Absolute Flux Calibration

Melanie Krips

(by Arancha Castro-Carrizo)

Outline

I. Primary/Secondary Flux Calibrators

II. Practical Tips to Calibrate the Fluxes of your Sources

Motivation

What do we want in a flux calibrator?

- strong (>1 Jy) emission at mm wavelengths
- compact (<< 1") emission at mm wavelengths
- emission should not be variable in time
- preferentially with long LST range (i.e., high declination source)
- no or only little sun-avoidance
- preferentially well known properties (such as SED, size)

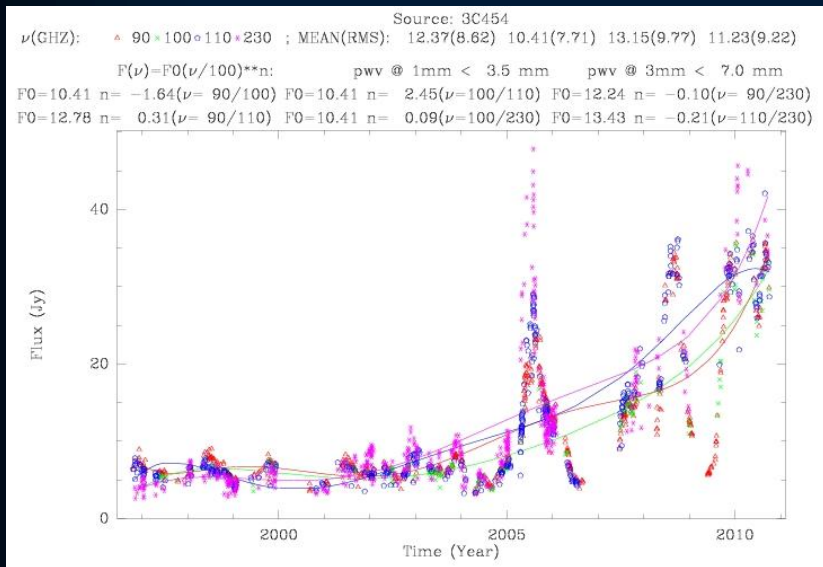
Flux Calibrators

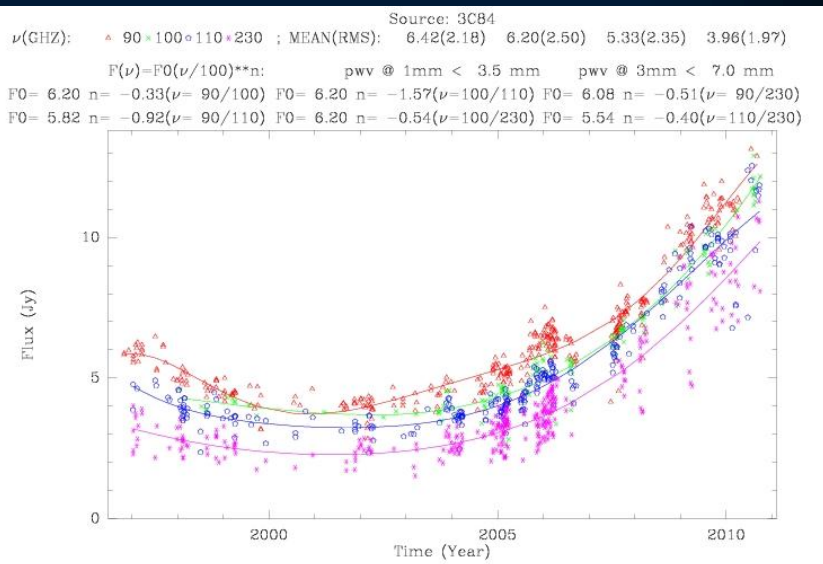
1. Quasars
2. Planets
3. Solar Bodies (Satellites, Asteroids, Dwarf Planets)
4. Radio Stars

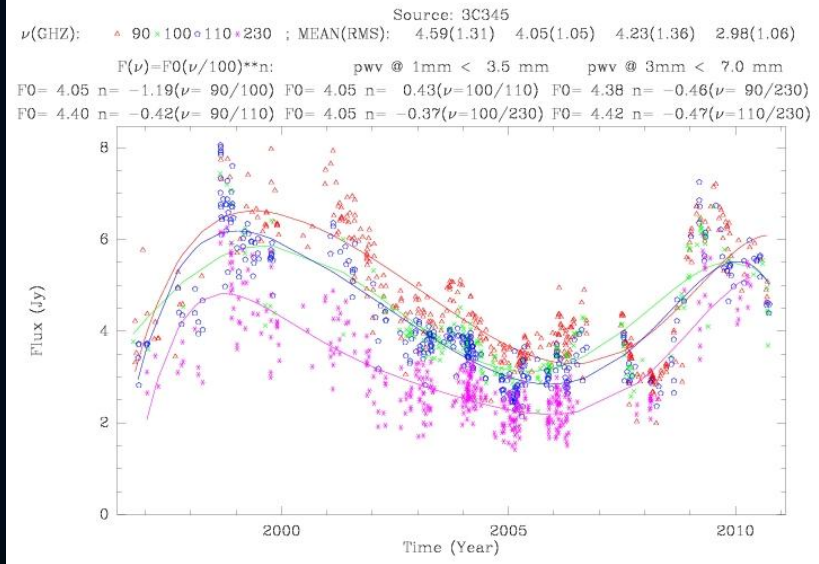
Flux Calibrators

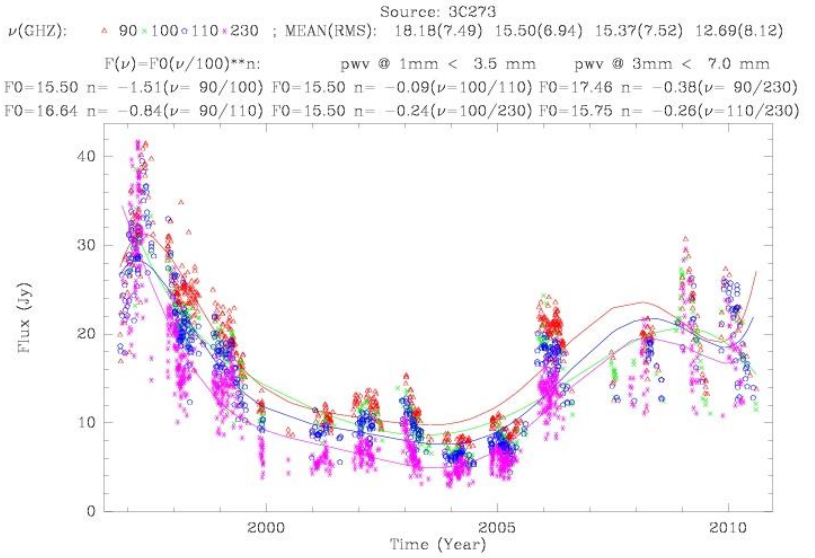
1. Quasars
2. Planets
3. Solar Bodies (Satellites, Asteroids, Dwarf Planets)
4. Radio Stars

Flux Calibrators: Quasars

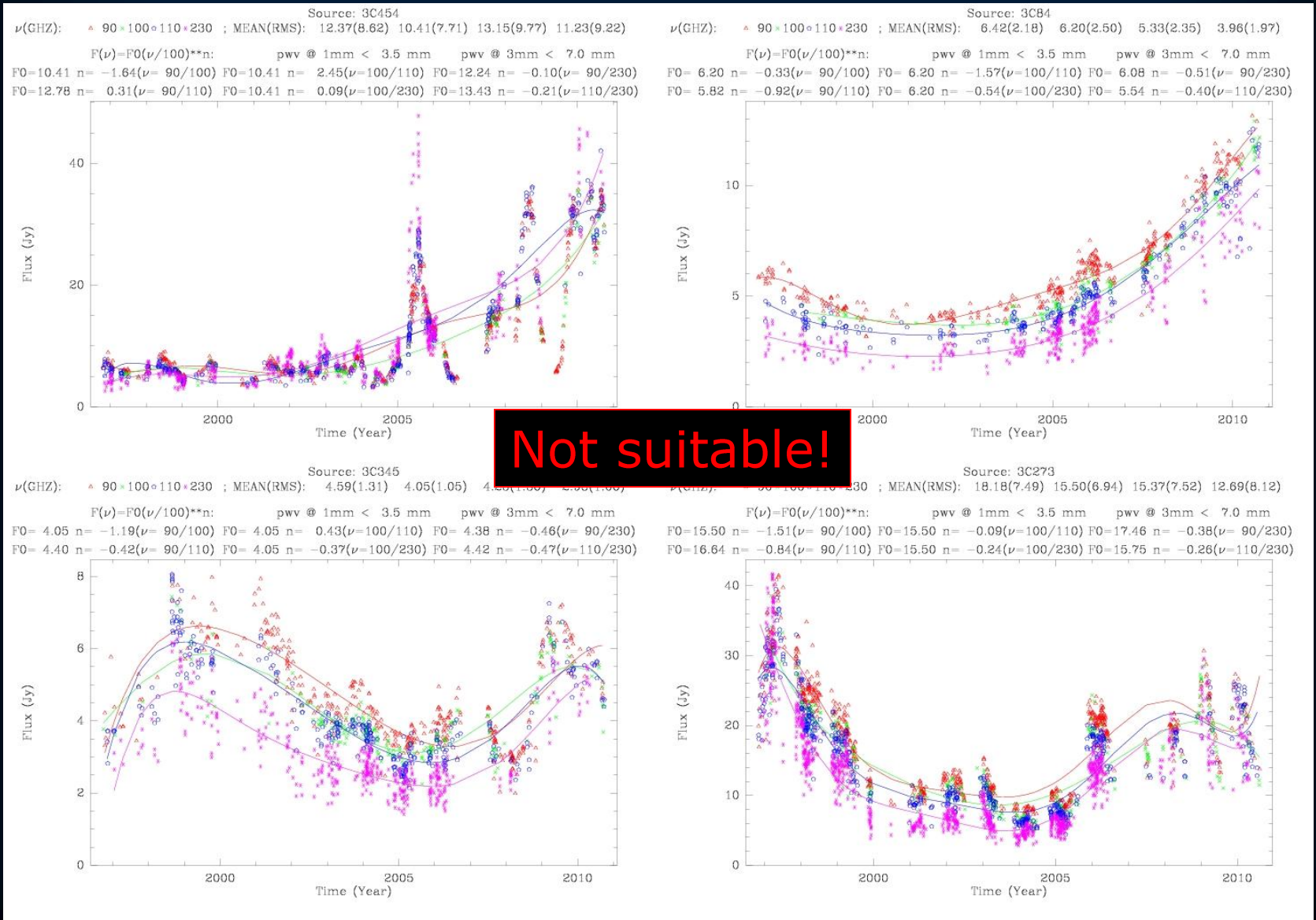








Flux Calibrators: Quasars



Flux Calibrators

1. Quasars
2. Planets
3. Solar Bodies (Satellites, Asteroids, Dwarf Planets)
4. Radio Stars

Flux Calibrators: Planets

- Pro:
  most of the solar planets have strong mm-emission and reasonably well derived flux models

- Contra:
  1.) Fluxes not completely constant
  2.) They start to be resolved (≥3") already at 3mm
  3.) Some of them have broad molecular line absorption (e.g., Mars, Jupiter, Saturn)
  4.) Not always visible, i.e., more constraints due to sun-avoidance, short LST ranges


Mars


Uranus


Jupiter


Saturn


Neptune

Flux Calibrators: Planets

- Pro:
  most of the solar planets have strong mm-emission and reasonably well derived flux models

- Contra:
  1.) Fluxes not completely constant
  2.) They start to be resolved (≥3") already at 3mm
  3.) Some of them have broad molecular line absorption (e.g., Mars, Jupiter, Saturn)
  4.) Not always visible, i.e., more constraints due to sun-avoidance, short LST ranges


Mars


Uranus

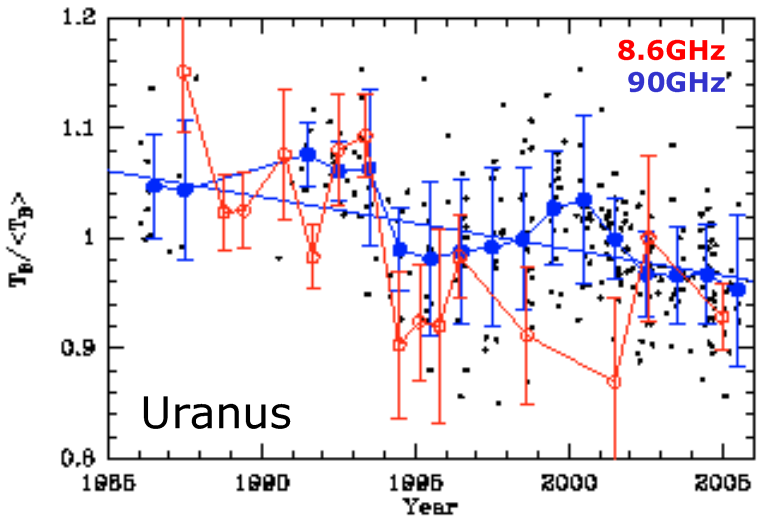

Jupiter

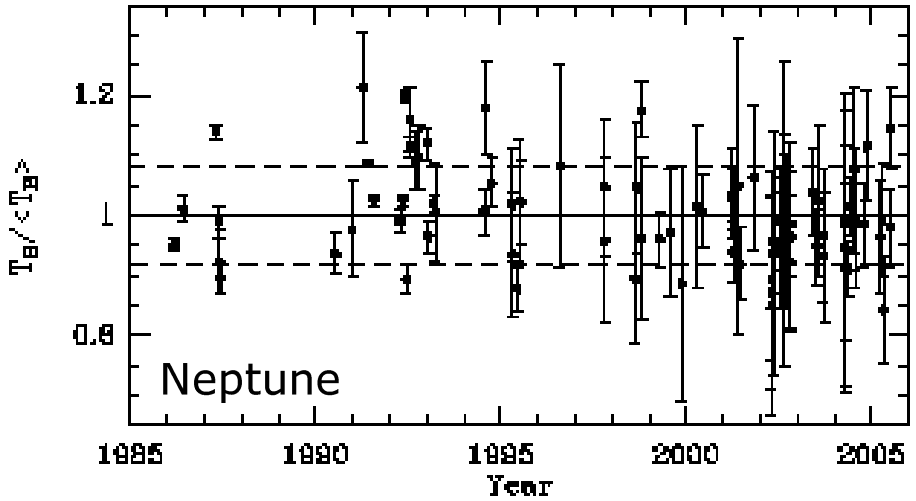

Saturn


Neptune

Flux Calibrators: Planets

Kramer et al. (2008)



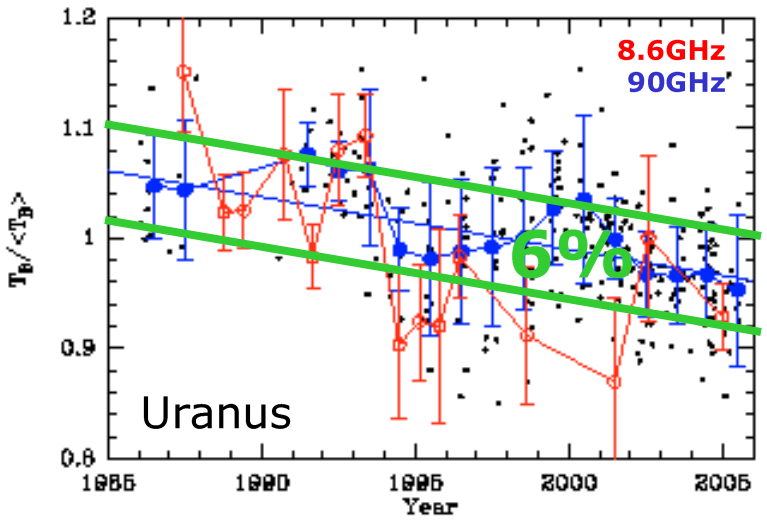


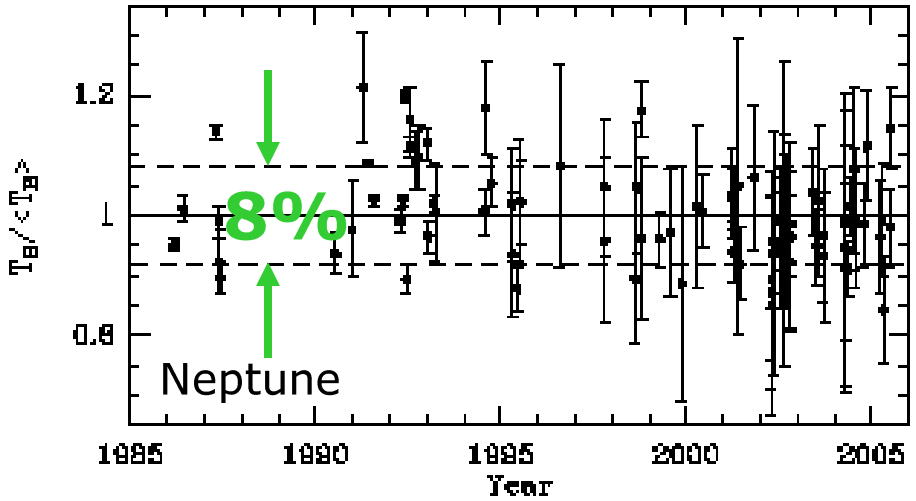
(e.g., Mars, Jupiter, Saturn)

4.) Not always visible, i.e., more constraints due to sun-avoidance, short LST ranges

Flux Calibrators: Planets

Kramer et al. (2008)

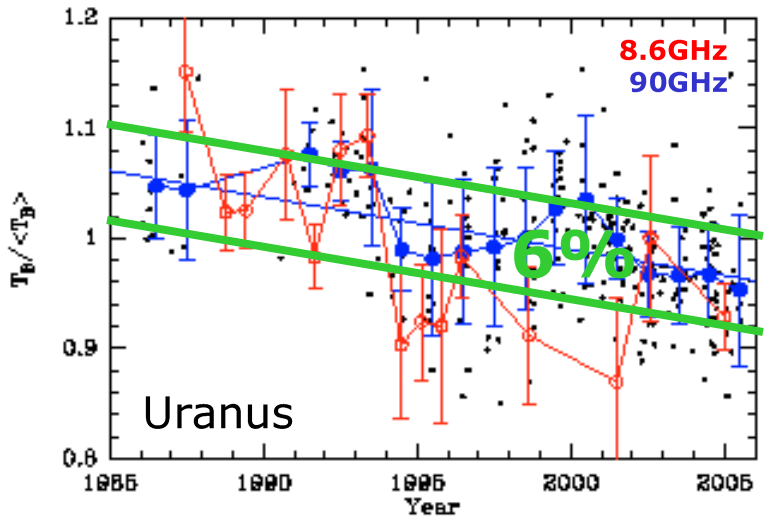




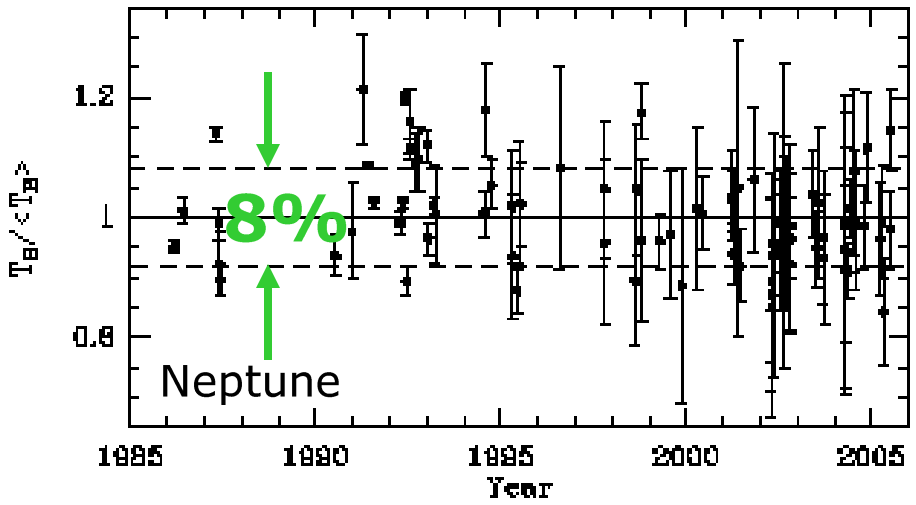
(e.g., Mars, Jupiter, Saturn)

4.) Not always visible, i.e., more constraints due to sun-avoidance, short LST ranges

Flux Calibrators: Planets

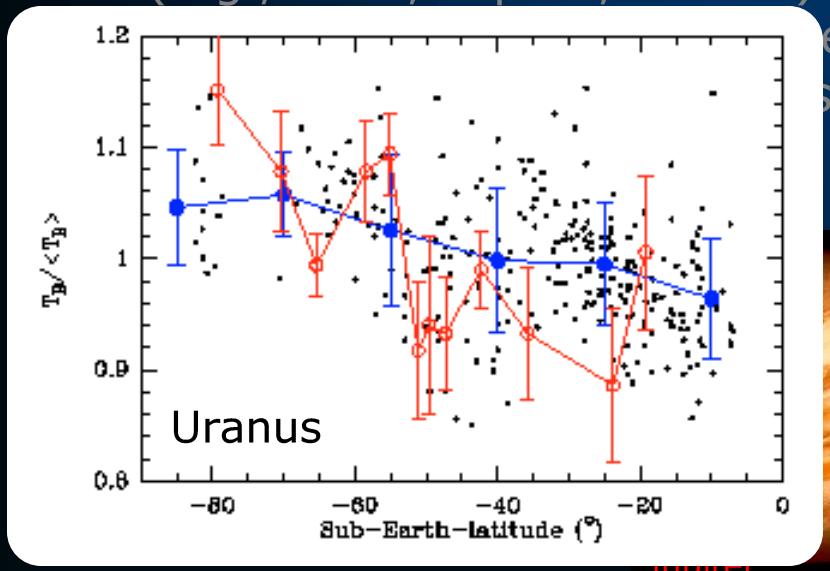


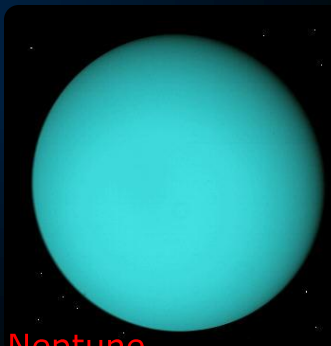
Kramer et al. (2008)



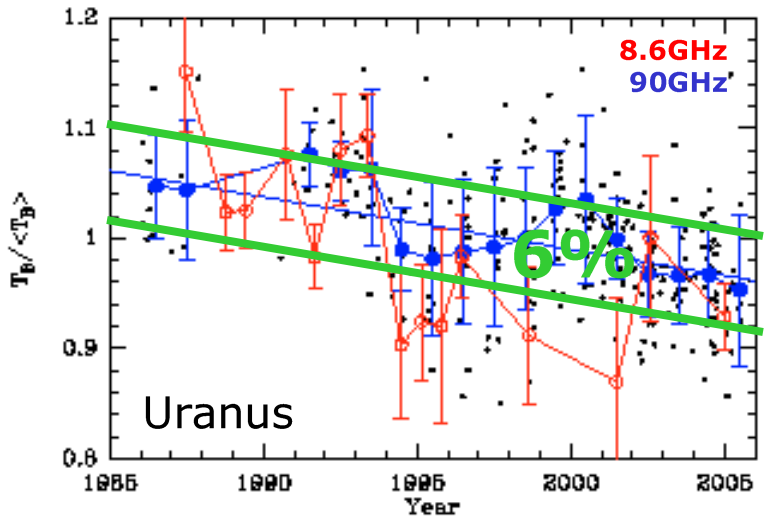
(e.g., Mars, Jupiter, Saturn)

e constraints due to sun-

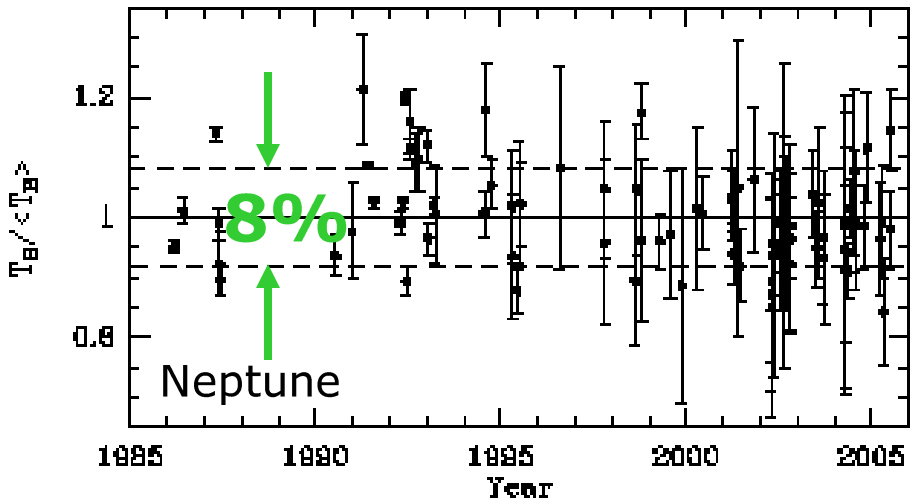




Flux Calibrators: Planets



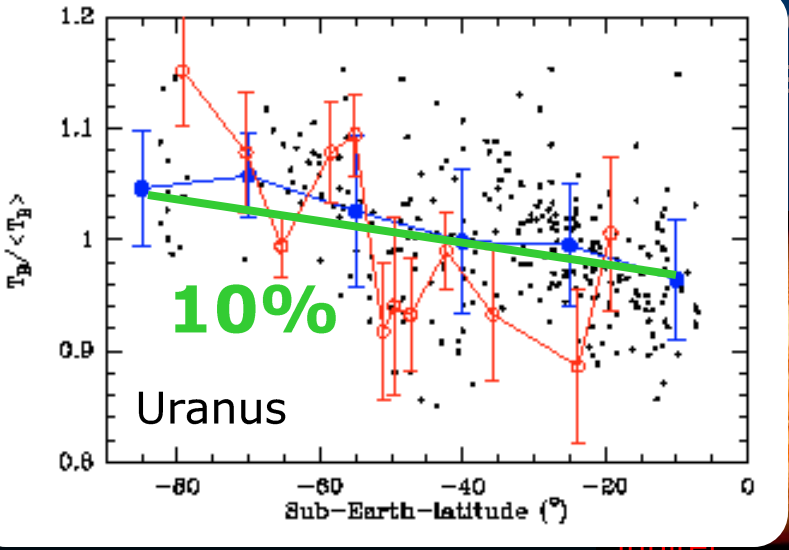
Kramer et al. (2008)

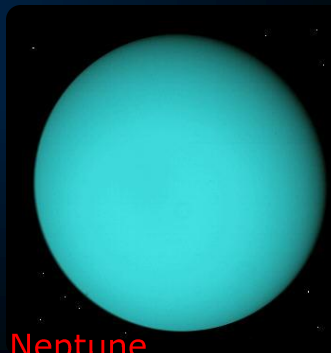


(e.g., Mars, Jupiter, Saturn)

e constraints due to sun-

s





Flux Calibrators: Planets

- Pro:
  most of the solar planets have strong mm-emission and reasonably well derived flux models

- Contra:
  1.) Fluxes not completely constant
  2.) They start to be resolved (≥2”) already at 3mm
  3.) Some of them have broad molecular line absorption (e.g., Mars, Jupiter, Saturn)
  4.) Not always visible, i.e., more constraints due to sun-avoidance, short LST ranges


Mars


Uranus

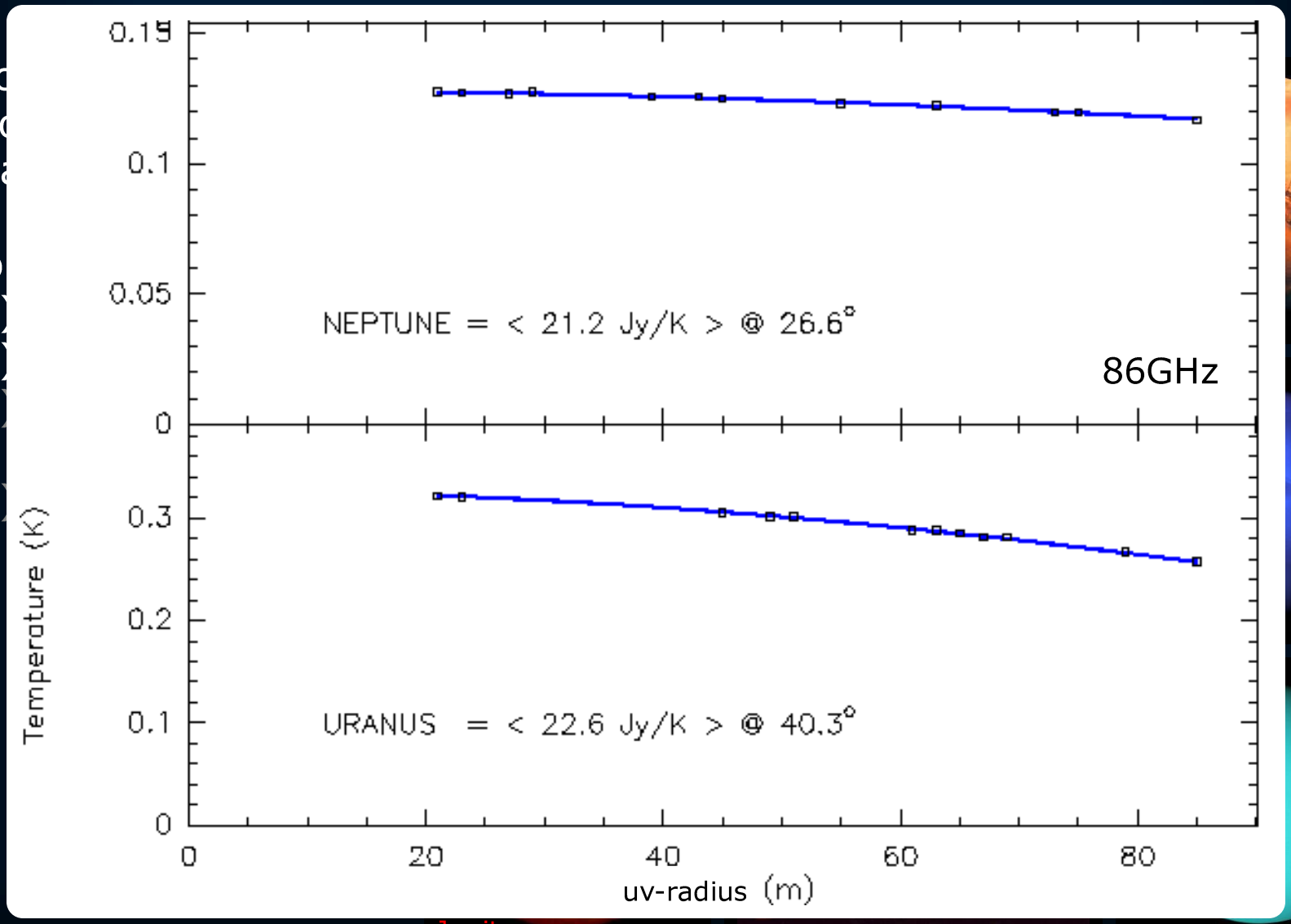

Jupiter


Saturn


Neptune

Flux Calibrators: Planets

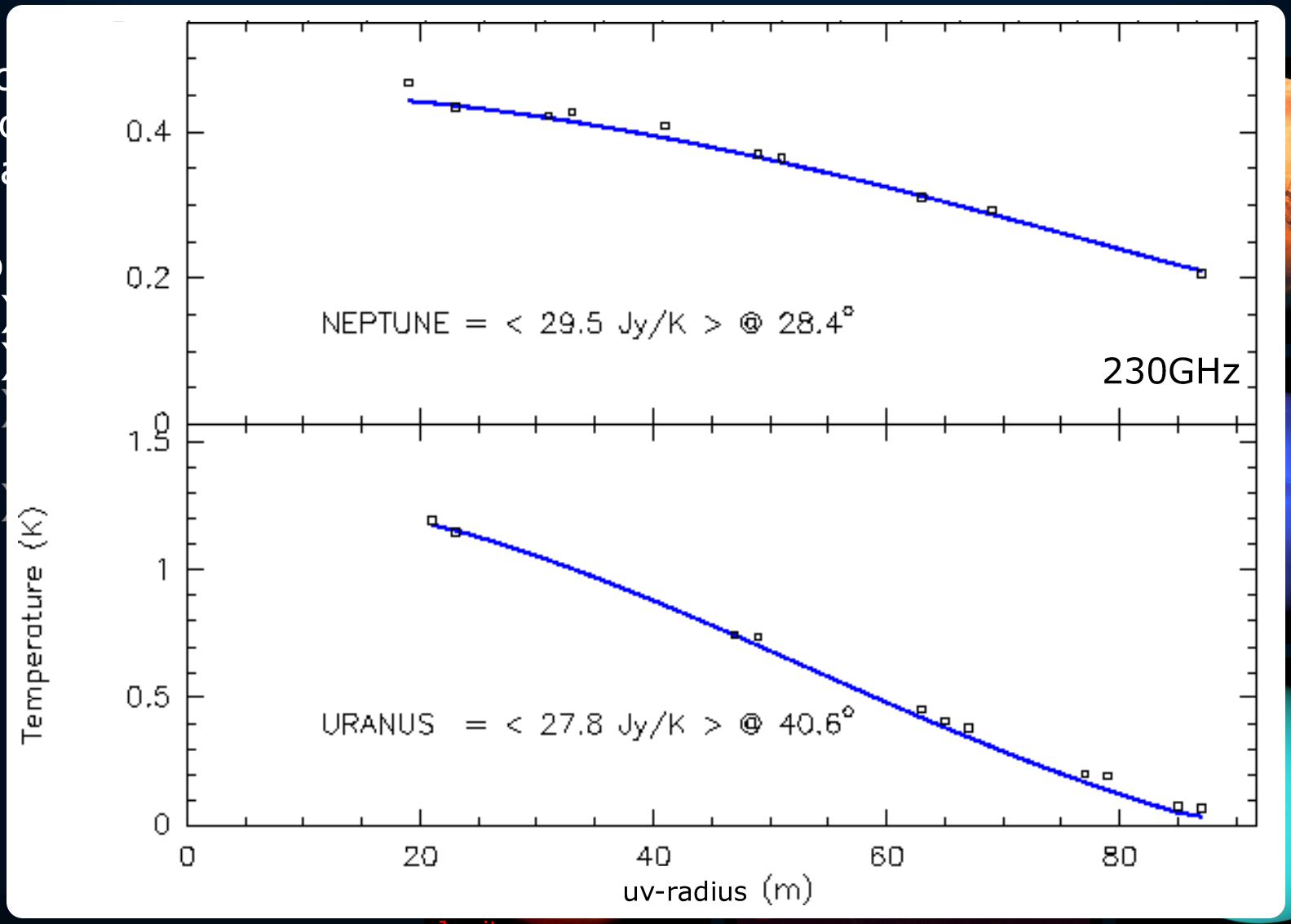
- Pro
  mo
  rea
- Co
  1.
  2.
  3.
  4.



