PdBI data calibration

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Data processing strategy

Begins with proposal/setup preparation.

Depends on the scientific goals to be achieved.

- For a "classical" project:
  - Phase calibrators
  - RF bassband calibration
  - Spectral setup
- Special project may require specific observing procedure

Getting started ...

An account is opened entitled `'project_number' (e.g. ISH8)` containing

- directory `calib`
  - may contain a `Baselines` directory containing baseline solutions obtained around the obverving dates
  - This is where the calibration will take place
- directory `maps`
  - originally empty ; will contain the maps
- directory `reports`
  - contains the calibrations performed at Bure by automatic pipeline reduction possibly improved by the AOD
  - the notes entered by the AOD regarding your project. **Please read them !**

PdBI data processing

(1) What did happen at the Plateau

- Instrument calibrated
  - pointing, focus
  - antenna positions *
  - delays *
  - receivers rejection and phasing of polarizations *
- Raw data are writen in an **.ipb file**
- Calibration applied on-site:
  - **IF bandpass** (measured on noise diode)
  - **atmospheric absorption** ($\longrightarrow$ unit = Kelvin, not counts) *
  - **real-time atmospheric phase** correction

* can be corrected/modified off-line if necessary

PdBI data processing

(2) Off-line data calibration

- Four main steps
  - **RF bandpass**
  - **phase fluctuations vs. time**
  - **absolute flux calibration**
  - **amplitude fluctuations vs. time**
- Off-line calibrations are stored in a **.hpb file**

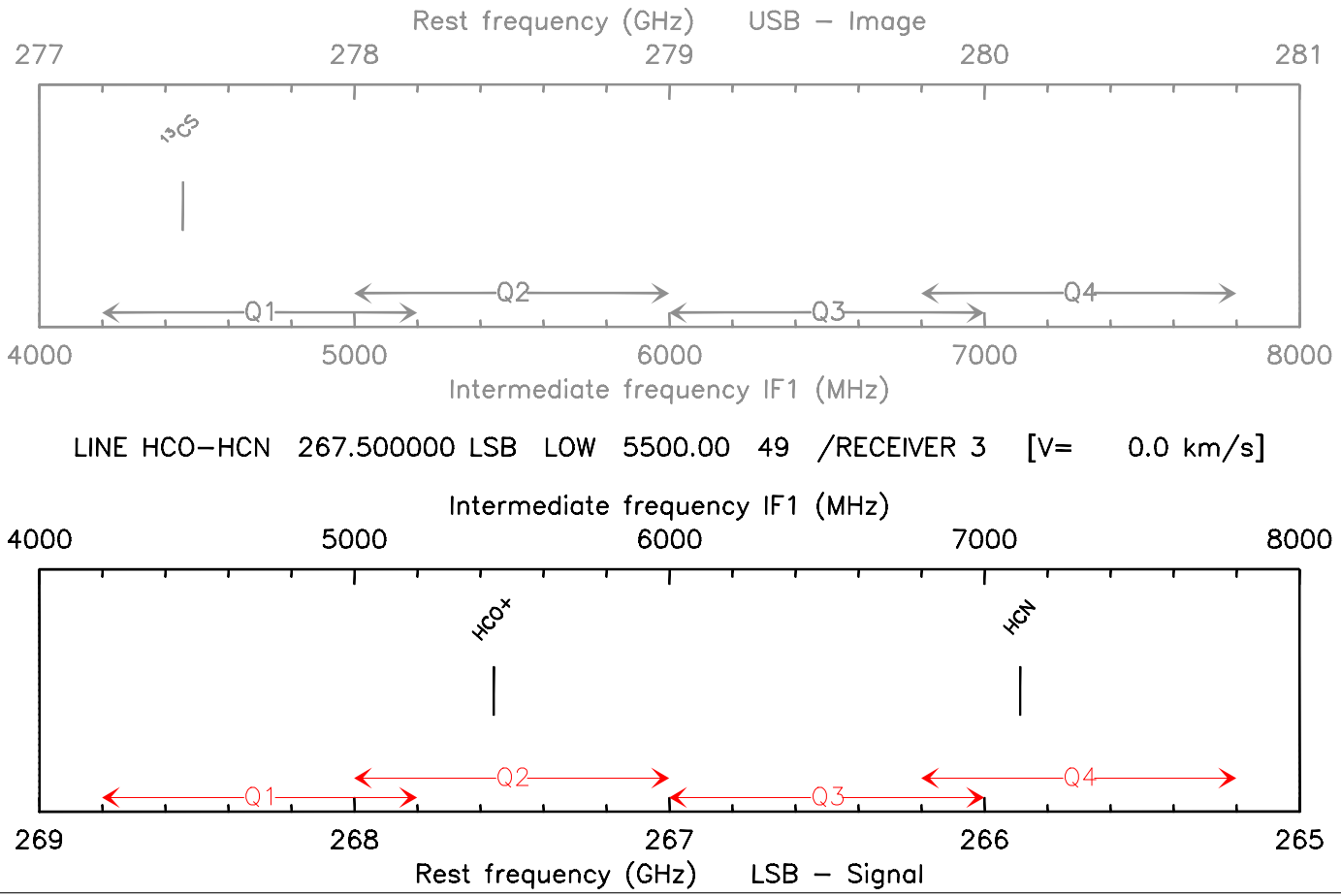
(3) After the data calibration: imaging

Calibration (CLIC) $\longrightarrow$ *uv*-table $\longrightarrow$ Imaging & Deconvolution (MAPPING)

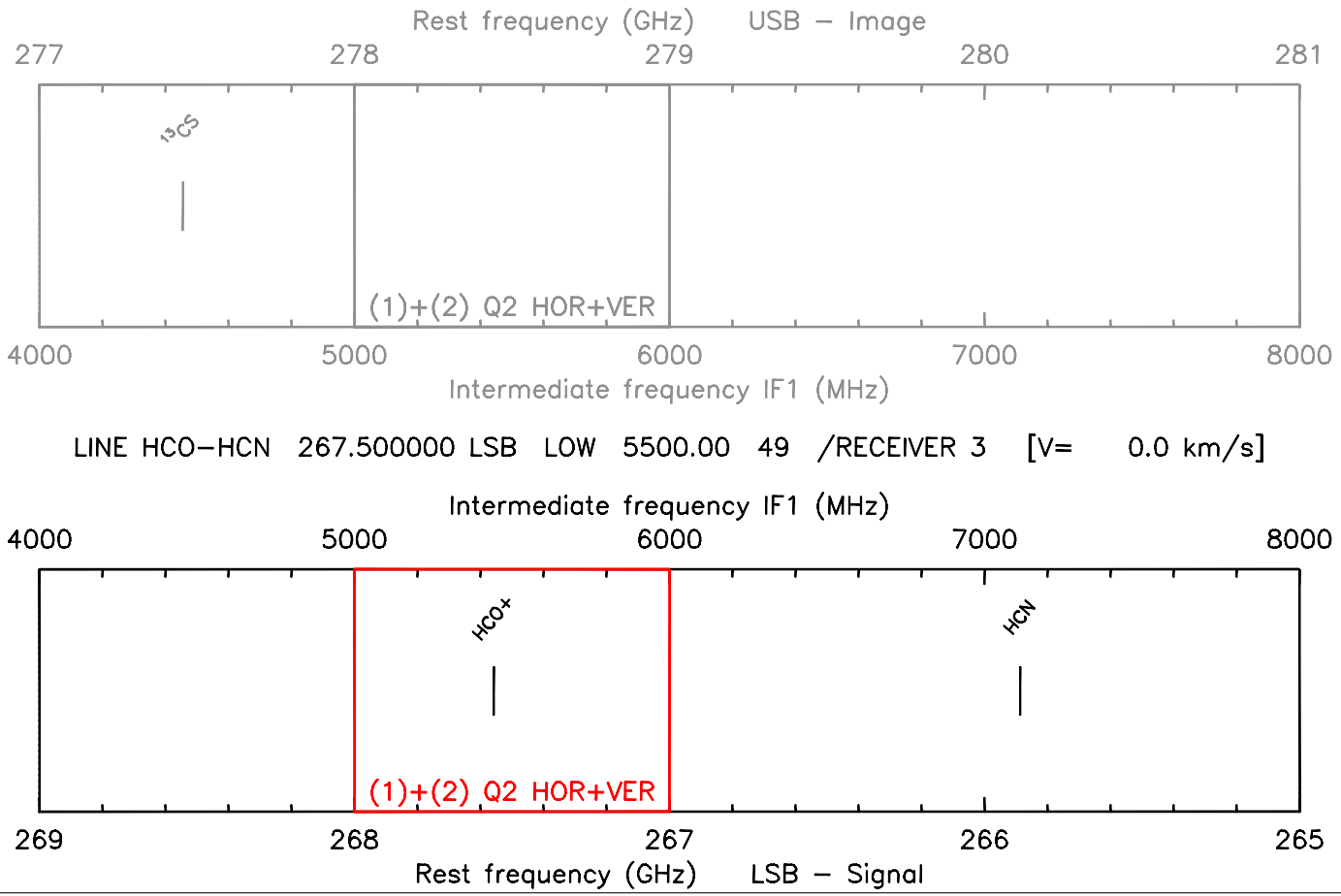
New receivers and frequency scheme

- **Since beginning of 2007, a new generation of receivers was installed at Bure**
- With much better performance (as measured by T_{rec}).
- In fact several changes in frequency plan:
  - **dual polarization capabilities** (linear H and V polarization)
  - **larger bandwith (4 GHz instead of 580 MHz)**
  - optic fibers to carry the broader signal
  - a new IF processor to match receiver output to correlator input
- Purpose: cut up to two 1 GHz slices out of the 2× 4 GHz signals coming from the receivers.
- Referred to as **"correlator narrow inputs"**

