bands vs LWw flux

mismatch "wide" vs "narrow" bands (IV)



plot of SED dust Tp (K): "wide"/" narrow" results ratio vs LWw flux

preliminary conclusions:

- **range of dust temperature between 30 K and 80 K**
  ➔ **a range that could be expected for this kind of sources**

- **need to reduce all data material (for other sources/positions) in order to derive more significant conclusions about SED dust Tp**

- **hope to get better understanding of the SED spectra with the use of FIS01 "filtering" information**

- **???**