Jupiter Saturn Neptune

Flux Calibrators: Planets

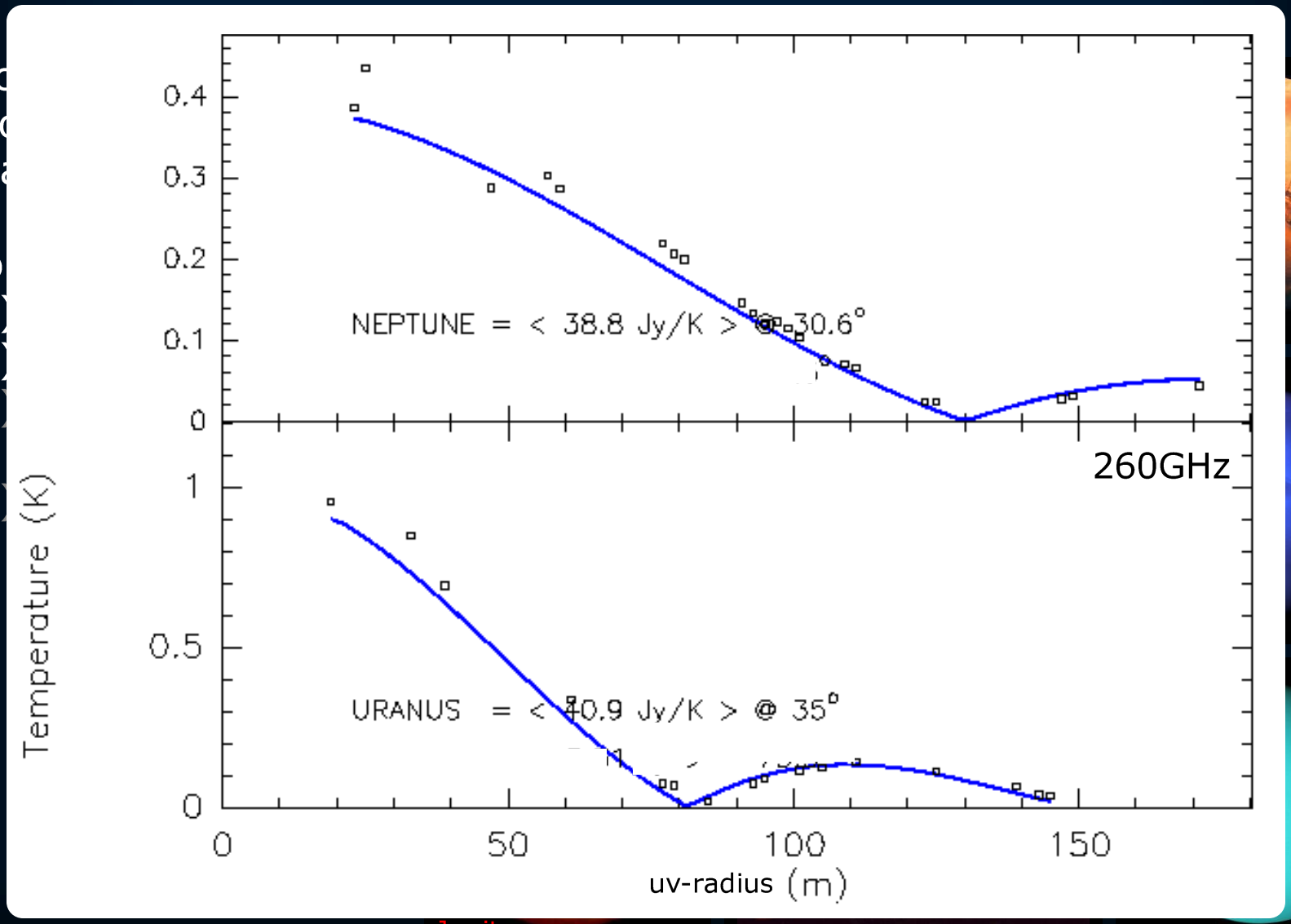
- Pro
  mo
  rea
- Co
  1.
  2.
  3.
  4.



Jupiter Saturn Neptune

Flux Calibrators: Planets

- Pro
  mo
  rea
- Co
  1.)
  2.)
  3.)
  4.)



Jupiter Saturn Neptune

Flux Calibrators: Planets

- Pro:
  most of the solar planets have strong mm-emission and reasonably well derived flux models

- Contra:
  1.) Fluxes not completely constant
  2.) They start to be resolved (≥2”) already at 3mm
  3.) Some of them have broad molecular line absorption (e.g., Mars, Jupiter, Saturn)
  4.) Not always visible, i.e., more constraints due to sun-avoidance, short LST ranges


Mars


Uranus

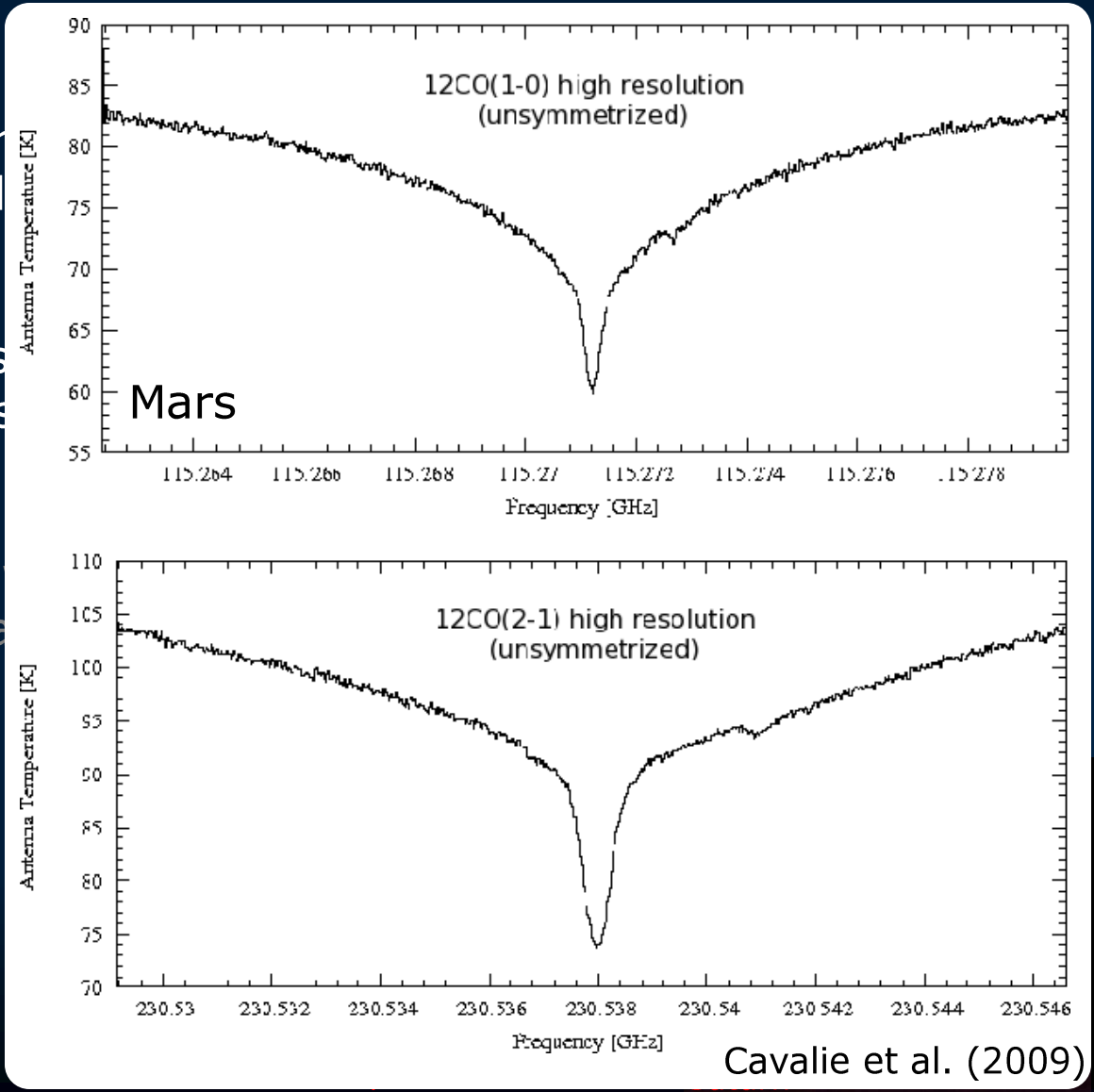

Jupiter


Saturn


Neptune

Flux Calibrators: Planets

- Pro:
  most of th
  reasonabl
- Contra:
  1.) Fluxes
  2.) They s
  3.) Some
  (e.g.,
  4.) Not al
  avoida



Cavalie et al. (2009)


Mars

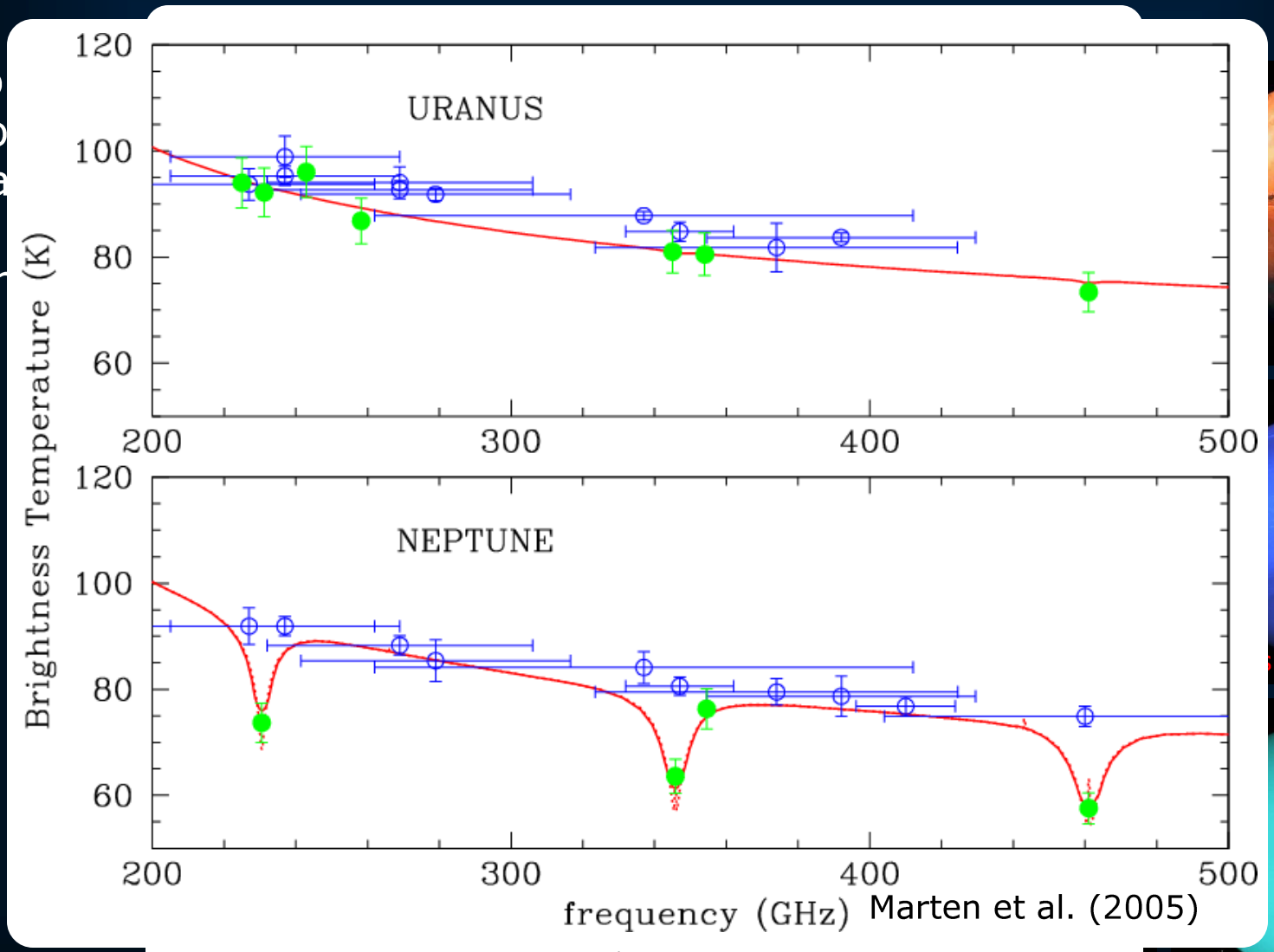

Uranus


Neptune

Flux Calibrators: Planets

- Pro
  mo
  rea
- Cor
  1.)
  2.)
  3.)

  4.)



Marten et al. (2005)

Cavalie et al. (2009)

Neptune

Flux Calibrators: Planets

- Pro:
  most of the solar planets have strong mm-emission and reasonably well derived flux models

- Contra:
  1.) Fluxes not completely constant
  2.) They start to be resolved (≥2”) already at 3mm
  3.) Some of them have broad molecular line absorption (e.g., Mars, Jupiter, Saturn)
  4.) Not always visible, i.e., more constraints due to sun-avoidance, short LST ranges


Mars


Uranus

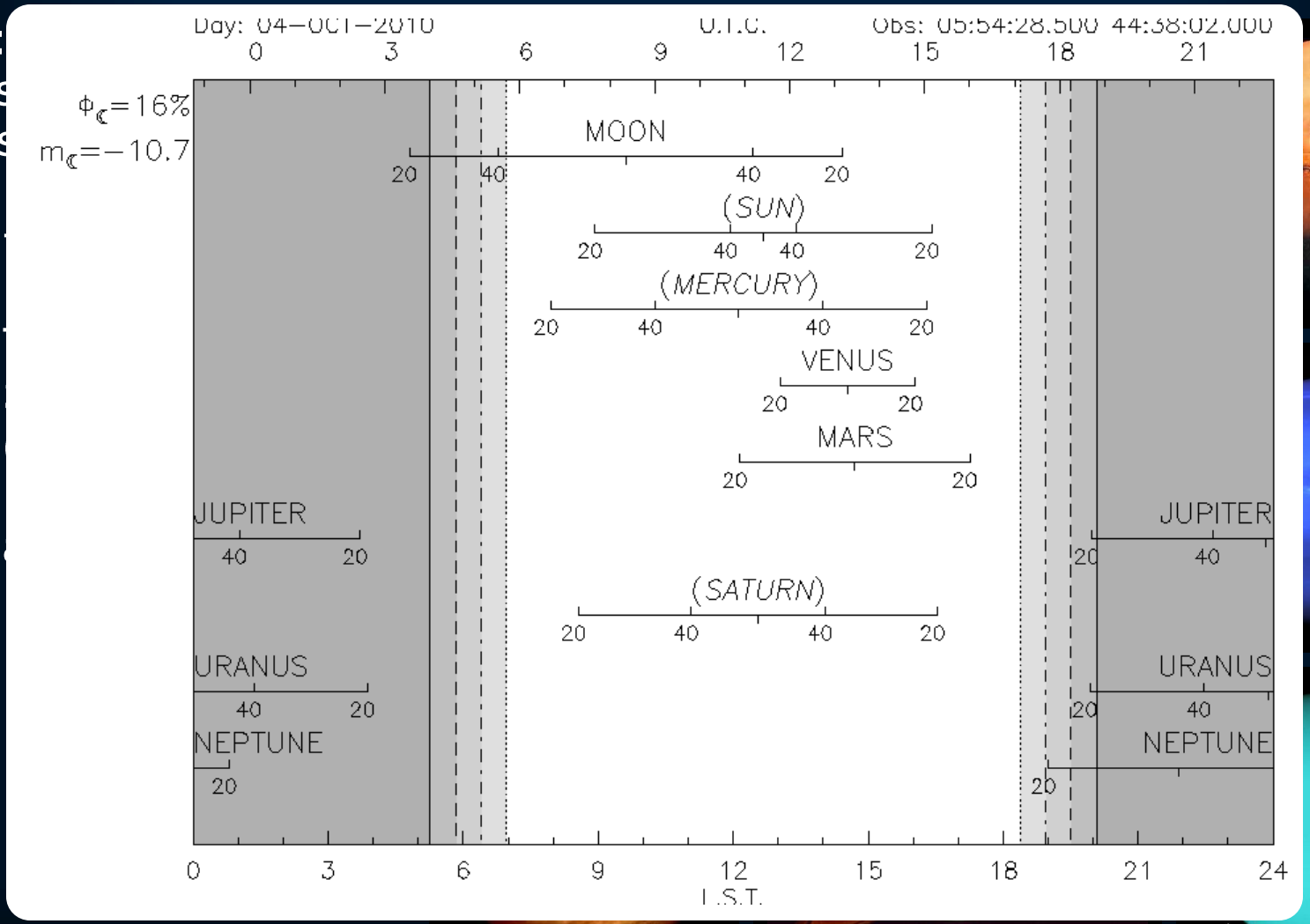

Jupiter


Saturn


Neptune

Flux Calibrators: Planets

- Pro:
  mos
  reas
- Con
  1.)
  2.)
  3.)
  4.)



Jupiter Saturn Neptune

Flux Calibrators

1. Quasars
2. Planets
3. Solar Bodies (Satellites, Asteroids, Dwarf Planets)
4. Radio Stars

Flux Calibrators: Satellites

- Pro:
  - They are quite compact (hence better for extended configurations and/or higher frequencies than planets) and still sufficiently bright (>500mJy@3mm)

- Already regularly used at the SMA & ALMA: Titan, Ganymede, Callisto

- Contra:
  - Titan also shows broad molecular lines
  - they are not always useable especially when they are too close to their 'mother'-planet (or each other); one needs at least 3xPB
  - flux models not as well constrained as for planets

Flux Calibrators: Satellites

- Pro:
  - They are quite compact (hence better for extended configurations and/or higher frequencies than planets) and still sufficiently bright (>500mJy@3mm)

- Already regularly used at the SMA & ALMA : Titan, Ganymede, Callisto

- Contra:
  - Titan also shows broad molecular lines
  - they are not always useable especially when they are too close to their 'mother'-planet (or each other); one needs at least 3xPB
  - flux models not as well constrained as for planets

Flux Calibrators: Satellites

- Pro:
  - They are quite compact (hence better for extended configurations and/or higher frequencies than planets) and still sufficiently bright (>500mJy@3mm)

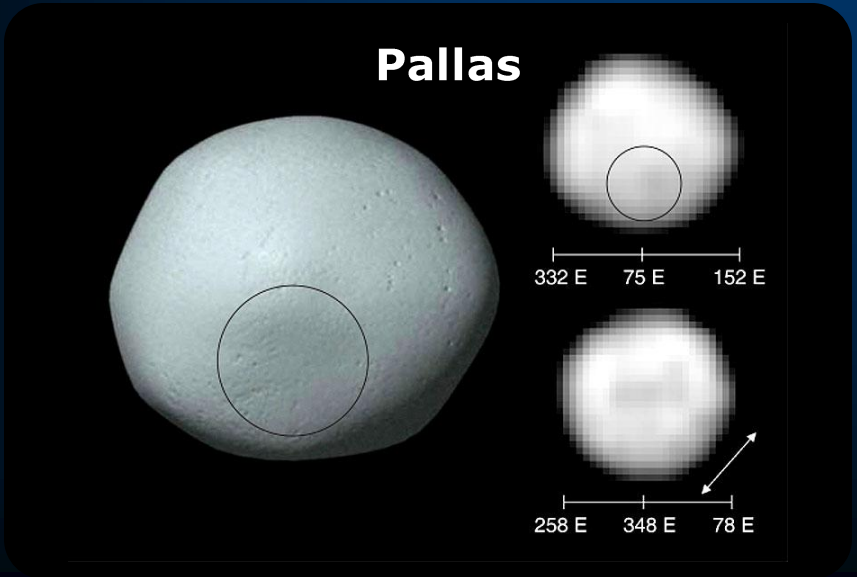
- Already regularly used at the SMA & ALMA : Titan, Ganymede, Callisto

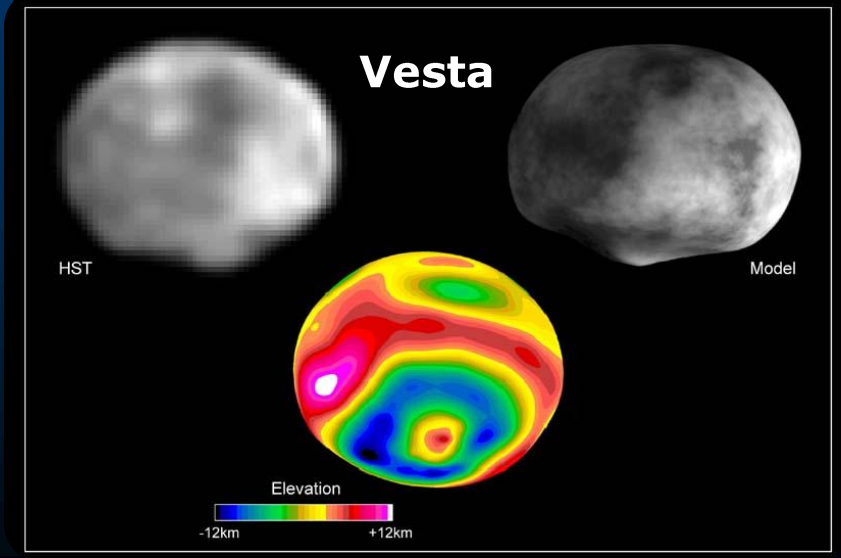
- Contra:
  - Titan also shows broad molecular lines
  - they are not always useable especially when they are too close to their 'mother'-planet (or each other); one needs at least 3xPB
  - flux models not as well constrained as for planets

Flux Calibrators: Asteroids/Dwarf Planets

- Pro:
  - bright and relatively small solar bodies

- Contra:
  - Still uncertainties in their flux; some of them known to vary quite significantly within a day
  - irregular shapes

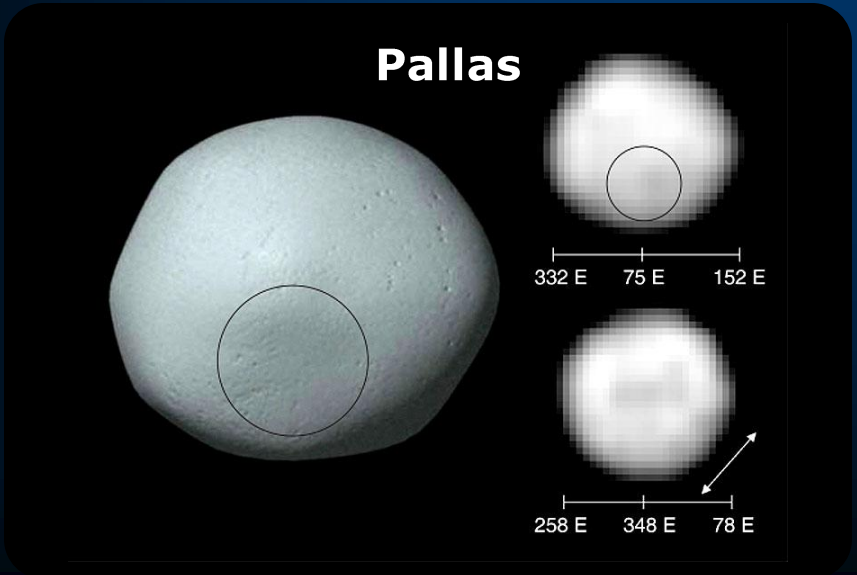


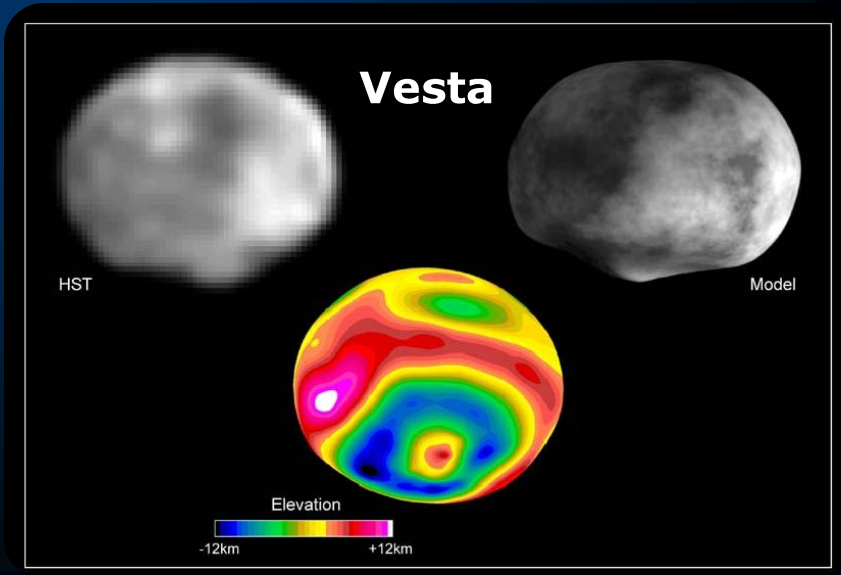


Flux Calibrators: Asteroids/Dwarf Planets

- Pro:
  - bright and relatively small solar bodies

- Contra:
  - Still uncertainties in their flux; some of them known to vary quite significantly within a day
  - irregular shapes





Flux Calibrators

1. Quasars
2. Planets
3. Solar Bodies (Satellites, Asteroids, Dwarf Planets)
4. Radio Stars

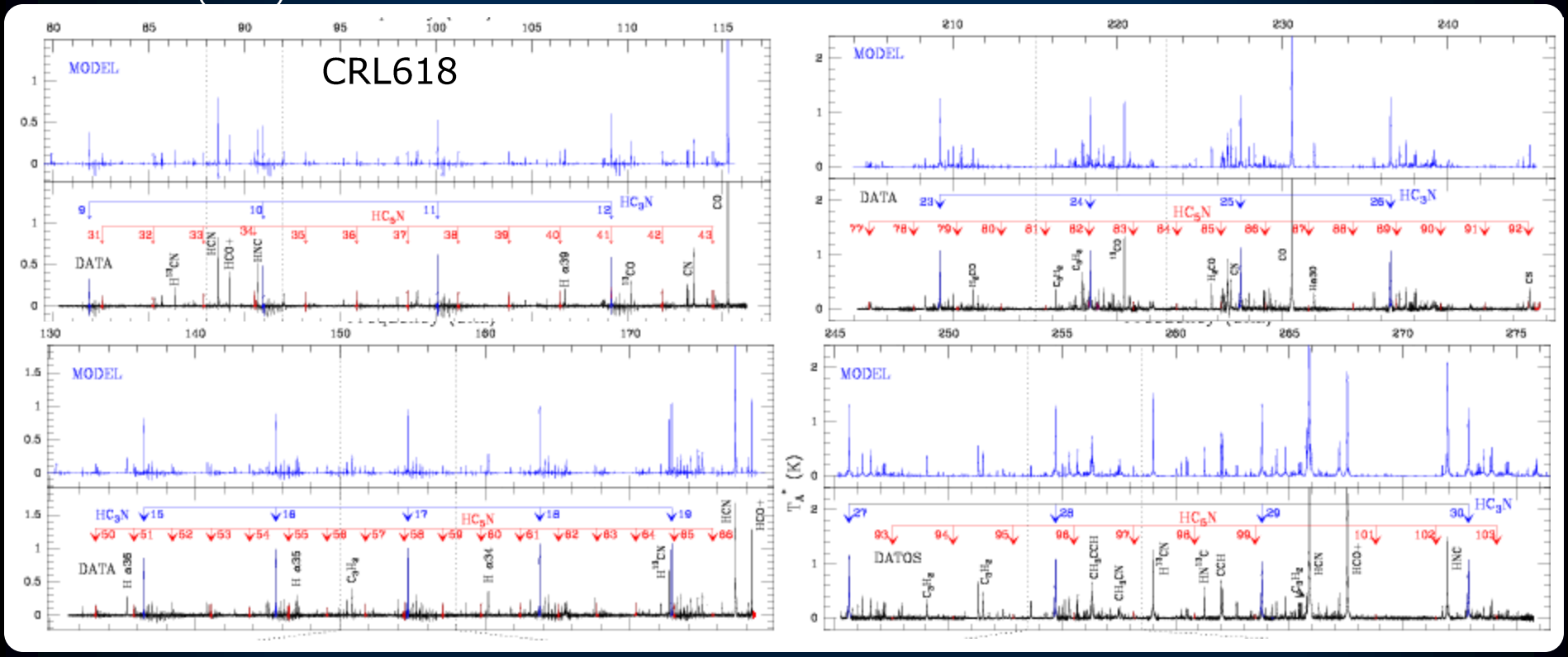
Flux Calibrators: Radio Stars

Radio bright stars:

- MWC349 (binary star)
- CRL618 (PPN)
- W3OH (HII region)
- NGC7072 (young PN)
- NGC7538 (HII region)
- K3-50A (HII-region)
- …..

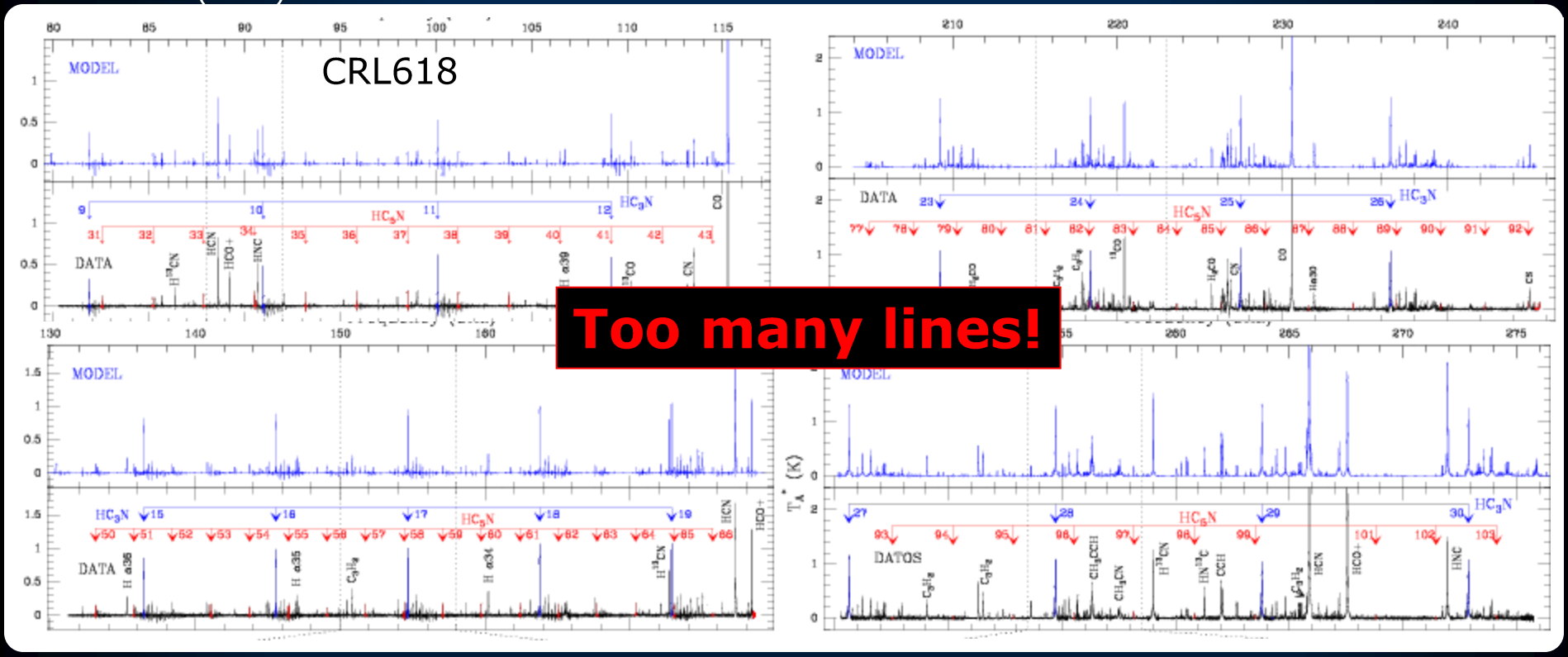
Flux Calibrators: Radio Stars

Pardo et al. (2009)

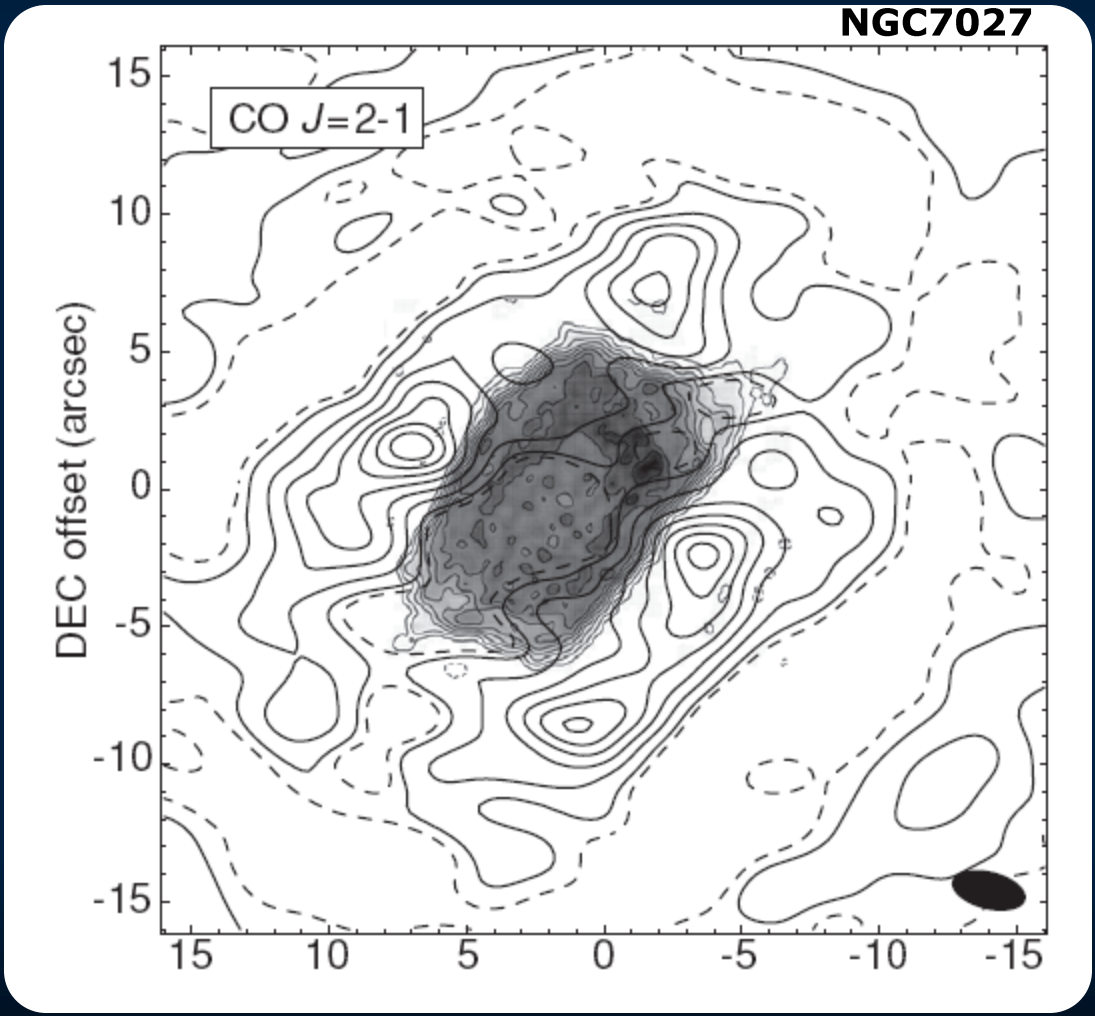


Flux Calibrators: Radio Stars

Pardo et al. (2009)