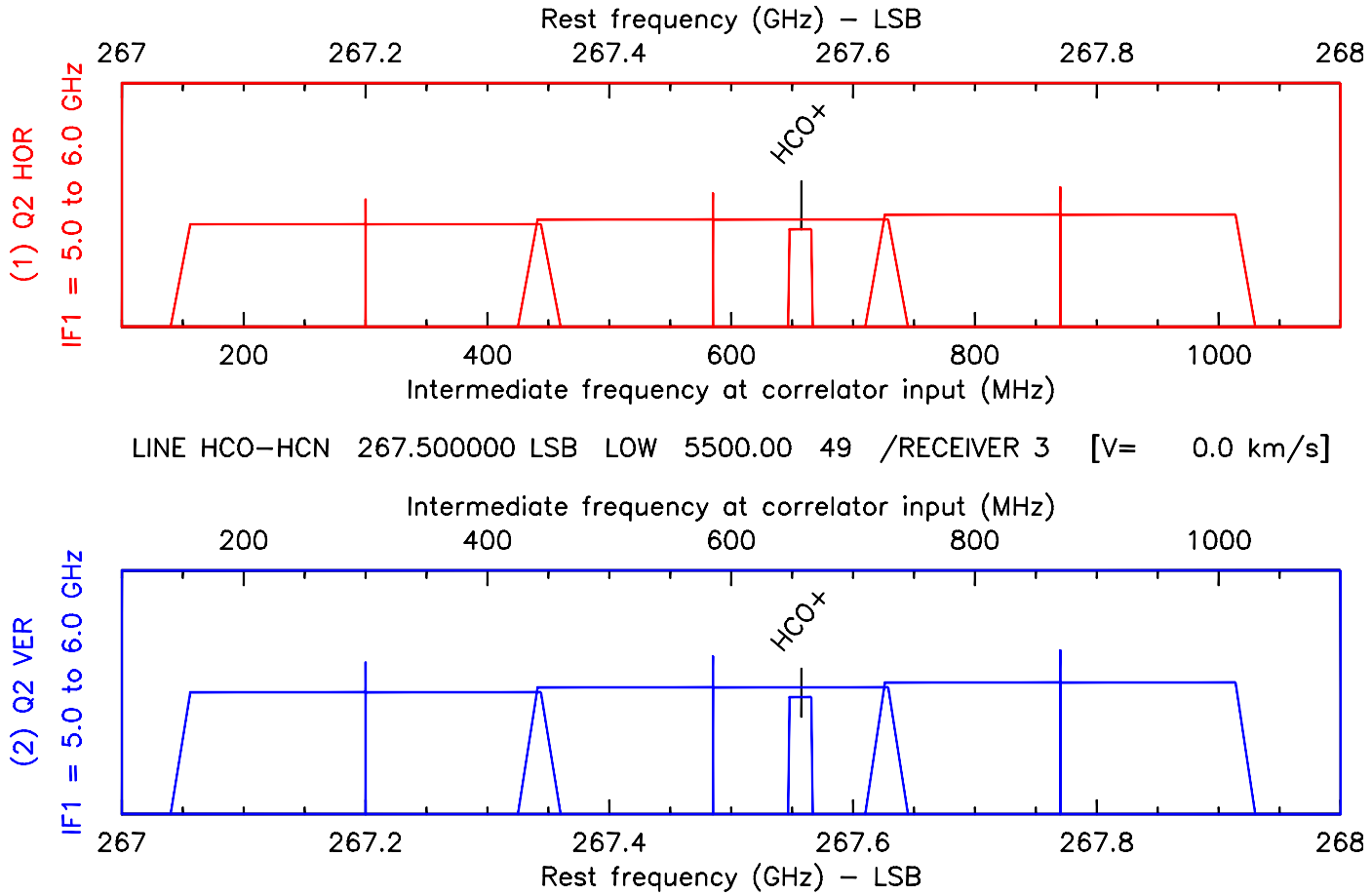
A picture is worth a thousand words



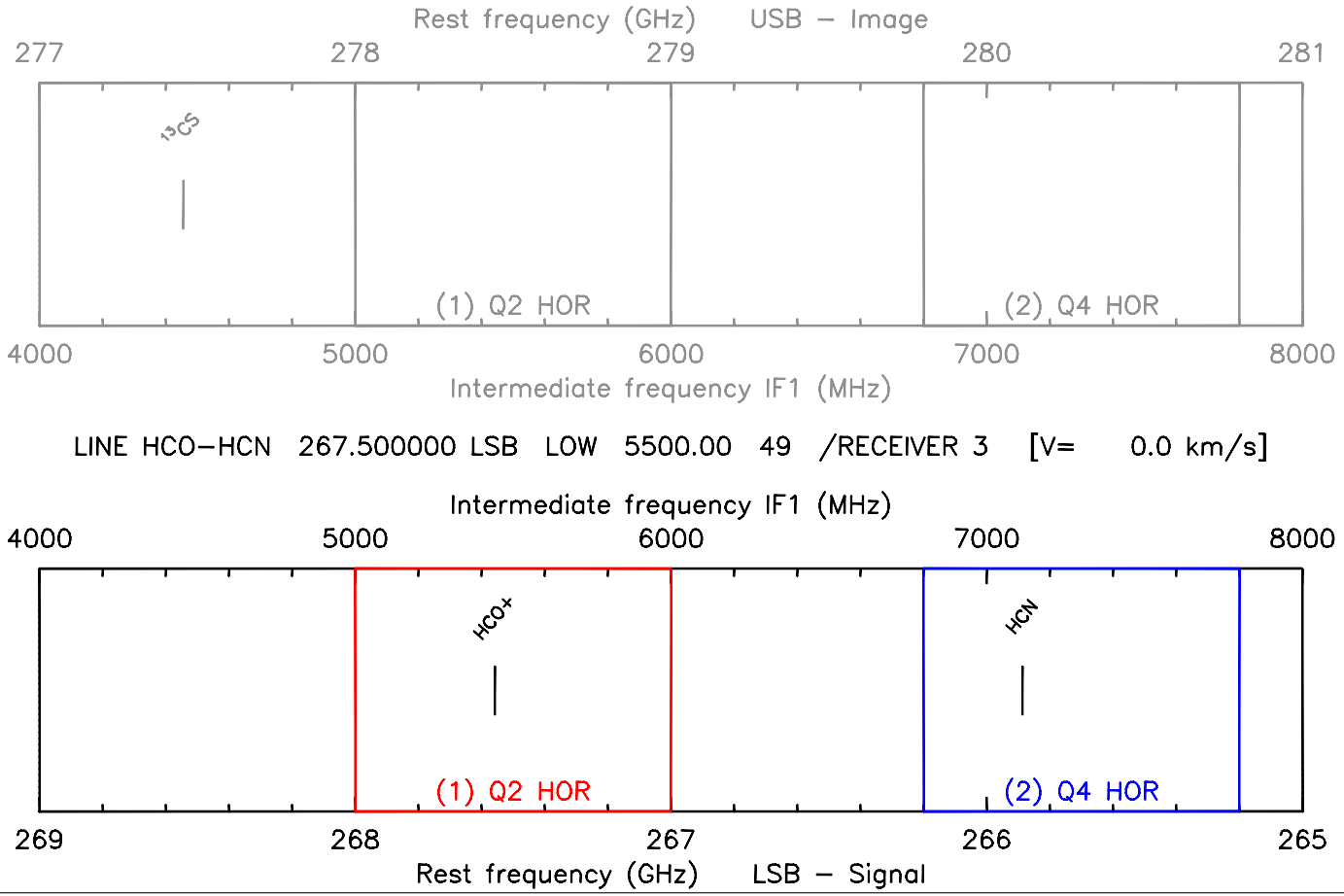
A picture is worth a thousand words



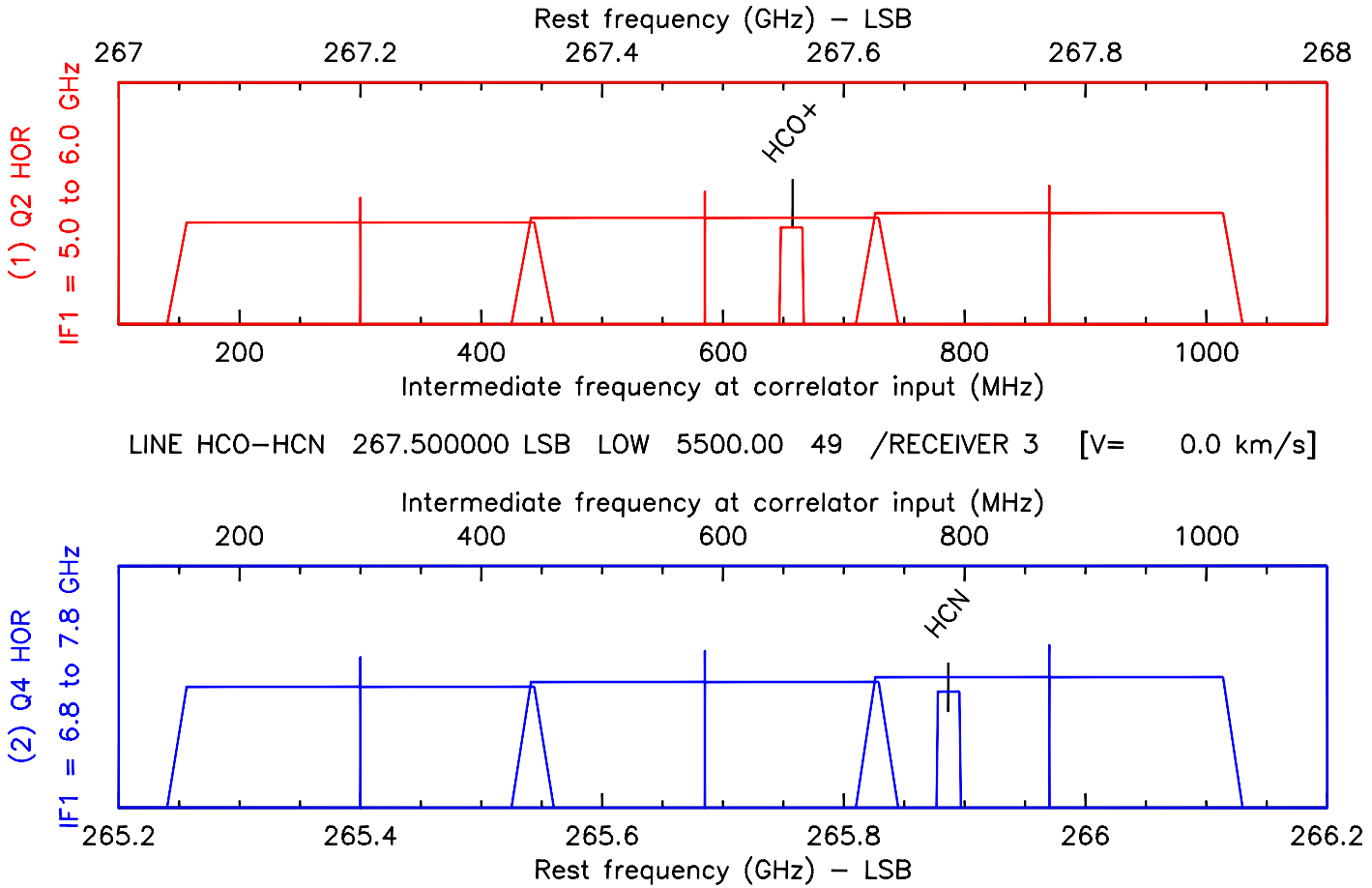
A picture is worth a thousand words



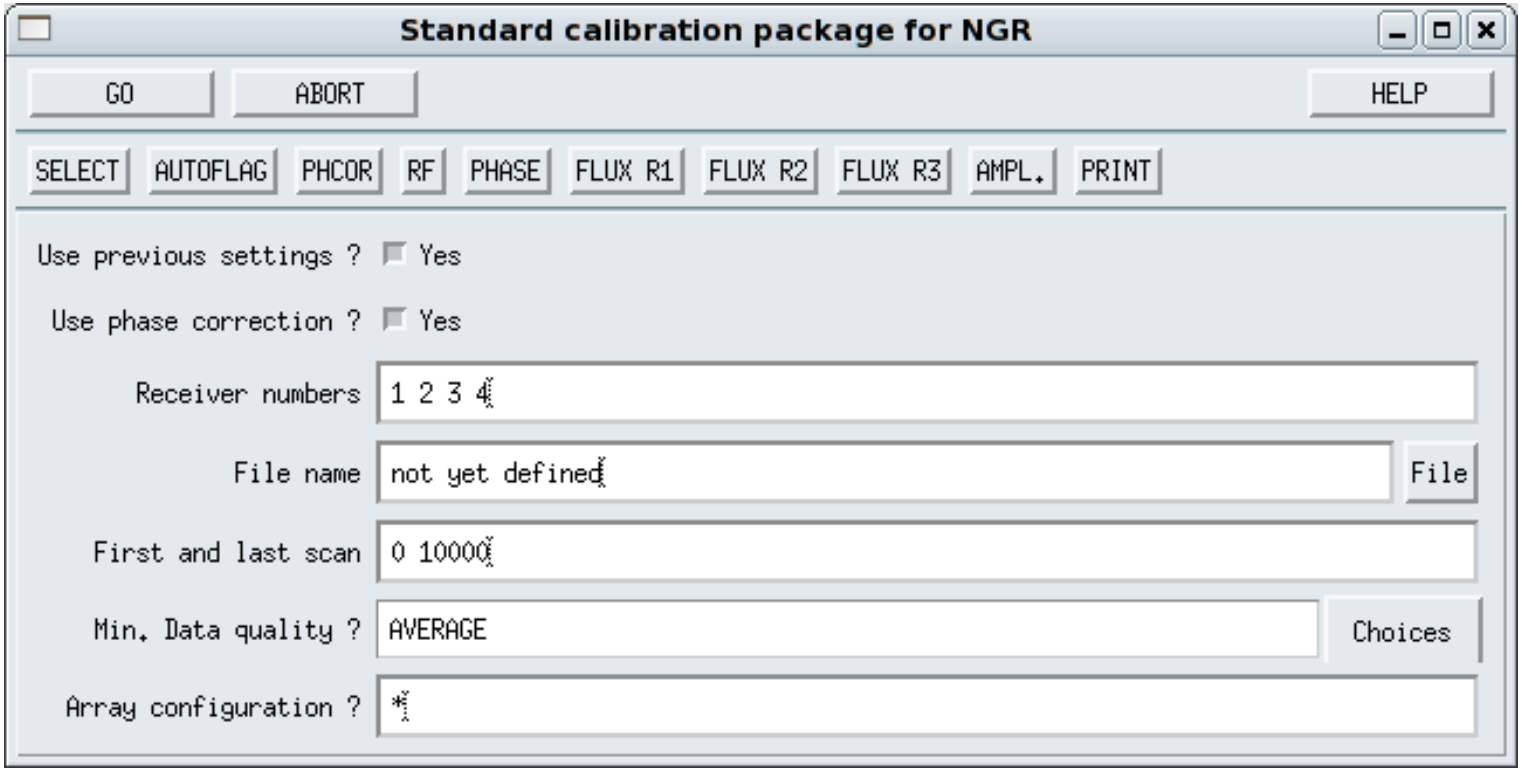
A picture is worth a thousand words



A picture is worth a thousand words

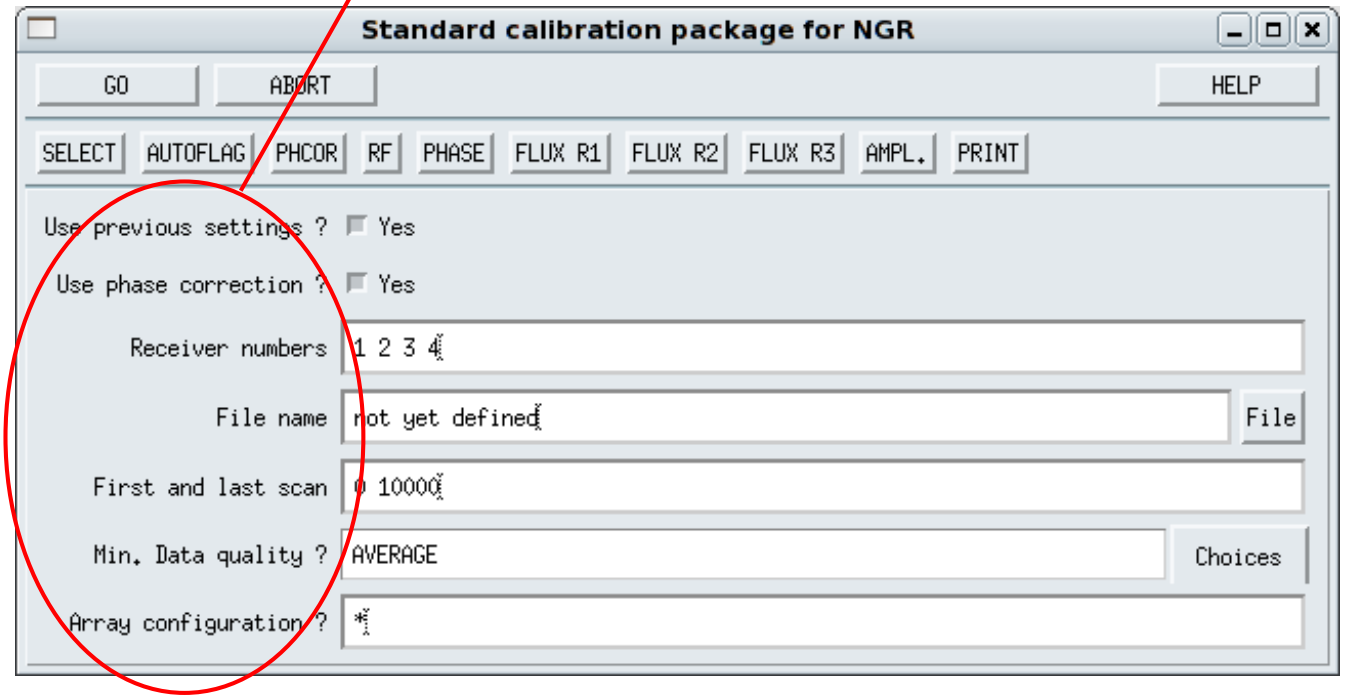


Standard PdBI calibration user interface



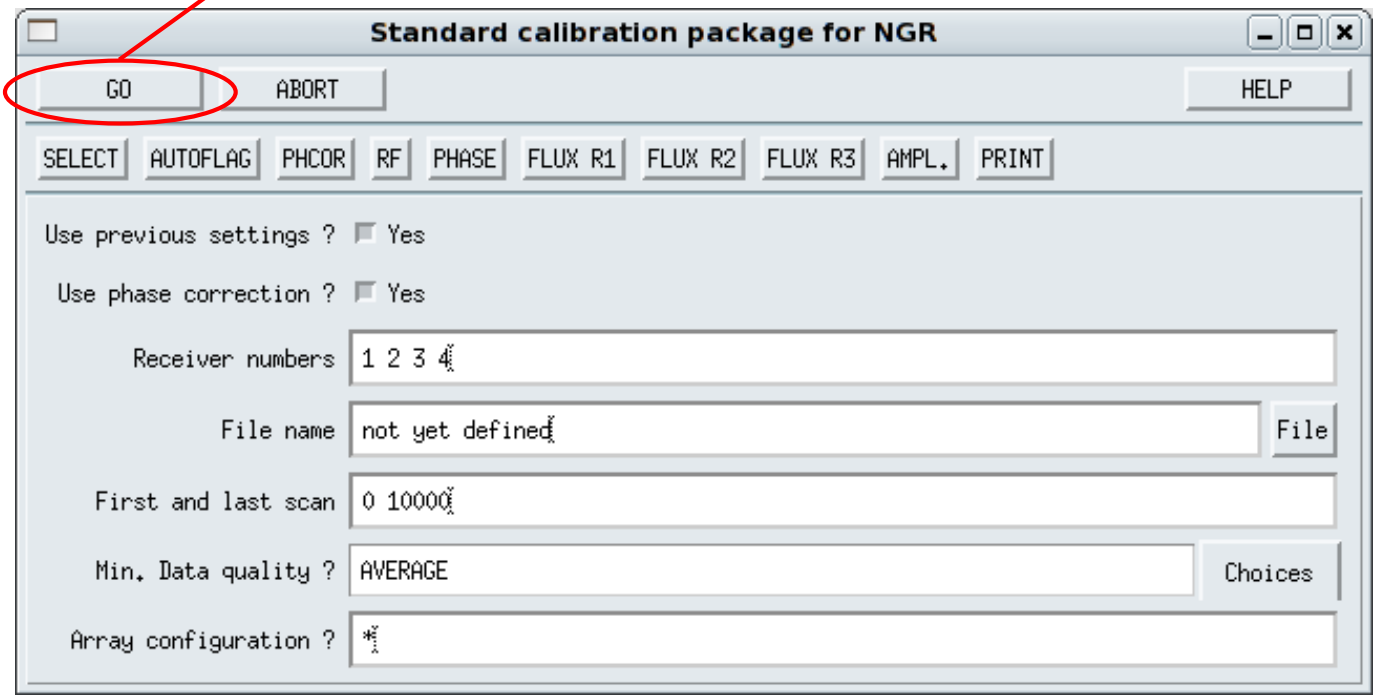
Standard calibration user interface

Input parameters to reduce an observation



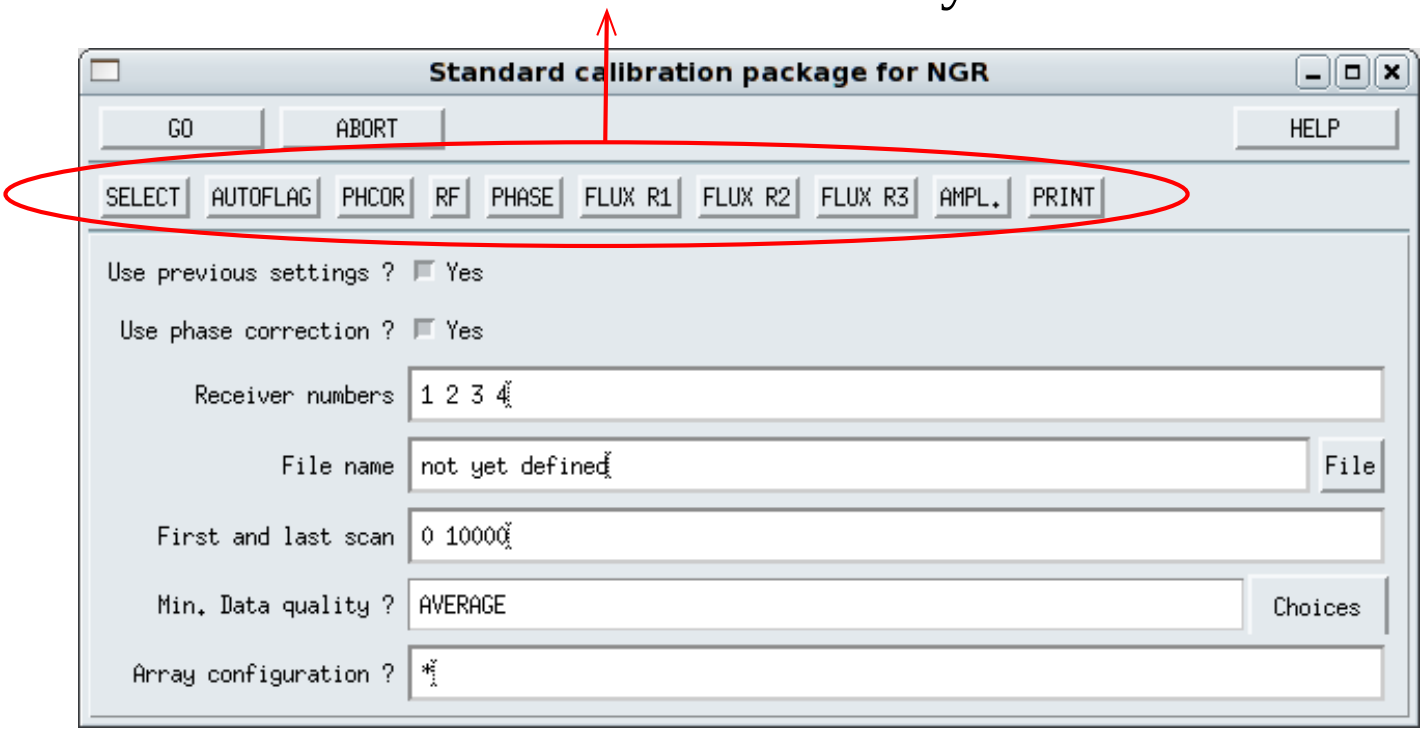
Standard calibration user interface

All calibration steps in a row (pipeline)



Standard calibration user interface

One button per calibration step
The user can check/modify the results

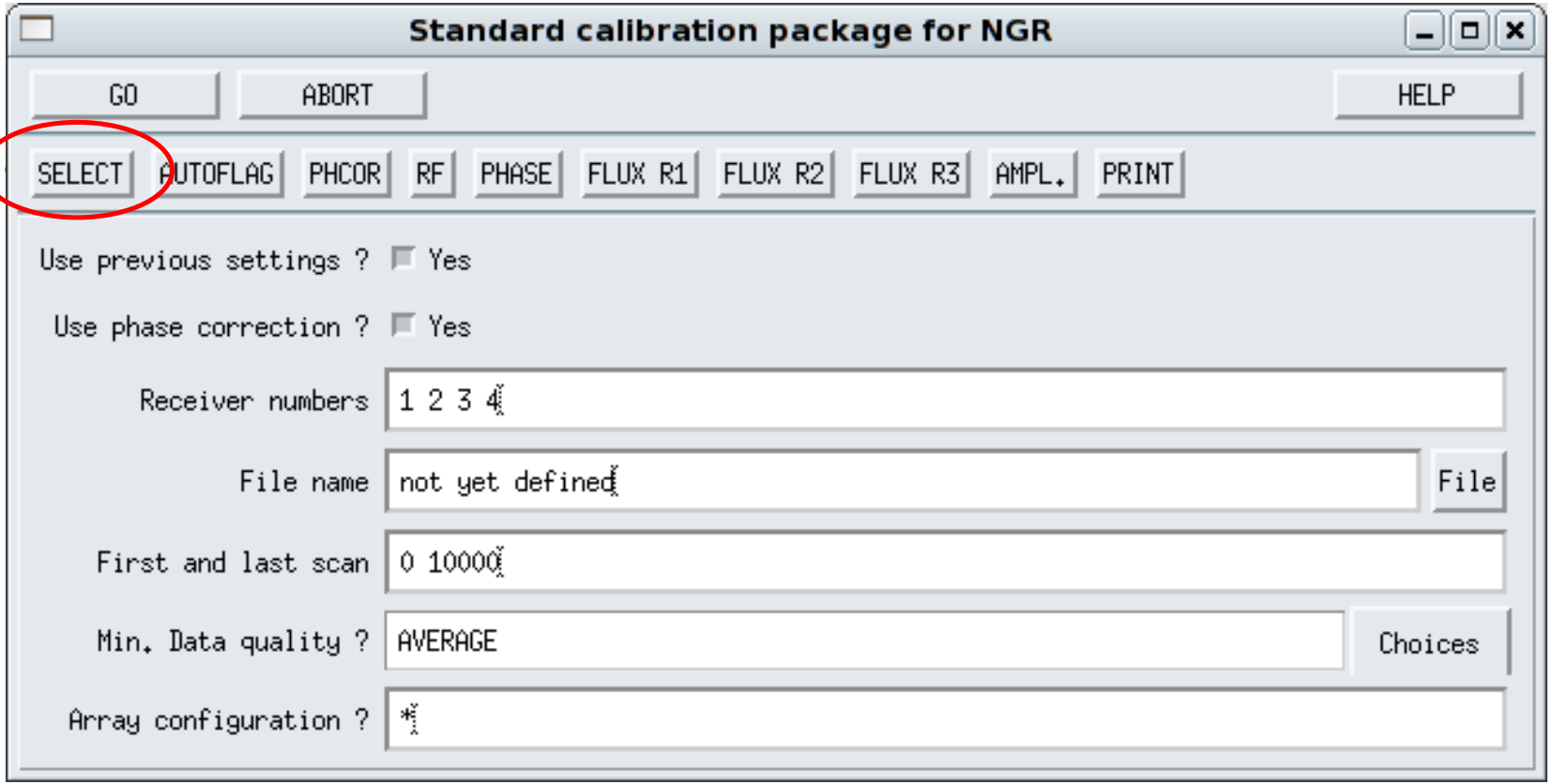


Input parameters

- `Use previous settings?` – In case the calibration was already done
- `Use phase correction?` – Use or not atmospheric phase correction: should always be **yes**
- `Receivers numbers` – Receiver **1** = 3 mm (80–116 GHz)
  Receiver **2** = 2 mm (128–174 GHz)
  Receiver **3** = 1 mm (200–267 GHz)
- `File name` – File to be calibrated
- `First and last scan` – To select only part of the data
- `Min. Data Quality?` – To select only part of the data
- `Array configuration?` – In case of configuration change