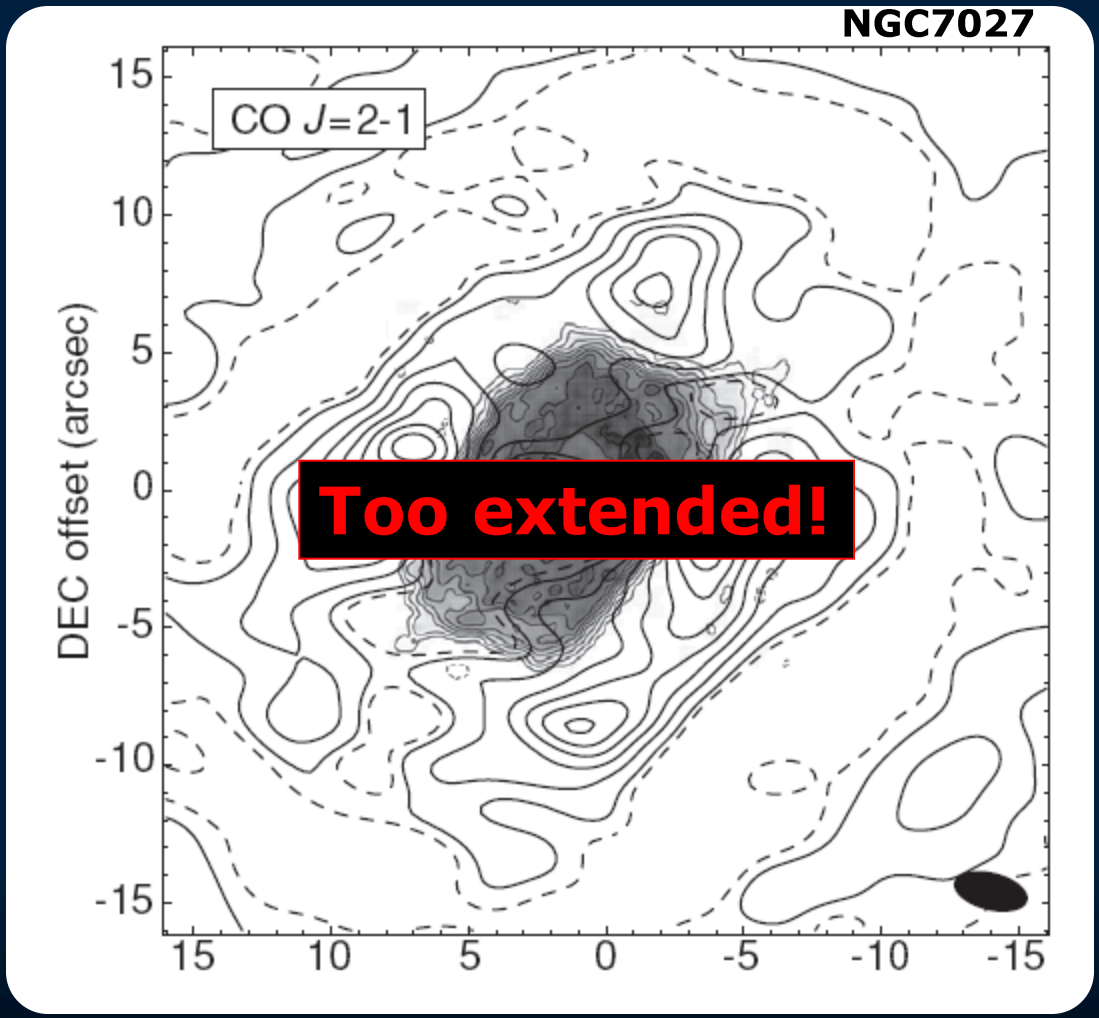


Flux Calibrators: Radio Stars



Nakashima et al. (2010)

Flux Calibrators: Radio Stars



Nakashima et al. (2010)

Flux Calibrators: Radio Stars

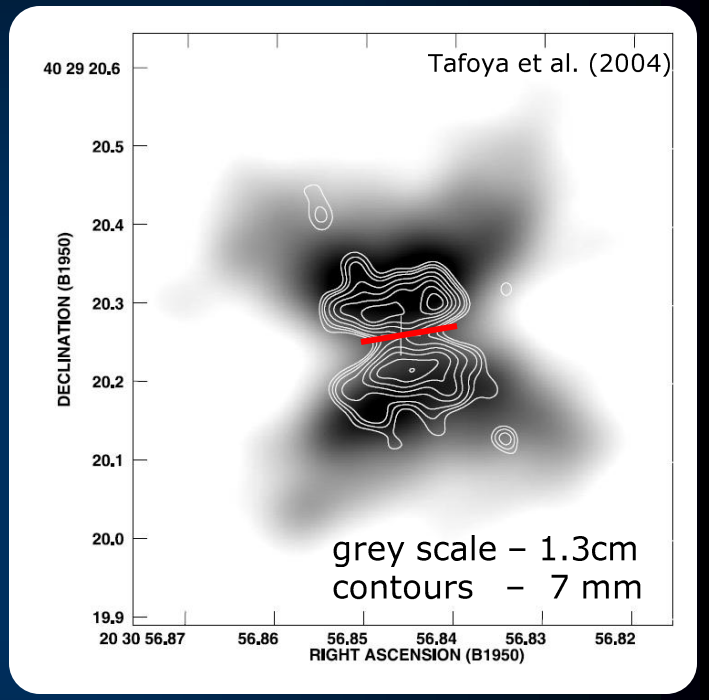
Radio bright stars:

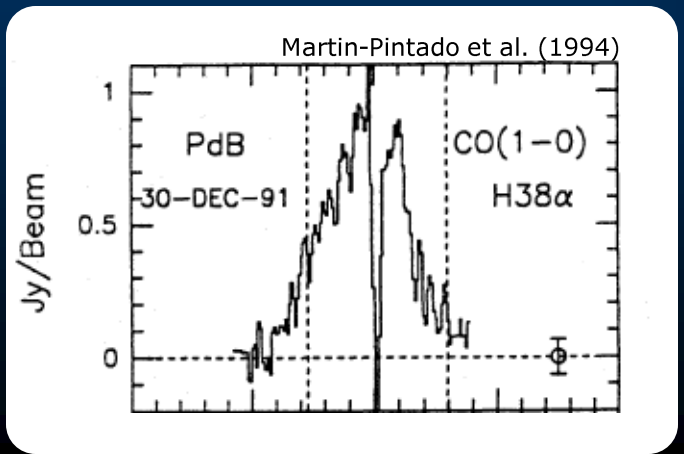
- MWC349
- ~~CRL618~~
- ~~W3OH~~
- ~~NGC7072~~
- ~~NGC7538~~
- ~~K3-50A~~

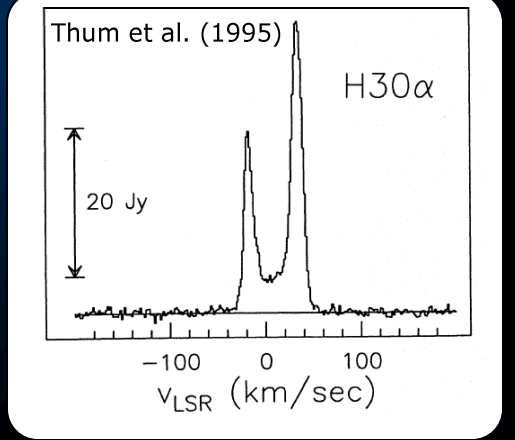
Flux Calibrators: MWC349

Some facts:

- binary stellar system:
  MWC349A (Be) & MWC349B (B0 type III)
- the two stars are separated by 2.4″±0.1″ and possibly interact
- MWC349A the brightest radio continuum star
- radio continuum produced by "ionised bipolar flow that photoevaporates from the surface of a neutral Keplerian disk"
- size of flow decreases with frequency
- strong but highly variable hydrogen maser emission (RRLs) from the near-edge-on disk (~0.065″=80AU@1.2kpc)
- at declination of >40deg -> visible for ~13h per day



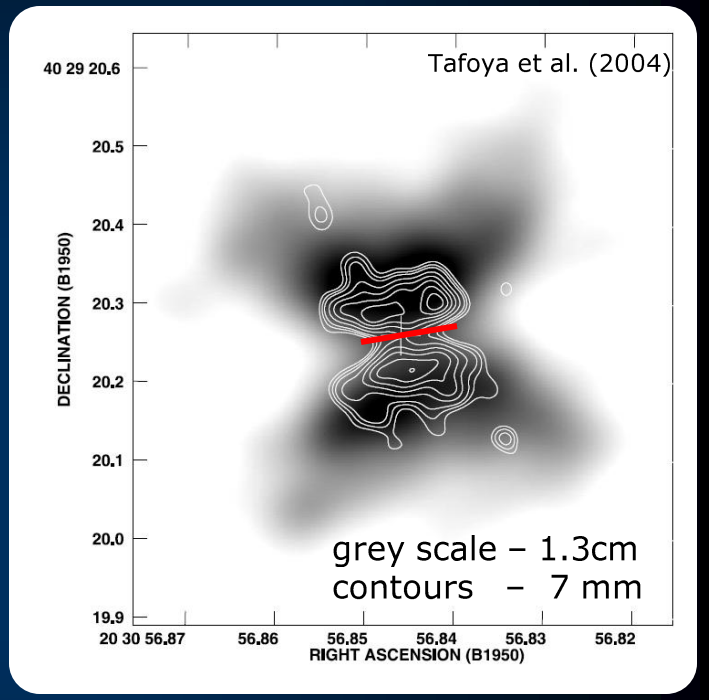


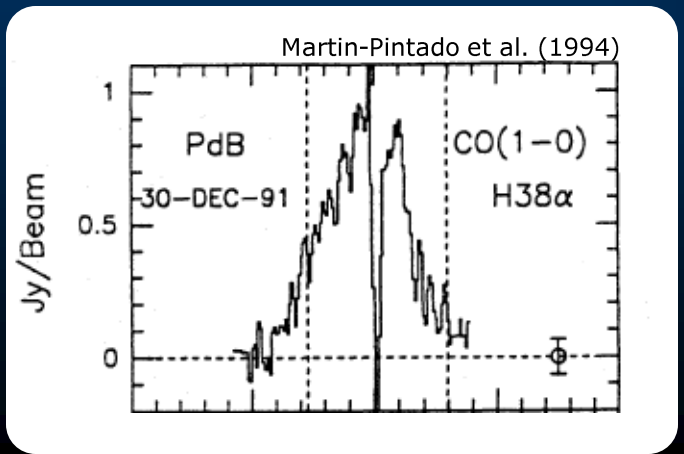


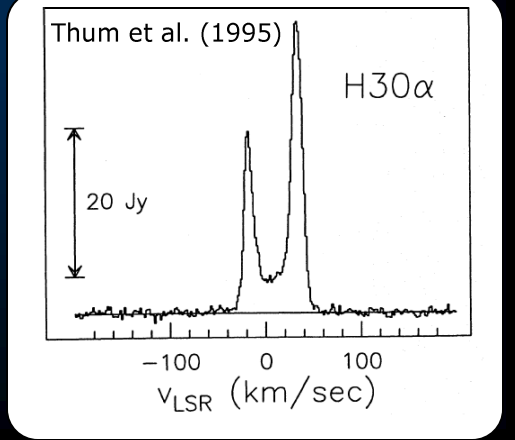
Flux Calibrators: MWC349

Some facts:

- binary stellar system: MWC349A (Be) & MWC349B (B0 type III)
- the two stars are separated by 2.4”±0.1” and possibly interact
- MWC349A the brightest radio continuum star
- radio continuum produced by “ionised bipolar flow that photoevaporates from the surface of a neutral Keplerian disk”
- size of flow decreases with frequency
- strong but highly variable hydrogen maser emission (RRLs) from the near-edge-on disk (~0.065”=80AU@1.2kpc)
- at declination of >40deg -> visible for ~13h per day



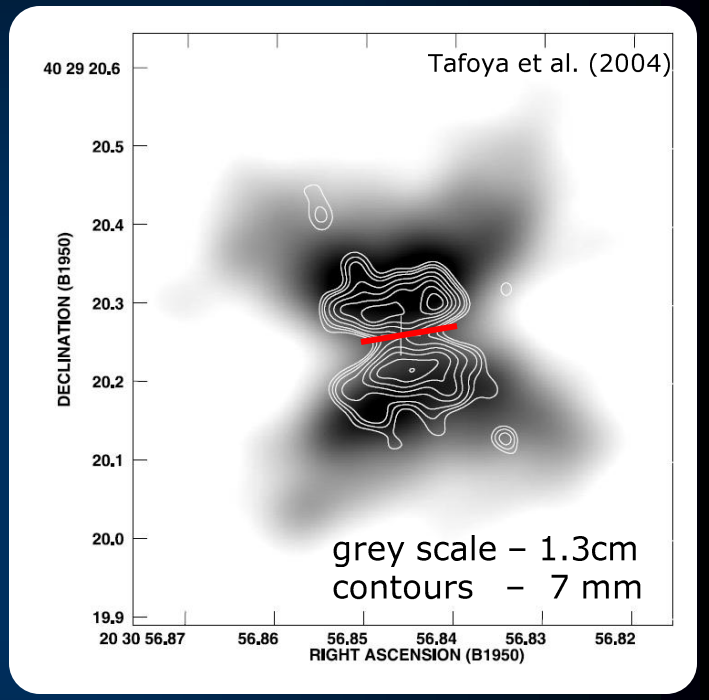


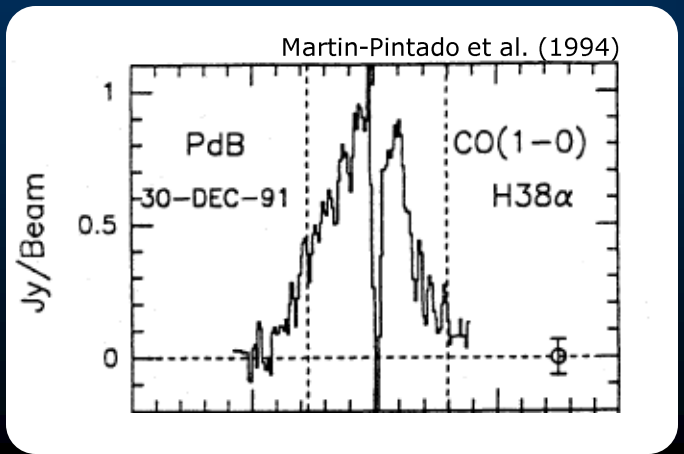


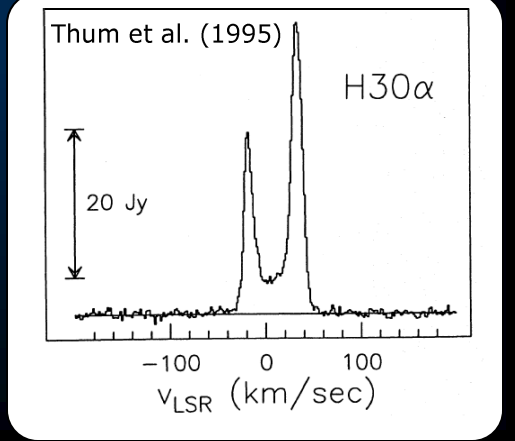
Flux Calibrators: MWC349

Some facts:

- binary stellar system: MWC349A (Be) & MWC349B (B0 type III)
- the two stars are separated by 2.4"±0.1" and possibly interact
- MWC349A the brightest radio continuum star
- radio continuum produced by "ionised bipolar flow that photoevaporates from the surface of a neutral Keplerian disk"
- size of flow decreases with frequency
- strong but highly variable hydrogen maser emission (RRLs) from the near-edge-on disk (~0.065"=80AU@1.2kpc)
- at declination of >40deg -> visible for ~13h per day



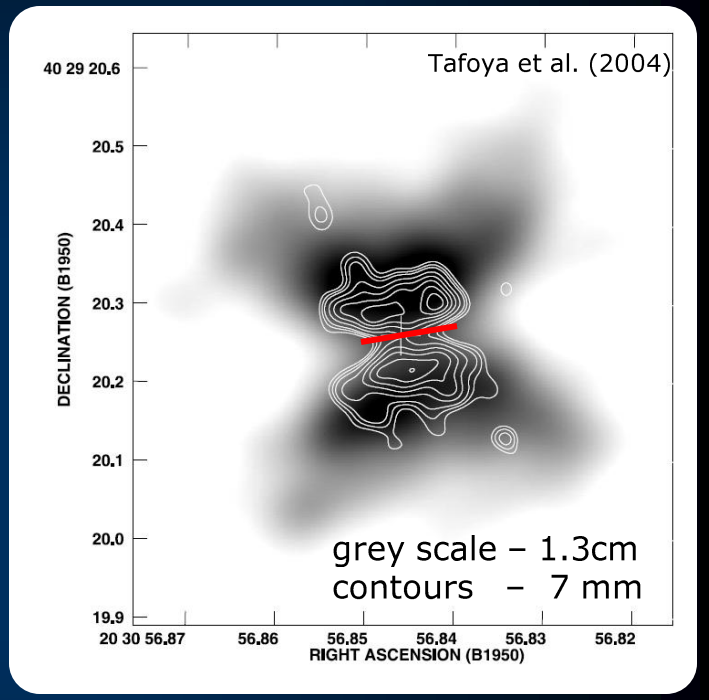


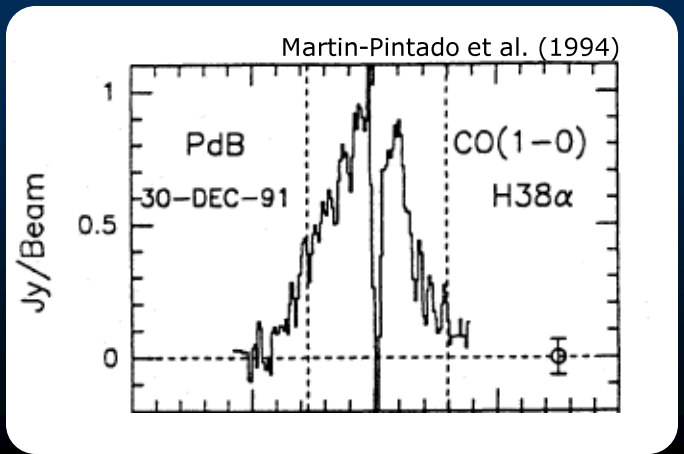


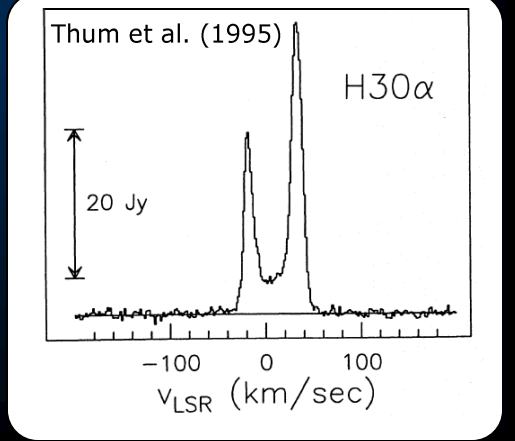
Flux Calibrators: MWC349

Some facts:

- binary stellar system: MWC349A (Be) & MWC349B (B0 type III)
- the two stars are separated by 2.4"±0.1" and possibly interact
- MWC349A the brightest radio continuum star
- radio continuum produced by "ionised bipolar flow that photoevaporates from the surface of a neutral Keplerian disk"
- size of flow decreases with frequency
- strong but highly variable hydrogen maser emission (RRLs) from the near-edge-on disk (~0.065"=80AU@1.2kpc)
- at declination of >40deg -> visible for ~13h per day



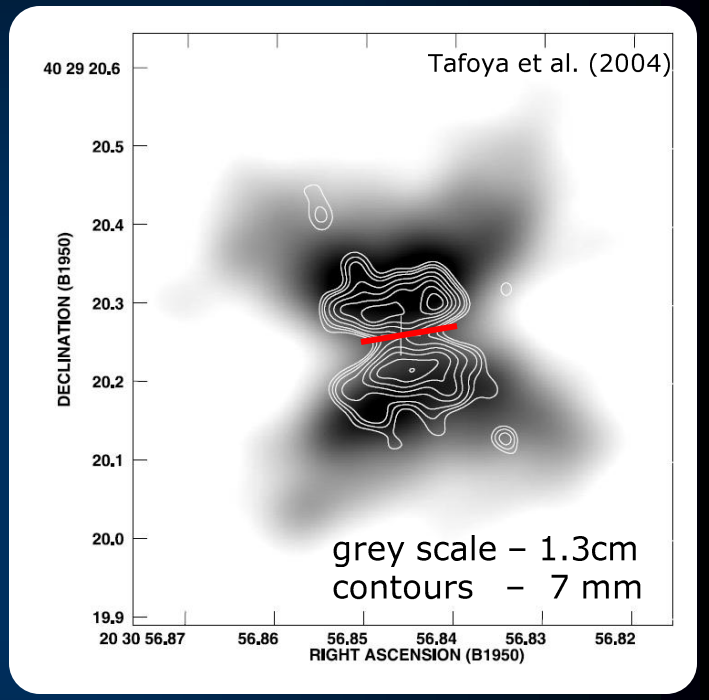


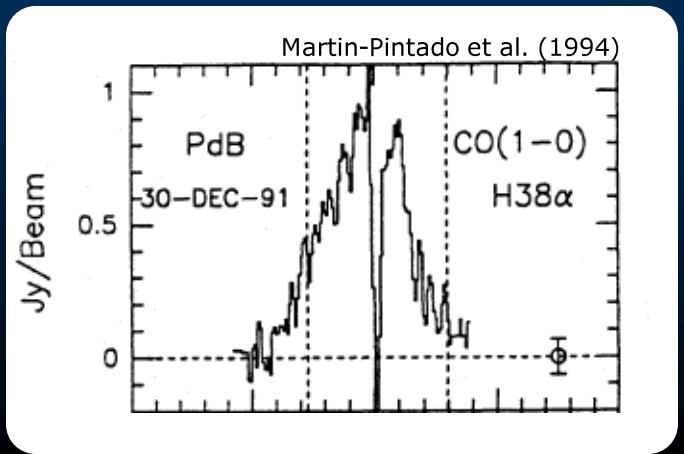


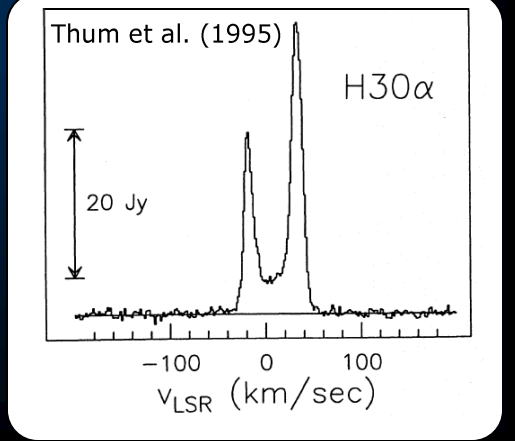
Flux Calibrators: MWC349

Some facts:

- binary stellar system: MWC349A (Be) & MWC349B (B0 type III)
- the two stars are separated by 2.4"±0.1" and possibly interact
- MWC349A the brightest radio continuum star
- radio continuum produced by "ionised bipolar flow that photoevaporates from the surface of a neutral Keplerian disk"
- size of flow decreases with frequency
- strong but highly variable hydrogen maser emission (RRLs) from the near-edge-on disk (~0.065"=80AU@1.2kpc)
- at declination of >40deg -> visible for ~13h per day



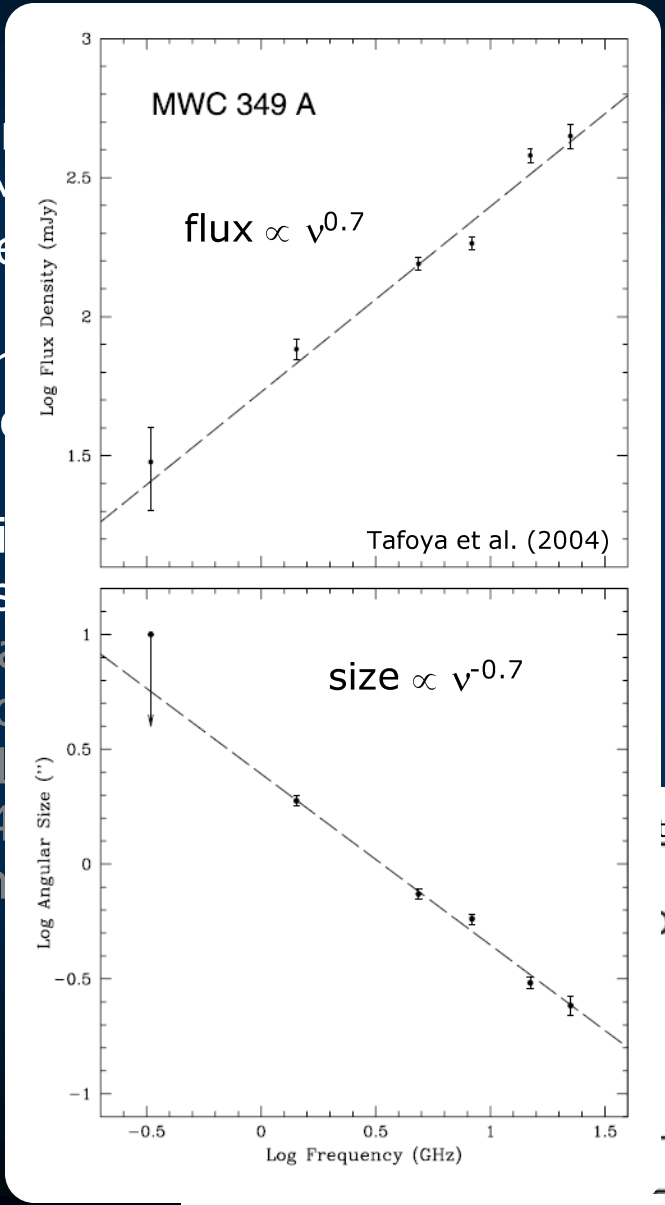


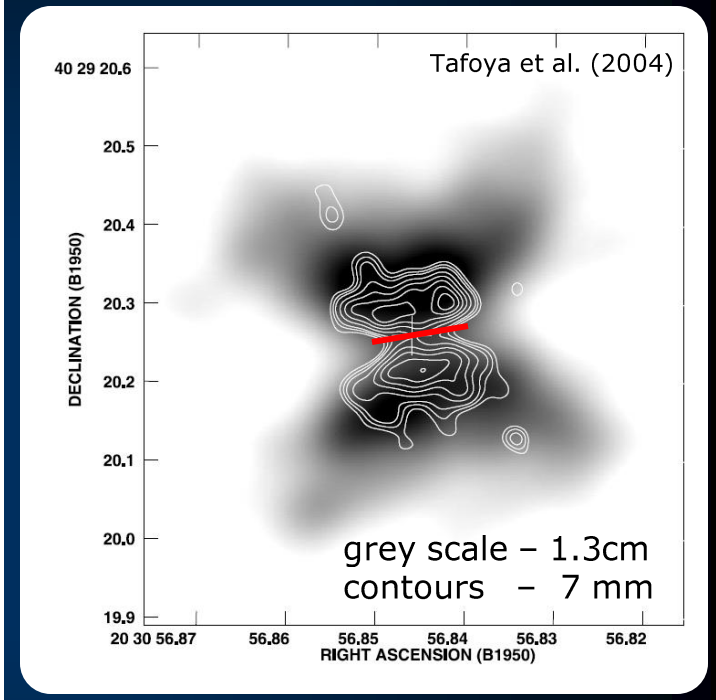


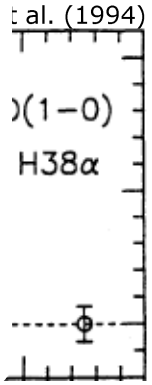
Flux Calibrators: MWC349

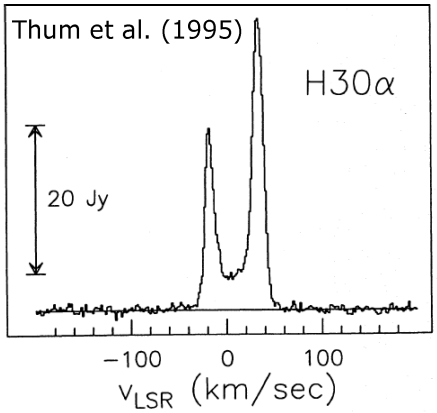
Some facts:

- binary stellar syste
  MWC349A (Be) & M
- the two stars are se
  possibly interact
- MWC349A the brigh
- radio continuum pr
  flow that photoeva
  of a neutral Keplerі
- size of flow decreas
- strong but highly va
  emission (RRLs) fro
  (~0.065”=80AU@1
- at declination of >4
  -> visible for ~13h
  day





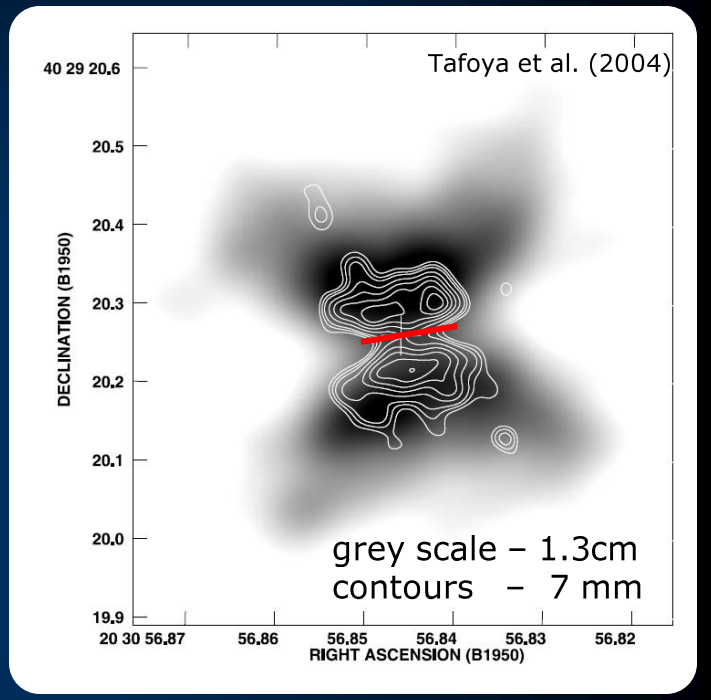


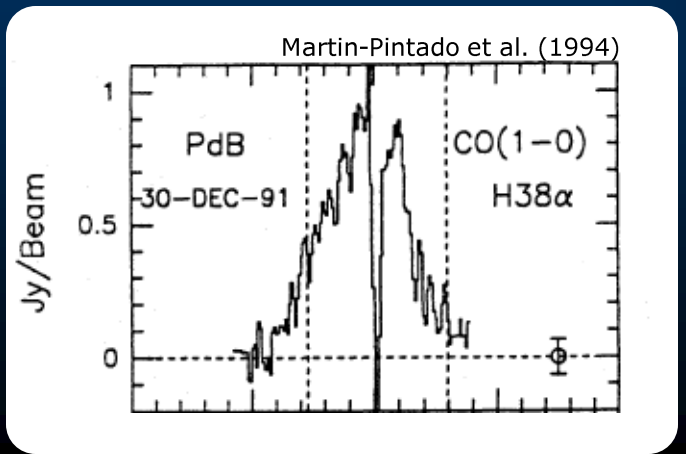


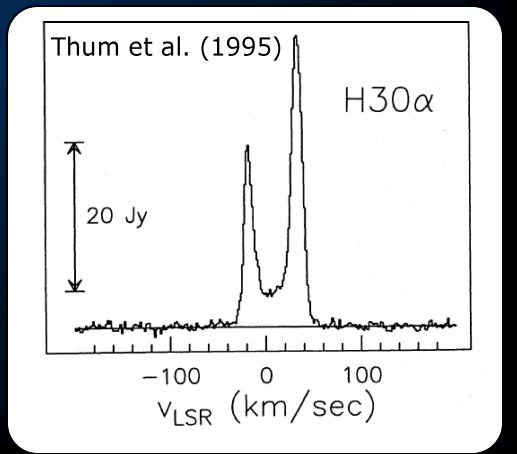
Flux Calibrators: MWC349

Some facts:

- binary stellar system: MWC349A (Be) & MWC349B (B0 type III)
- the two stars are separated by 2.4"±0.1" and possibly interact
- MWC349A the brightest radio continuum star
- radio continuum produced by "ionised bipolar flow that photoevaporates from the surface of a neutral Keplerian disk"
- size of flow decreases with frequency
- strong but highly variable hydrogen maser emission (RRLs) from the near-edge-on disk (~0.065"=80AU@1.2kpc)
- at declination of >40deg -> visible for ~13h per day





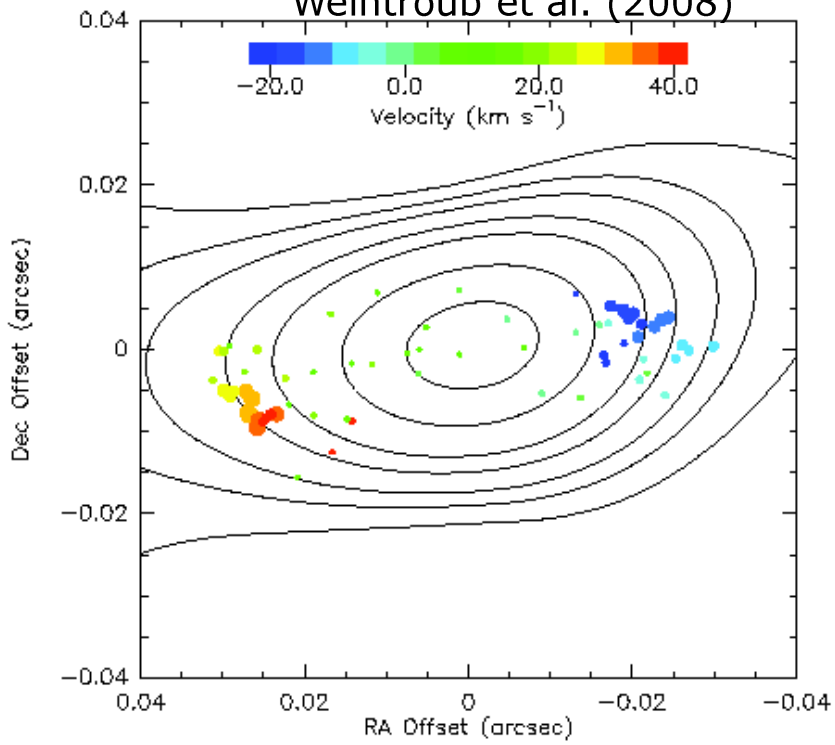


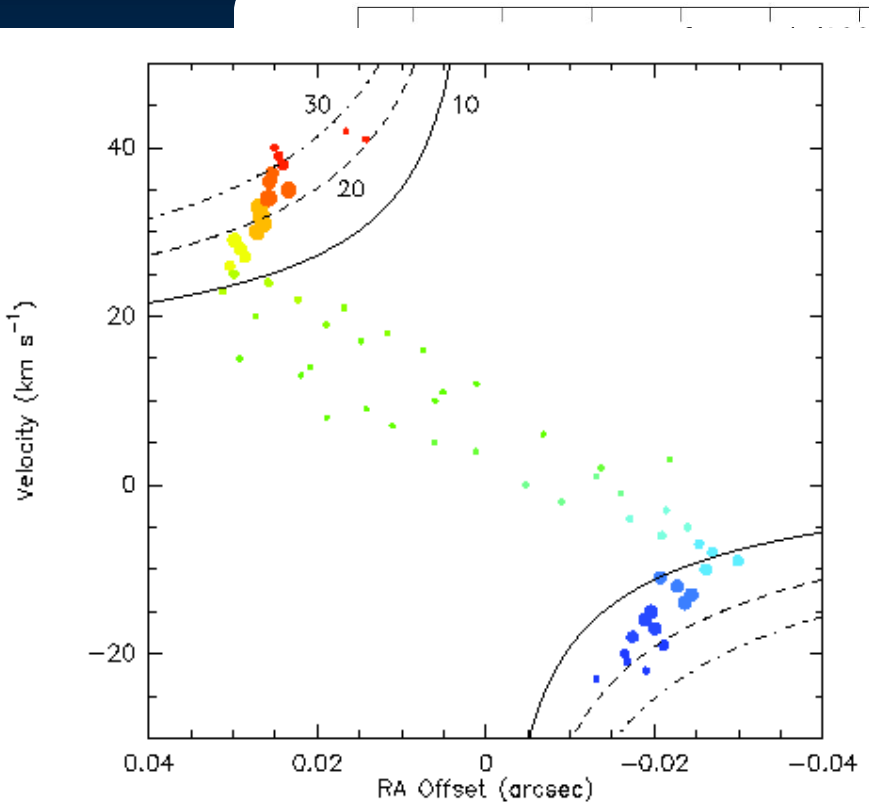
Flux Calibrators: MWC349

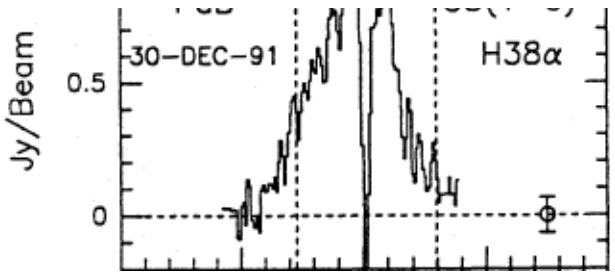
Some facts:

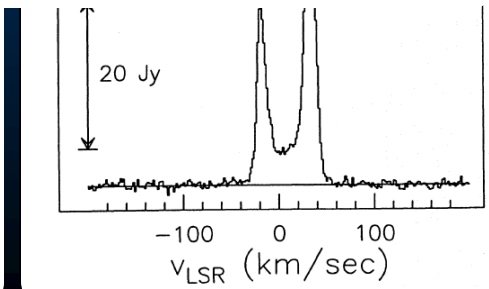
- binary stellar system:
-
-
-
-
-
-
-
-
- day

Weintroub et al. (2008)





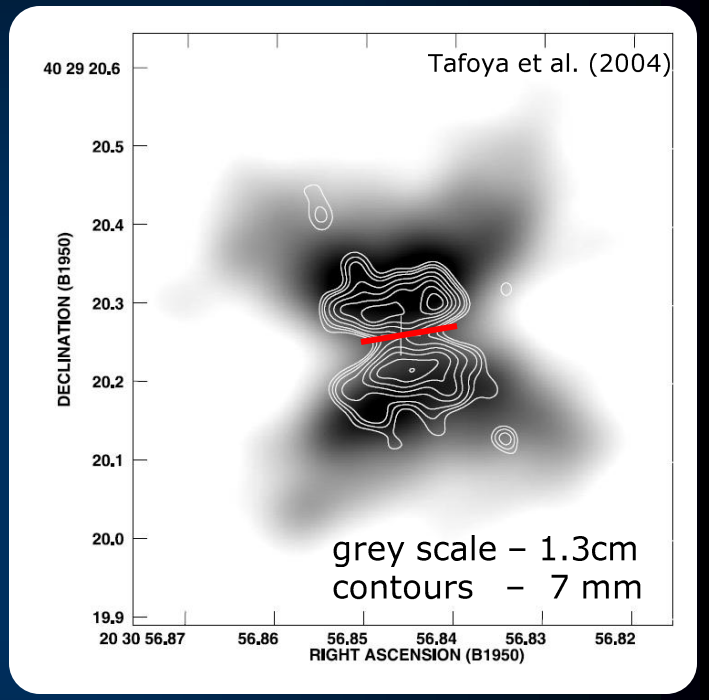


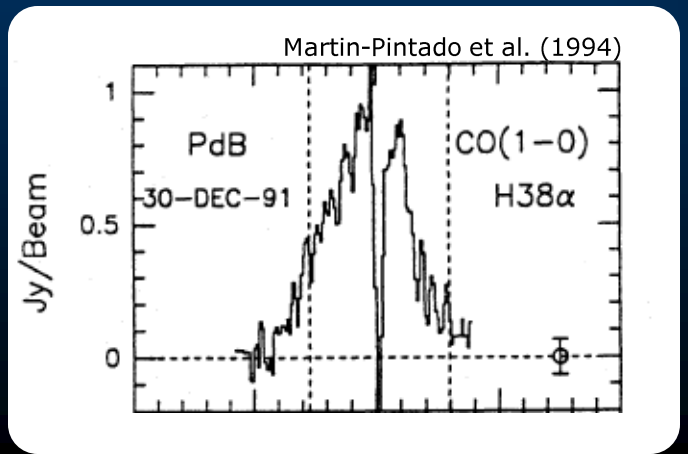


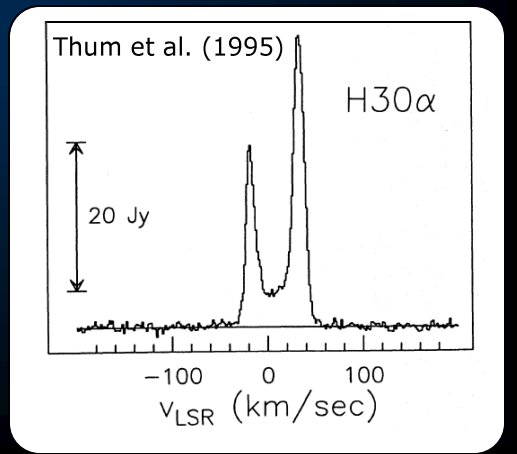
Flux Calibrators: MWC349

Some facts:

- binary stellar system: MWC349A (Be) & MWC349B (B0 type III)
- the two stars are separated by 2.4"±0.1" and possibly interact
- MWC349A the brightest radio continuum star
- radio continuum produced by "ionised bipolar flow that photoevaporates from the surface of a neutral Keplerian disk"
- size of flow decreases with frequency
- strong but highly variable hydrogen maser emission (RRLs) from the near-edge-on disk (~0.065"=80AU@1.2kpc)
- at declination of >40deg => visible for ~13h per day at Bure



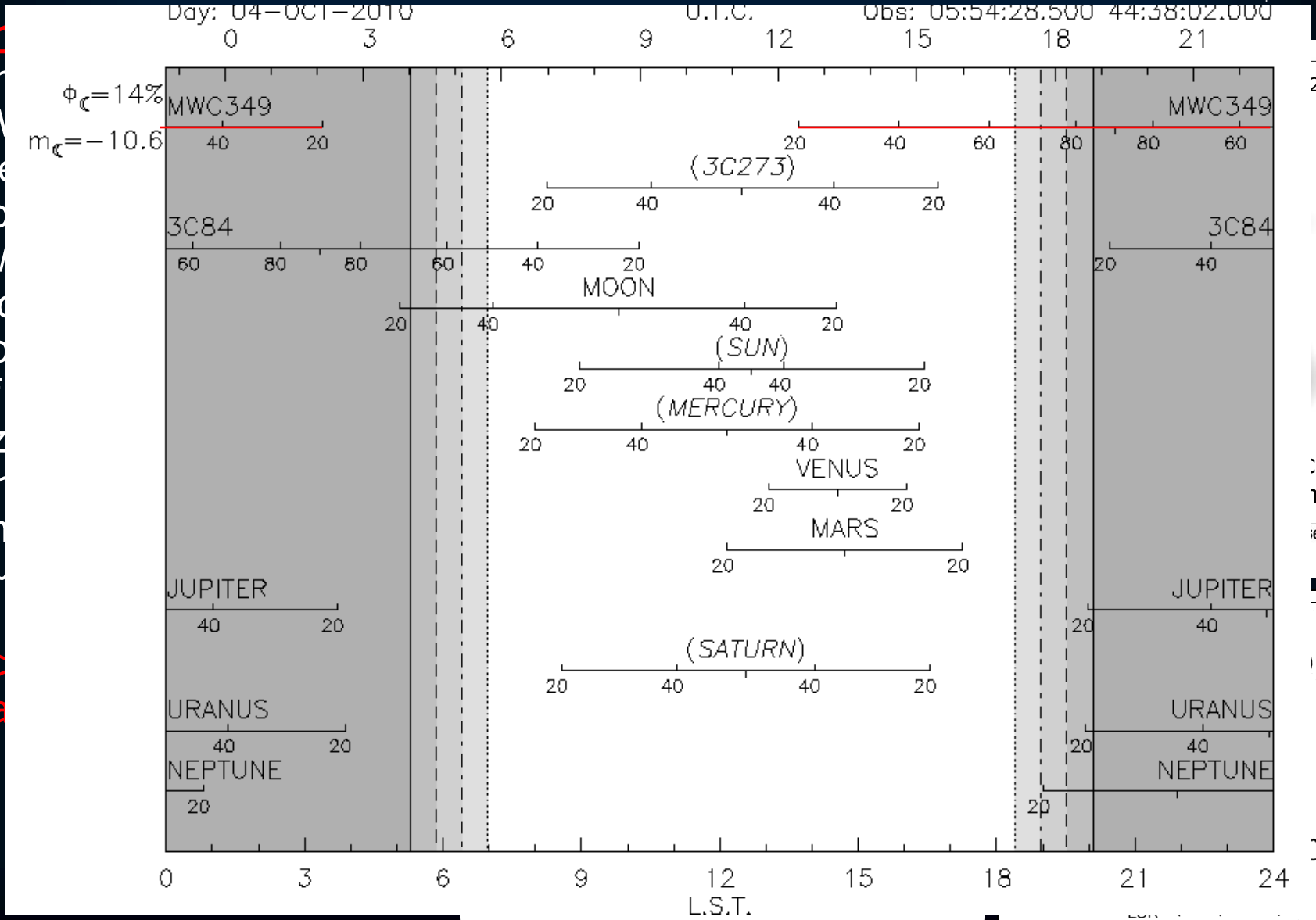




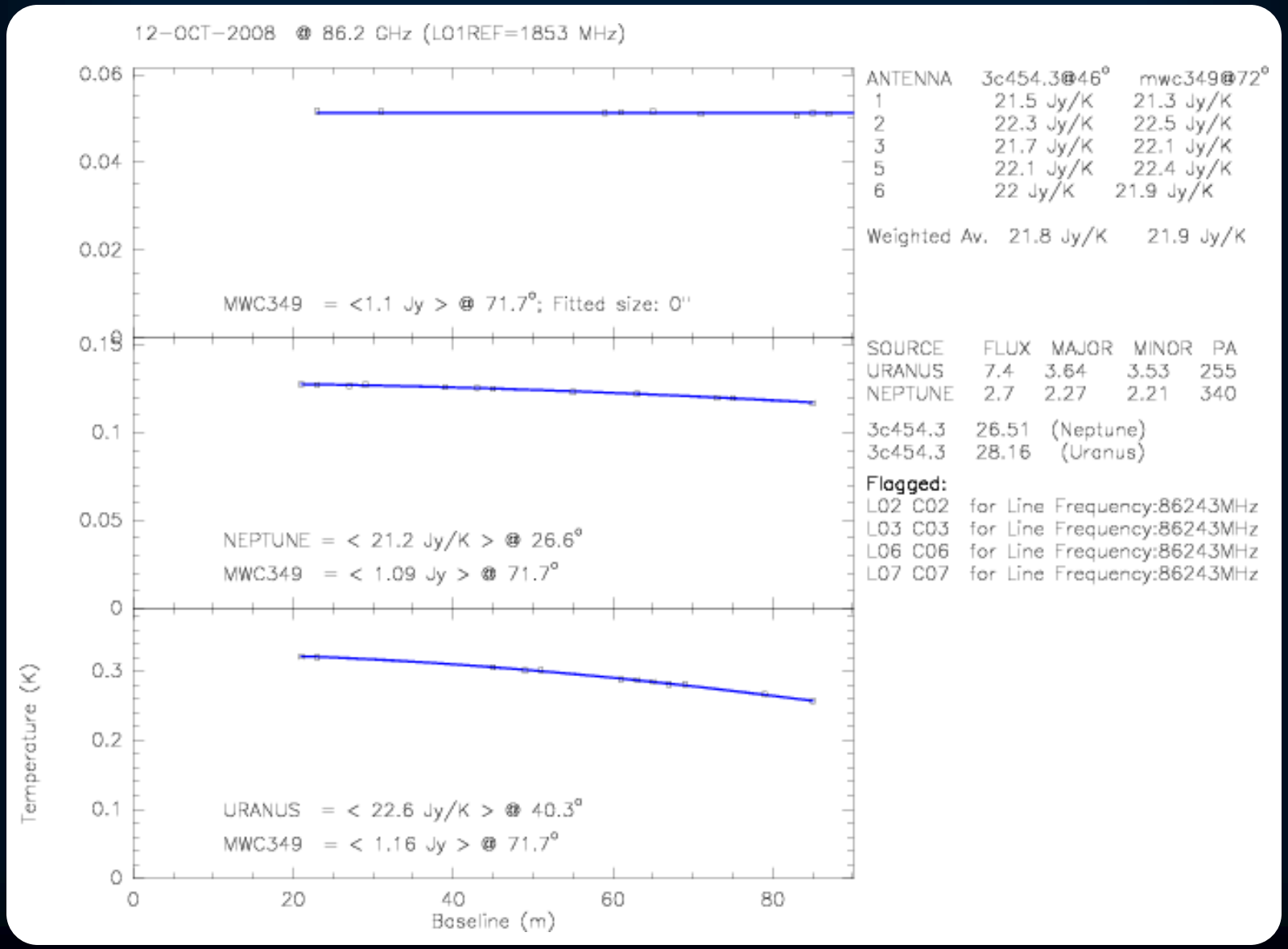
Flux Calibrators: MWC349

Som

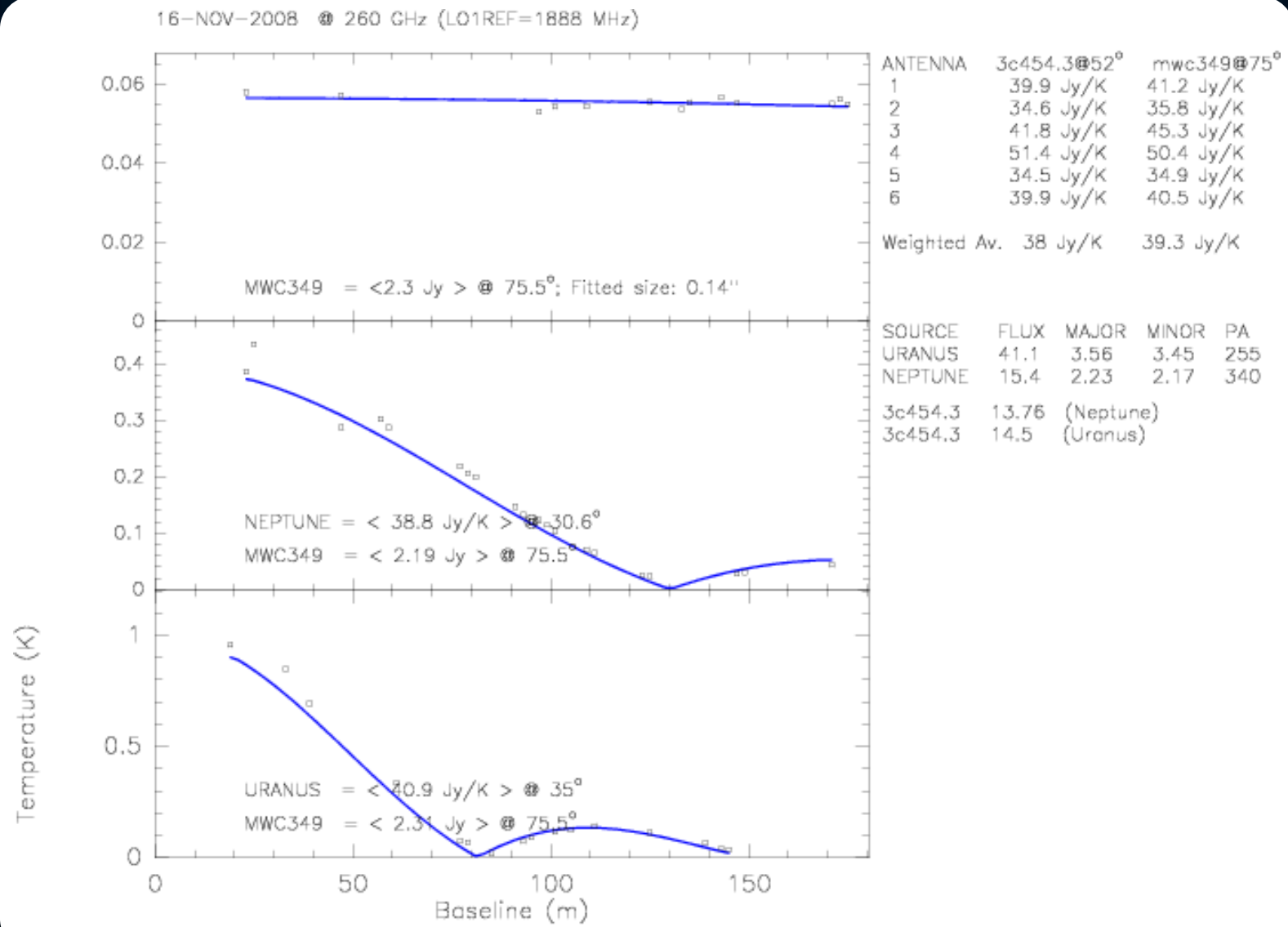
- bir
  MW
- the
  po
- MW
- rad
  flo
  of
- siz
- str
  en
  (~
- at
  =>
  da



How to calibrate a calibrator?



How to calibrate a calibrator?

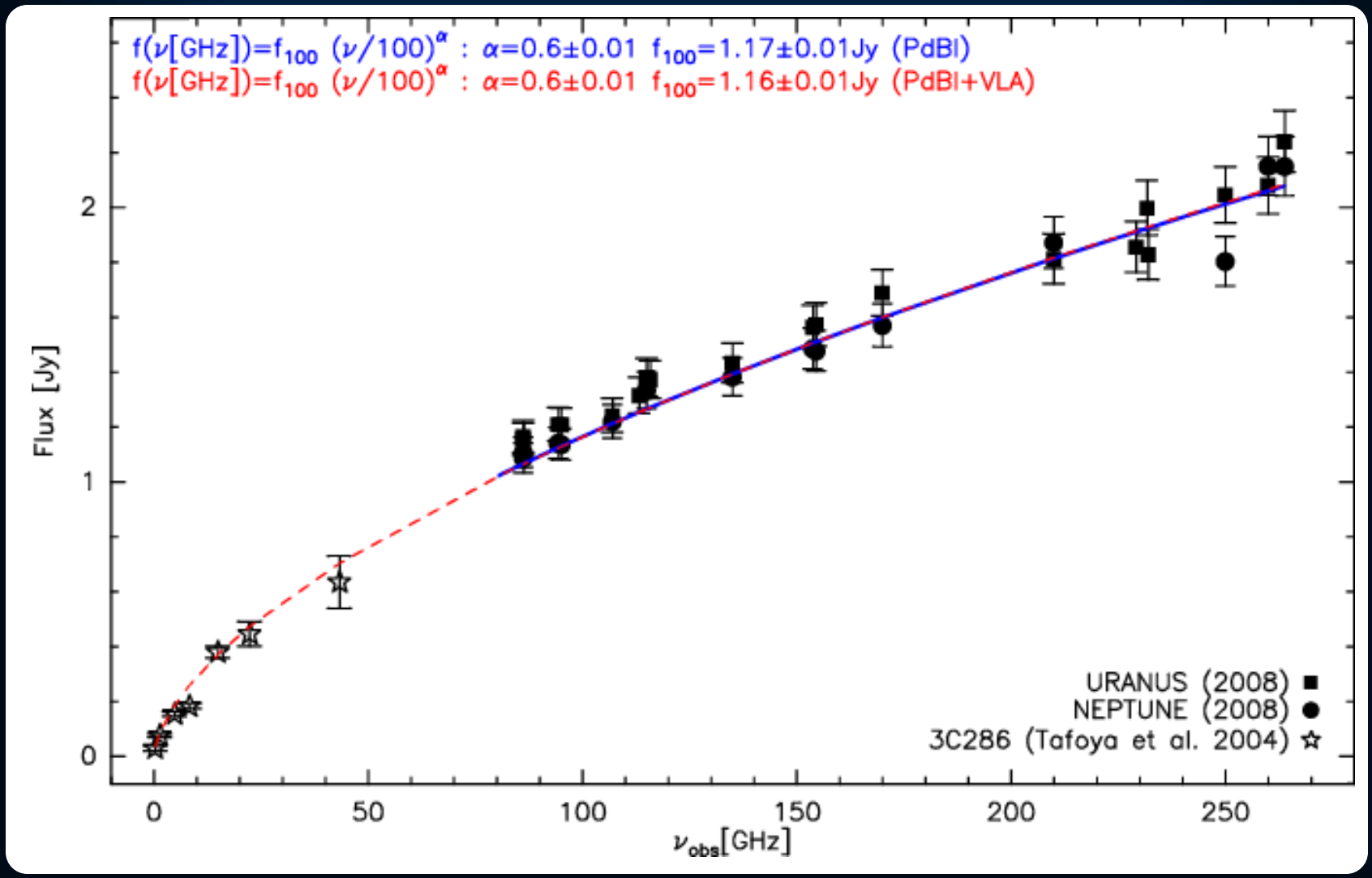


ANTENNA	3c454.3@52°	mwc349@75°
1	39.9 Jy/K	41.2 Jy/K
2	34.6 Jy/K	35.8 Jy/K
3	41.8 Jy/K	45.3 Jy/K
4	51.4 Jy/K	50.4 Jy/K
5	34.5 Jy/K	34.9 Jy/K
6	39.9 Jy/K	40.5 Jy/K
Weighted Av.	38 Jy/K	39.3 Jy/K

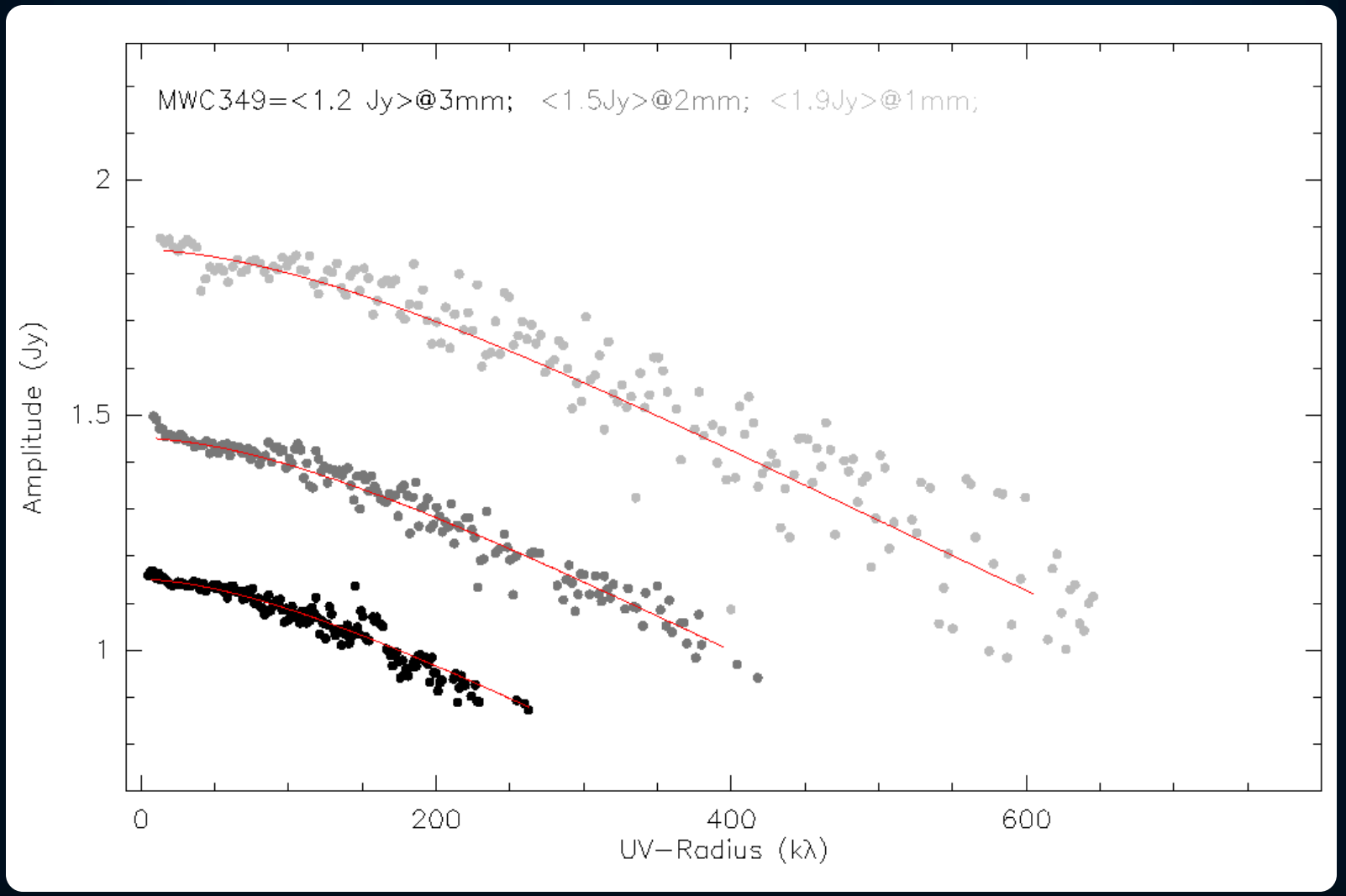
SOURCE	FLUX	MAJOR	MINOR	PA
URANUS	41.1	3.56	3.45	255
NEPTUNE	15.4	2.23	2.17	340

3c454.3 13.76 (Neptune)
3c454.3 14.5 (Uranus)

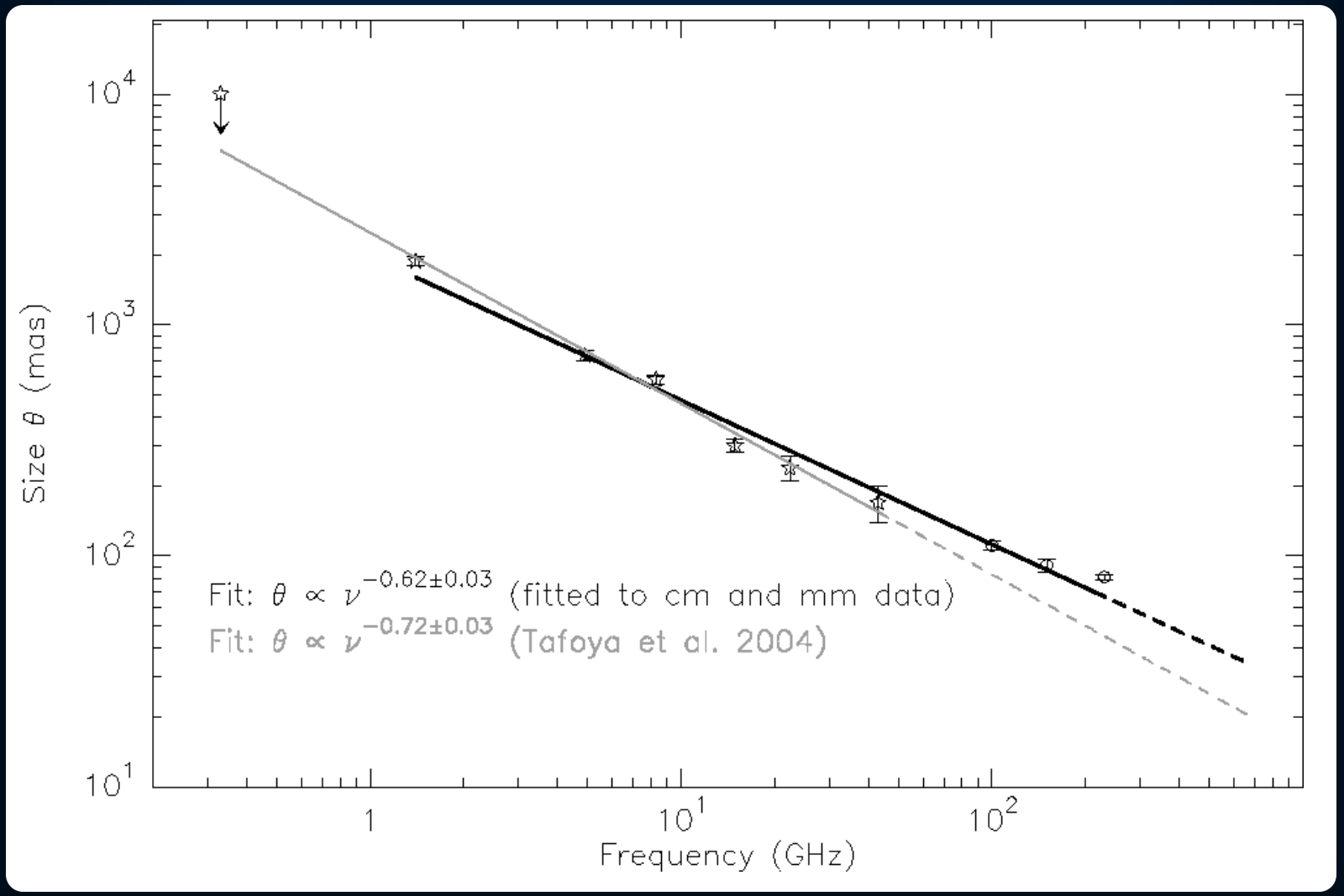
Flux of MWC349: SED



Size of MWC349



Size of MWC349



Flux Calibrators: Radio Stars

Reference radio bright stars:

- MWC349

Flux Calibrators: Radio Stars

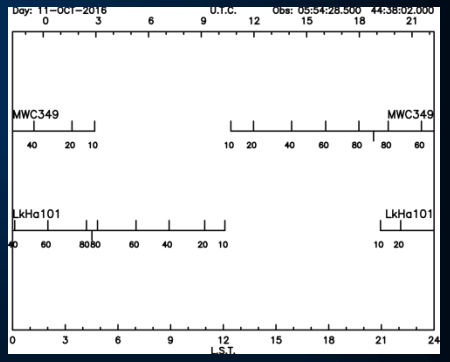
Reference radio bright stars:

- MWC349

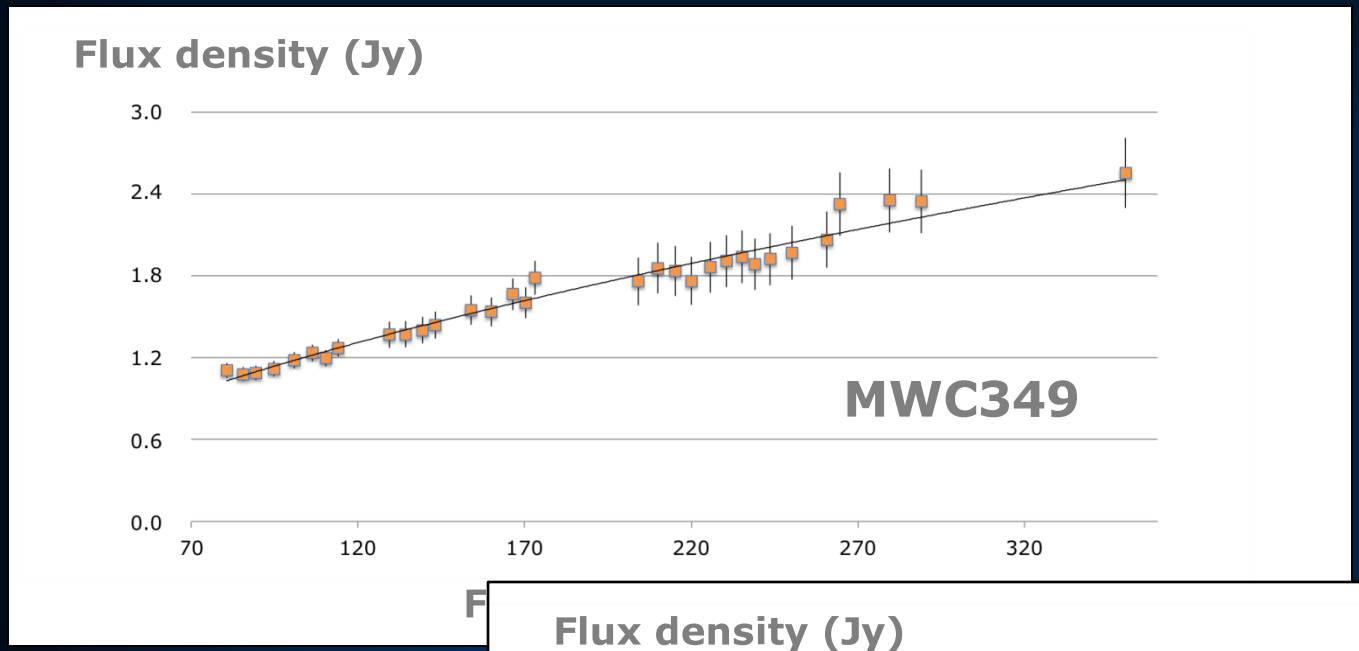
- Since ~ 2013 we also use LkHa101

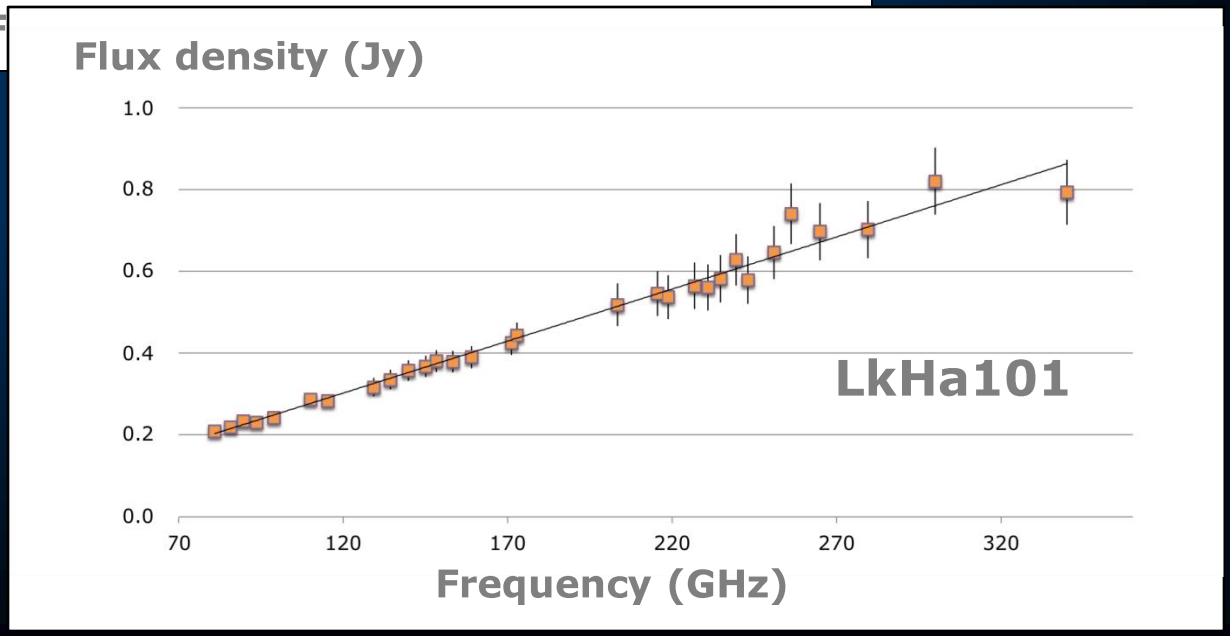
- LkHa101 covers the complementary observable LST