In most cases, only the file name must be entered

SELECT: Open the file

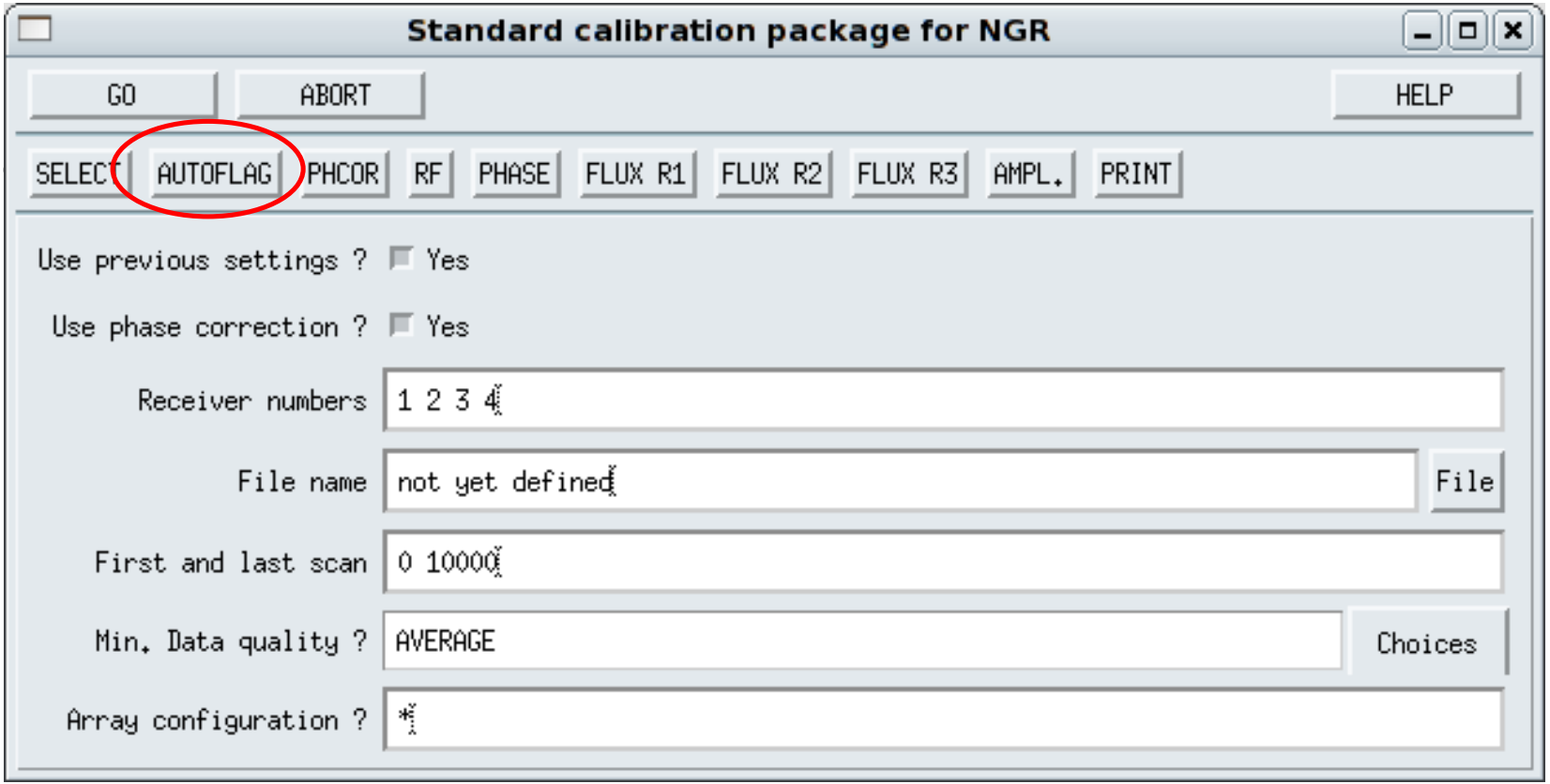


SELECT

- Open the file
- Basic checks, initializations of pipeline variables
- Automatic determination of the **receiver tuning (LSB/USB/DSB)**
- Detect possible **re-tuning of the receivers during the observations**
- Find the **bandpass calibrator** (= strongest quasar). It is possible to override this behaviour with e.g.:

```
let band_source 'the_source_I_prefer'
```

AUTOFLAG: Automatic flagging



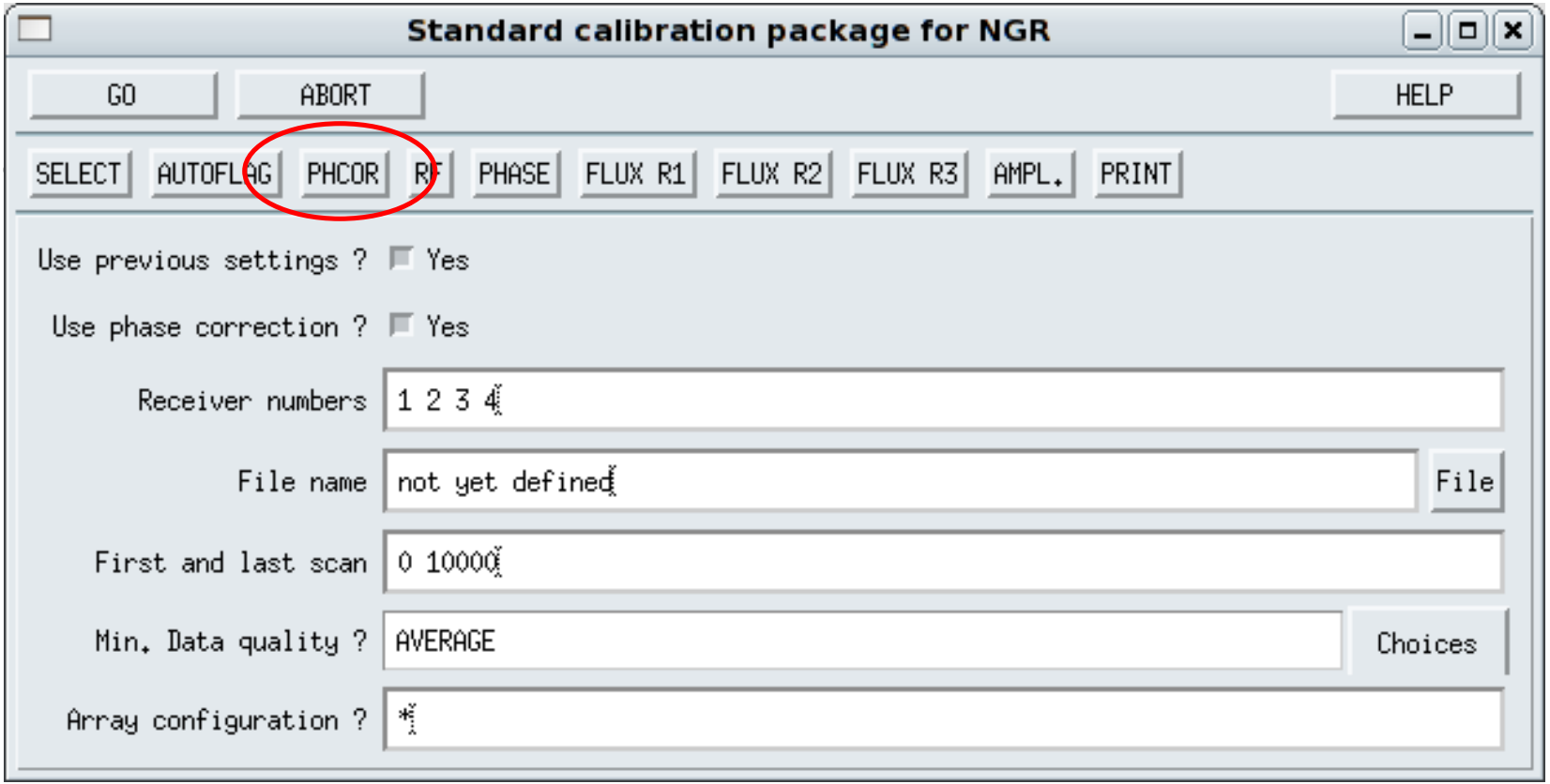
AUTOFLAG

- Instrumental problems are detected on site $\longrightarrow$ data are **flagged with keywords** (e.g. LOCK, L01, TSYS, ...)

- Off-line flagging of the data to **detect and flag possible corrupted scans**: loop on all scans and look for
  - timing error problems
  - wrong amplitude points *(not yet implemented)*

- Also: check observing date and warn for known problems at the time of the observations

PHCORR: Atmospheric phase correction



Atmospheric phase correction

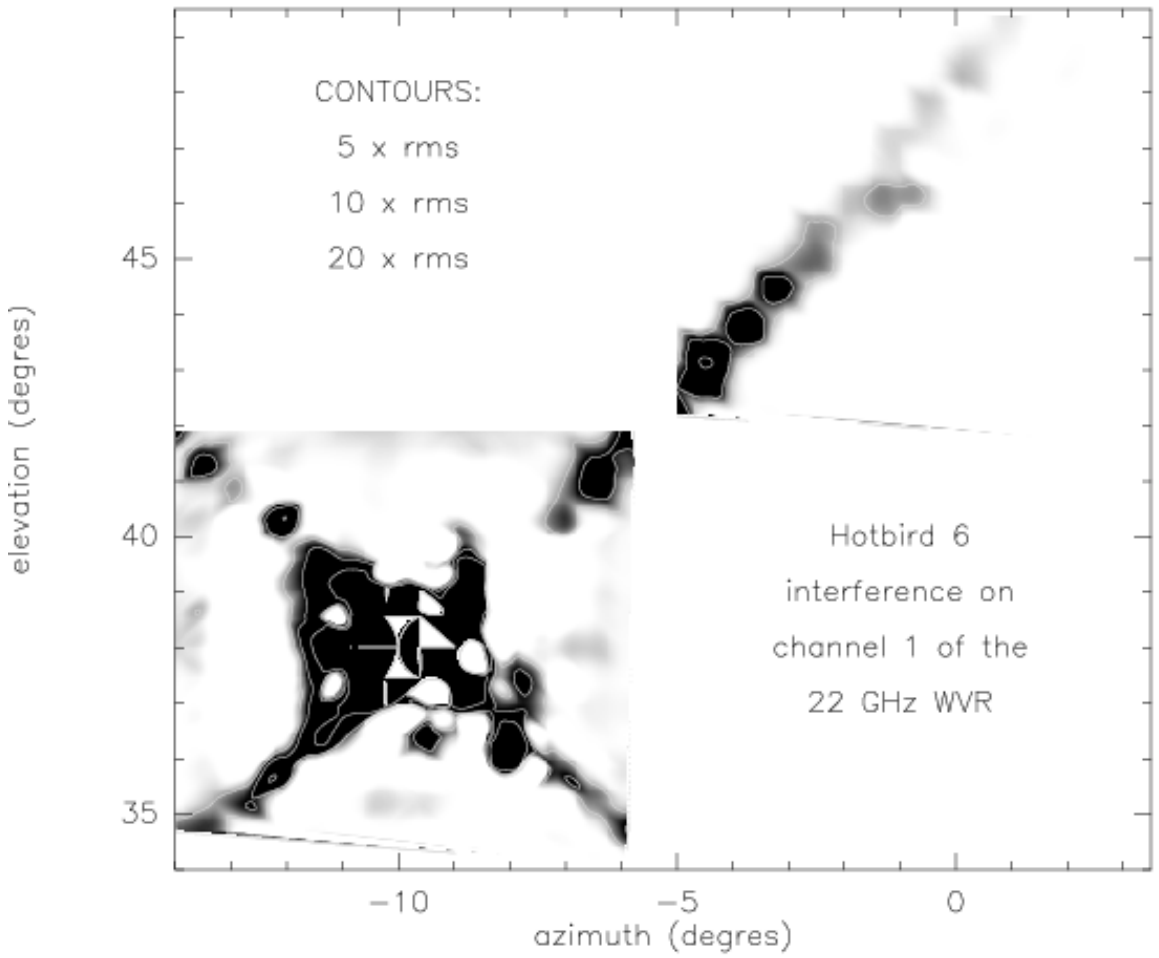
- Water emission $\longrightarrow$ Atmospheric model $\longrightarrow$ Path length $\longrightarrow$ Phase

- Water emission measurement
  - used to be based on **1 mm total power** measurements
  - now based on **22 GHz water vapour radiometers** (3 channels)

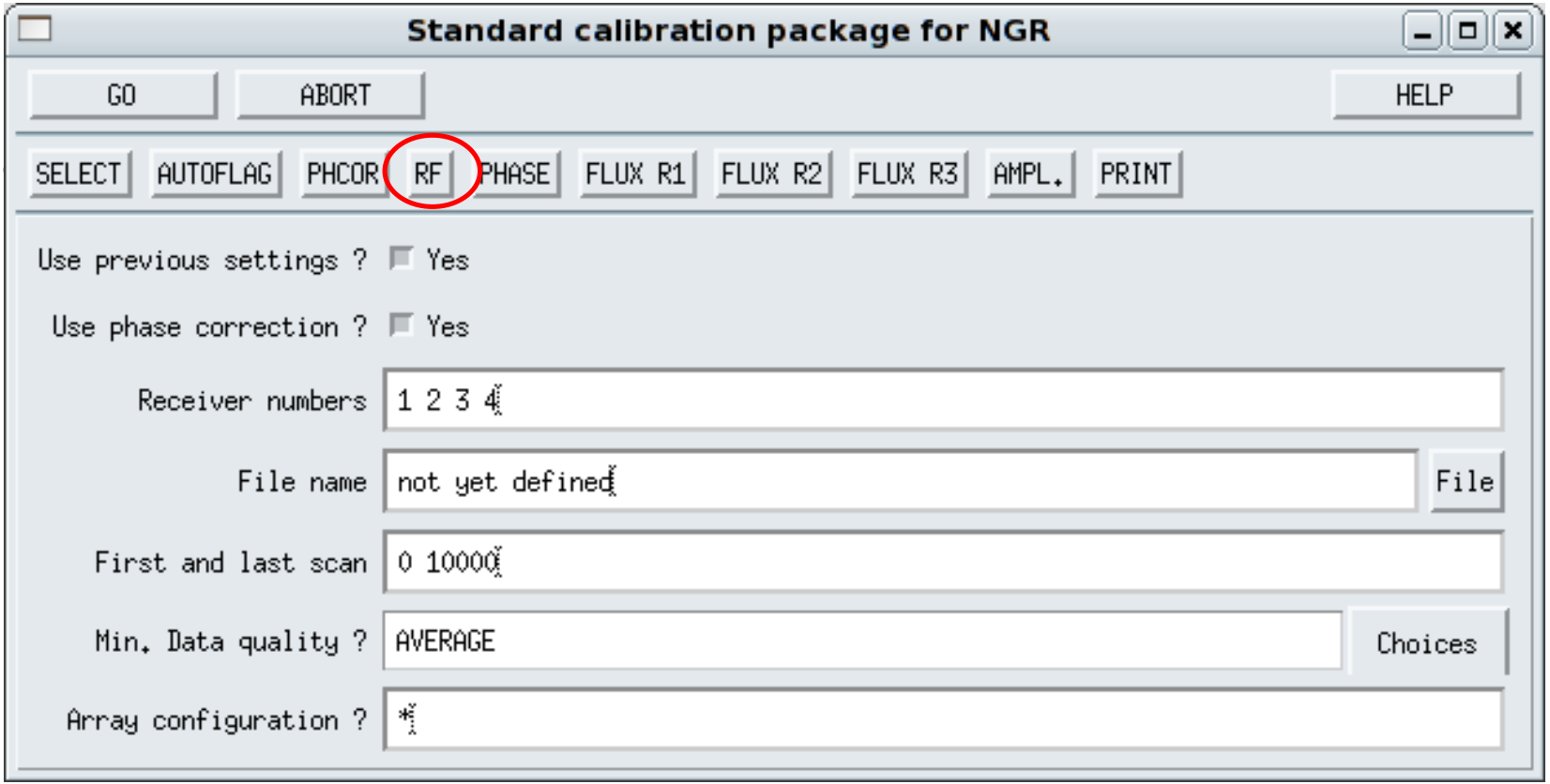
- Plateau de Bure real-time phase correction
  - applied to scan-averaged ($\sim$1 min) data in the correlator
  - mostly a **correction of the amplitude decorrelation**
  - **both corrected and non-corrected data are stored in the file**

PHCORR

- For all calibrator measurements: **check whether the real-time atmospheric phase correction improves or the result or not**
  - compare corrected and uncorrected data for each scan
  - amplitude should be higher on the corrected data...
  - store antenna-based flag in each scan
- Procedure also checks for possible interference in some channels of the WVR by communication satellite (e.g. Hotbird).
- Astronomical targets: the result obtained on the closest (in time) calibrator measurement is used
- In all further processing, the **phase correction is used only if it improves the result** (default behaviour of CLIC)


CONTOURS:
5 x rms
10 x rms
20 x rms
Hotbird 6
interference on
channel 1 of the
22 GHz WVR
elevation (degres)
azimuth (degres)
45
40
35
−10
−5
0