- 24h LST coverage with FLUX reference



Flux Calibrators: Radio Stars / our main references

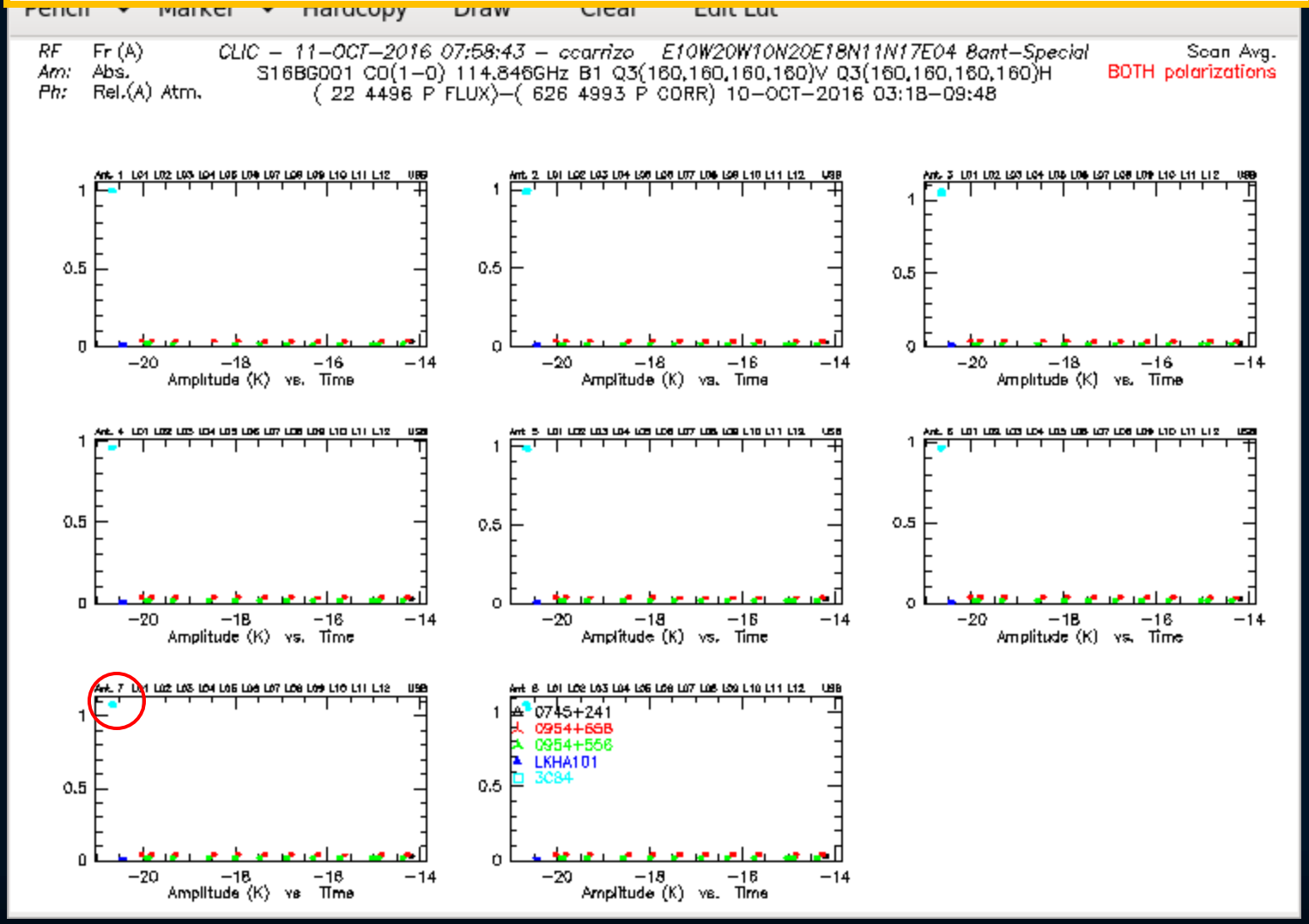




Primary Flux Calibrators

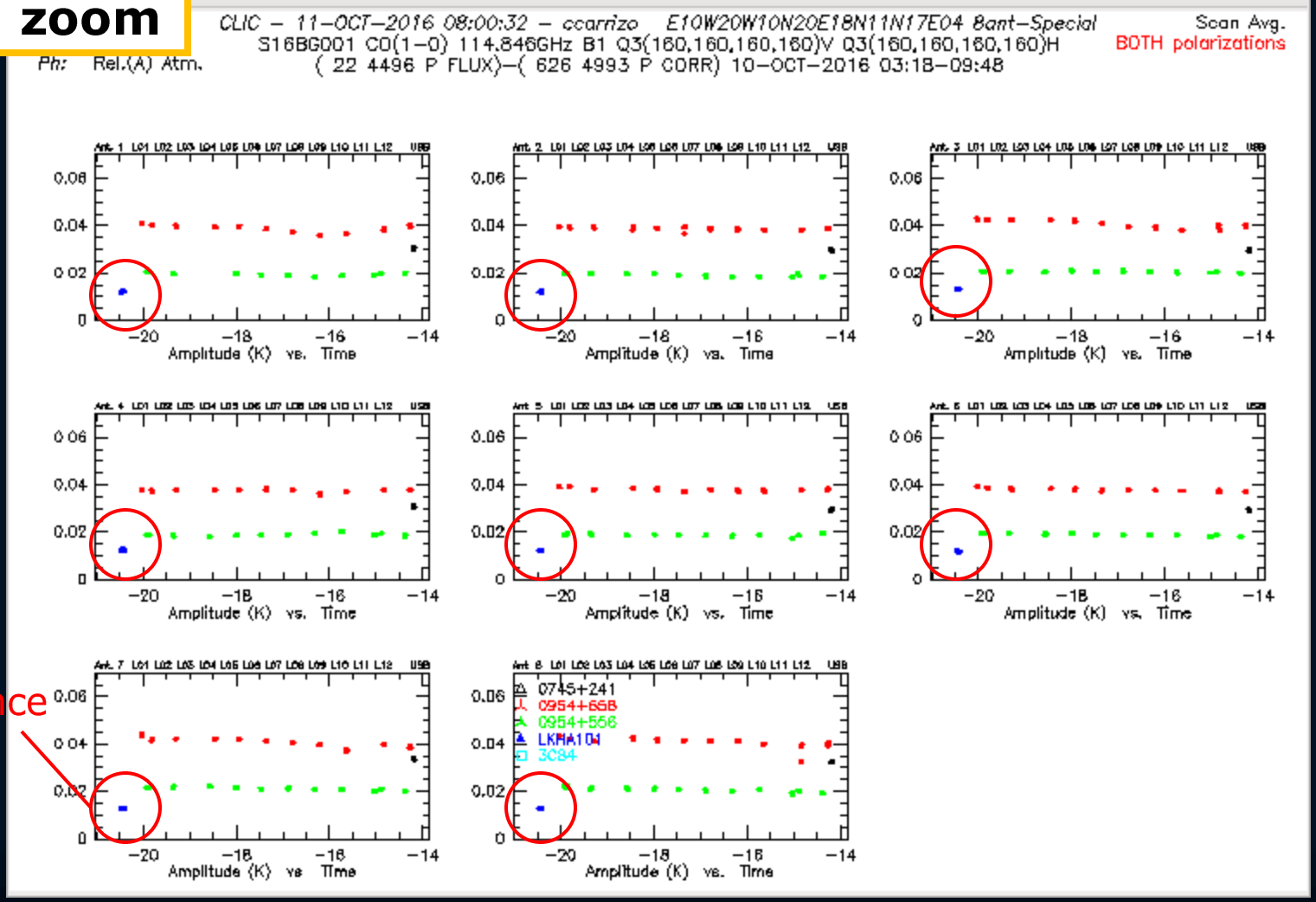
1. Quasars
2. Planets
3. Solar Bodies (Satellites, Asteroids, Dwarf Planets)
4. Radio Stars

Amplitudes vs time for all calibrators in Ta* (K)



Amplitudes vs time for all calibrators in Ta* (K)

zoom

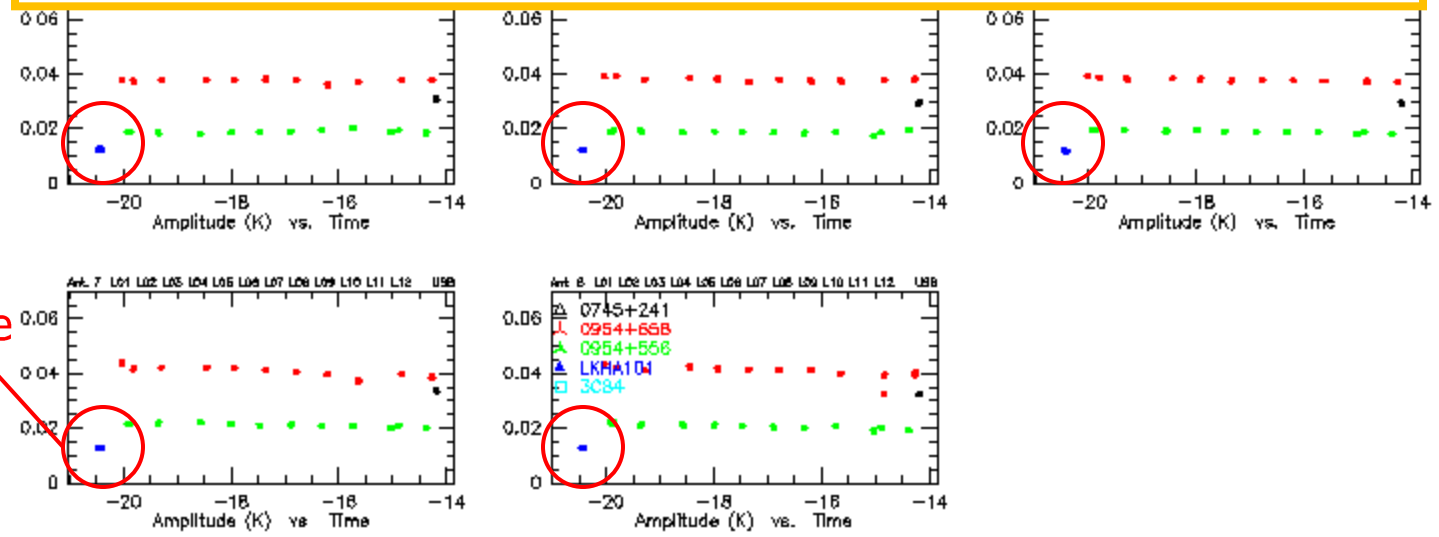


Flux reference

Steps in flux calibration:

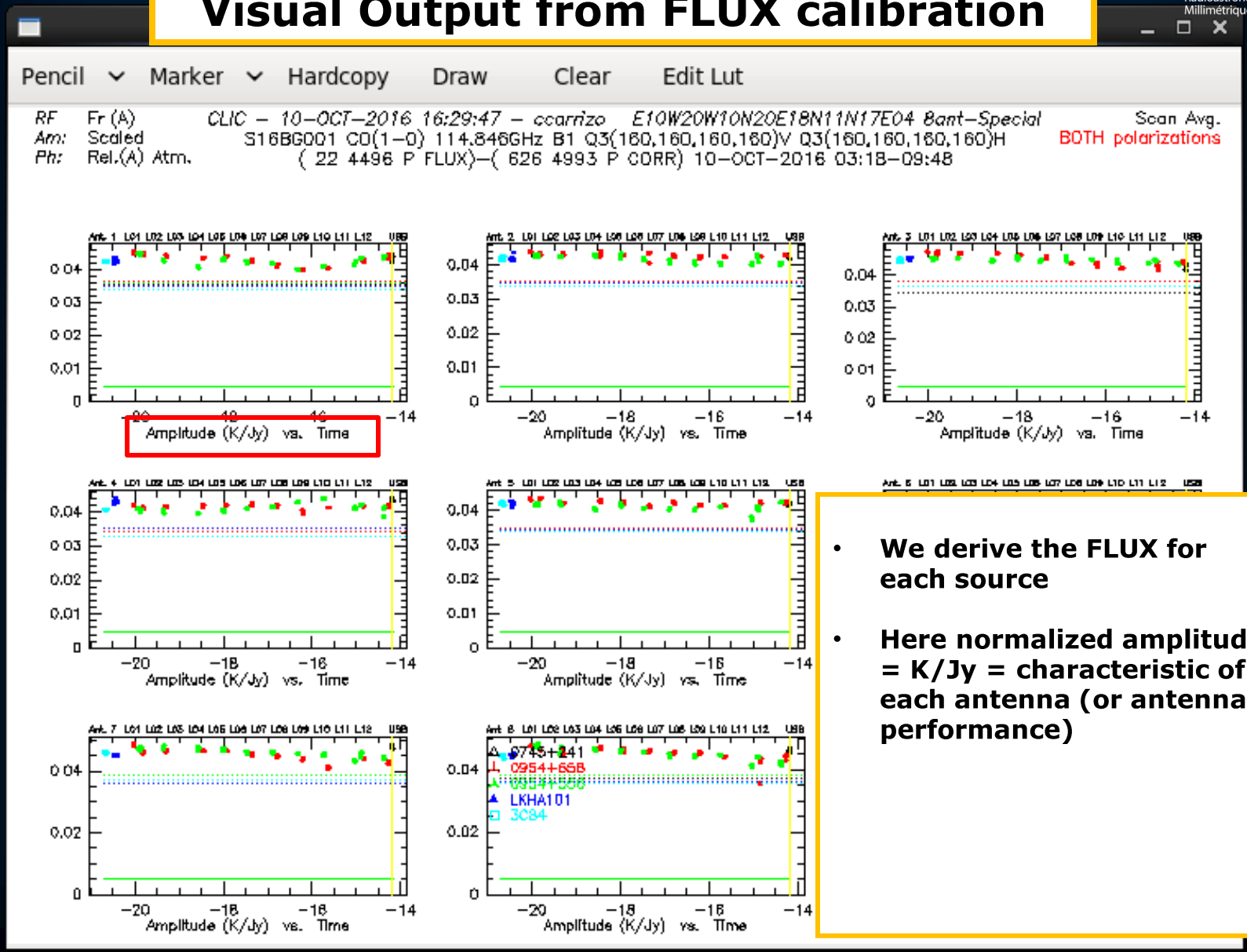
1) Fix the flux (Jy) of the reference calibrator
2) Estimate K/Jy factor (antenna efficiency)
3) Derive flux for other calibrators

Final representation = normalized amplitudes = antenna efficiencies (Jy/K or K/Jy)



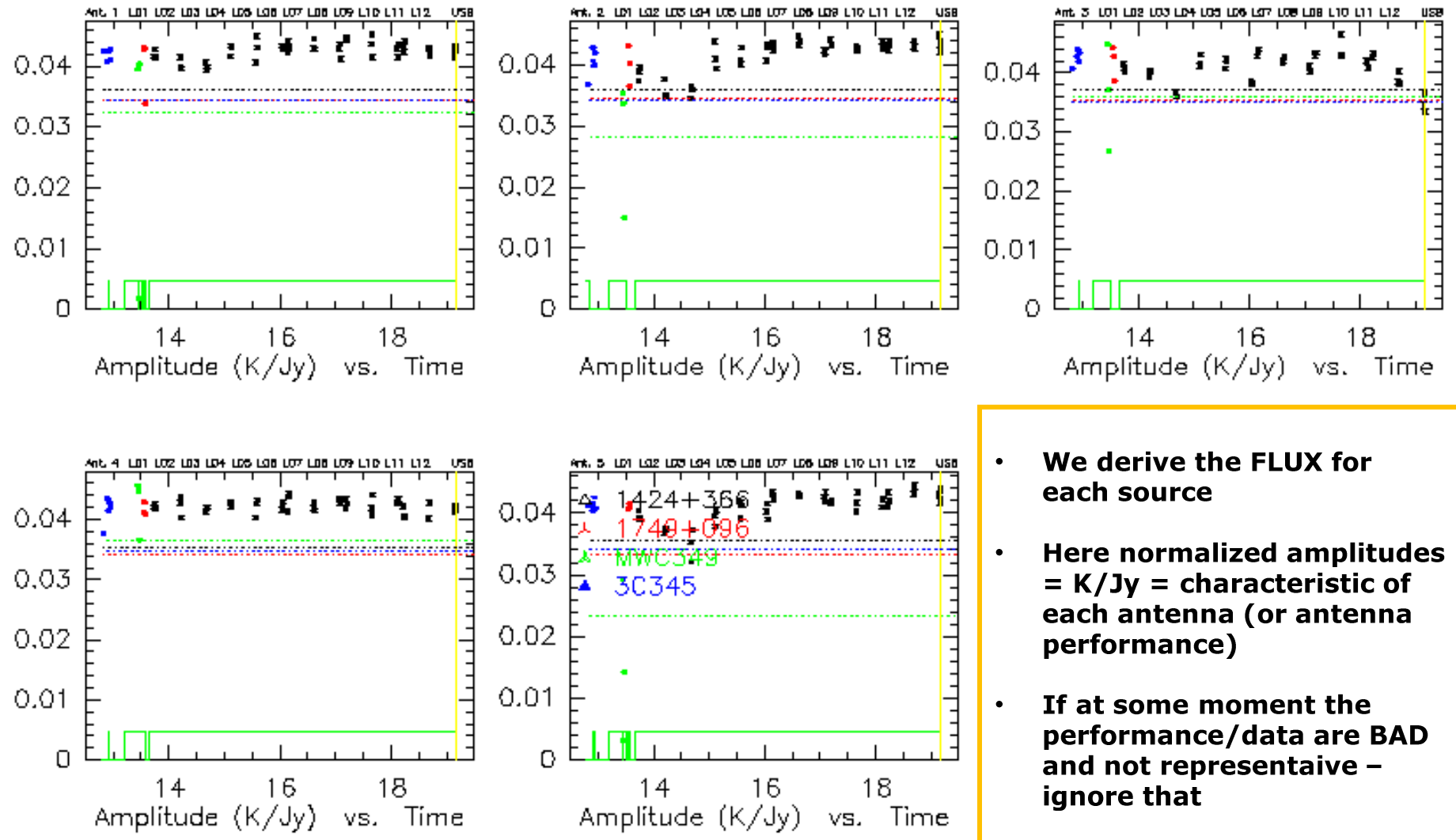
Flux reference

Visual Output from FLUX calibration



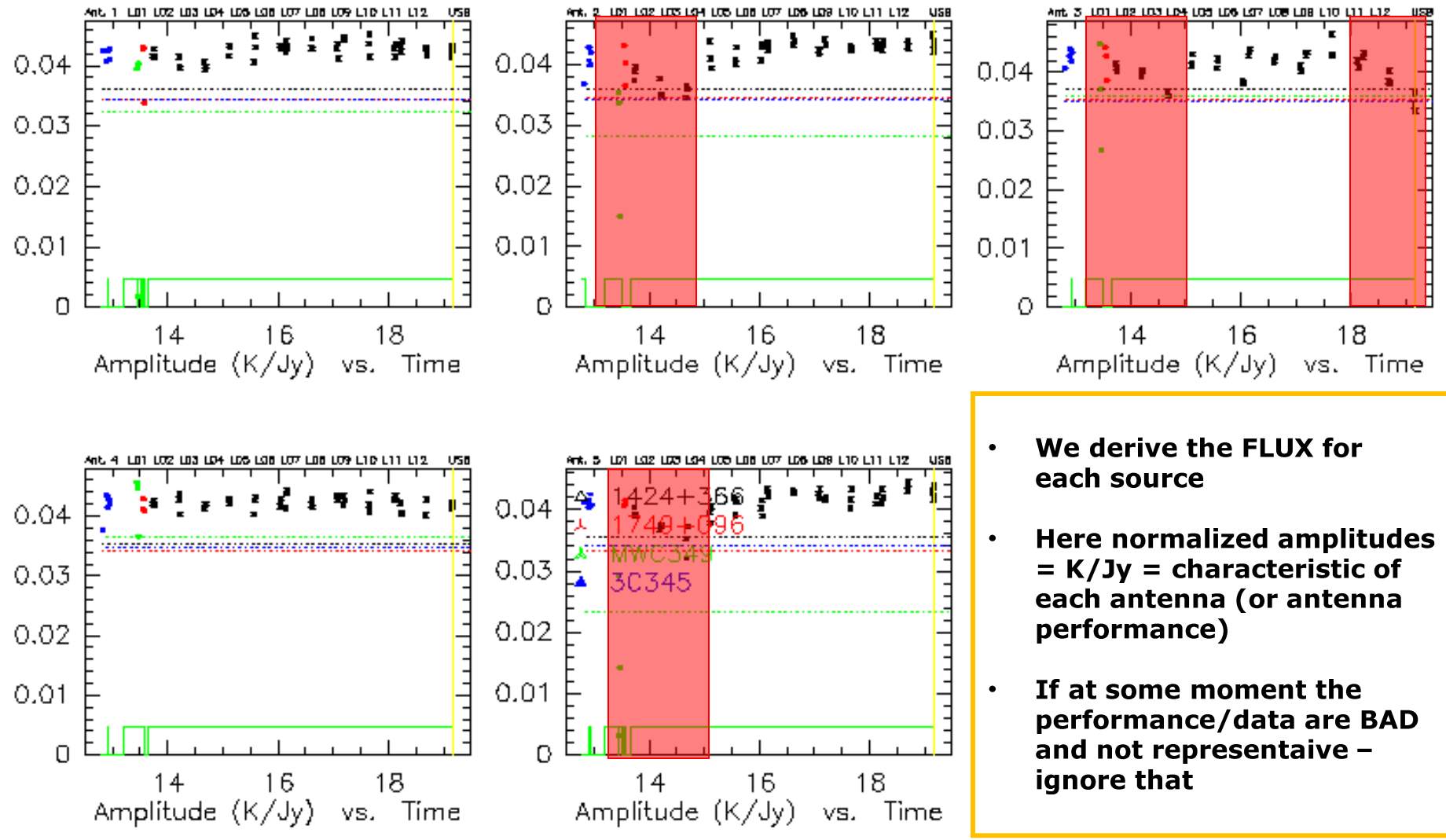
- **We derive the FLUX for each source**
- **Here normalized amplitudes = K/Jy = characteristic of each antenna (or antenna performance)**

Visual Output from FLUX calibration



- **We derive the FLUX for each source**
- **Here normalized amplitudes = K/Jy = characteristic of each antenna (or antenna performance)**
- **If at some moment the performance/data are BAD and not representaive – ignore that**

Visual Output from FLUX calibration



- **We derive the FLUX for each source**
- **Here normalized amplitudes = K/Jy = characteristic of each antenna (or antenna performance)**
- **If at some moment the performance/data are BAD and not representaive – ignore that**

Practical Tips

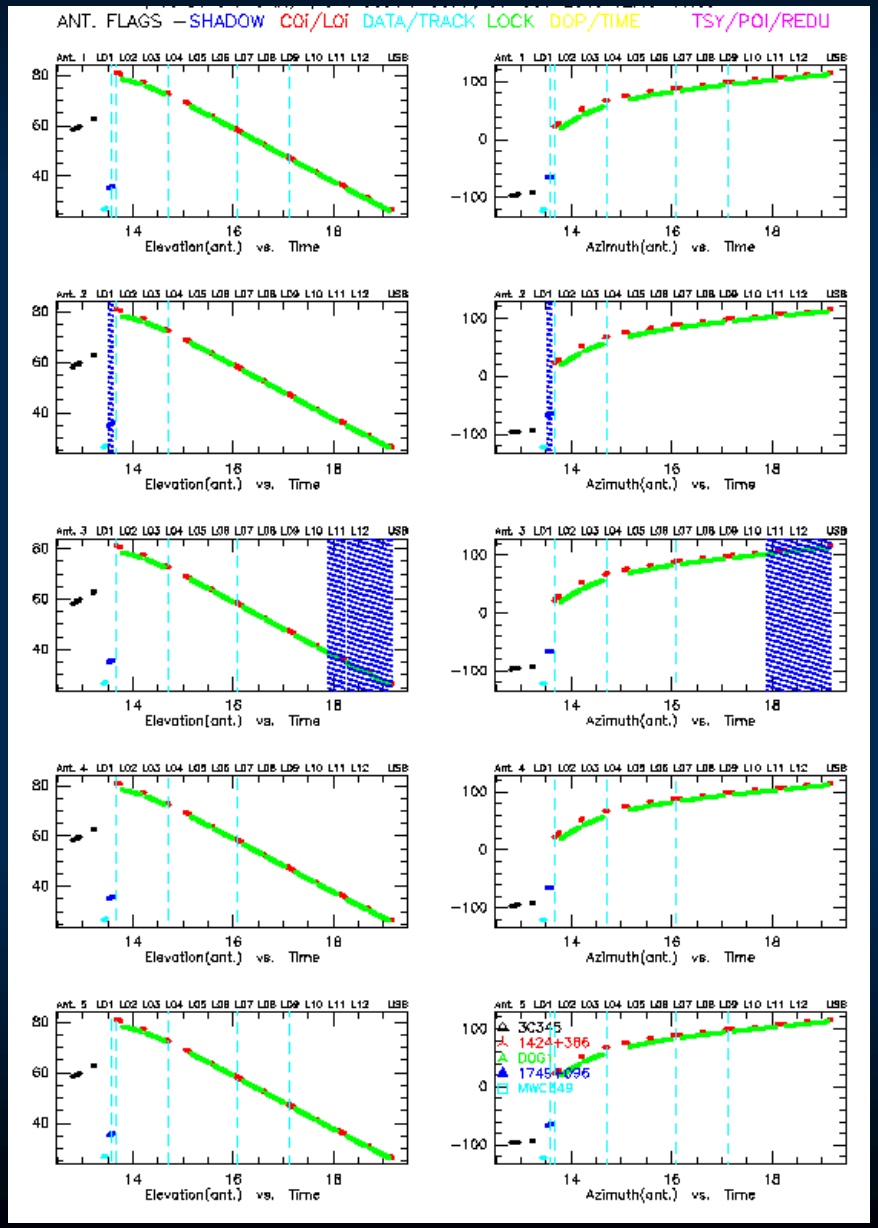
Which are the issues to consider?

Checklist:

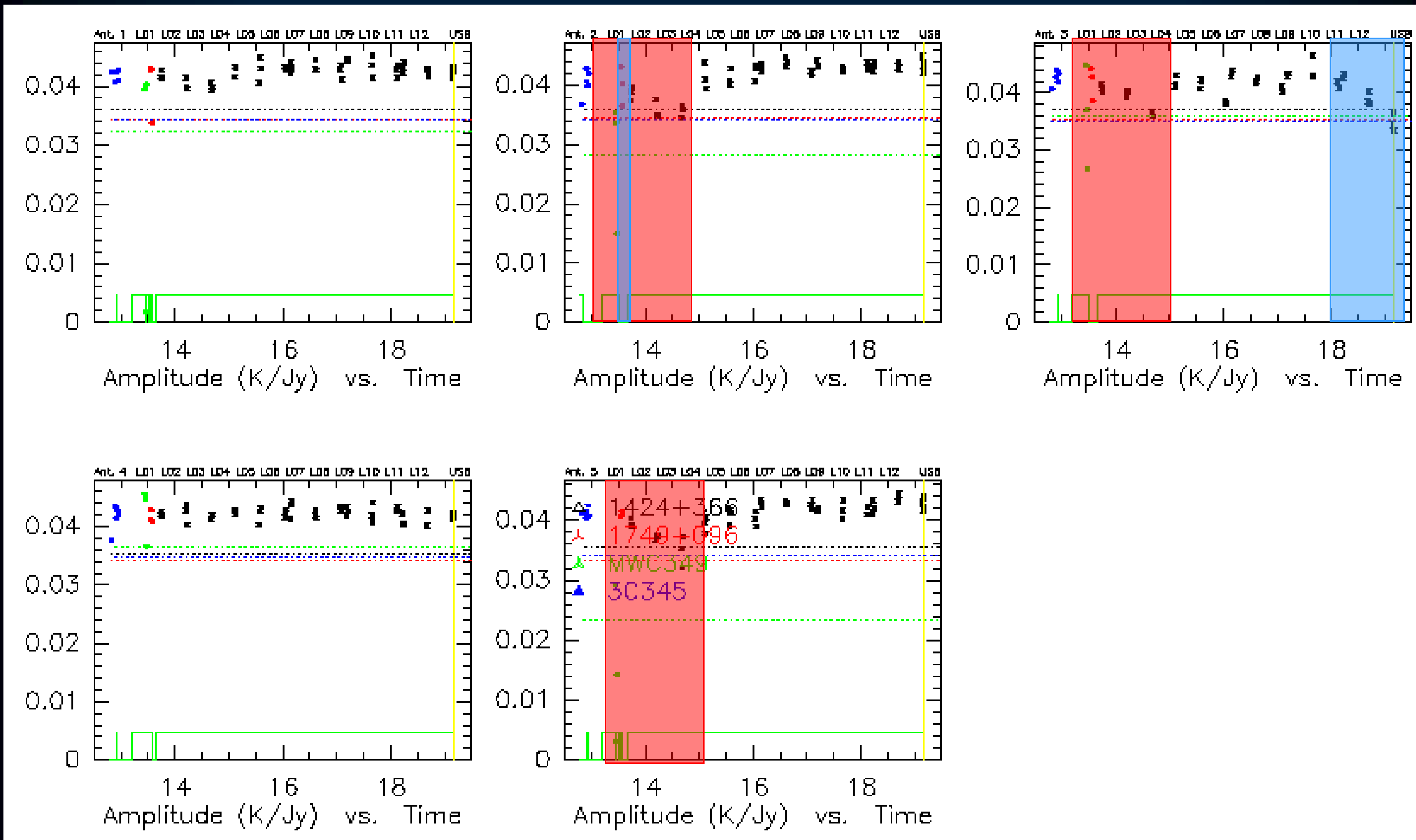
- Antenna Shadowing
- Pointing/Focus Problems
- Tracking Problems
- Noisy data
- Has Flux Calibrator Lines?
- Is Flux Calibrator Extended?
- Check Elevation of your source
- Check whether source is polarised
  (only important when using one polarisation)
- Do phases of different spectral windows overlap?

Practical Tips: Shadowing

First Look



Practical Tips: Shadowing



Practical Tips

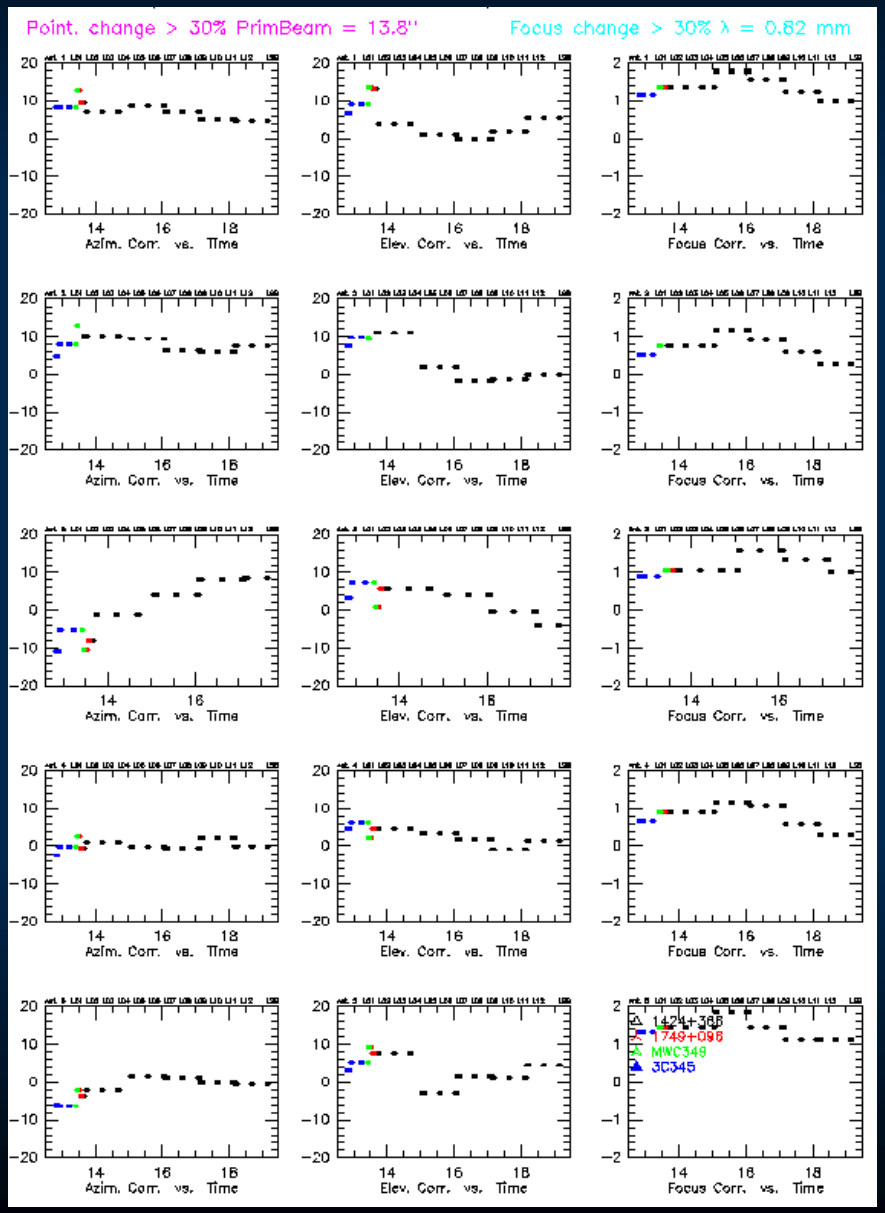
Which are the issues to consider?

Checklist:

- Antenna Shadowing
- Pointing/Focus Problems
- Tracking Problems
- Noisy data
- Has Flux Calibrator Lines?
- Is Flux Calibrator Extended?
- Check Elevation of your source
- Check whether source is polarised (only important when using one polarisation)
- Do phases of different spectral windows overlap?

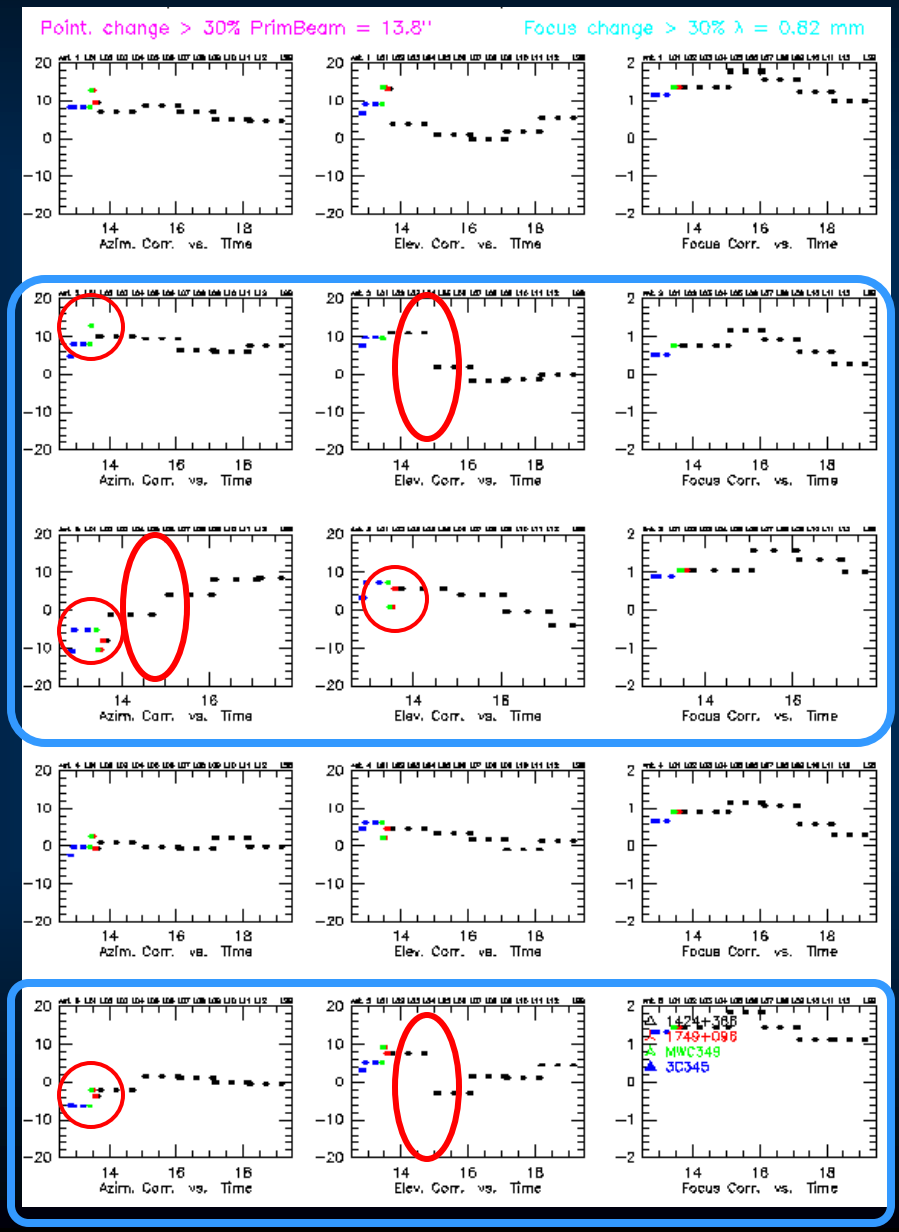
Practical Tips: Pointing/Focus

First Look

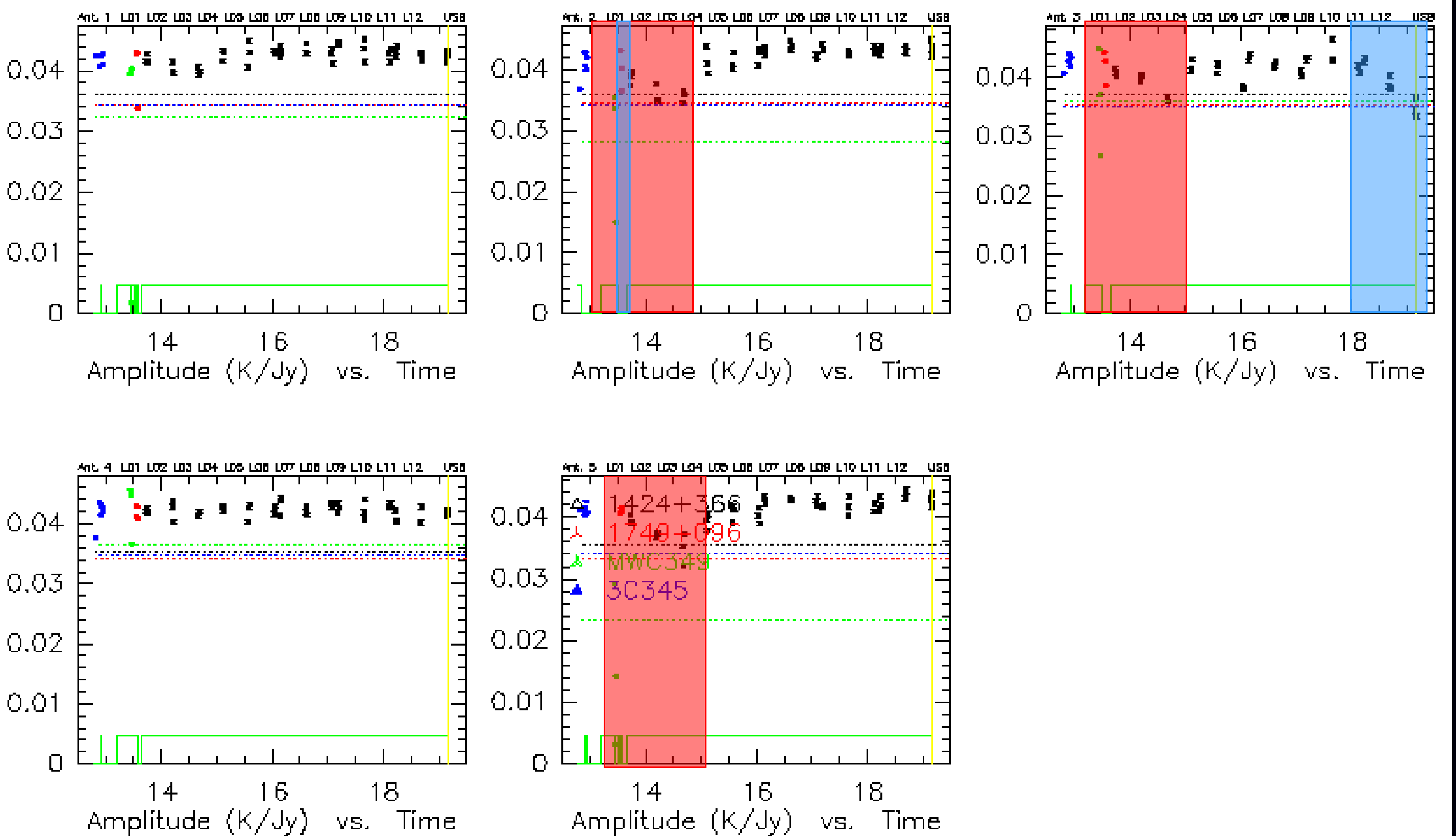


Practical Tips: Pointing/Focus

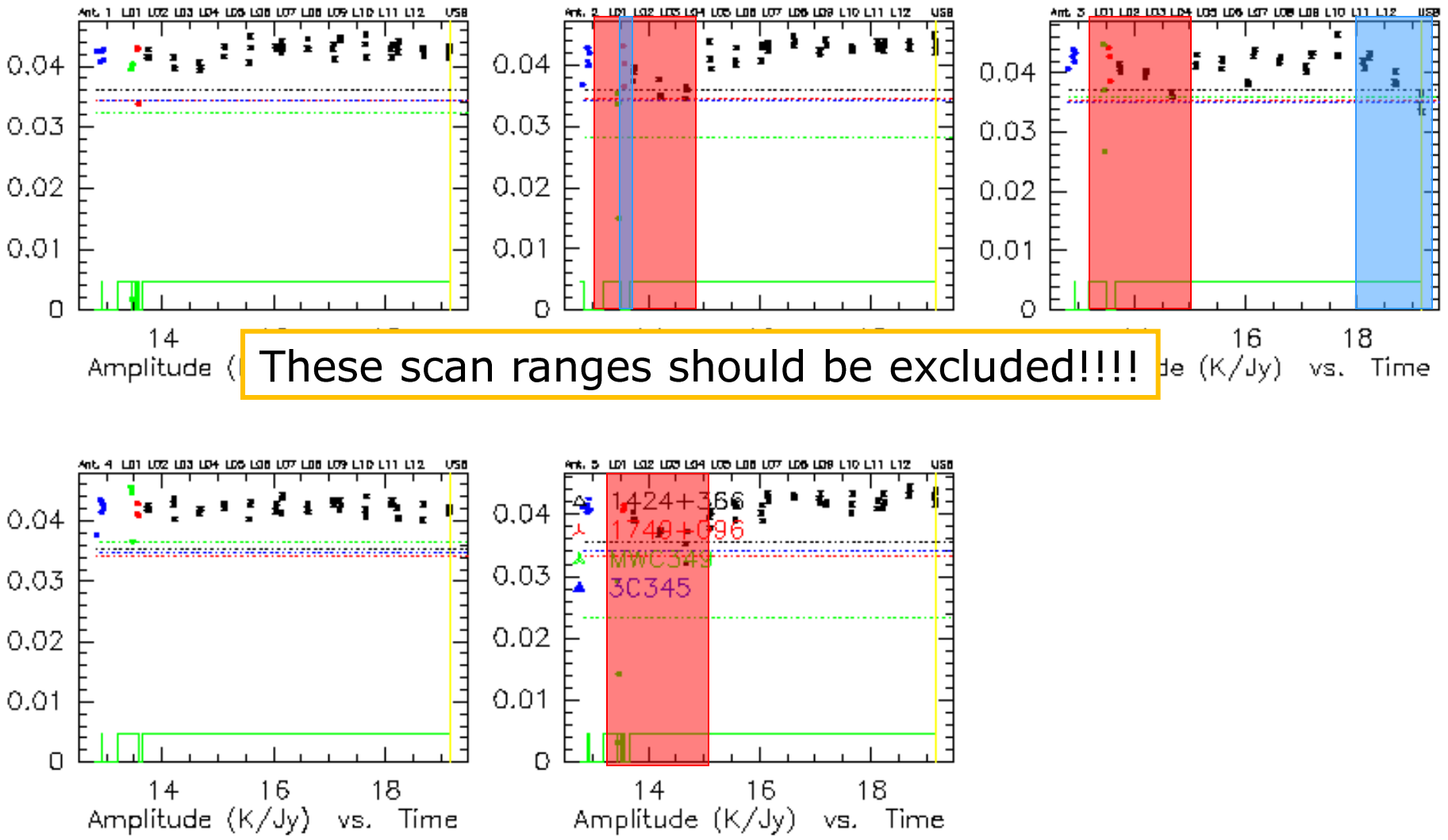
First Look



Practical Tips



Practical Tips



These scan ranges should be excluded!!!!

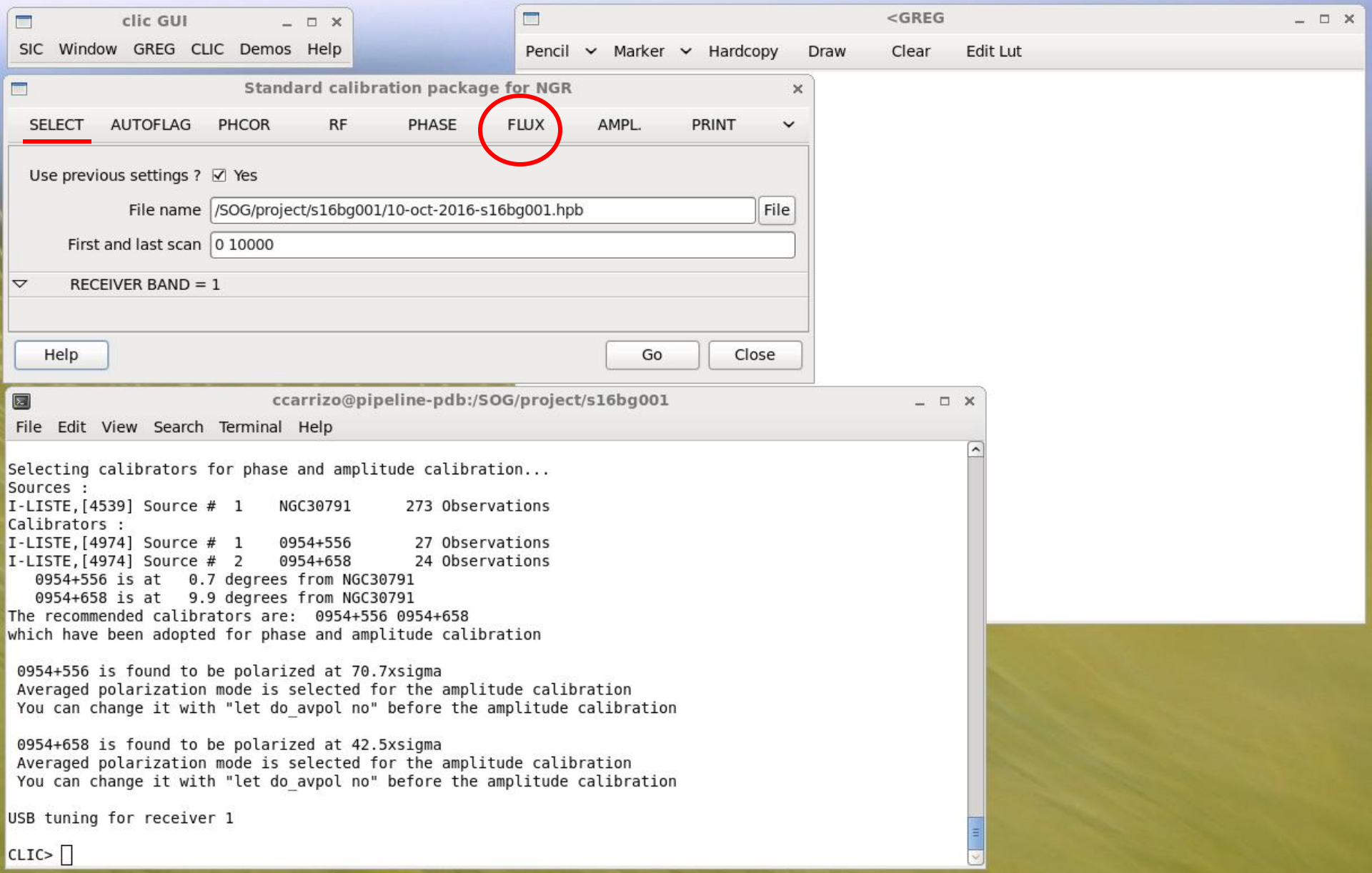
Practical Tips

Which are the issues to consider?

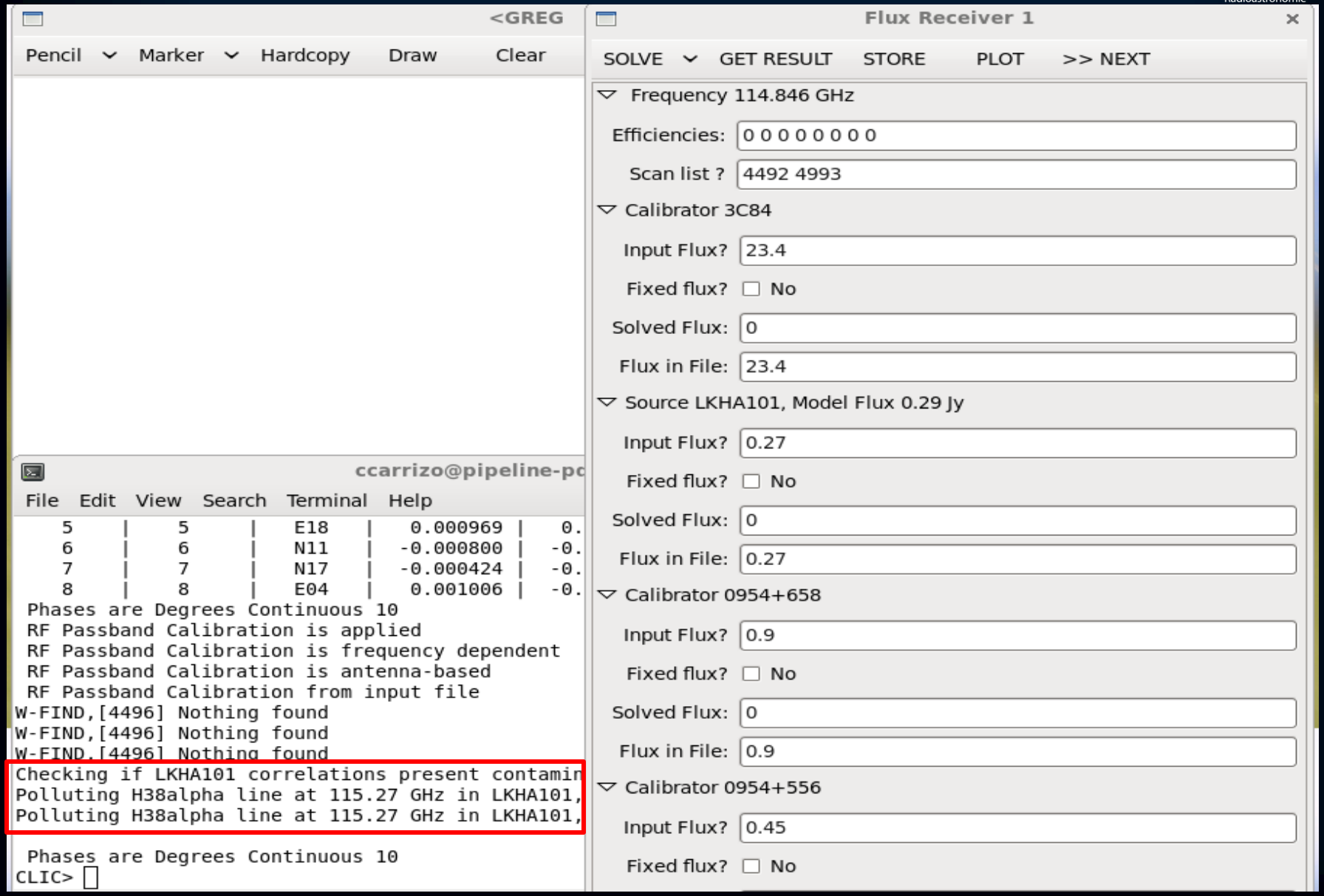
Checklist:

- Antenna Shadowing
- Pointing/Focus Problems
- Tracking Problems
- Noisy data
- Has Flux Calibrator Lines?
- Is Flux Calibrator Extended?
- Check Elevation of your source
- Check whether source is polarised
  (only important when using one polarisation)
- Do phases of different spectral windows overlap?

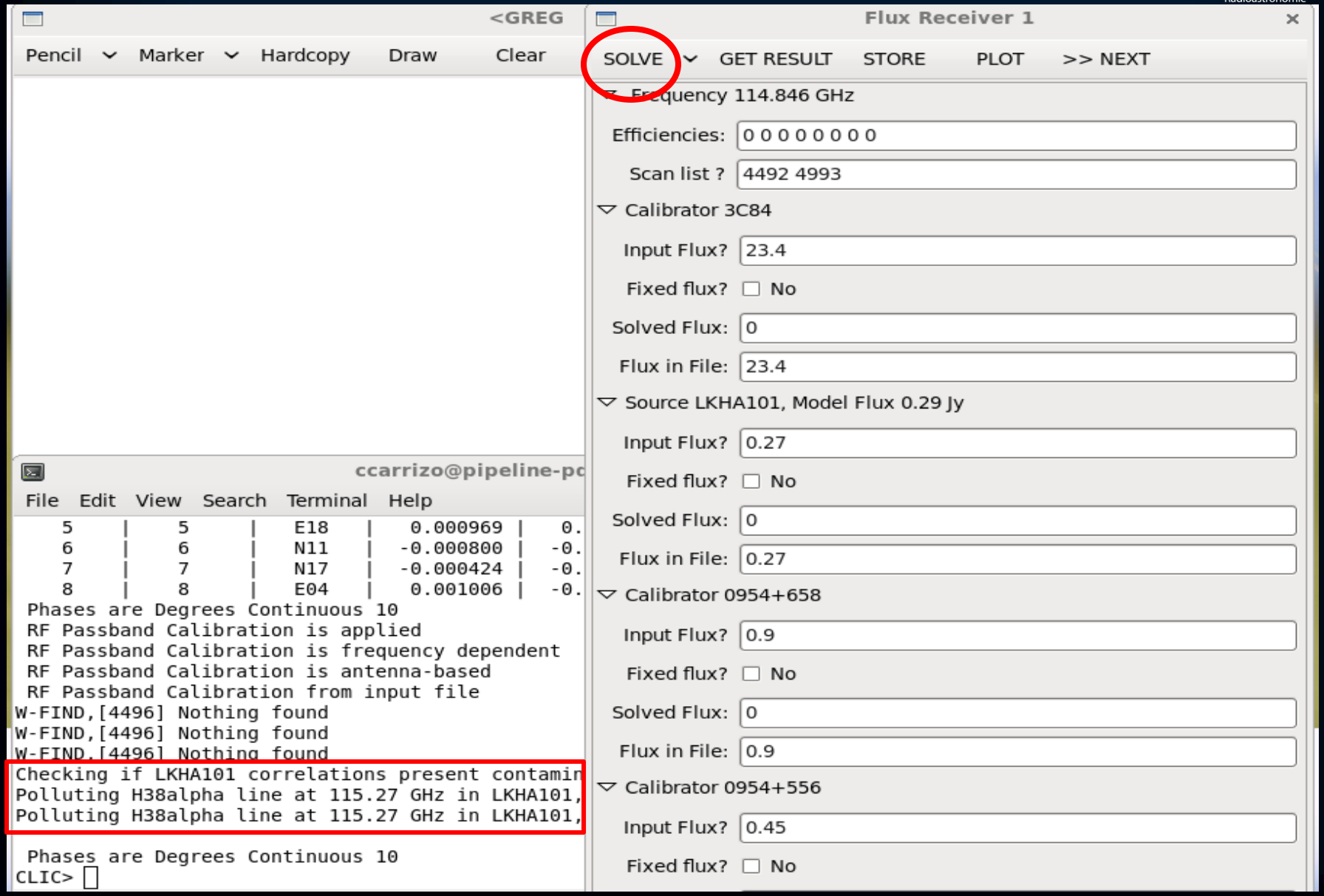
Practical Tips: CLIC software tools



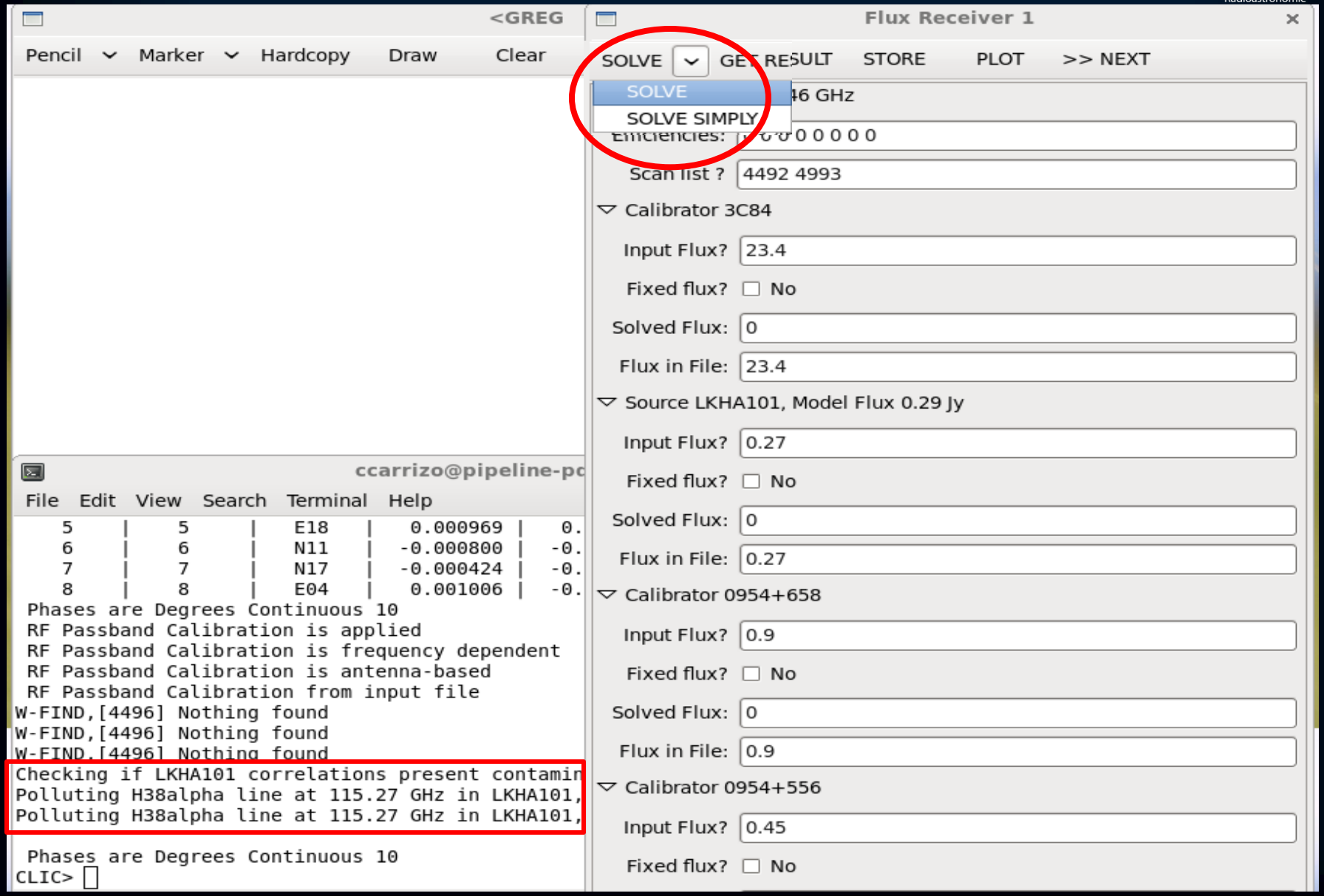
Practical Tips: CLIC software tools



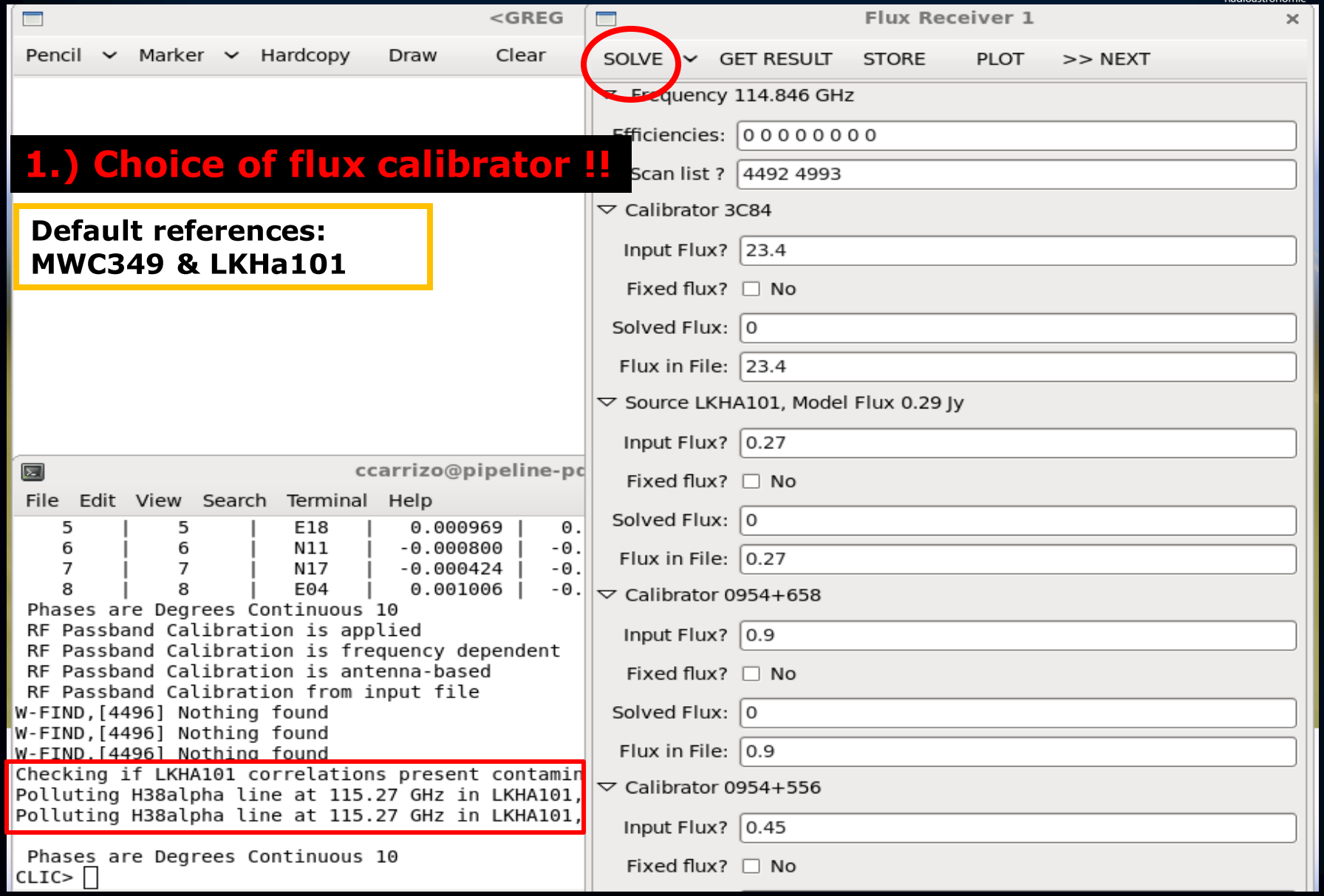
Practical Tips: CLIC software tools



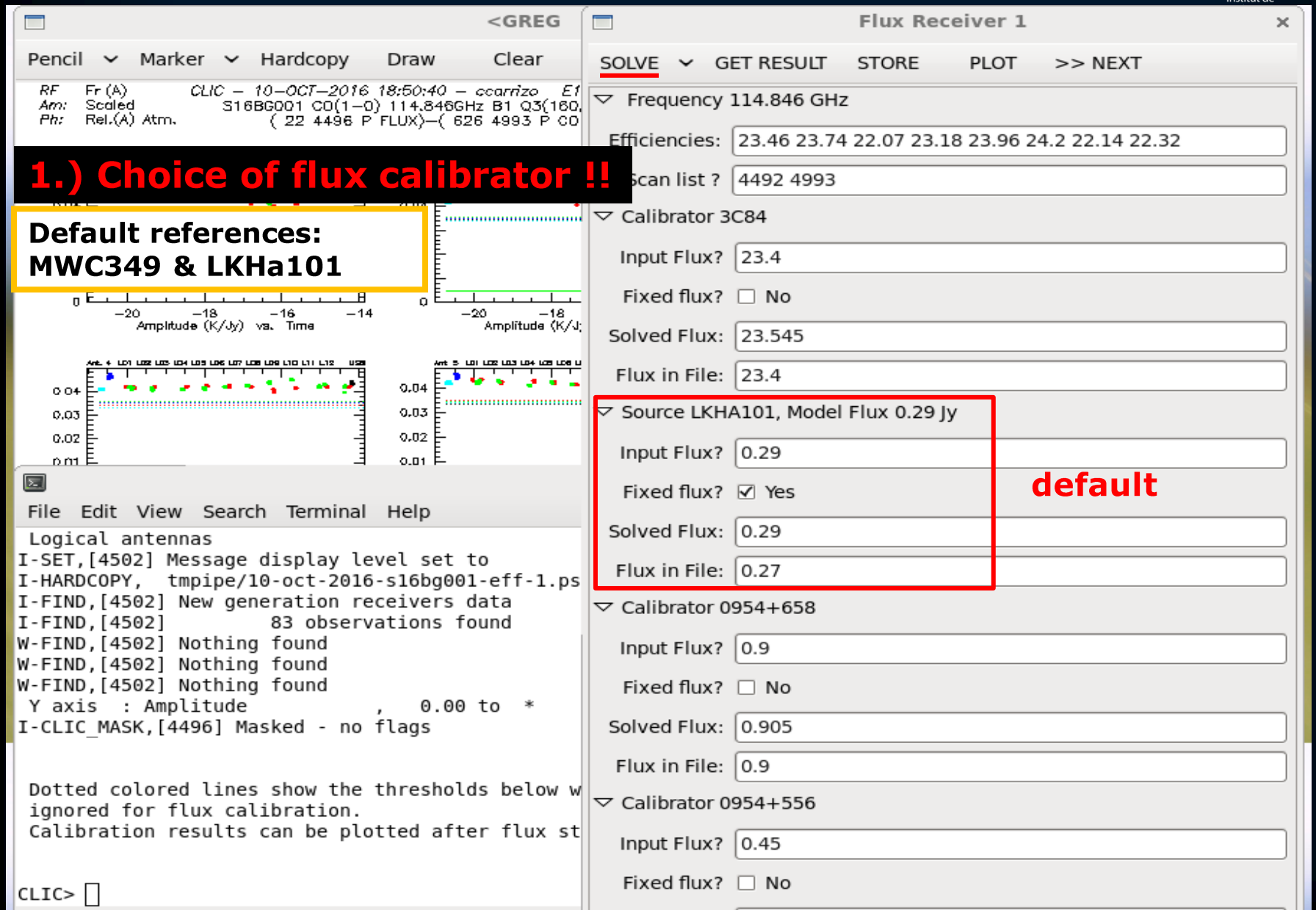
Practical Tips: CLIC software tools



Practical Tips: CLIC software tools

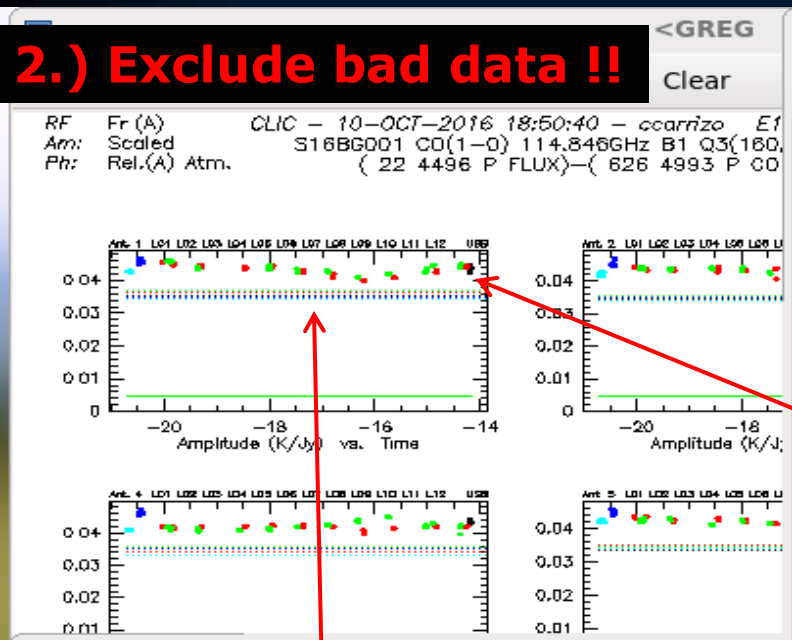


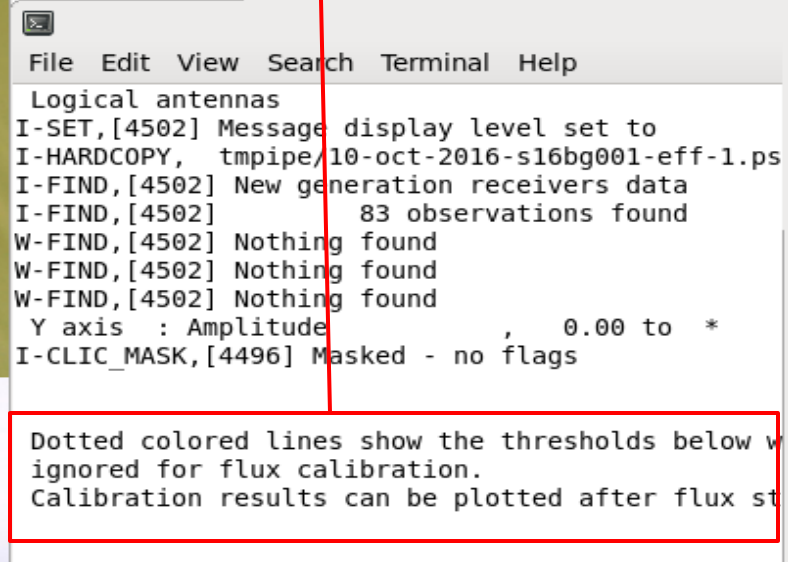
Practical Tips: CLIC software tools

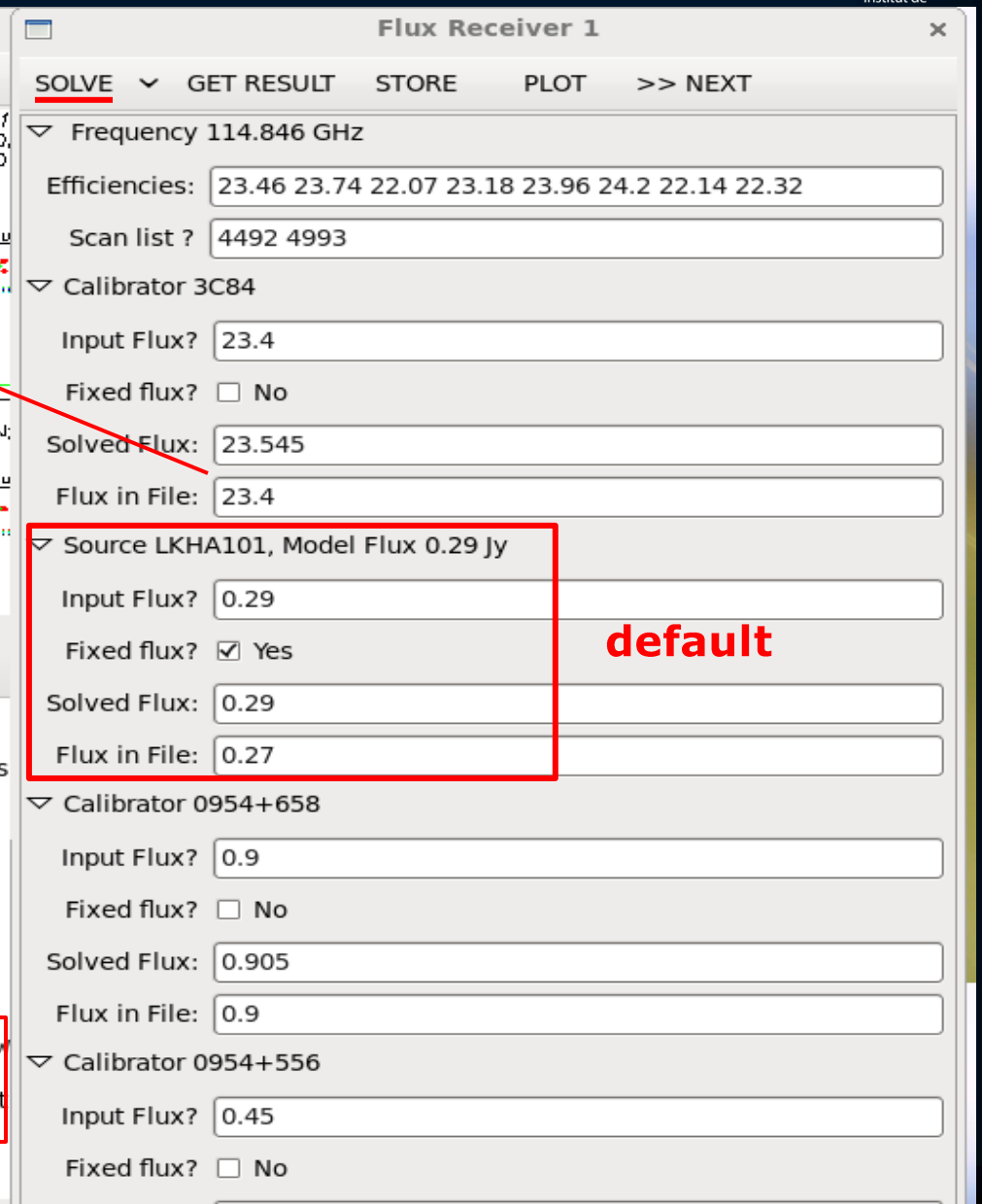


Practical Tips: CLIC software tools

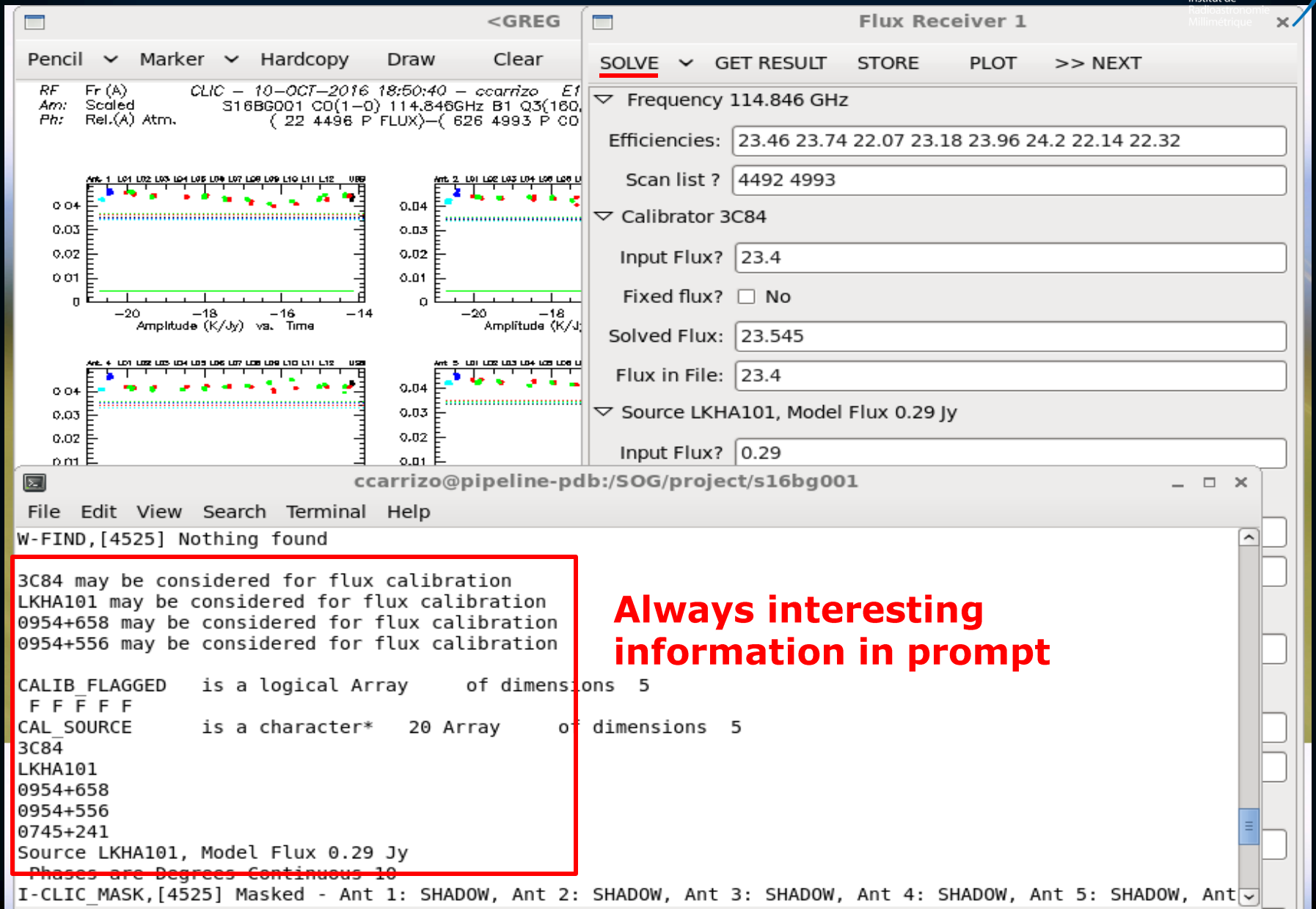
2.) Exclude bad data !!