RF: RF Bandpass calibration



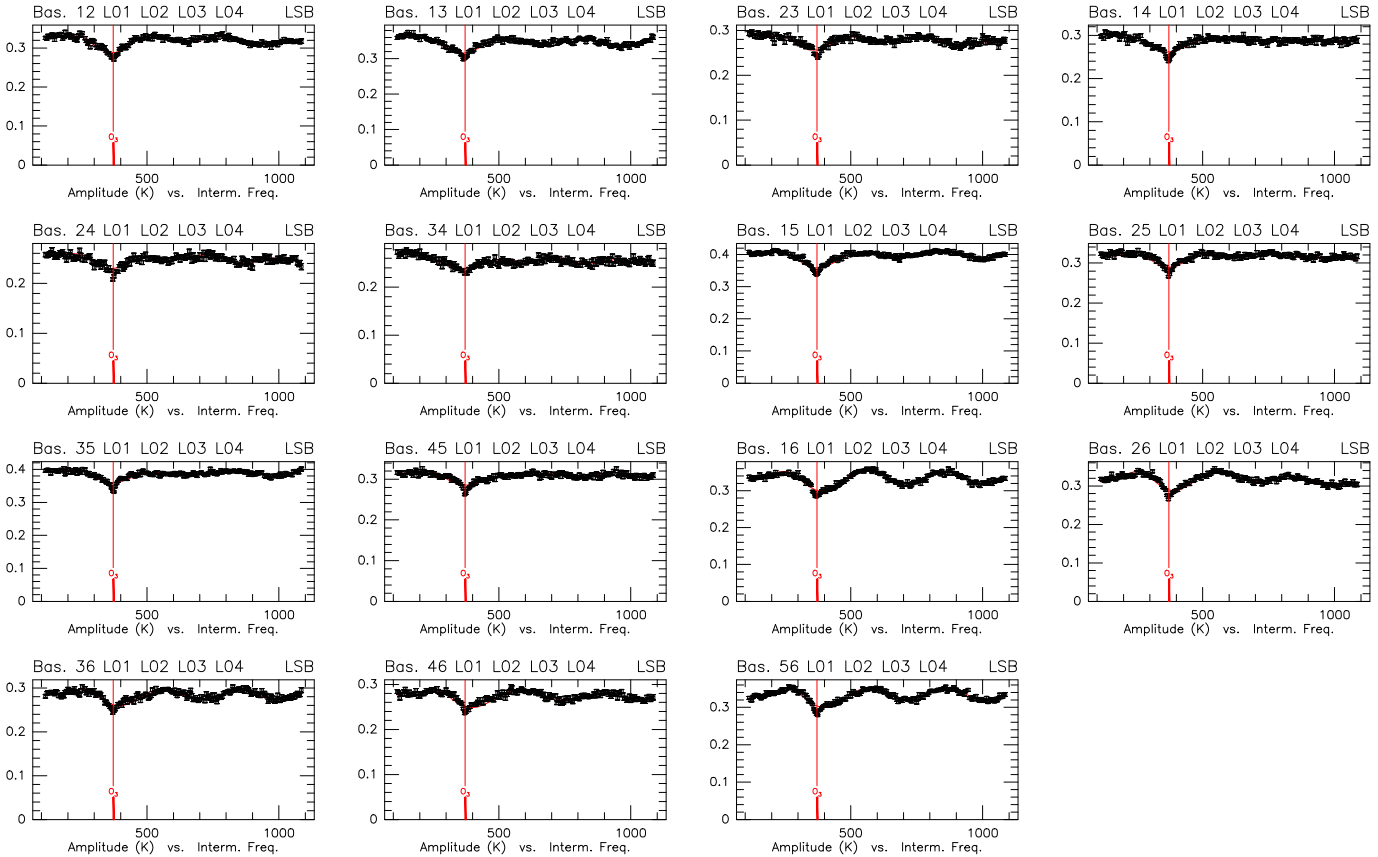
RF Bandpass calibration

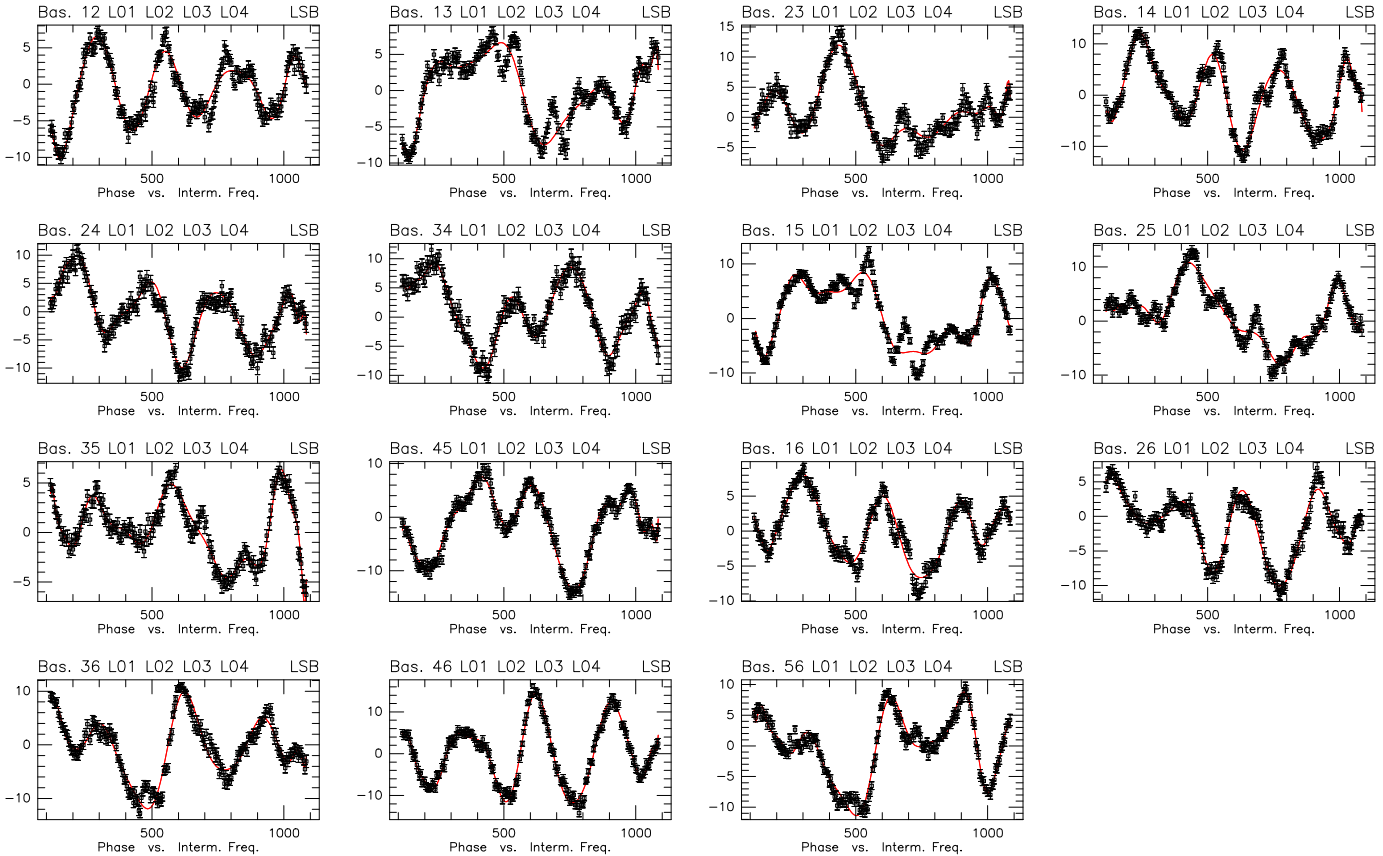
- Basic assumption: **the frequency- and time- variations are independant**
  - RF bandpass constant during the observations
  - RF bandpass mainly originates from the receiver $\longrightarrow$ must be re-calibrated after each re-tuning

- Calibration method:
  - a **strong quasar** is observed at the beginning of each project (typically: 10–15 minutes)
  - **its phase must be zero, its amplitude must be constant $\longrightarrow$ fit a gain vs. frequency curve** to estimate the RF bandpass
  - correct all subsequent data for this bandpass

RF

- Select the bandpass calibrator observations
- Self-calibration and average in time (improves SNR)
- Smooth to 5 MHz resolution (improves SNR)
- Solve for **antenna-based gain** (both amplitude and phase)
- Fit polynomial amplitude and phase vs. frequency curves
- Store calibration curves in all observations (calibrators + sources)
- **Do this calibration for:**
  - each scan range (receiver re-tuning)
  - each correlator input (usually 2).
  - the signal side band (USB or LSB)


Bas. 12 L01 L02 L03 L04 LSB
Bas. 13 L01 L02 L03 L04 LSB
Bas. 23 L01 L02 L03 L04 LSB
Bas. 14 L01 L02 L03 L04 LSB
Bas. 24 L01 L02 L03 L04 LSB
Bas. 34 L01 L02 L03 L04 LSB
Bas. 15 L01 L02 L03 L04 LSB
Bas. 25 L01 L02 L03 L04 LSB
Bas. 35 L01 L02 L03 L04 LSB
Bas. 45 L01 L02 L03 L04 LSB
Bas. 16 L01 L02 L03 L04 LSB
Bas. 26 L01 L02 L03 L04 LSB
Bas. 36 L01 L02 L03 L04 LSB
Bas. 46 L01 L02 L03 L04 LSB
Bas. 56 L01 L02 L03 L04 LSB
Amplitude (K) vs. Interm. Freq.

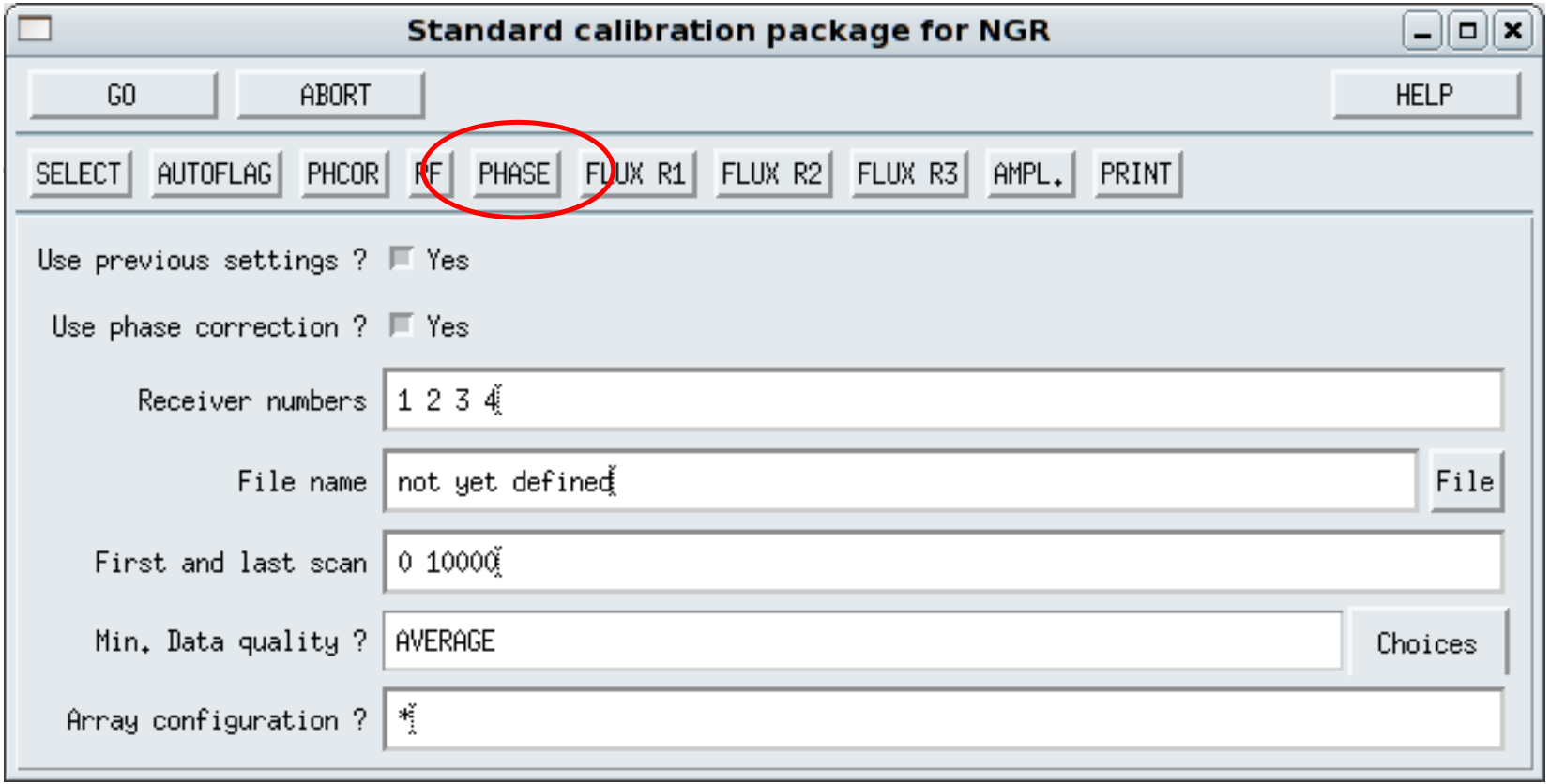

Bas. 12 L01 L02 L03 L04 LSB
Bas. 13 L01 L02 L03 L04 LSB
Bas. 23 L01 L02 L03 L04 LSB
Bas. 14 L01 L02 L03 L04 LSB
Bas. 24 L01 L02 L03 L04 LSB
Bas. 34 L01 L02 L03 L04 LSB
Bas. 15 L01 L02 L03 L04 LSB
Bas. 25 L01 L02 L03 L04 LSB
Bas. 35 L01 L02 L03 L04 LSB
Bas. 45 L01 L02 L03 L04 LSB
Bas. 16 L01 L02 L03 L04 LSB
Bas. 26 L01 L02 L03 L04 LSB
Bas. 36 L01 L02 L03 L04 LSB
Bas. 46 L01 L02 L03 L04 LSB
Bas. 56 L01 L02 L03 L04 LSB
Phase vs. Interm. Freq.

Interactive mode

```
(...)
I-SOLVE_RF,[1119] Pha. Bas. 16  L01 L02 L03 L04 LSB rms:   1.074
I-SOLVE_RF,[1119] Pha. Bas. 26  L01 L02 L03 L04 LSB rms:   1.109
I-SOLVE_RF,[1119] Pha. Bas. 36  L01 L02 L03 L04 LSB rms:   1.566
I-SOLVE_RF,[1119] Pha. Bas. 46  L01 L02 L03 L04 LSB rms:   1.302
I-SOLVE_RF,[1119] Pha. Bas. 56  L01 L02 L03 L04 LSB rms:   1.229
LSB Bandpass Calibration for receiver 3, narrow 1:
Command was SOLVE RF 12 20 /PLOT
CLIC_3> SIC\PAUSE
CLIC_4>
```

- RF calibration very robust, no input usually required
- CO absorption in front of quasars $\longrightarrow$ usually does not affect the fit, no need to flag data

PHASE: Phase calibration



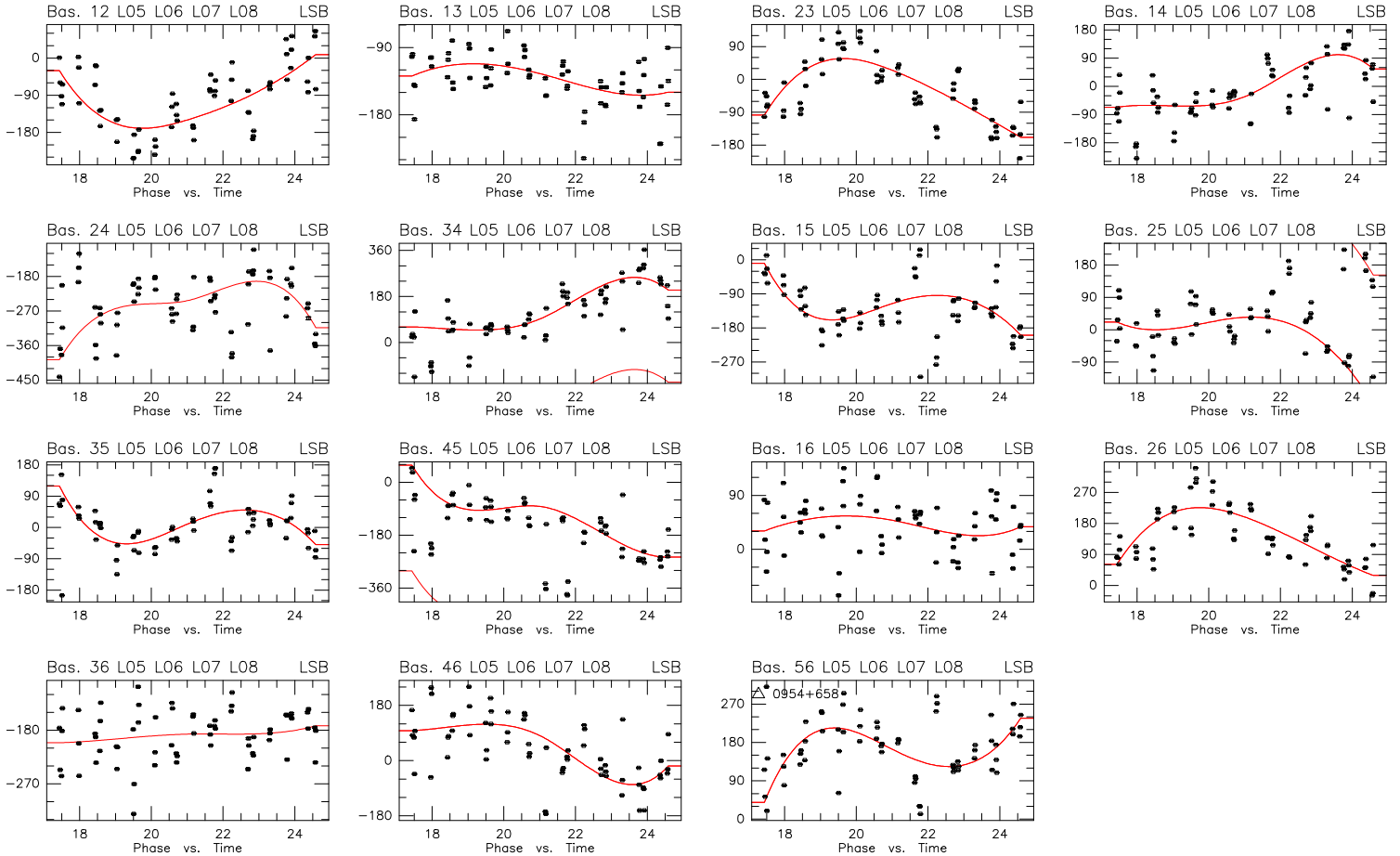
Phase calibration

- Time dependence of the phase is caused by the atmosphere **and** the instrument (drifts, baseline errors)

- Calibration method:
  - a point source calibrator (quasar) is observed every $\sim$ 20 minutes
  - **its phase must be zero $\longrightarrow$ fit a gain vs. time to the data to estimate the phase variations**
  - in practice: two calibrators may be observed (depending on the observing strategy)

PHASE

- Select the phase calibrator observations
- Apply RF bandpass calibration
- Derive **antenna-based gain**
- Least-square fit of cubic splines (phase vs. time)
- Store calibration curves in all observations (calibrators + sources)
- **Do this calibration for:**
  - each polarisation (1 or 2)
  - the signal side band (LSB or USB)

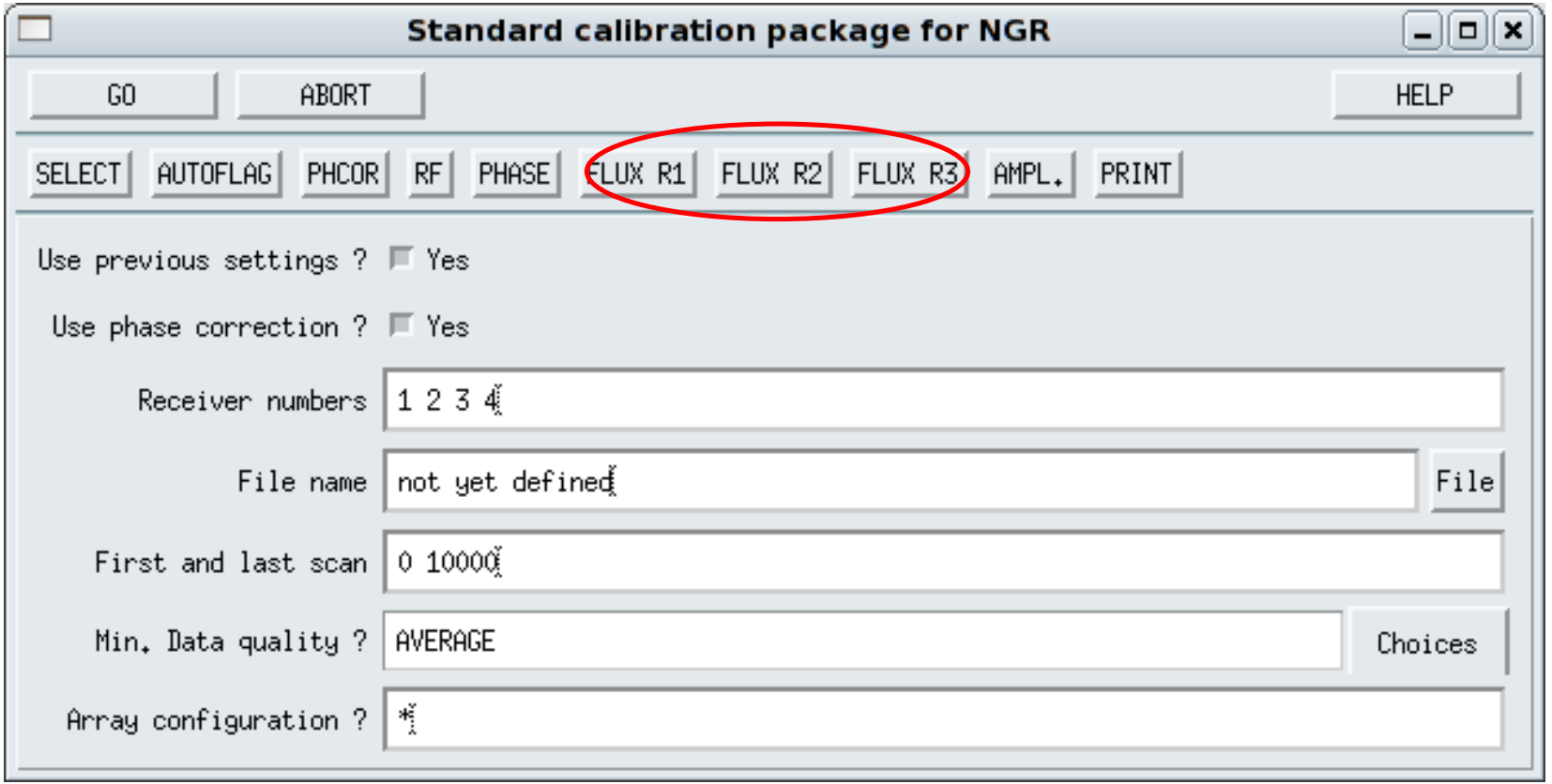

Bas. 12 L05 L06 L07 L08 LSB
Bas. 13 L05 L06 L07 L08 LSB
Bas. 23 L05 L06 L07 L08 LSB
Bas. 14 L05 L06 L07 L08 LSB
Bas. 24 L05 L06 L07 L08 LSB
Bas. 34 L05 L06 L07 L08 LSB
Bas. 15 L05 L06 L07 L08 LSB
Bas. 25 L05 L06 L07 L08 LSB
Bas. 35 L05 L06 L07 L08 LSB
Bas. 45 L05 L06 L07 L08 LSB
Bas. 16 L05 L06 L07 L08 LSB
Bas. 26 L05 L06 L07 L08 LSB
Bas. 36 L05 L06 L07 L08 LSB
Bas. 46 L05 L06 L07 L08 LSB
Bas. 56 L05 L06 L07 L08 LSB
0954+658
Phase vs. Time

Interactive mode

```
(...)
I-SOLVE_CAL,[1097] Pha. Bas. 16  L05 L06 L07 L08 LSB rms:   43.88 deg.
I-SOLVE_CAL,[1097] Pha. Bas. 26  L05 L06 L07 L08 LSB rms:   52.23 deg.
I-SOLVE_CAL,[1097] Pha. Bas. 36  L05 L06 L07 L08 LSB rms:   39.68 deg.
I-SOLVE_CAL,[1097] Pha. Bas. 46  L05 L06 L07 L08 LSB rms:   69.06 deg.
I-SOLVE_CAL,[1097] Pha. Bas. 56  L05 L06 L07 L08 LSB rms:   57.61 deg.
Phase calibration for receiver 3, polar h:
Command was SOLVE PHASE  /PLOT
You may try SOLVE PHASE  /PLOT   /WEIGHT  /BREAK 0 16.9
CLIC_3> SIC\PAUSE
CLIC_4>
```

- Potential problems
  - very noisy data (too weak calibrator)
  - strong drifts (baseline)
  - difference between the two phase calibrators (baseline)

FLUX: Flux scale calibration



Flux and Amplitude calibration

Backend counts $\longrightarrow$ Temperature (Kelvin) (Ta* scale)

- Done by chopper-wheel calibration at PdBI (every ∼20 minutes)
- Correct for
  - variation in electronic gains
  - variation of atmospheric absorption

Temperature (Kelvin) $\longrightarrow$ Flux (Jansky)

- Scaling by **antenna efficiency (Jy/K)**
- **Not sufficient for mm-interferometers**, because
  - amplitude loss due to decorrelation (phase noise)
  - variation of the antenna gain (pointing, focus, ...)

Flux and Amplitude calibration

- **Need to do amplitude referencing to a point source** (quasar) to calibrate out the temporal variation of the antenna efficiency
- **Problem**: **all** quasars have varying fluxes and spectral indexes (several 10% in a few months)
- Consequence: amplitude calibration is done in three steps
  1. Atmospheric calibration on site (temperature scale)
  2. Find flux of quasars (`FLUX` button)
  3. Find temporal variation of amplitude (`AMPL` button)

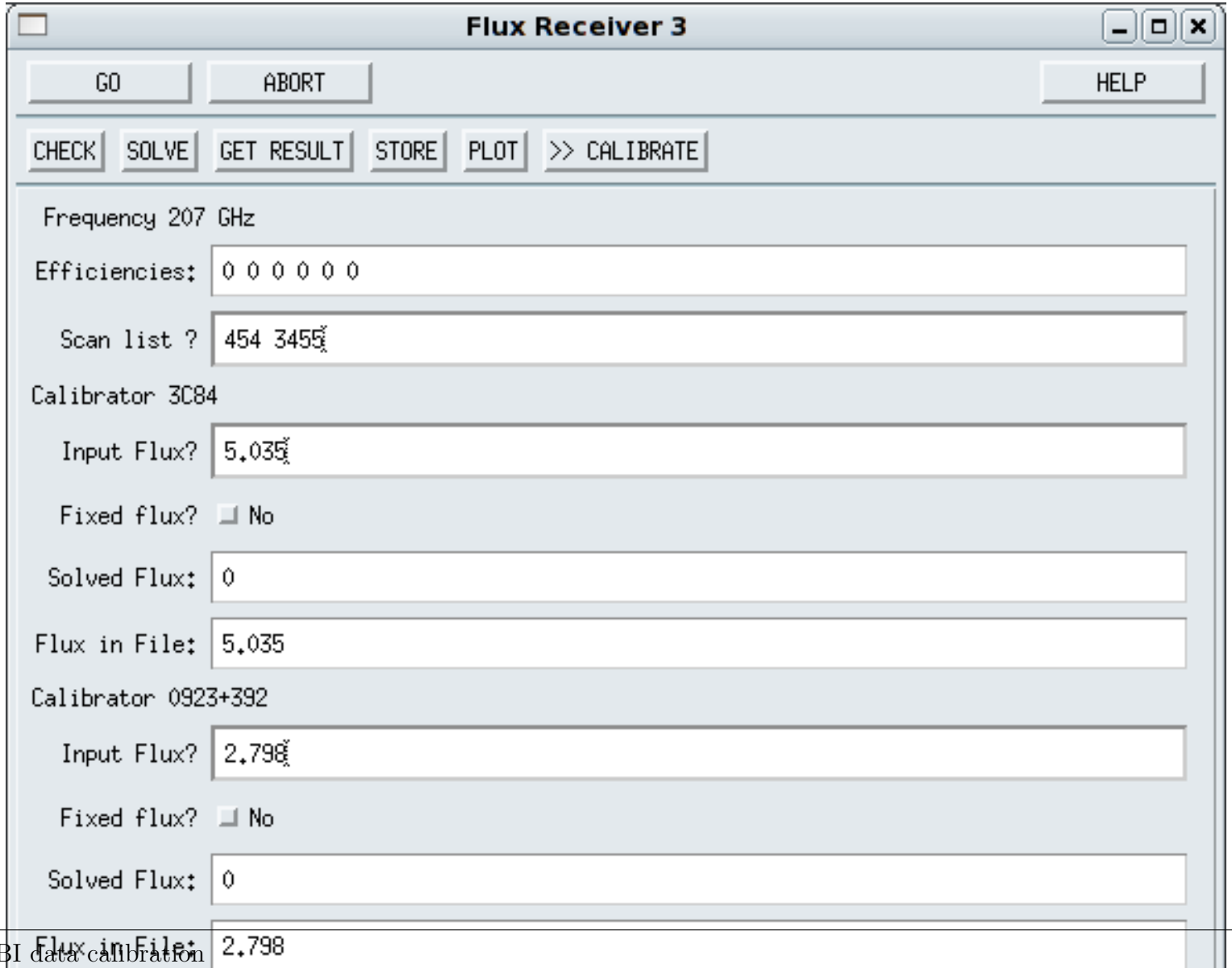
In most project, finding the absolute flux scale (2) is the most difficult step in the calibration

Step 2: Flux calibration

- Principle:
  - fix the flux of one or several **reference source(s)**
  - divide the measured temperature by this flux = antenna efficiencies (Jy/K)
  - apply antenna efficiencies to other sources to derive their flux

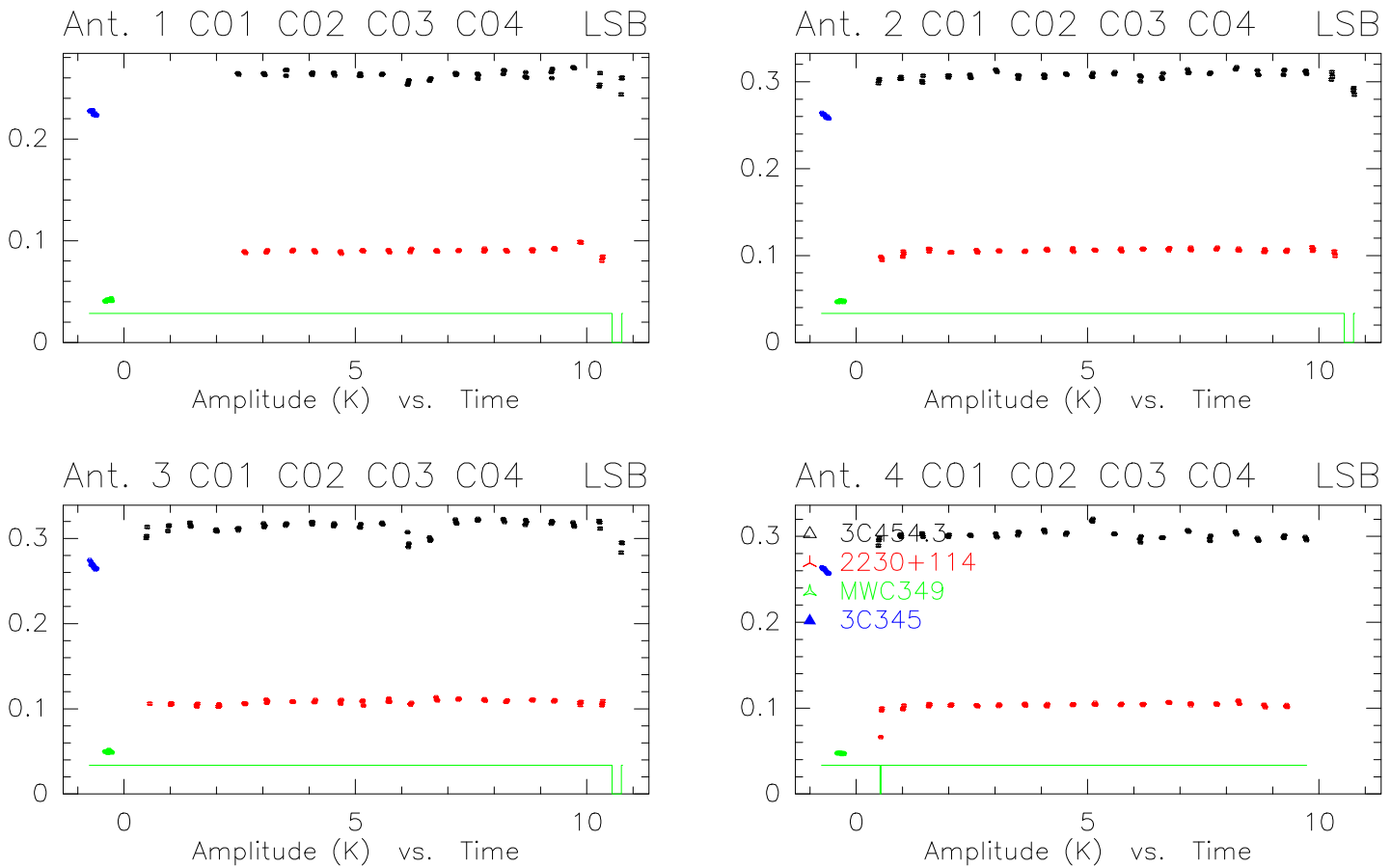
- Reference sources:
  - Planets are primary calibrators
  - **Strong quasars** (used as RF calibrator) have fluxes regularly measured against planets
  - **MWC 349**: $1.10\,(\nu/87)^{0.6}$ Jy
  - **MWC 349 observed in all projects whenever possible**


Flux Receiver 3
GO
ABORT
HELP
CHECK
SOLVE
GET RESULT
STORE
PLOT
>> CALIBRATE
Frequency 207 GHz
Efficiencies: 0 0 0 0 0 0
Scan list ? 454 3455
Calibrator 3C84
Input Flux? 5.035
Fixed flux? No
Solved Flux: 0
Flux in File: 5.035
Calibrator 0923+392
Input Flux? 2.798
Fixed flux? No
Solved Flux: 0
Flux in File: 2.798
Calibrator 0954+658
Input Flux? 1.216
Fixed flux? No
Solved Flux: 0
Flux in File: 1.216
Calibrator 3C345
Input Flux? 1.412
Fixed flux? No
Solved Flux: 0
Flux in File: 1.412
Calibrator 3C273
Input Flux? 13.892
Fixed flux? No
Solved Flux: 0
Flux in File: 13.892


Flux Receiver 3
GO
ABORT
HELP
CHECK
SOLVE
GET RESULT
STORE
PLOT
>> CALIBRATE
Frequency 207 GHz
Efficiencies: 0 0 0 0 0 0
Scan list ? 454 3455
Calibrator 3C84
Input Flux? 5.035
Fixed flux? No
Solved Flux: 0
Flux in File: 5.035
Calibrator 0923+392
Input Flux? 2.798
Fixed flux? No
Solved Flux: 0
Flux in File: 2.798

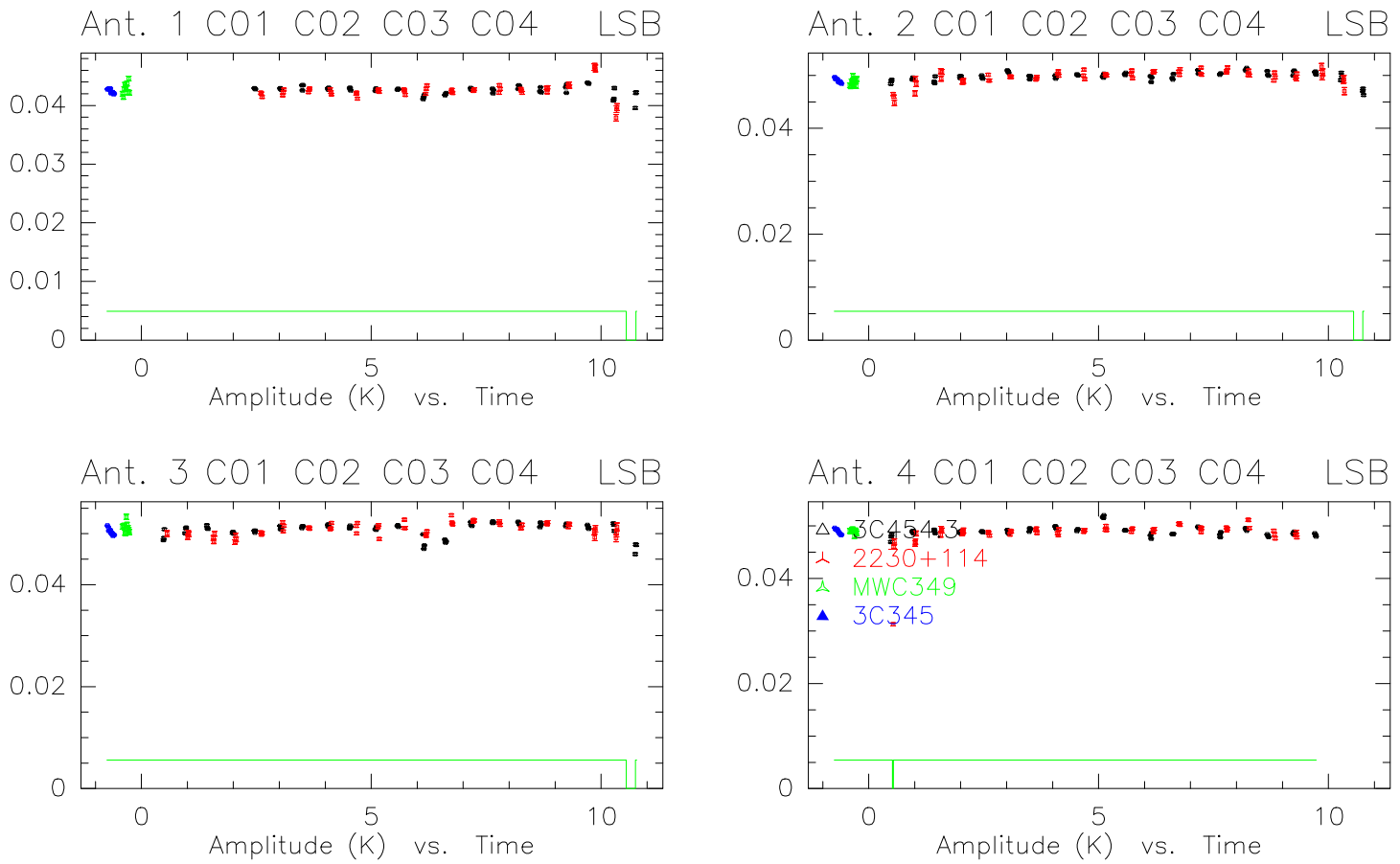
FLUX window

- `CHECK` – plot (inverse of) antenna efficiencies as a function of time using values currently in data file
- `SOLVE` – solve for the fluxes **using the selected reference sources**
- `GET RESULT` – accept the results
- `STORE` – store the fluxes in data file
- `PLOT` – plot (inverse of) antenna efficiencies as a function of time
- `>> CALIBRATE` – back to main calibration window