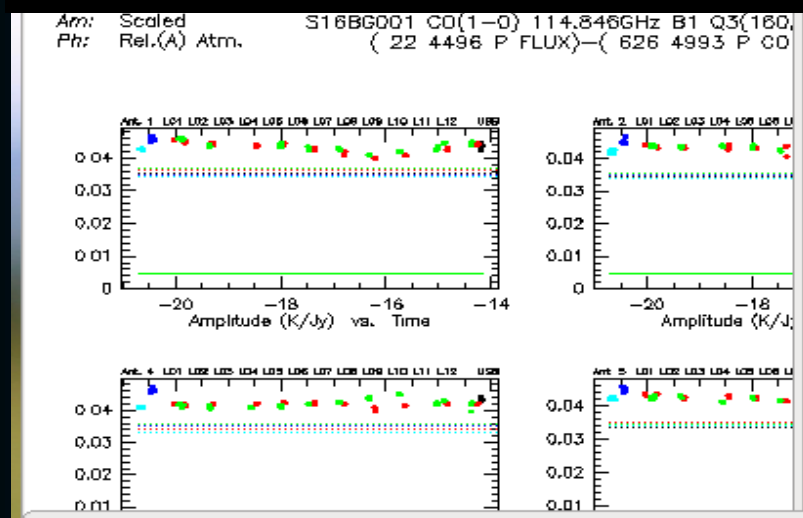
Practical Tips: CLIC software tools



Always interesting information in prompt

Practical Tips: CLIC software tools

3.) Check Antenna efficiencies and found source fluxes !!!



Flux Receiver 1

GET RESULT | STORE | PLOT | >> NEXT

Frequency 114.846 GHz

Efficiencies: 23.46 23.74 22.07 23.18 23.96 24.2 22.14 22.32

Scan list ? 4492 4993

Calibrator 3C84

Input Flux? 23.4

Fixed flux? No

Solved Flux: 23.545

Flux in File: 23.4

Source LKHA101, Model Flux 0.29 Jy

Input Flux? 0.29

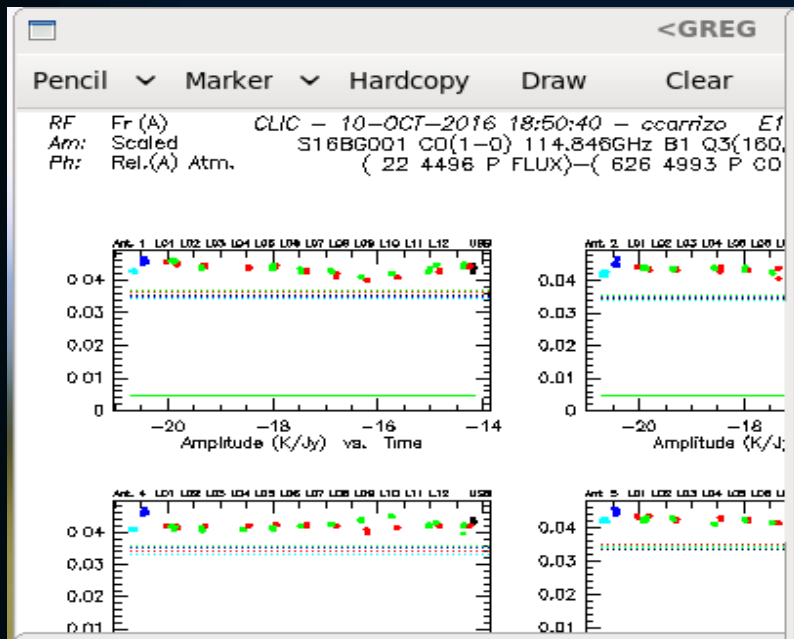
ccarrizo@pipeline-pdb:/SOG/project/s16bg001

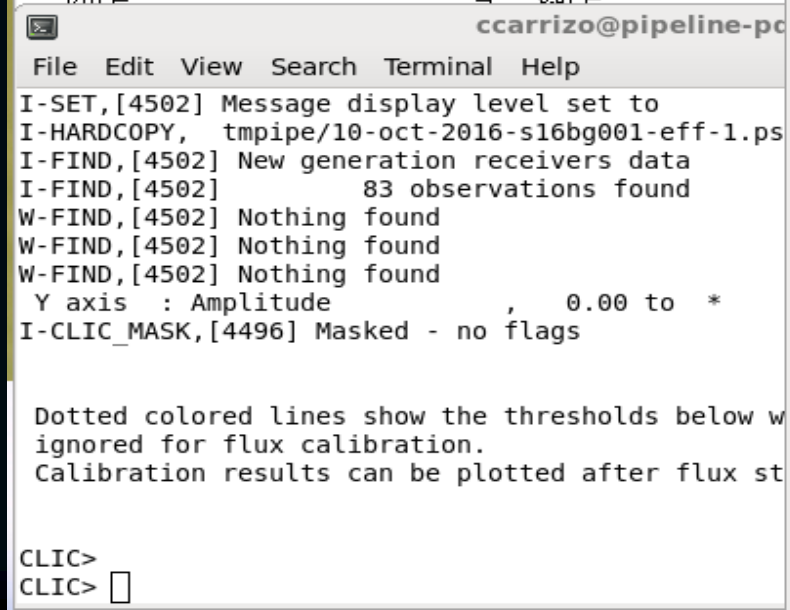
File Edit View Search Terminal Help

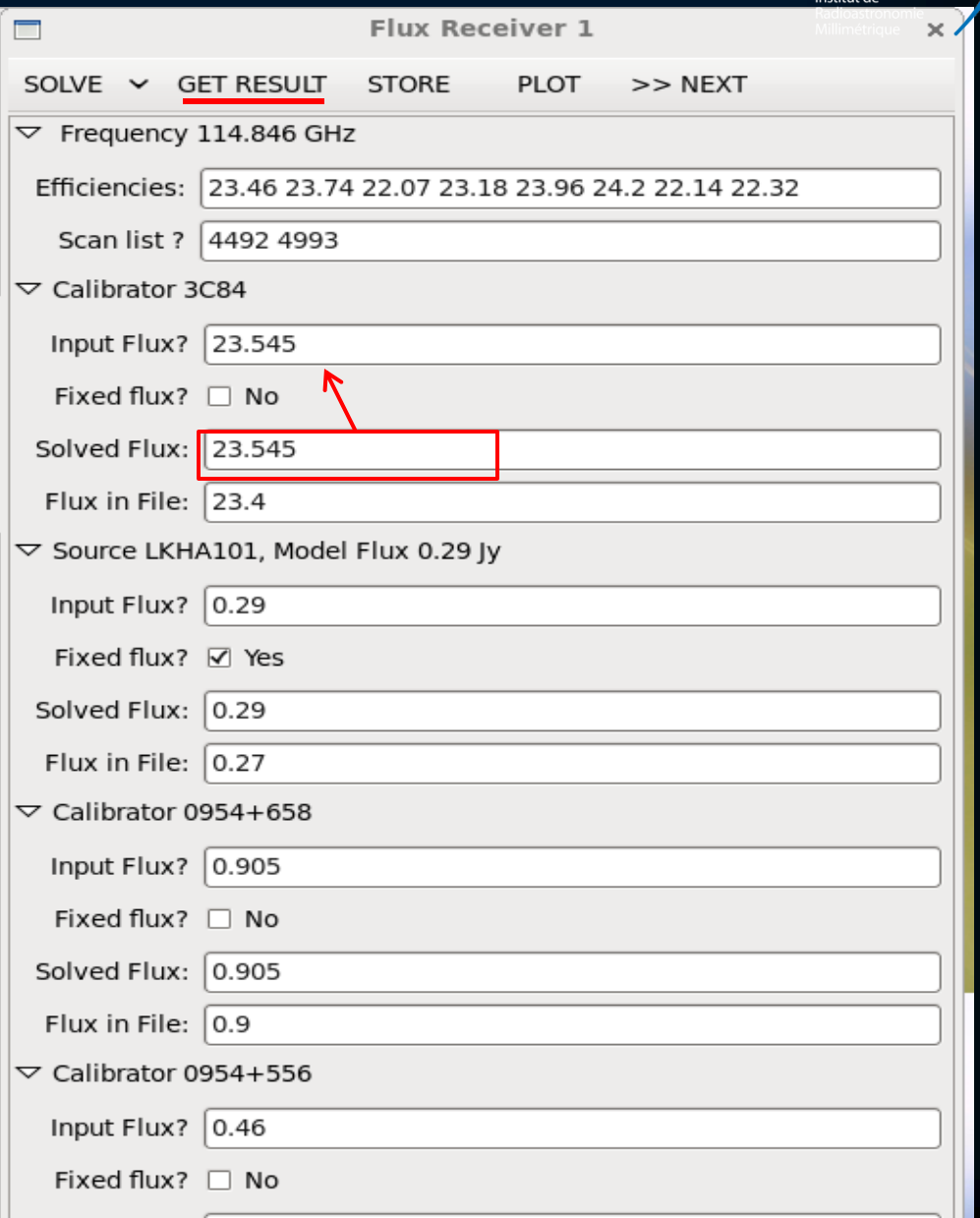
```
Flux and efficiency result for receiver 1 at 114.8 GHz:

                  in file          solve flux
                ---------------    ---------------
      3C84    read:  23.40 Jy    found:  23.55 Jy
    LKHA101   read:   0.27 Jy    fixed:   0.29 Jy   (model:  0.29 Jy)
  0954+658    read:   0.90 Jy    found:   0.91 Jy
  0954+556    read:   0.45 Jy    found:   0.46 Jy
  0745+241    read:   0.70 Jy    found:   0.70 Jy

    Antenna  1 (A1)       23.5 Jy/K   ( 1.01)
    Antenna  2 (A2)       23.7 Jy/K   ( 1.00)
    Antenna  3 (A3)       22.1 Jy/K   ( 1.07)
    Antenna  4 (A4)       23.2 Jy/K   ( 1.02)
    Antenna  5 (A5)       24.0 Jy/K   ( 0.99)
    Antenna  6 (A6)       24.2 Jy/K   ( 0.98)
    Antenna  7 (A7)       22.1 Jy/K   ( 1.07)
    Antenna  8 (A8)       22.3 Jy/K   ( 1.06)
```

Always interesting information in prompt

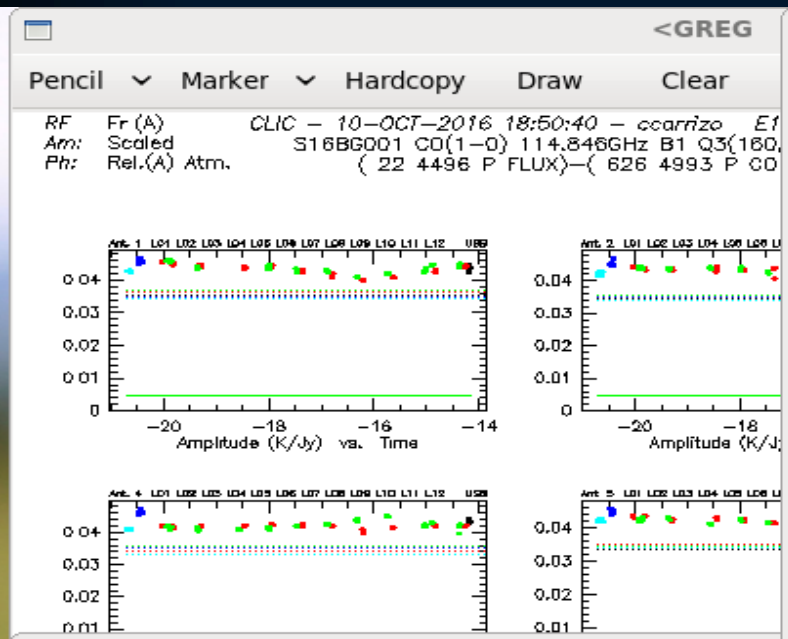
Practical Tips: CLIC software tools

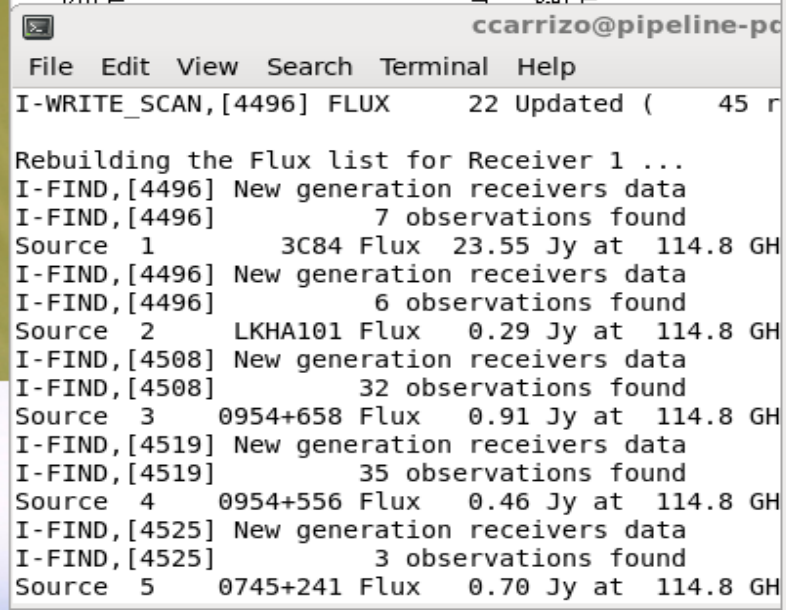


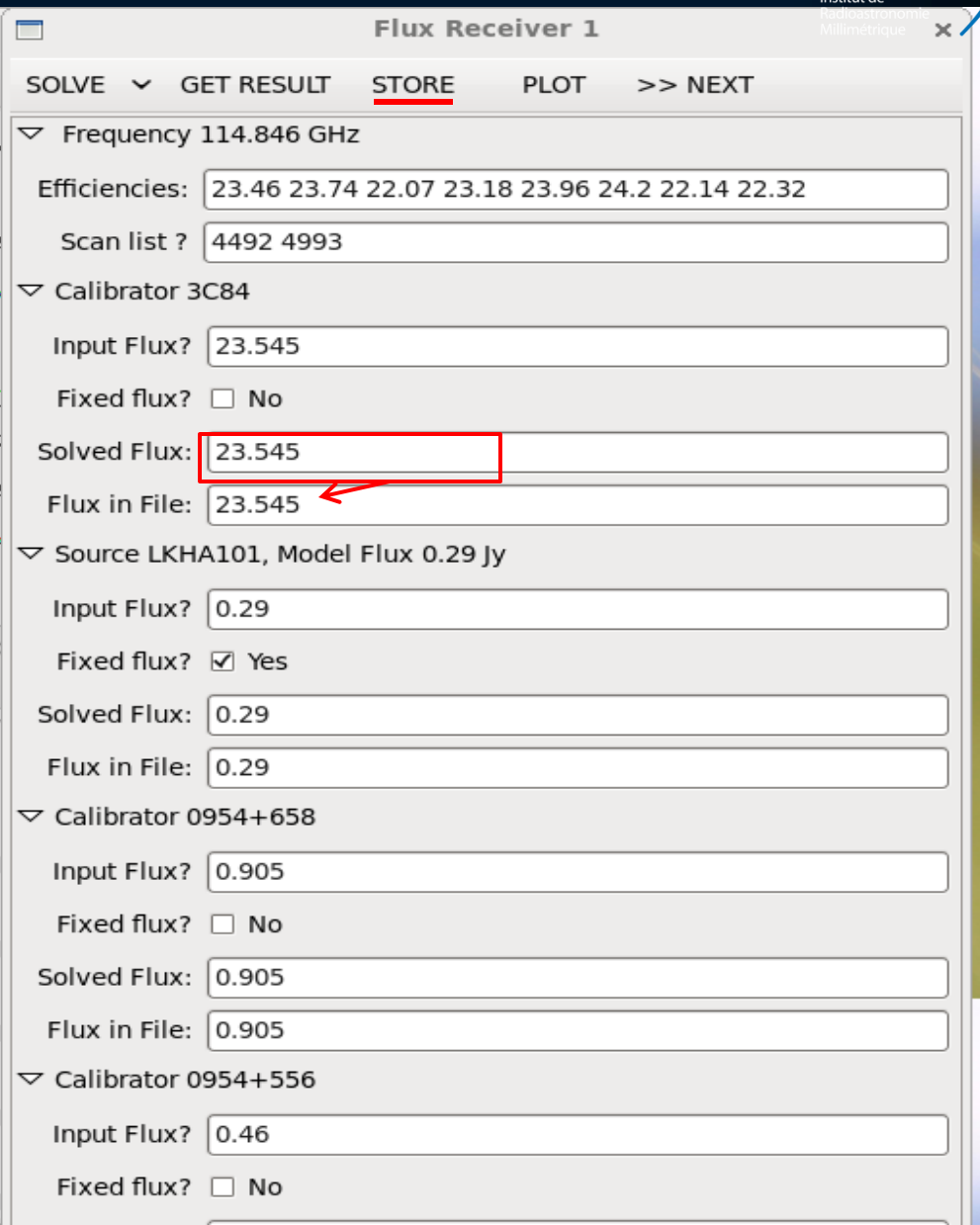




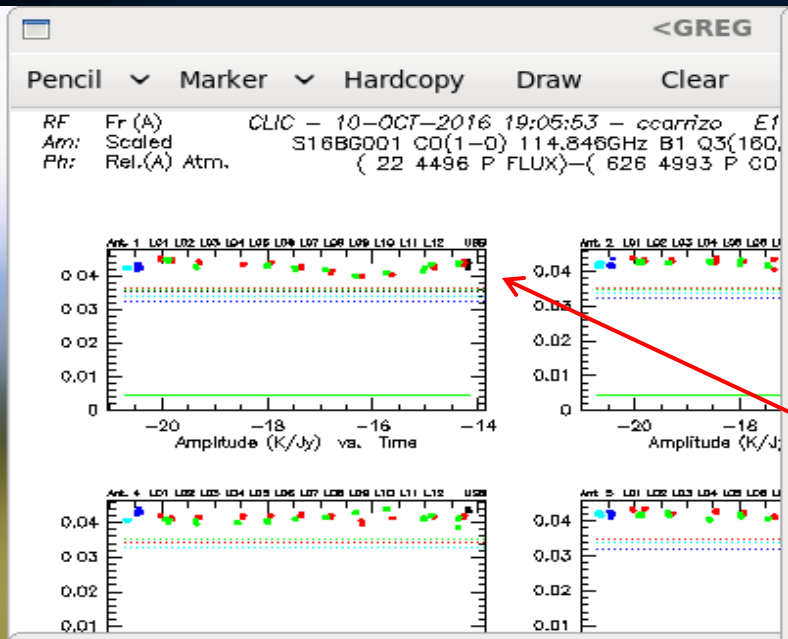
Practical Tips: CLIC software tools

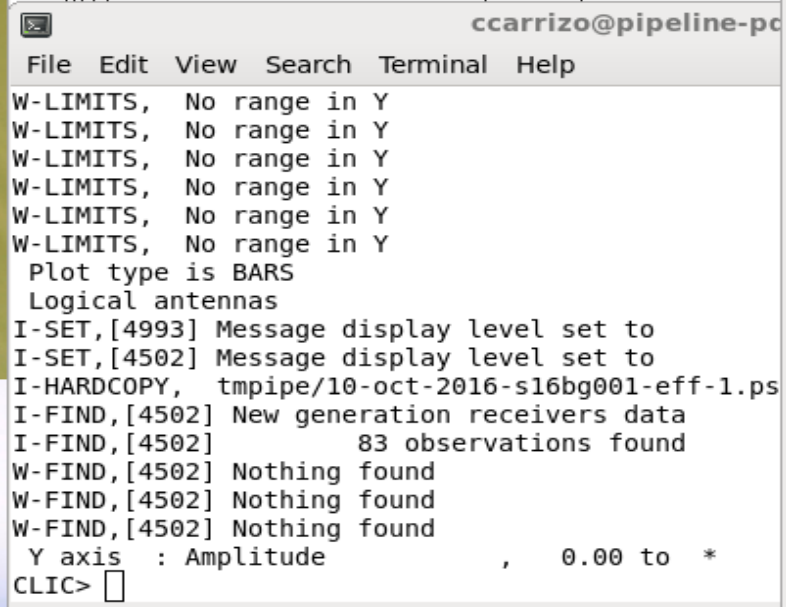


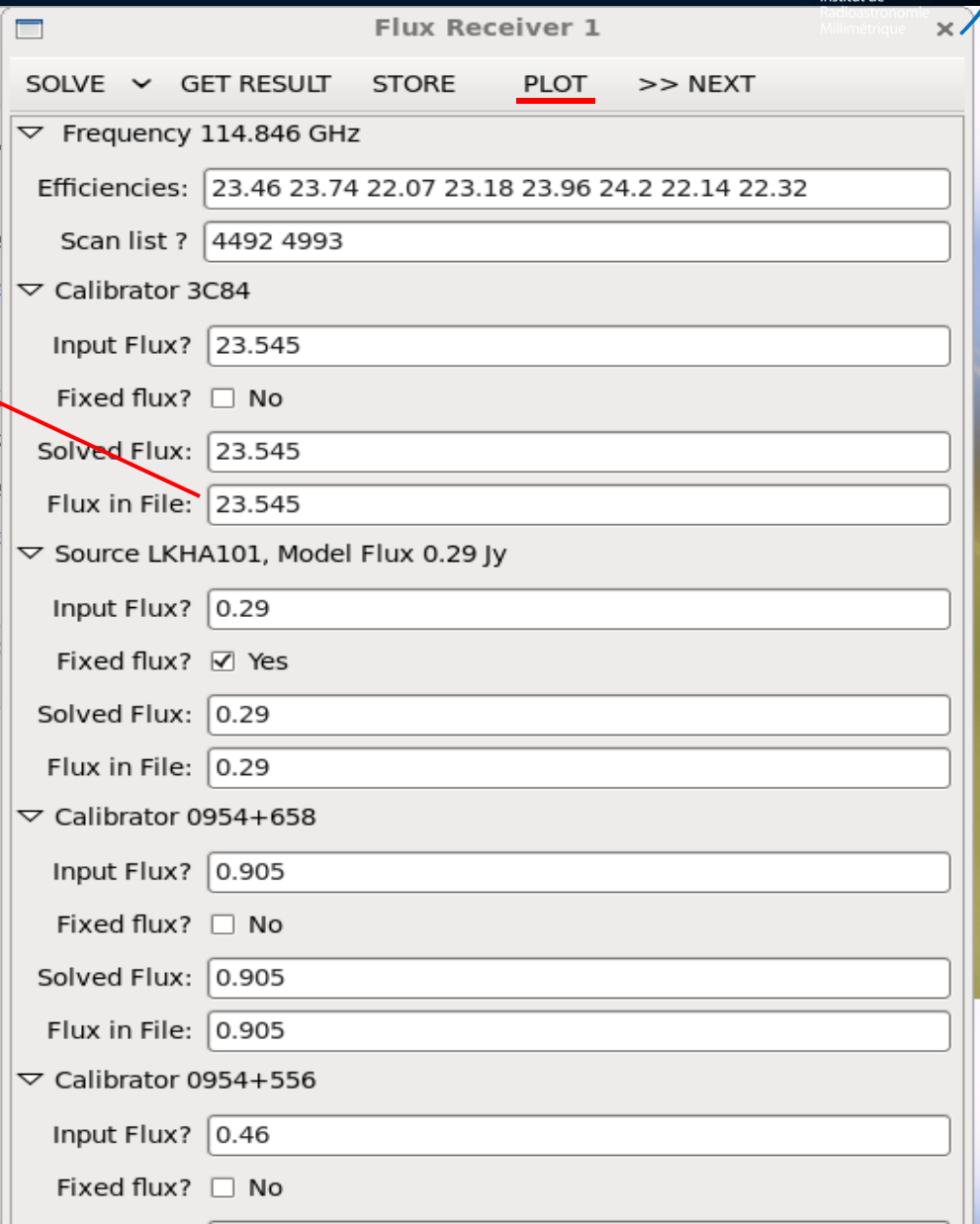




Practical Tips: CLIC software tools

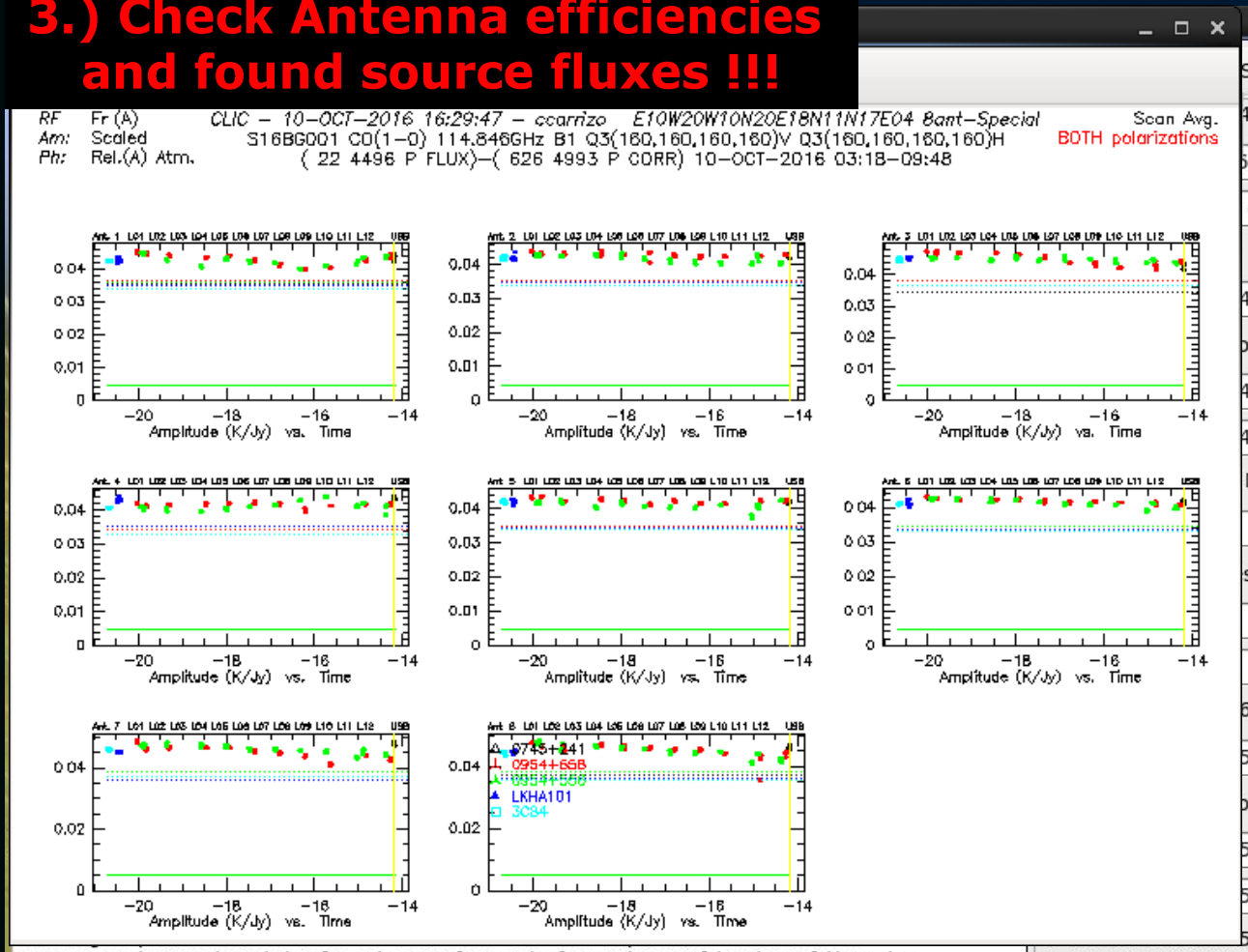




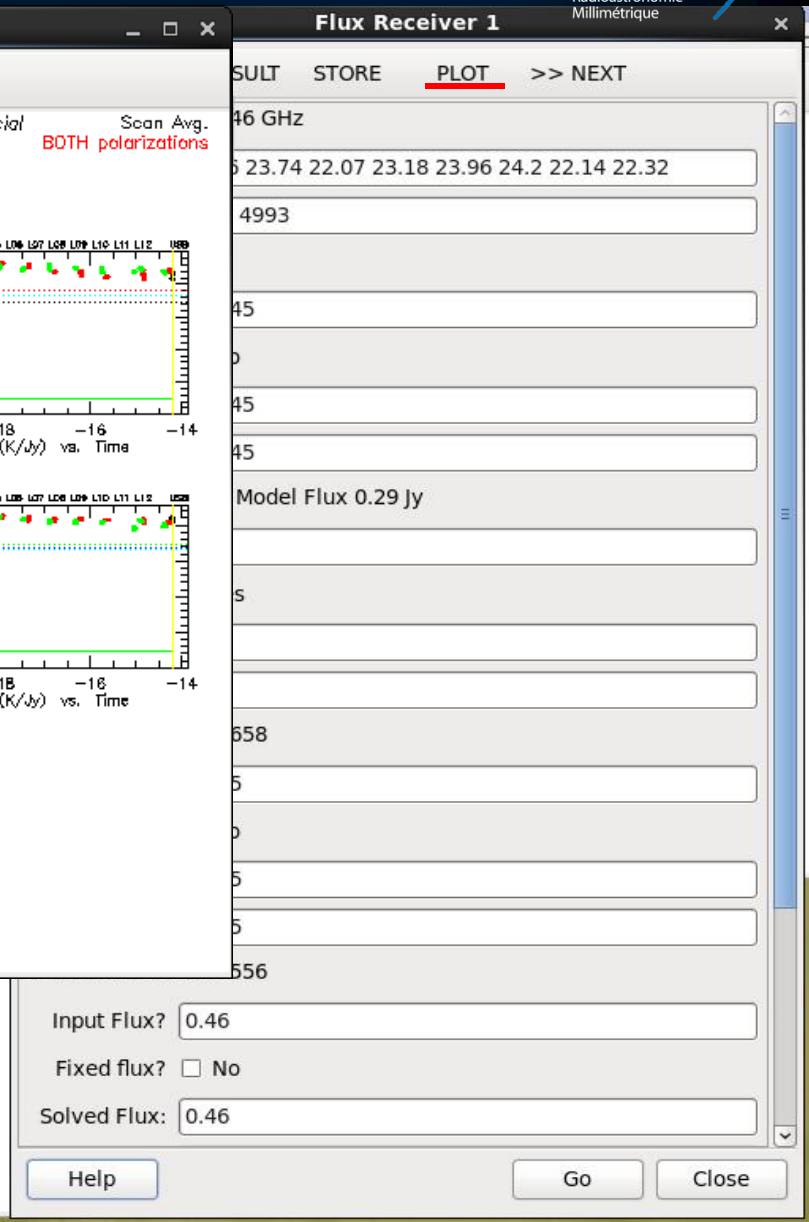


Practical Tips: CLIC software tools

3.) Check Antenna efficiencies and found source fluxes !!!




```
You can change it with "let do_avpol no" before the amplitude calibration

0954+658 is found to be polarized at 42.5xsigma
Averaged polarization mode is selected for the amplitude calibration
You can change it with "let do_avpol no" before the amplitude calibration

USB tuning for receiver 1

CLIC>
```

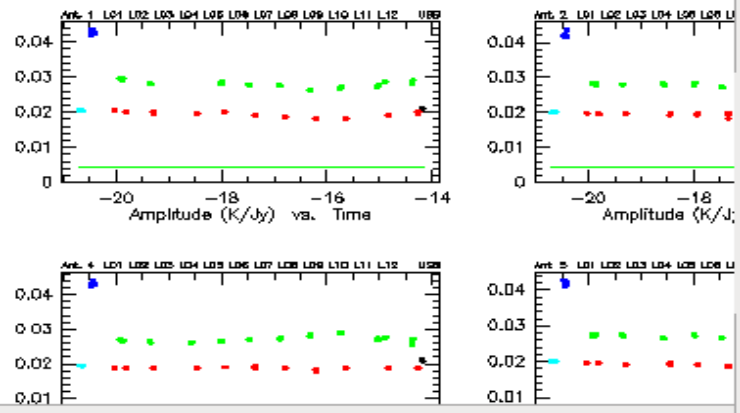


Practical Tips: CLIC software tools

If we adopt wrong fluxes

Pencil Marker

RF Fr (A) CLIC – 10-OCT-2016 19:35:22 – ccarrizo E1
Am: Scaled S16BG001 CO(1–0) 114.846GHz B1 Q3(160,
Ph: Rel.(A) Atm. (22 4496 P FLUX)–(626 4993 P CO



ccarrizo@pipeline-pc

File Edit View Search Terminal Help

```
W-LIMITS,  No range in Y
W-LIMITS,  No range in Y
W-LIMITS,  No range in Y
W-LIMITS,  No range in Y
W-LIMITS,  No range in Y
W-LIMITS,  No range in Y
W-LIMITS,  No range in Y
 Plot type is BARS
 Logical antennas
I-SET,[4993] Message display level set to
I-HARDCOPY,  tmpipe/10-oct-2016-s16bg001-eff-1.ps
I-FIND,[4993] New generation receivers data
I-FIND,[4993]         83 observations found
W-FIND,[4993] Nothing found
W-FIND,[4993] Nothing found
W-FIND,[4993] Nothing found
 Y axis  : Amplitude          ,   0.00 to  *
CLIC>
```