Ant. 1 C01 C02 C03 C04 LSB
Ant. 2 C01 C02 C03 C04 LSB
Ant. 3 C01 C02 C03 C04 LSB
Ant. 4 C01 C02 C03 C04 LSB
0
0.1
0.2
0.3
5
10
Amplitude (K) vs. Time
3C454.3
2230+114
MWC349
3C345

SOLVE FLUX

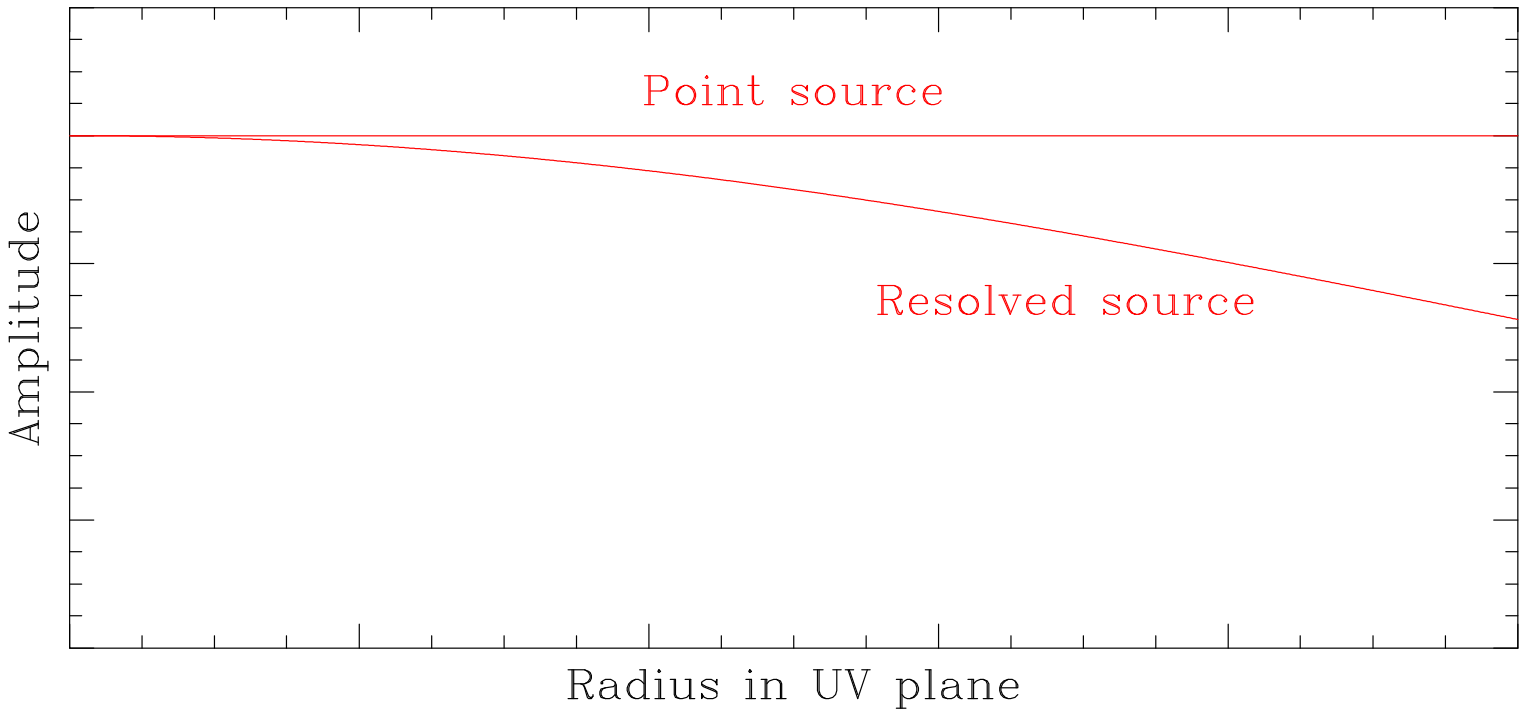
```
Flux and efficiency result for receiver 1 at 90.2 GHz:

                 in file            solve flux
              ---------------    ----------------
    3C345     read:    1.00 Jy   found:    5.32 Jy
   MWC349     read:    1.00 Jy   fixed:    0.97 Jy   (model:   0.97 Jy)
  3C454.3     read:    1.00 Jy   found:    6.16 Jy
 2230+114     read:    1.00 Jy   found:    2.12 Jy

 Antenna  1 (A1)    23.3 Jy/K   ( 0.94)
 Antenna  2 (A3)    20.6 Jy/K   ( 1.02)
 Antenna  3 (A4)    19.5 Jy/K   ( 1.07)
 Antenna  4 (A5)    20.5 Jy/K   ( 1.07)
```


Ant. 1 C01 C02 C03 C04 LSB
Ant. 2 C01 C02 C03 C04 LSB
Ant. 3 C01 C02 C03 C04 LSB
Ant. 4 C01 C02 C03 C04 LSB
0.04
0.03
0.02
0.01
0
5
10
Amplitude (K) vs. Time
3C454.3
2230+114
MWC349
3C345

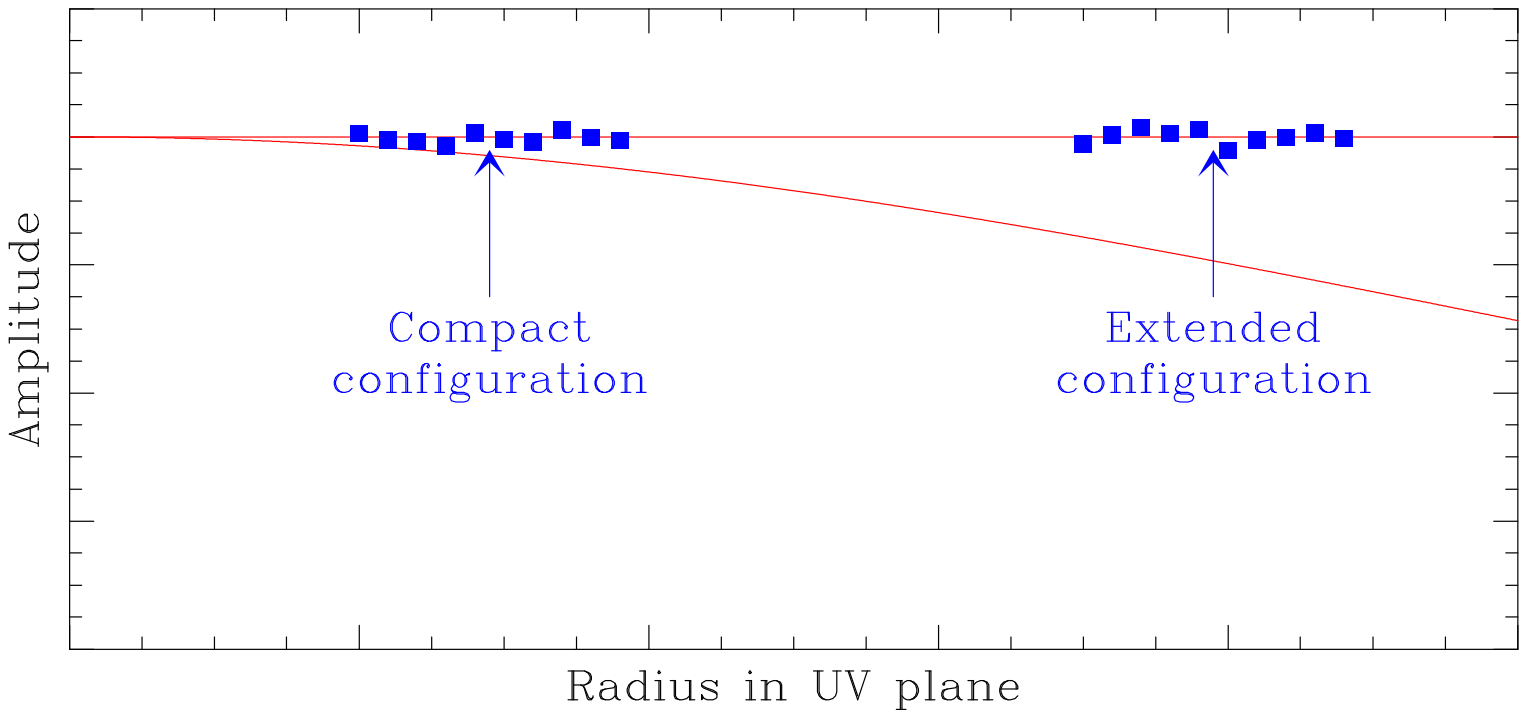
FLUX: recommended practices

- Ideally: select data that are close in time and that follow pointing/focus calibration
- Check the data quality of CRL 618 and MWC349 before using them as reference (may have been observed at low elevation)
- Check for the antenna efficiencies: cannot be better than **22 Jy/K at 3 mm, 35 Jy/K at 1 mm**
- **Cross-check flux calibration** between observations obtained within a short time interval (quasar fluxes are constant over a week)
- **A consistent flux calibration between observations is critical**
  - an error in the relative flux calibration between observations can mimic source structure
  - better have a wrong flux scale (scaling factor) than a wrong map (artefacts)