>> NEXT

Frequency 114.846 GHz

Efficiencies: 49.1 48.88 46.54 50.24 49.73 49.95 46.46 45.87

Scan list ? 4492 4993

Calibrator 3C84

Input Flux? 49.145

Fixed flux? ☐ No

Solved Flux: 49.145

Flux in File: 49.145

Source LKHA101, Model Flux 0.29 Jy

Input Flux? 0.29

Fixed flux? ☑ Yes

Solved Flux: 0.29

Flux in File: 0.29

Calibrator 0954+658

Input Flux? 2

Fixed flux? ☑ Yes

Solved Flux: 2

Flux in File: 2

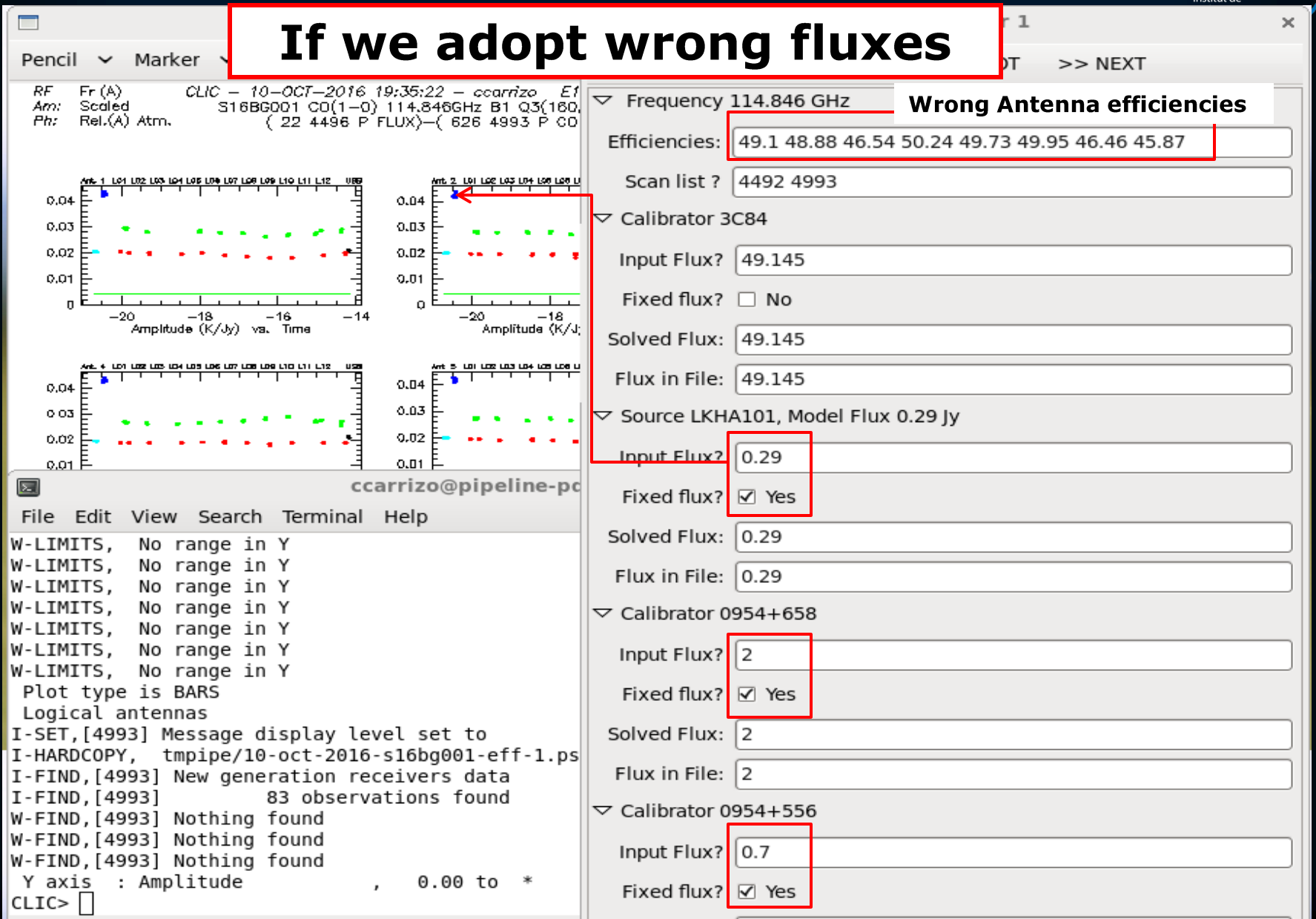
Calibrator 0954+556

Input Flux? 0.7

Fixed flux? ☑ Yes

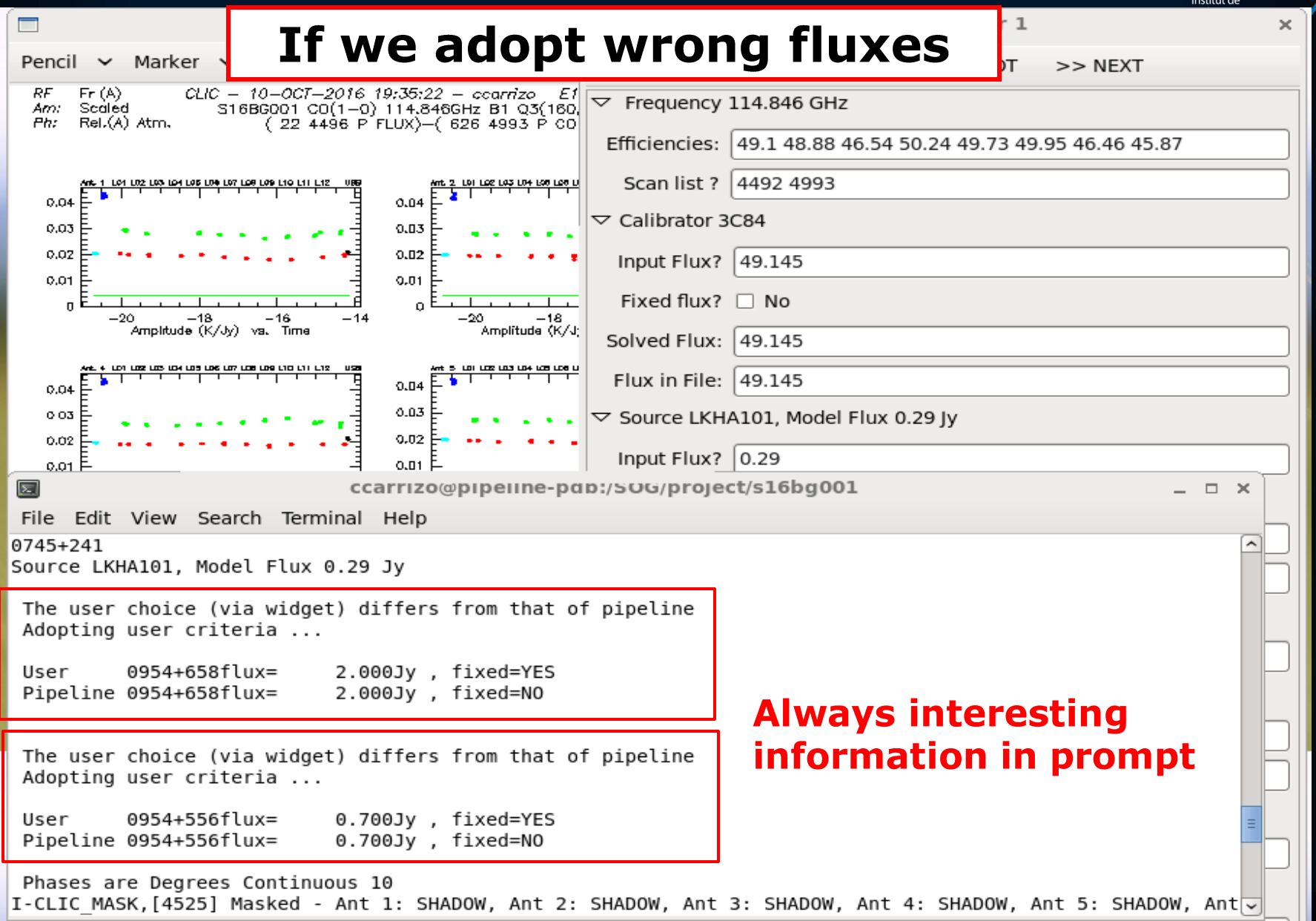
Practical Tips: CLIC software tools

If we adopt wrong fluxes



Practical Tips: CLIC software tools

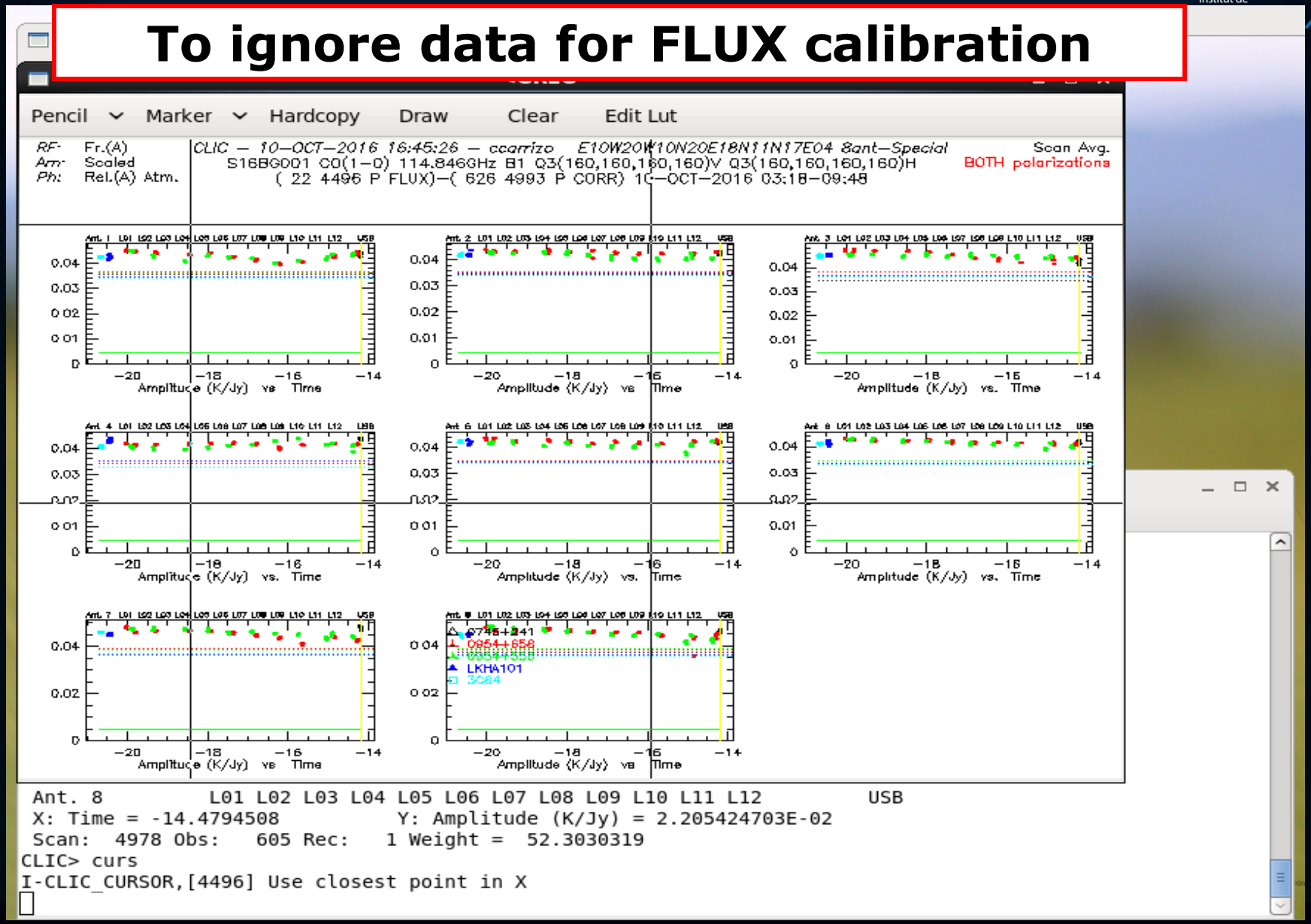
If we adopt wrong fluxes



Always interesting information in prompt

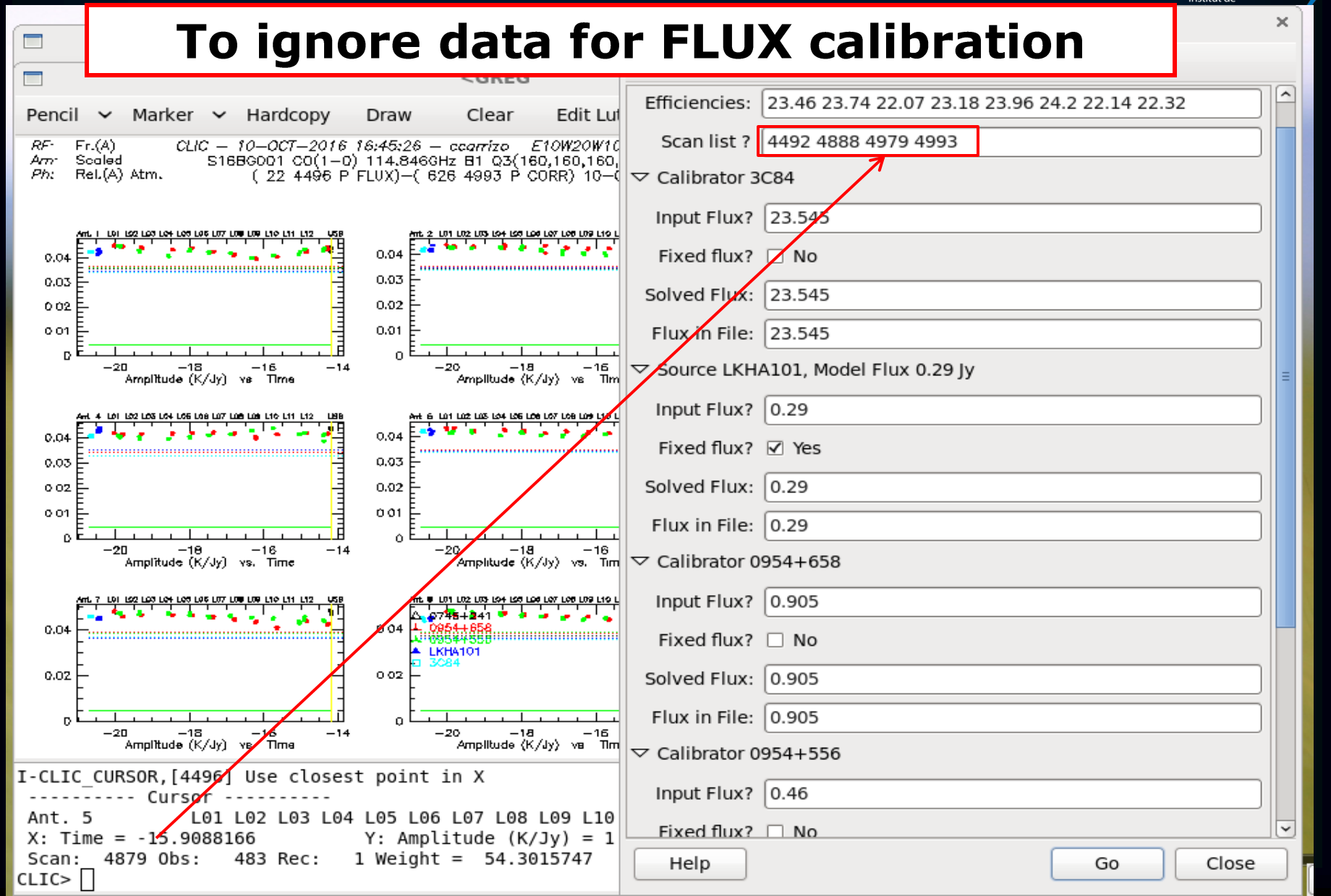
Practical Tips: CLIC software tools

To ignore data for FLUX calibration



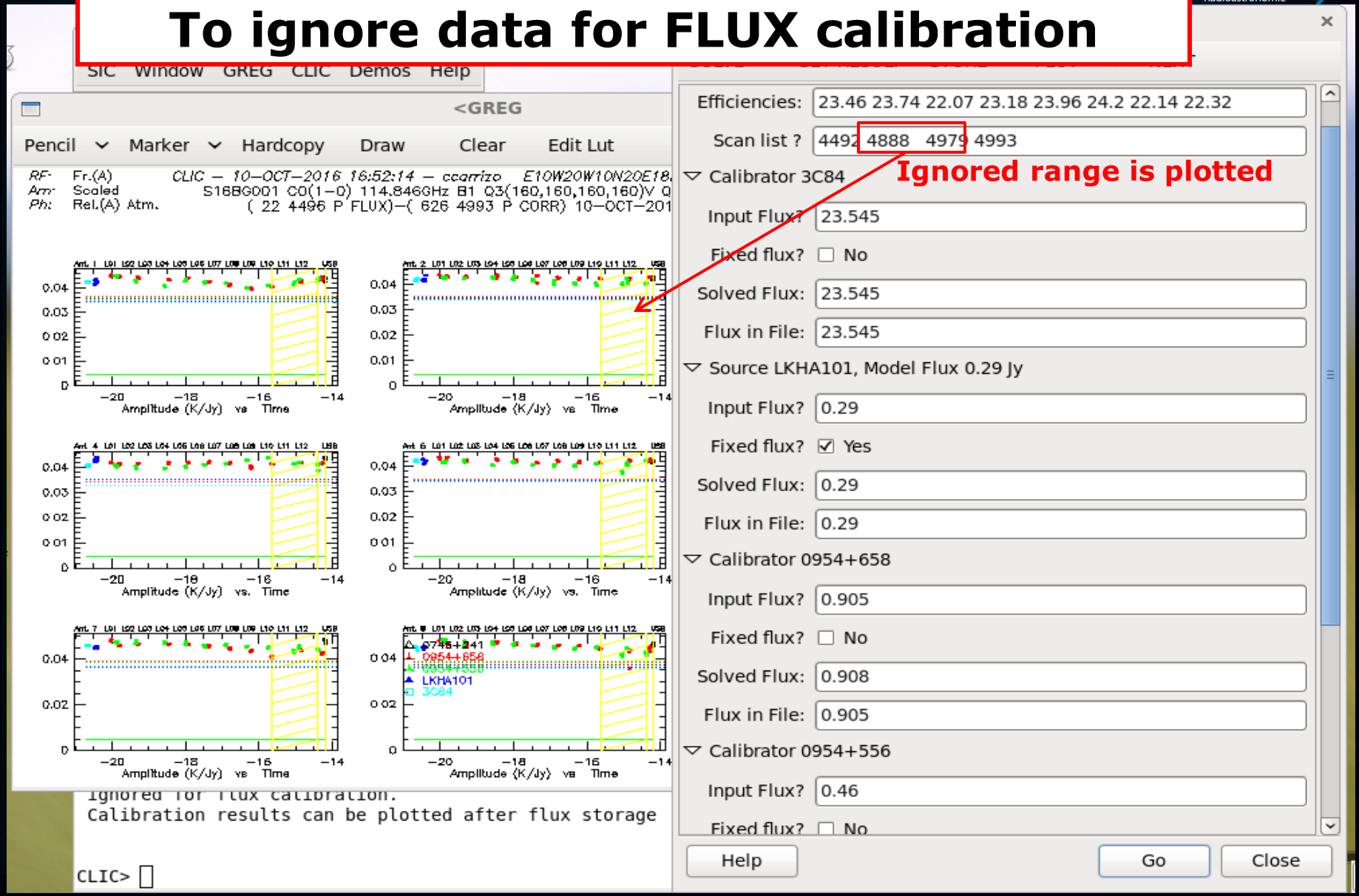
Practical Tips: CLIC software tools

To ignore data for FLUX calibration



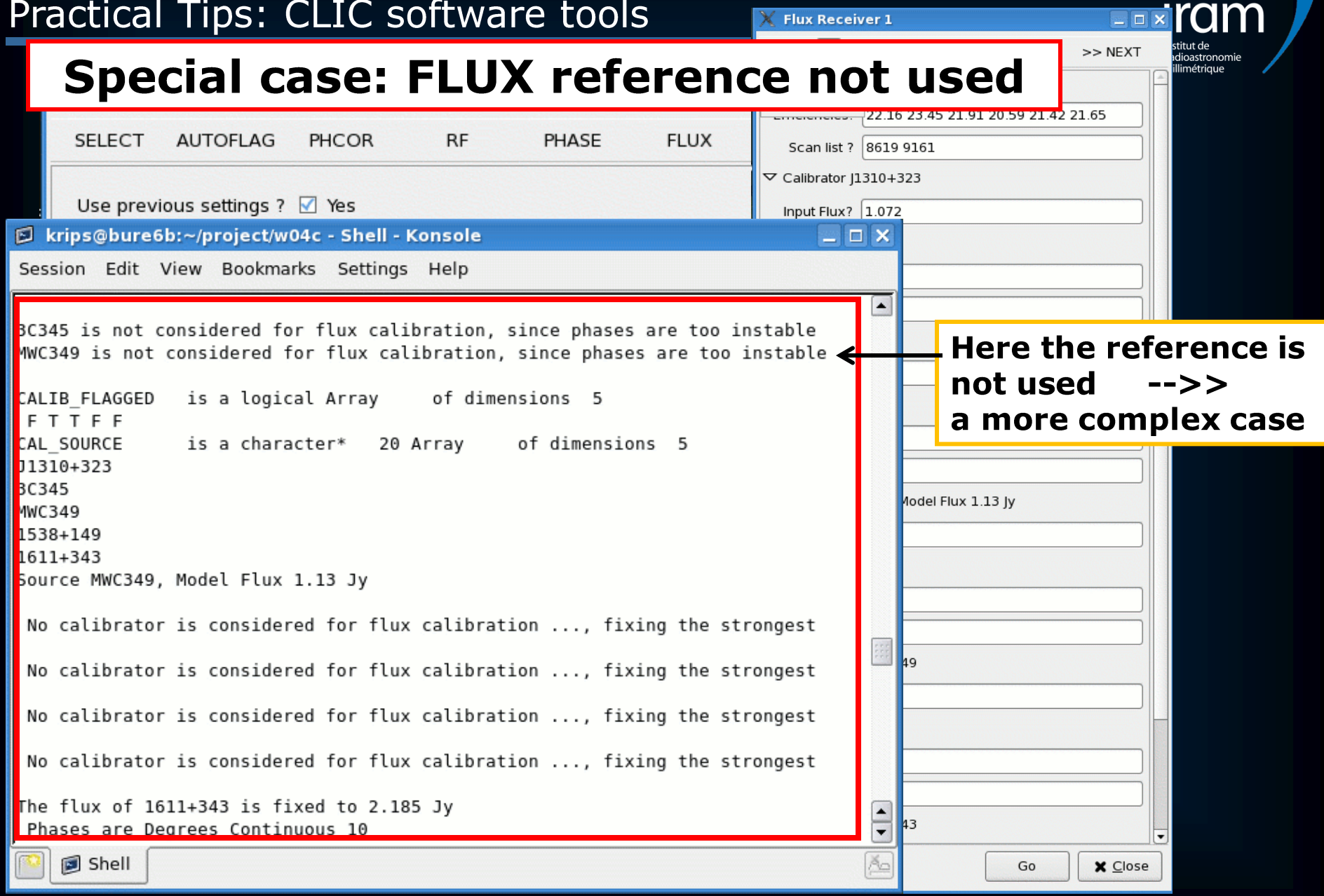
Practical Tips: CLIC software tools

To ignore data for FLUX calibration



Practical Tips: CLIC software tools

Special case: FLUX reference not used

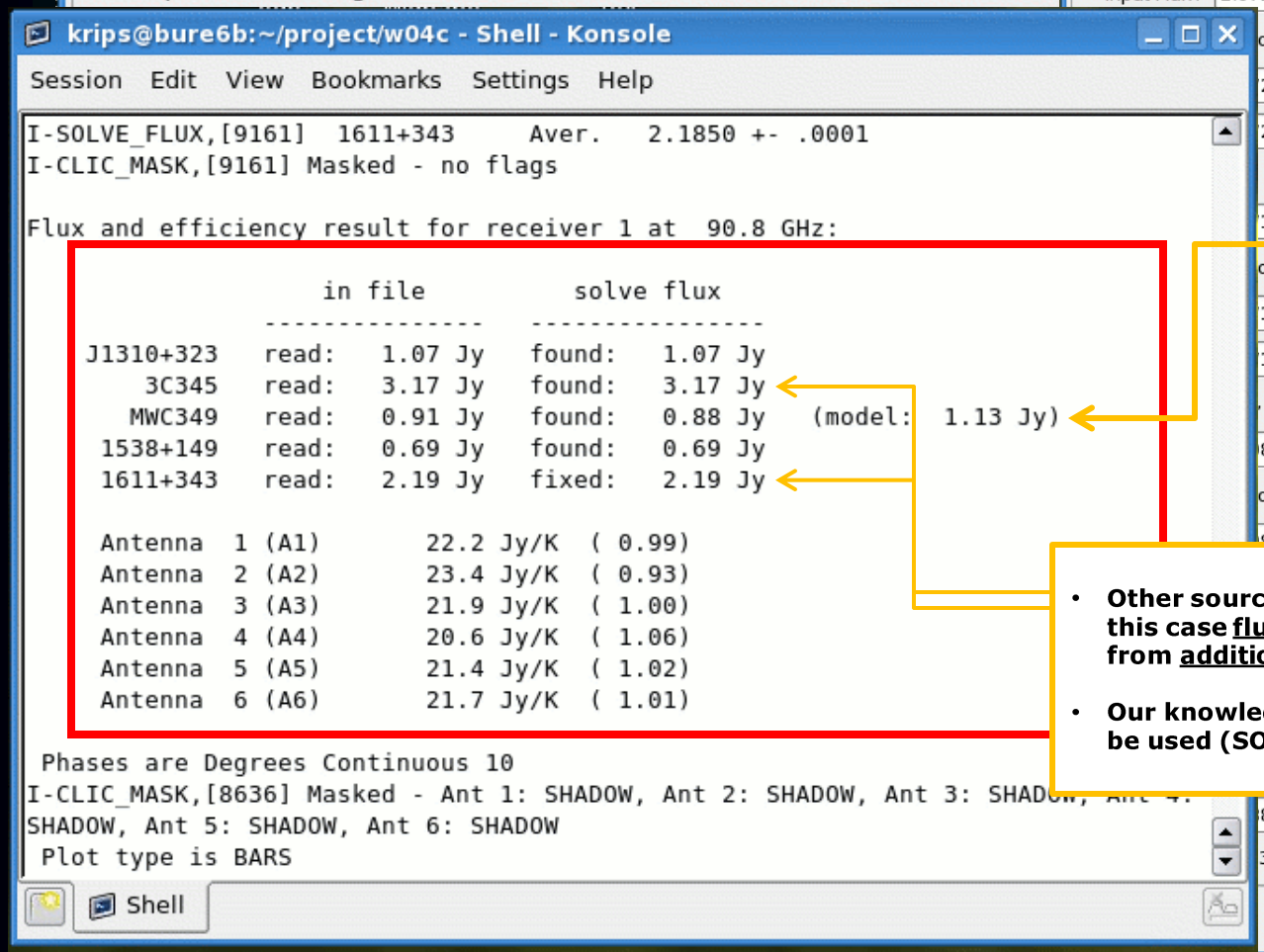


Here the reference is not used -->>
a more complex case

Practical Tips: CLIC software tools

Special case: FLUX reference not used

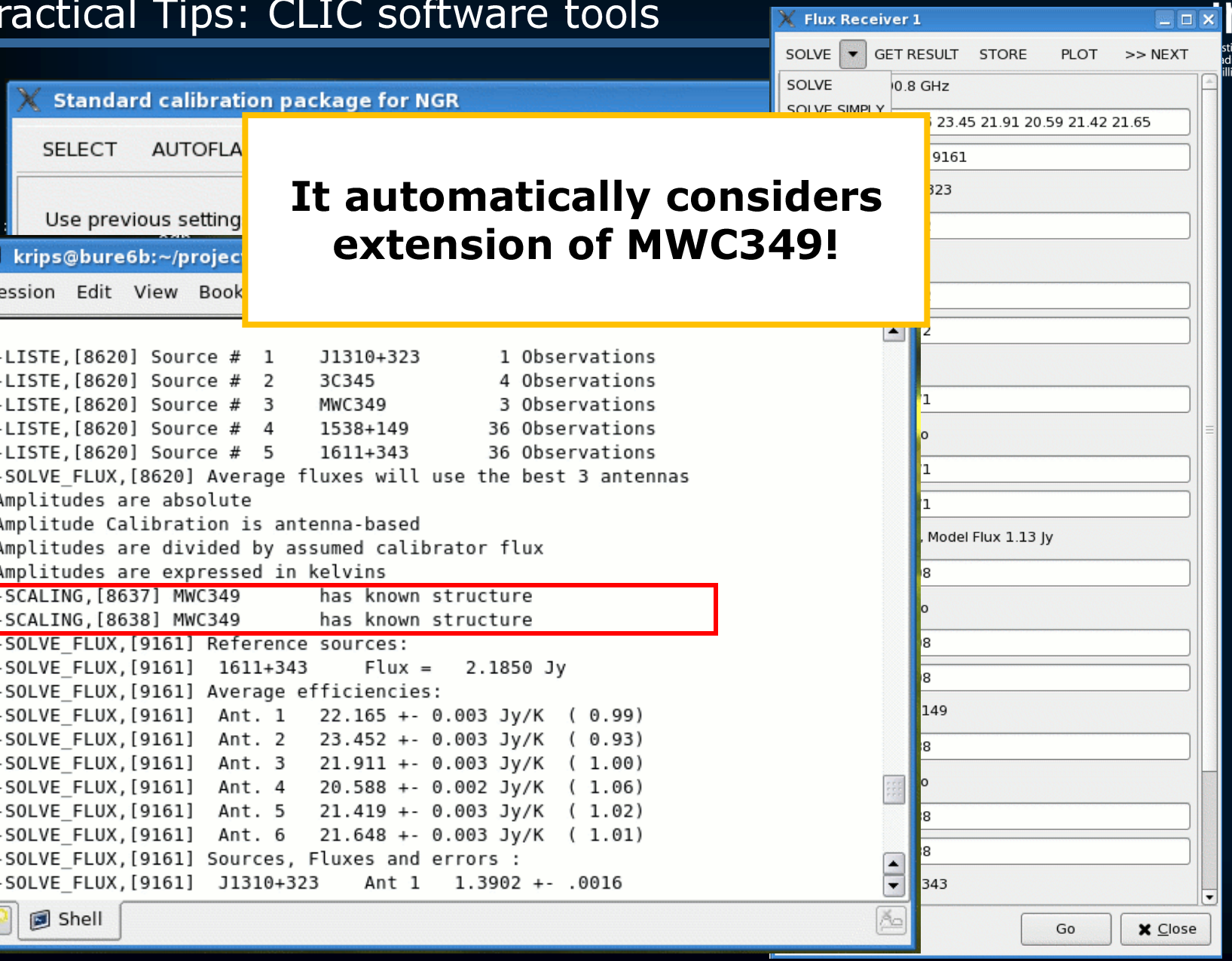
3.) Check Antenna efficiencies and found source fluxes !!!



- **Be critical, to understand why MWC349 is not used : e.g. briefly degraded conditions, perhaps due to source elevation or changing weather, which is not representative of the track.**
- **If the conditions are representative of the track, MWC349 should be used**

- **Other sources can be used otherwise as reference: in this case flux monitorings, plus information coming from additional tracks should be considered**
- **Our knowledge about antenna efficiencies should also be used (SOG will support you)**

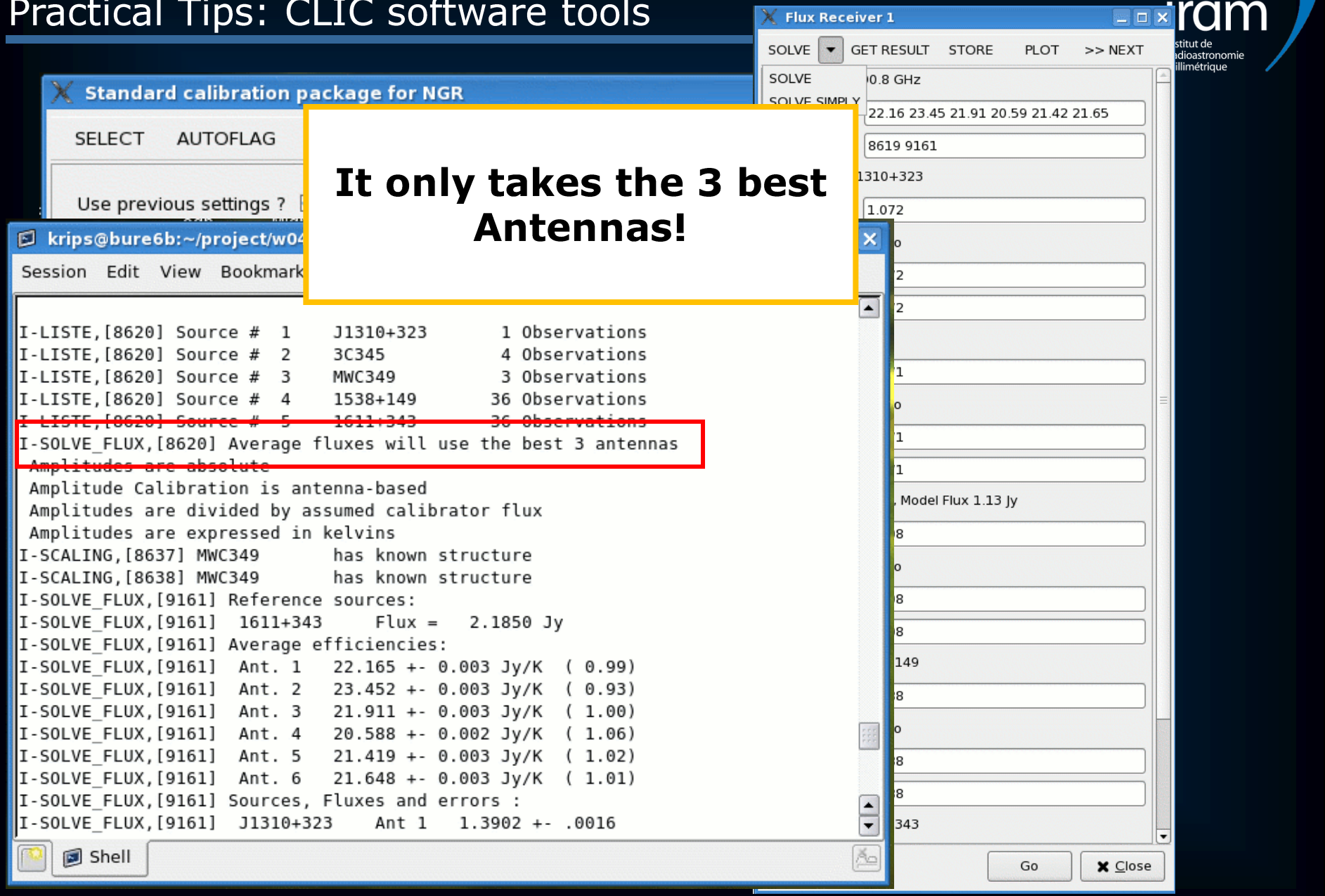
Practical Tips: CLIC software tools



It automatically considers extension of MWC349!

Practical Tips: CLIC software tools

It only takes the 3 best Antennas!



Questions?