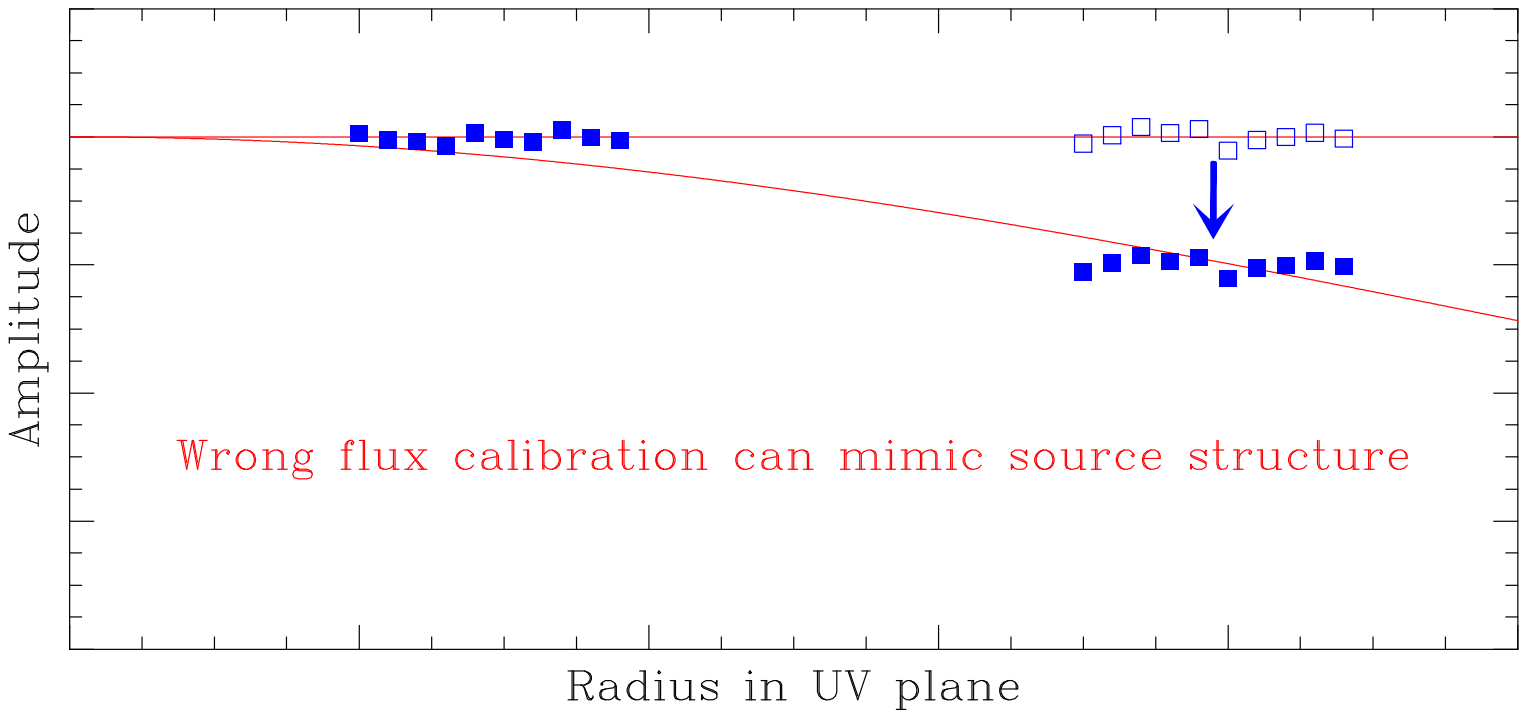
Flux calibration



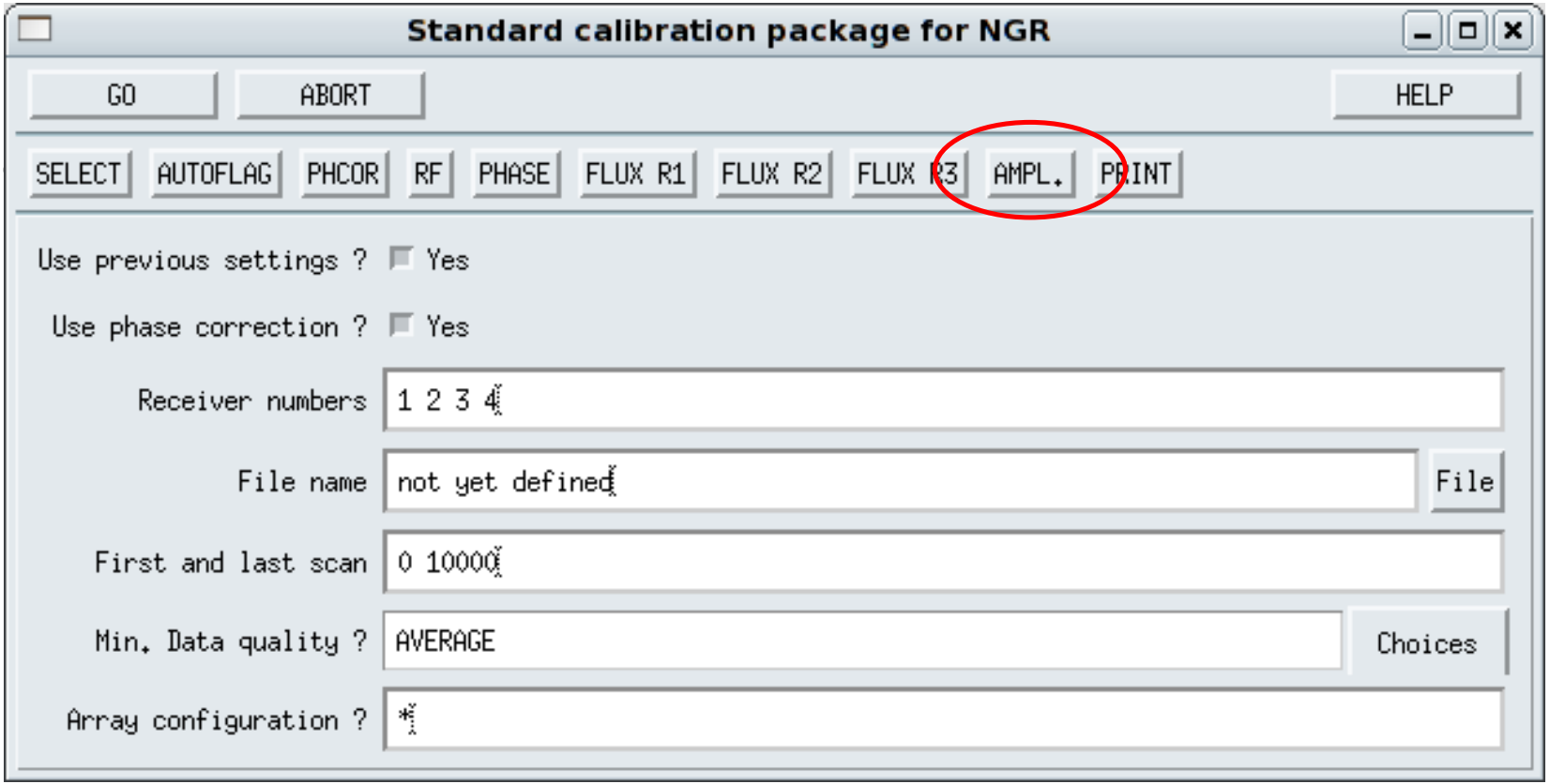
Flux calibration



Flux calibration

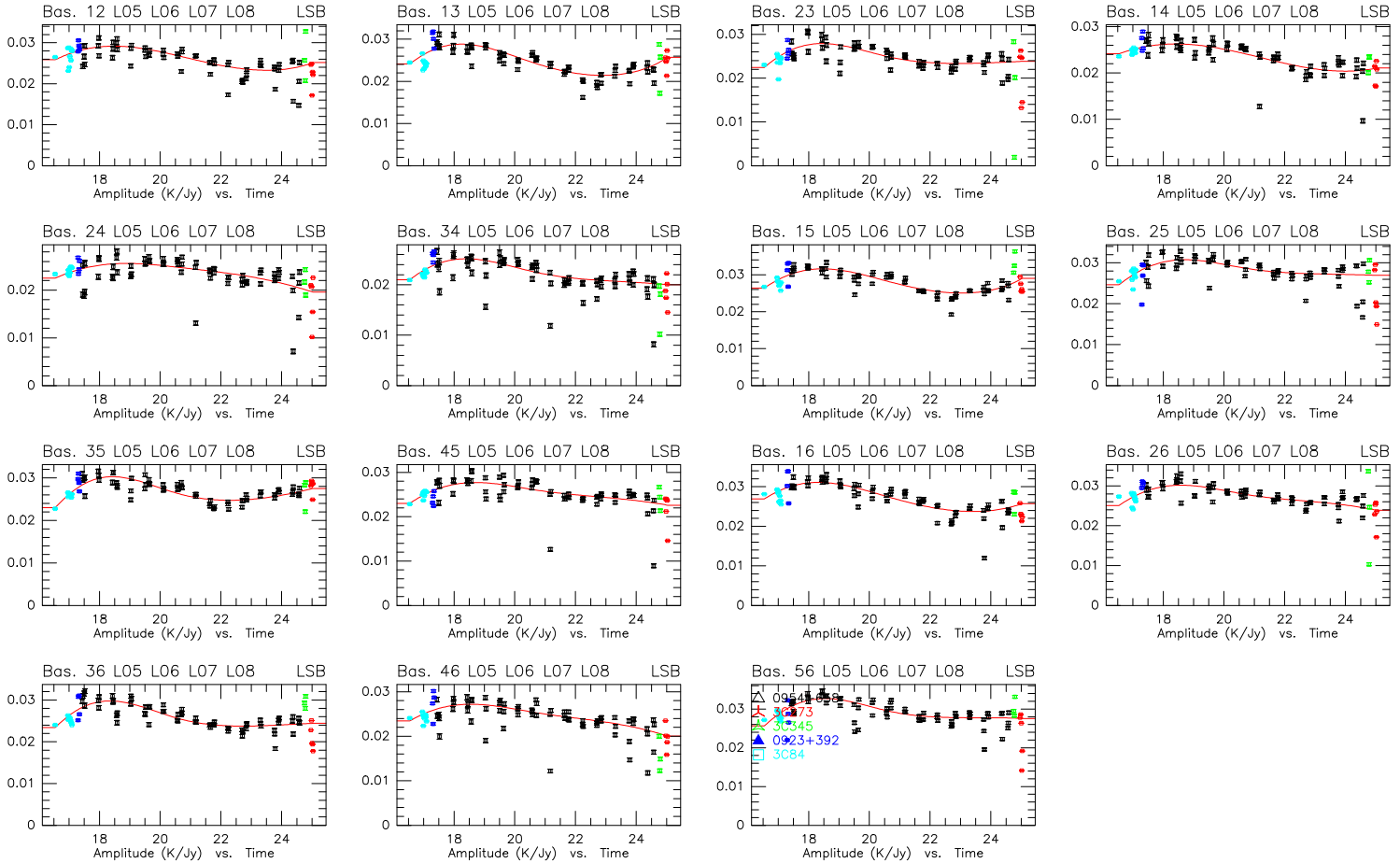


AMPL: Amplitude calibration



AMPL

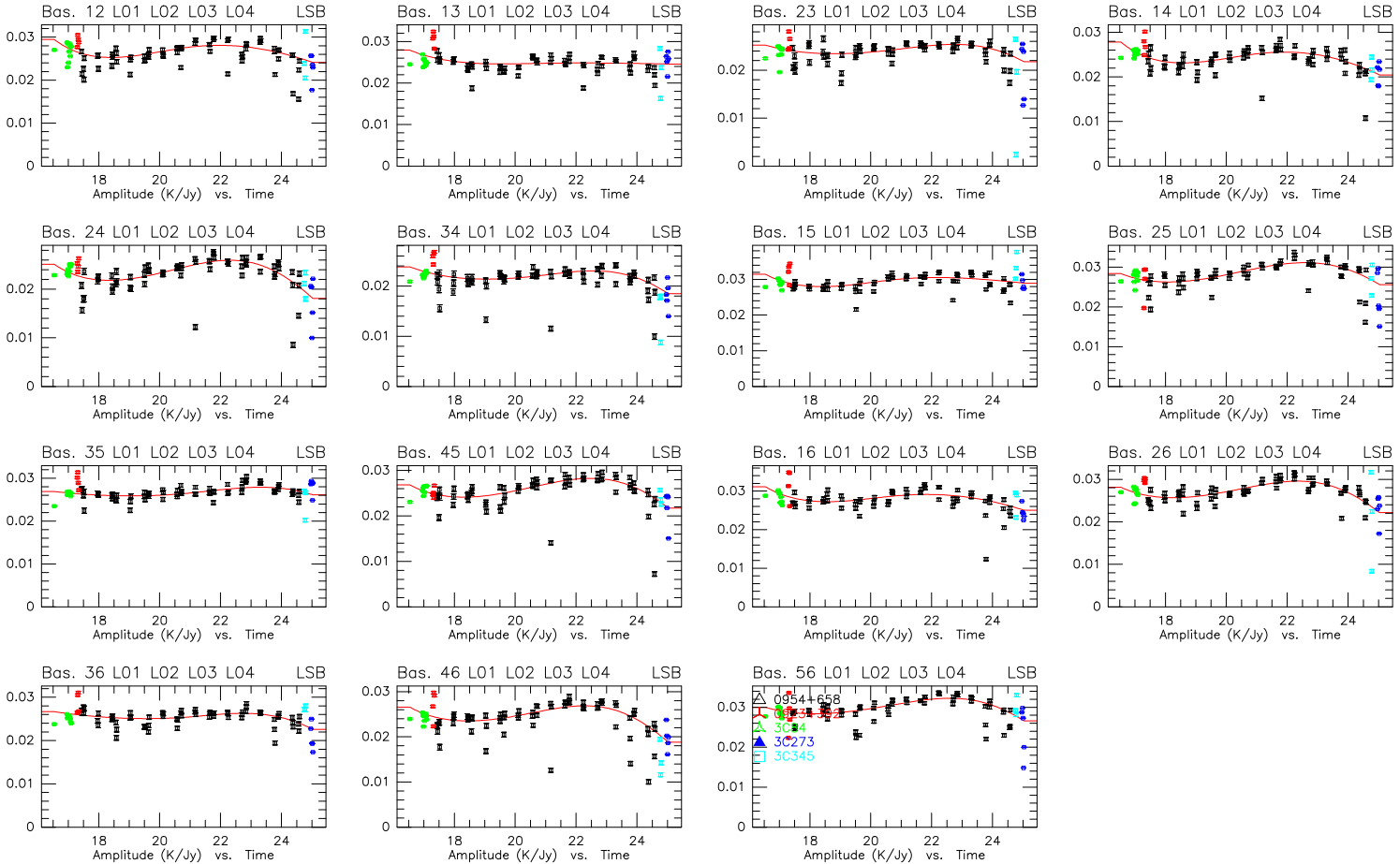
- Select the phase calibrator observations
- Apply RF and PHASE calibration
- **Divide visibility amplitudes by source fluxes to have all calibrators on the same scale** (in K/Jy)
- Compute **antenna-based gain**
- Least-square fit of amplitude vs. time
- Store calibration curve in all observations (calibrators + sources)

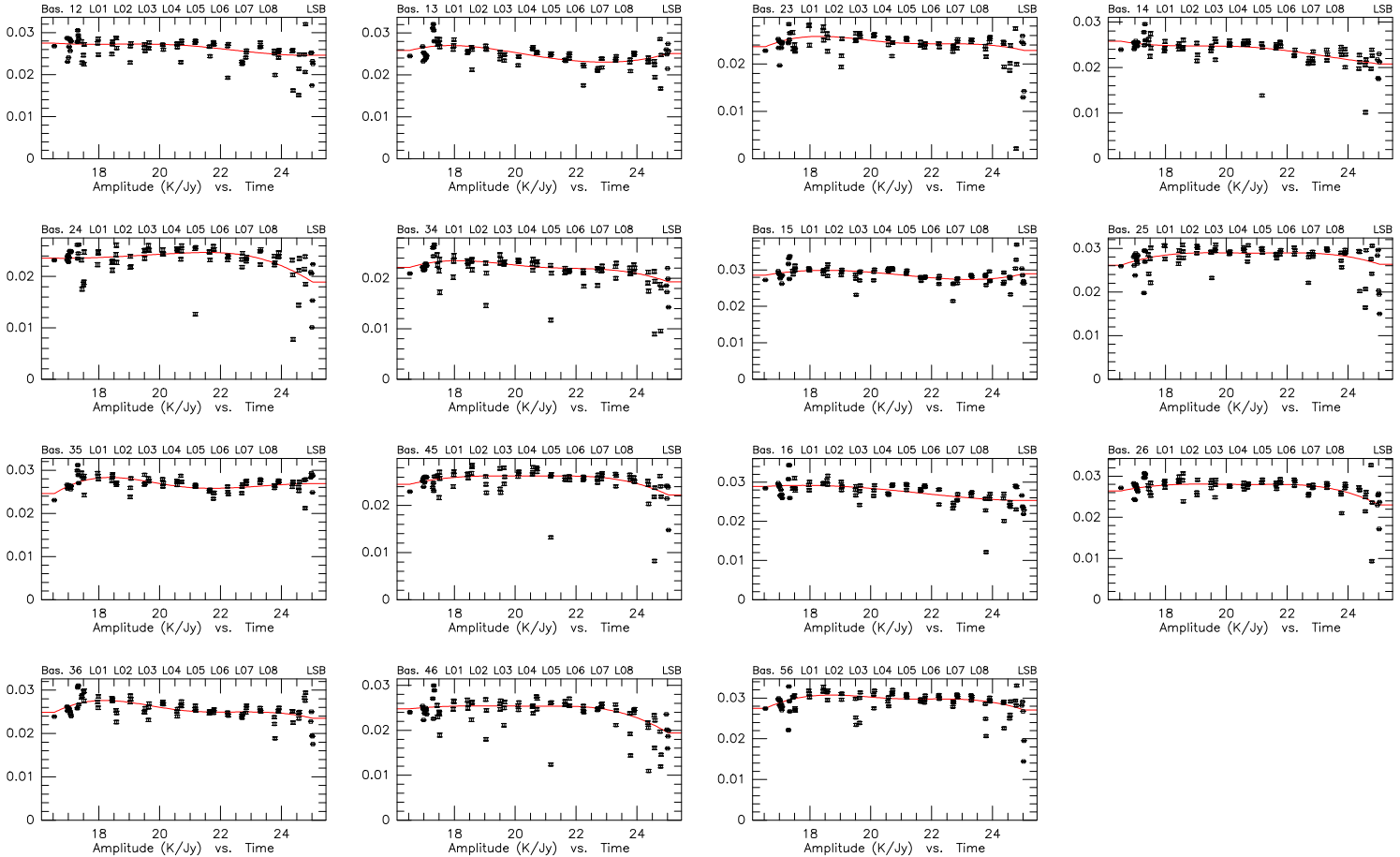

Bas. 12 L05 L06 L07 L08 LSB
Bas. 13 L05 L06 L07 L08 LSB
Bas. 23 L05 L06 L07 L08 LSB
Bas. 14 L05 L06 L07 L08 LSB
Bas. 24 L05 L06 L07 L08 LSB
Bas. 34 L05 L06 L07 L08 LSB
Bas. 15 L05 L06 L07 L08 LSB
Bas. 25 L05 L06 L07 L08 LSB
Bas. 35 L05 L06 L07 L08 LSB
Bas. 45 L05 L06 L07 L08 LSB
Bas. 16 L05 L06 L07 L08 LSB
Bas. 26 L05 L06 L07 L08 LSB
Bas. 36 L05 L06 L07 L08 LSB
Bas. 46 L05 L06 L07 L08 LSB
Bas. 56 L05 L06 L07 L08 LSB
0954+658
3273
3345
0923+392
3684
Amplitude (K/Jy) vs. Time

Interactive mode

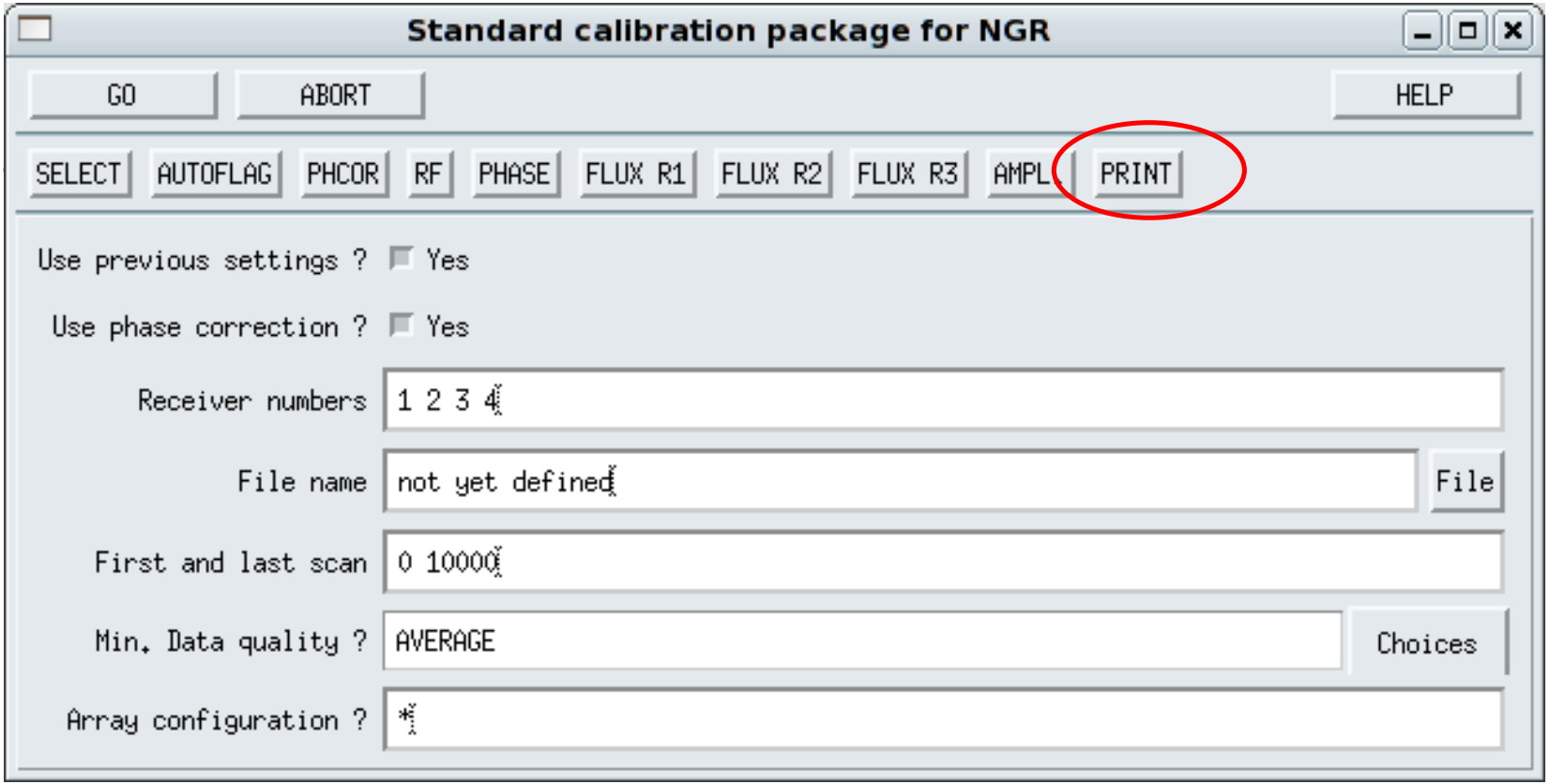
```
(...)
I-SOLVE_CAL,[1017] Amp. Bas. 16  L05 L06 L07 L08 LSB rms:    7.73 %
I-SOLVE_CAL,[1017] Amp. Bas. 26  L05 L06 L07 L08 LSB rms:    8.23 %
I-SOLVE_CAL,[1017] Amp. Bas. 36  L05 L06 L07 L08 LSB rms:    8.23 %
I-SOLVE_CAL,[1017] Amp. Bas. 46  L05 L06 L07 L08 LSB rms:   10.30 %
I-SOLVE_CAL,[1017] Amp. Bas. 56  L05 L06 L07 L08 LSB rms:    8.65 %
Amplitude  calibration for receiver 3, polar H:
Command was SOLVE AMPLITUDE  /PLOT
You may try SOLVE AMPLITUDE  /PLOT  /BREAK 0 16.9
CLIC_3> SIC\PAUSE
CLIC_4>
```

- Potential problems
  - focus or pointing errors – strong amplitude loss or jumps
  - **amplitude noise is biased** – too weak calibrators may give wrong results
  - **decorrelation is baseline-based, fit is antenna-based** – too high decorrelation may introduce systematic errors on some baselines


Bas. 12 L01 L02 L03 L04 LSB
Bas. 13 L01 L02 L03 L04 LSB
Bas. 23 L01 L02 L03 L04 LSB
Bas. 14 L01 L02 L03 L04 LSB
Bas. 24 L01 L02 L03 L04 LSB
Bas. 34 L01 L02 L03 L04 LSB
Bas. 15 L01 L02 L03 L04 LSB
Bas. 25 L01 L02 L03 L04 LSB
Bas. 35 L01 L02 L03 L04 LSB
Bas. 45 L01 L02 L03 L04 LSB
Bas. 16 L01 L02 L03 L04 LSB
Bas. 26 L01 L02 L03 L04 LSB
Bas. 36 L01 L02 L03 L04 LSB
Bas. 46 L01 L02 L03 L04 LSB
Bas. 56 L01 L02 L03 L04 LSB
0954+658
3C84
3C273
3C345
Amplitude (K/Jy) vs. Time


Bas. 12 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Bas. 13 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Bas. 23 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Bas. 14 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Bas. 24 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Bas. 34 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Bas. 15 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Bas. 25 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Bas. 35 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Bas. 45 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Bas. 16 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Bas. 26 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Bas. 36 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Bas. 46 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Bas. 56 L01 L02 L03 L04 L05 L06 L07 L08 LSB
Amplitude (K/Jy) vs. Time

PRINT: Print calibration report



Project ISH8 Data File 09-mar-2007-ish8
Observed on 10-MAR-2007 Configuration 6Bq-E23+E68
(W27E68W12N46N20E12)

Automatic calibration report by CLIC @ x_calib

October 6, 2008

Scan range:	0 to 10000
Use R1 phases for R2:	NO
Self cal. phases R1→R2:	NO
Use phase correction:	YES (1mm)
Minimum quality:	AVERAGE
Auto. flag procedure:	YES (0 scans)
WVR interference check:	YES (0 in 481 scans)

	Receiver 3
Bandpass:	Excellent
Phase:	Bad
Seeing HOR:	0.35″
Seeing VER:	0.35″
Amplitude:	Correct

1 Summary

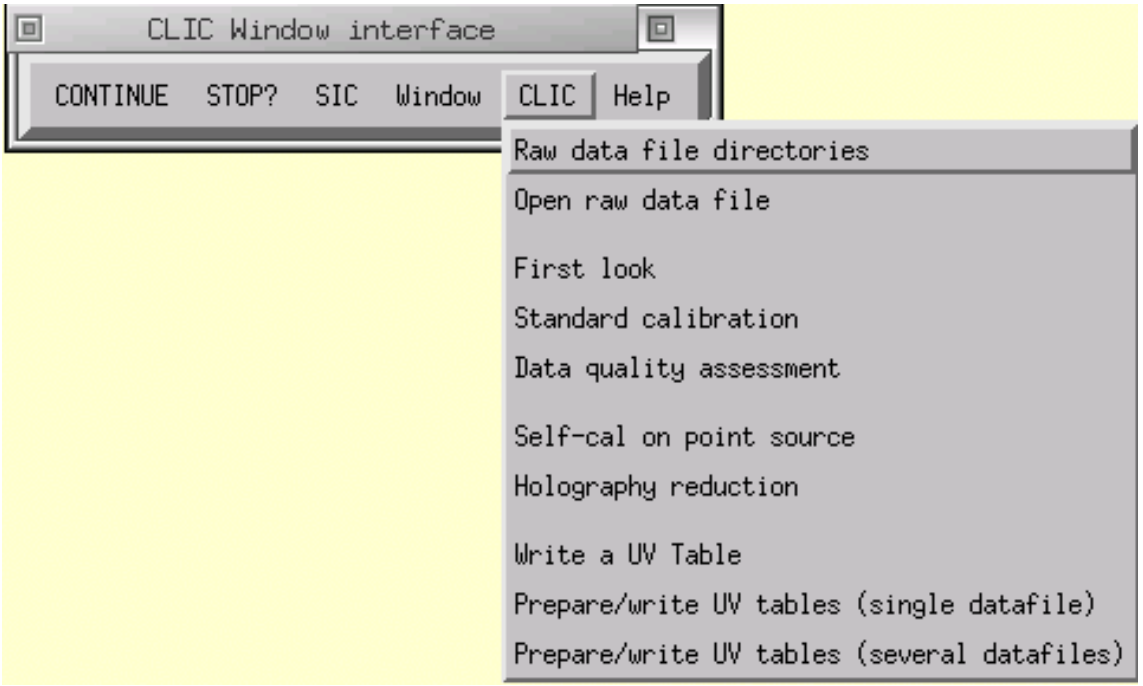
1.1 Calibrators

Fluxes (Jy)	207.0 GHz	
3C84	5.03	*Read*
0923+392	2.80	*Read*
0954+658	1.22	*Read*
3C345	1.41	*Read*
3C273	13.89	*Read*

1.2 Efficiencies

Antenna 1 (A1)	0.0	Jy/K	(0.00)
Antenna 2 (A2)	0.0	Jy/K	(0.00)
Antenna 3 (A3)	0.0	Jy/K	(0.00)
Antenna 4 (A4)	0.0	Jy/K	(0.00)

Other tools

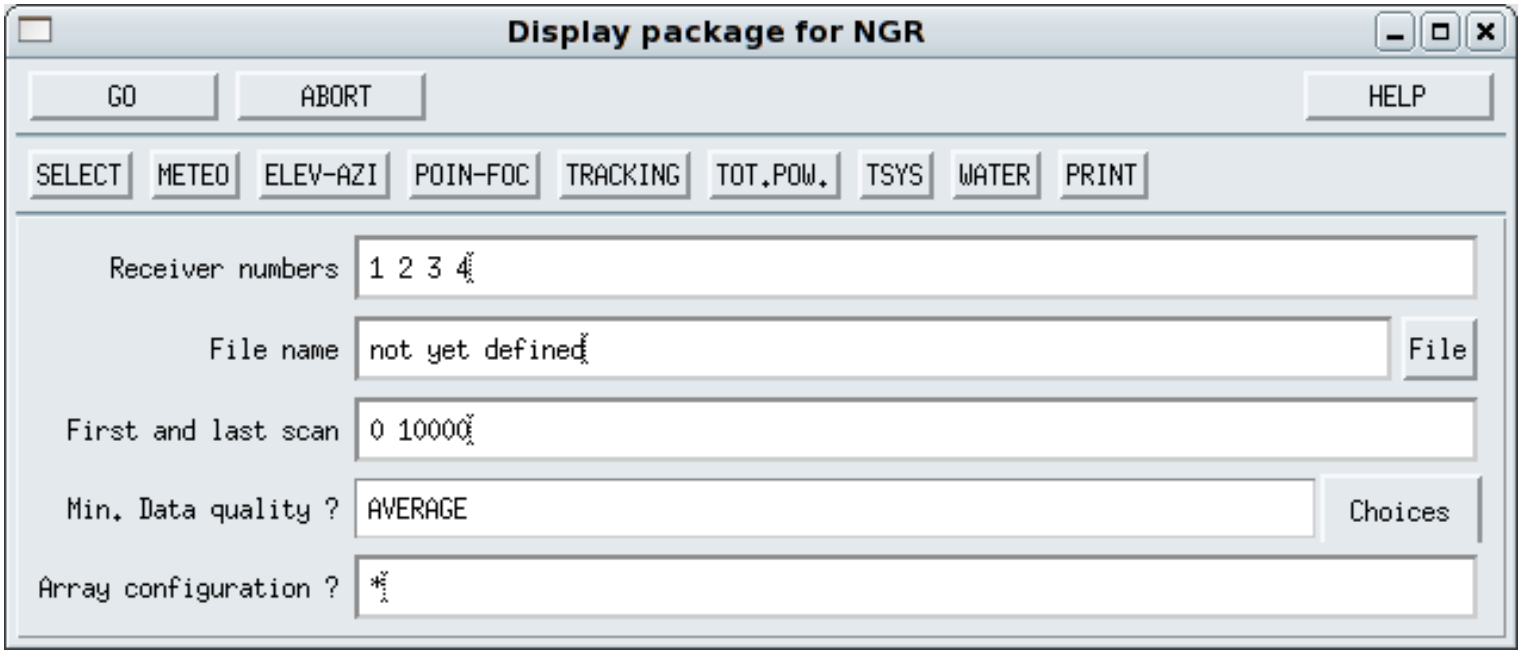

CLIC Window interface
CONTINUE
STOP?
SIC
Window
CLIC
Help
Raw data file directories
Open raw data file
First look
Standard calibration
Data quality assessment
Self-cal on point source
Holography reduction
Write a UV Table
Prepare/write UV tables (single datafile)
Prepare/write UV tables (several datafiles)

Other tools

- `Open raw data file` – create hpb file from ipb file
- `First look` – Basic checks of observing conditions: Tsys, Tracking, Pointing, Focus, Total Power, Water, etc...
- `Data quality assessment` – Select data to be used for imaging based on calibration results
- `Self-cal on point source` – self-calibration
- `Write a UV Table` – *uv*-table creation

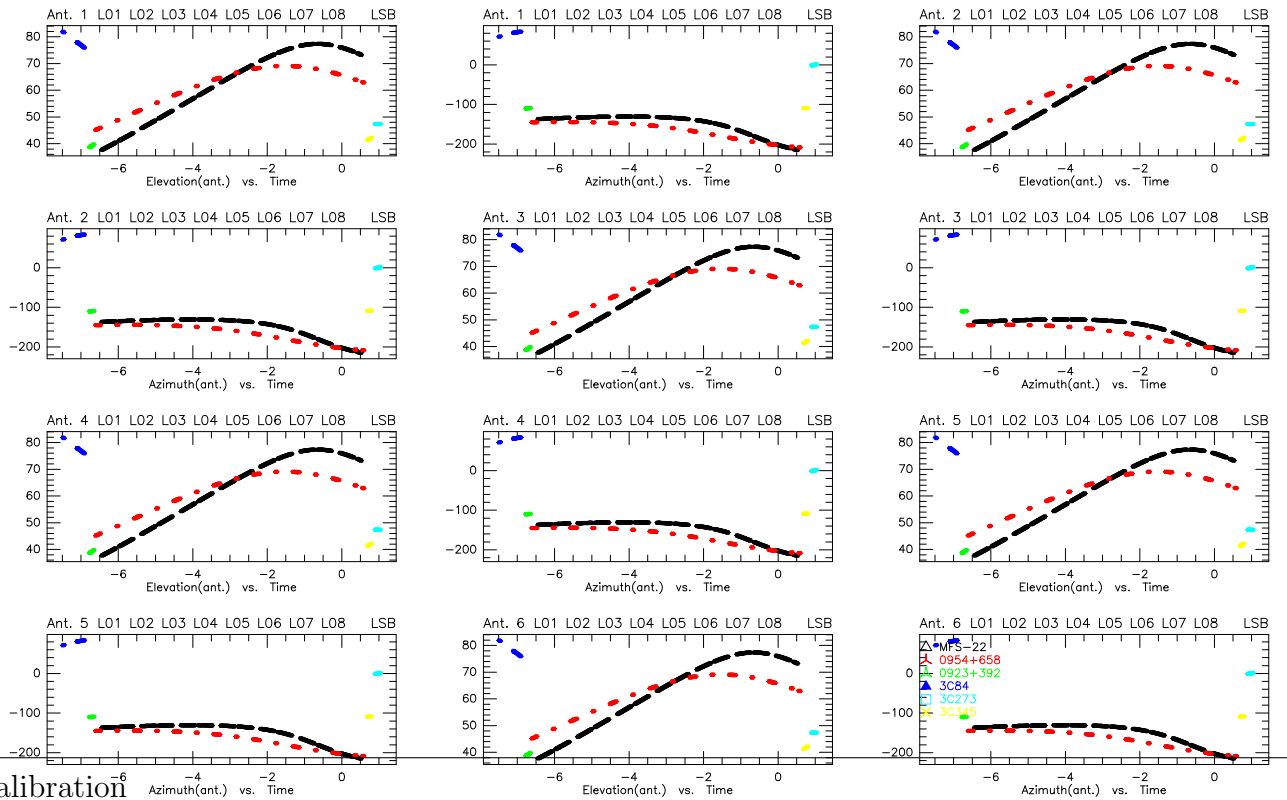
- **PdBI Pipeline**
  - First Look + Calibration + Data quality assessment + UV Table
  - For internal use (IRAM staff) for the time being

First look

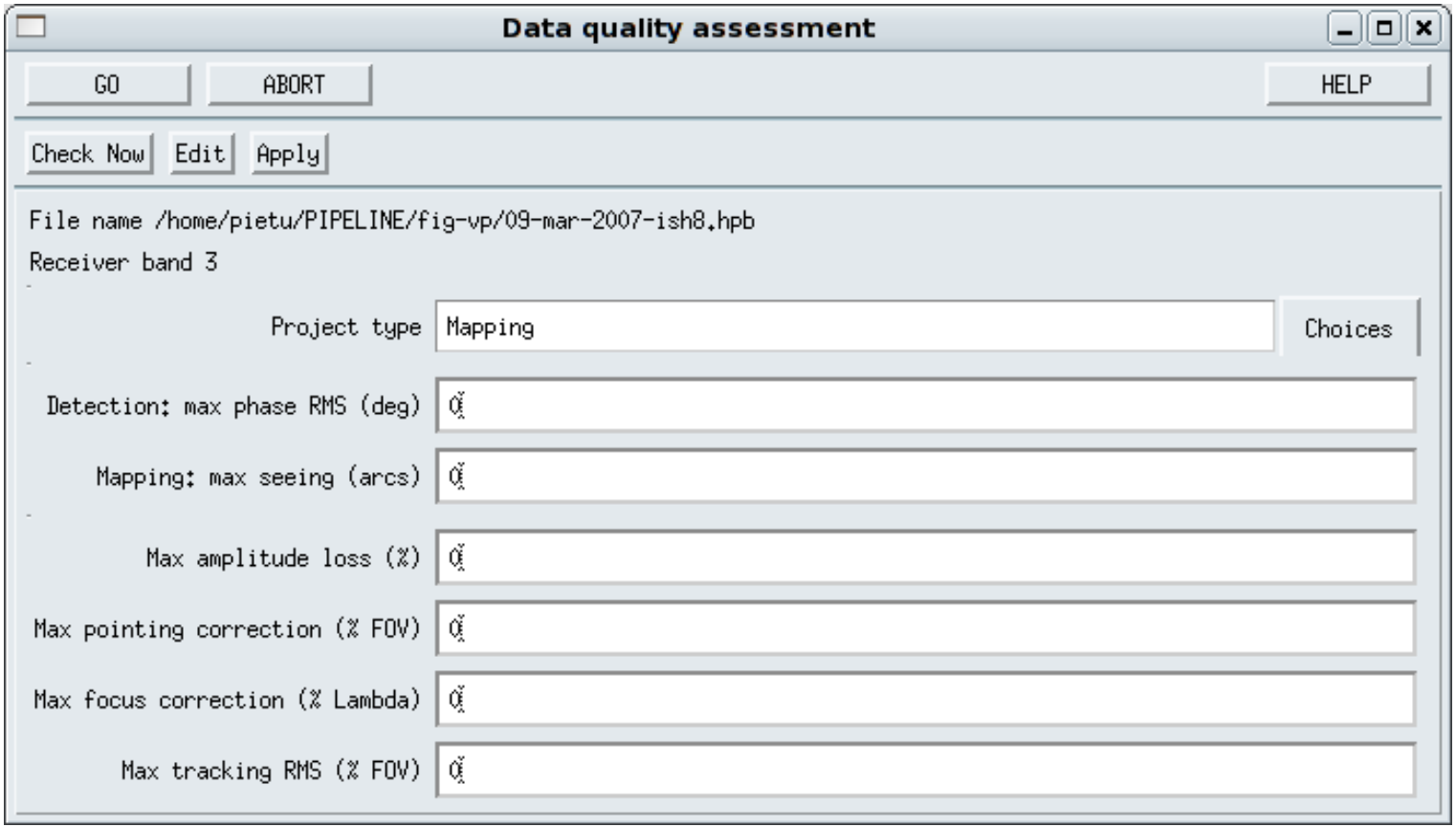

Display package for NGR
GO
ABORT
HELP
SELECT
METEO
ELEV-AZI
POIN-FOC
TRACKING
TOT.POW.
TSYS
WATER
PRINT
Receiver numbers
1 2 3 4
File name
not yet defined
File
First and last scan
0 10000
Min. Data quality ?
AVERAGE
Choices
Array configuration ?
*

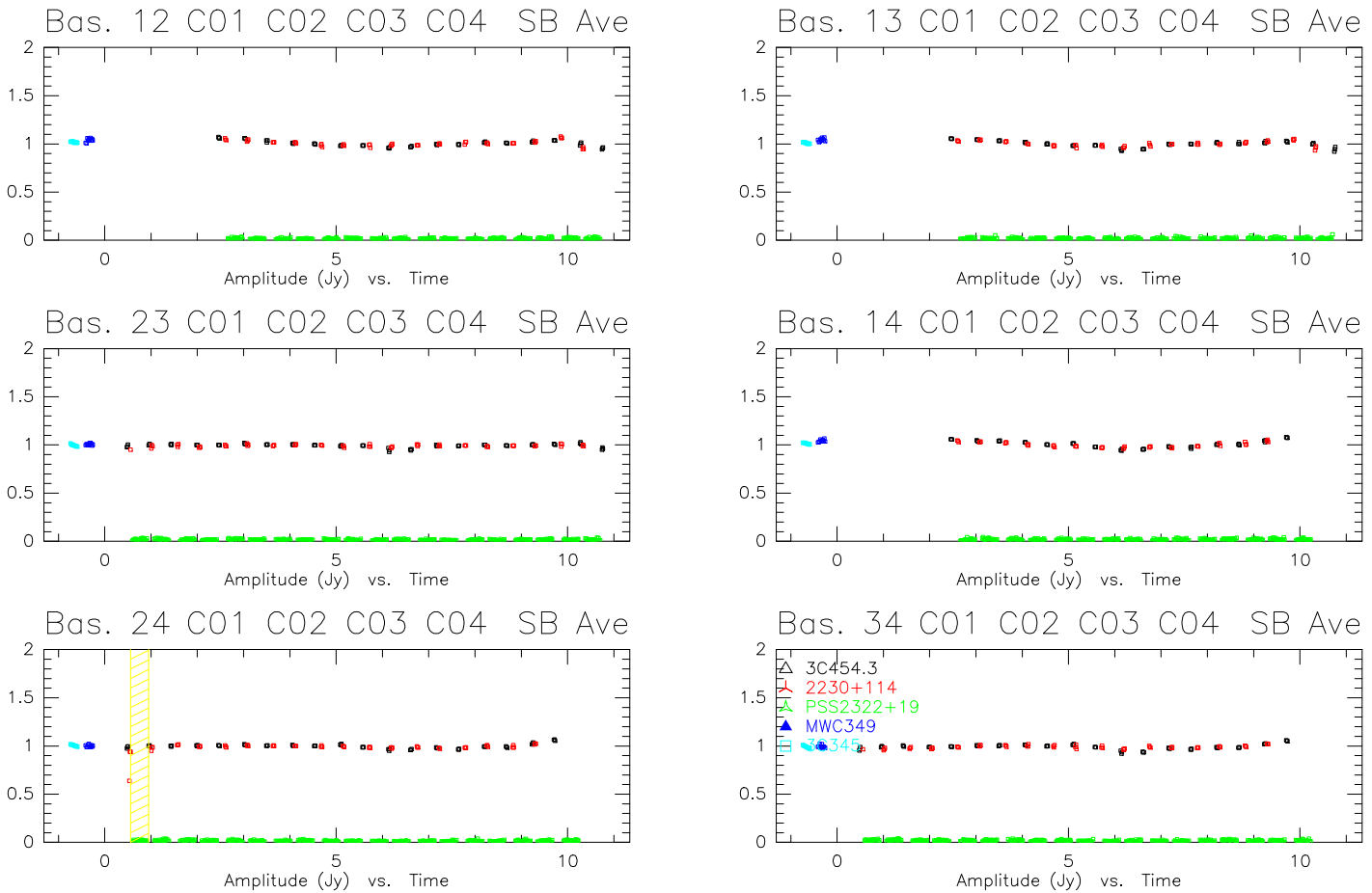
First look

RF: Uncal. *CLIC – 07–OCT–2008 17:27:07 – pietu@pctcp02 W27E68W12N46N20E12 6Bq–E23+E68* Scan Avg.
Am: Abs. ISH8 CH3CCH 207.000GHz B3 Q3(320,320,320,320)V Q3(320,320,320,320)H BOTH polarizations
Ph: Abs. Atm. (29 454 P GAIN)–(849 1123 P CORR) 09–MAR–2007 16:30–01:01



Data quality assessment




Bas. 12 C01 C02 C03 C04 SB Ave
Bas. 13 C01 C02 C03 C04 SB Ave
Bas. 23 C01 C02 C03 C04 SB Ave
Bas. 14 C01 C02 C03 C04 SB Ave
Bas. 24 C01 C02 C03 C04 SB Ave
Bas. 34 C01 C02 C03 C04 SB Ave
Amplitude (Jy) vs. Time
3C454.3
2230+114
PSS2322+19
MWC349
3C345

CALIBRATION TUTORIALS

This afternoon 14h00–16h30 and 16h30–19h