

CLIMB

Observing & Reduction

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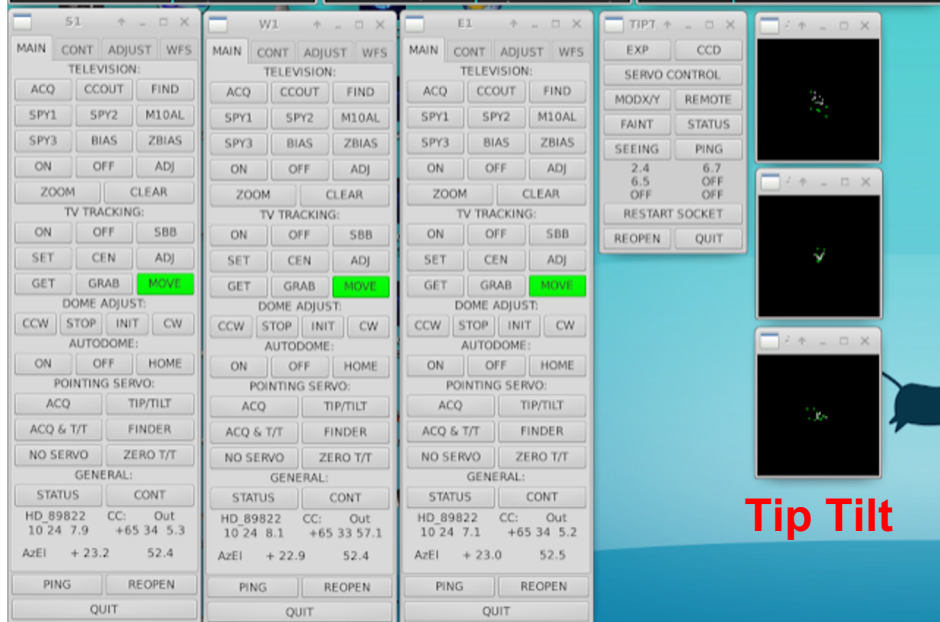
Observing

- CLIMB = 3 telescopes
- Each bracket = cal - obj - cal
= 3 V^2 points + 1 closure phase point
- Typically need 4+ brackets to do anything useful
- Calibrators need to be similar brightness to target (+/- 0.5 mag)

Observing

1. Operator slews to target & locks tracking
2. Align light on camera pixels (before each bracket)
3. Scan for fringes on a large scale (millimeters)
4. Search for fringes on a small scale (microns)
5. Check camera settings
6. Start exposure!

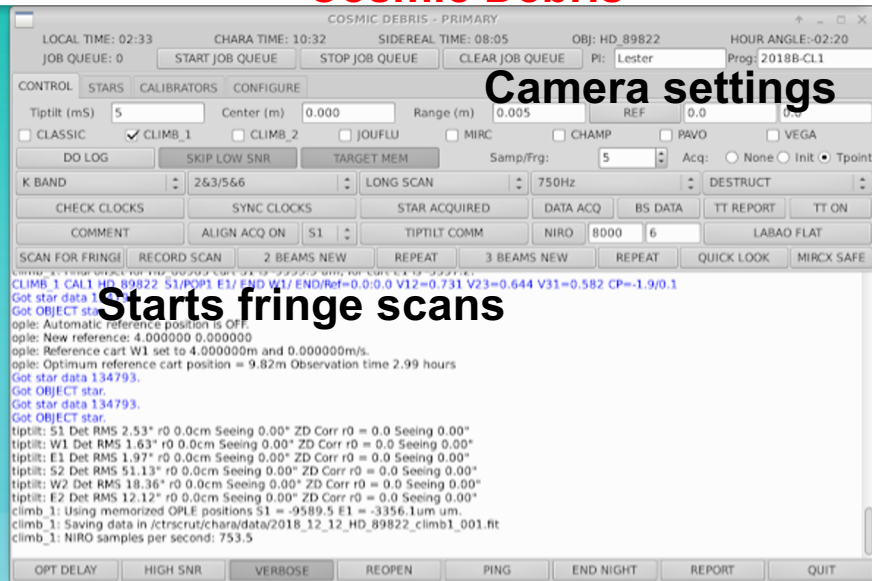
Telescope GUIs (old)



E1 Lurk OPLE Secondary VEGA Central Control W1 Lurk

Cosmic Debris

Camera settings



Starts fringe scans



Tip Tilt

TIPTILT STATUS

Local Tr:	2:33:01	N	SUM	Drms	Mrms	SRV	r0	SD	ZD	ZCr0	ZCSD	MS	Snd
CHARA Tr:	10:33:01	S1	1	5105	0.16	0.98	ON	2.4	3.26	37.9	3.1	2.68	ON
Lost T/S:	1179/1	W1	1	2780	0.14	0.42	ON	6.7	1.40	37.8	8.5	1.15	ON
Exp Tr r/s:	5	E1	1	4705	0.1300	0.43	ON	6.5	1.42	37.8	8.3	1.17	ON
Frms/Sec:	158.00	S2	1	14	X.XX	0.00	OFF	0.0	0.00	0.0	0.0	0.00	ON
Frame P:	SUB	FRAME	W2	1	12	X.XX	0.00	OFF	0.0	0.00	0.0	0.00	ON
Frame Ps:	0	0	E2	1	-5	X.XX	0.00	OFF	0.0	0.00	0.0	0.00	ON
Frame Sz:	21	18	SIGNALS:										ON
Npixels:	378		RMS PER:	5.000									OK

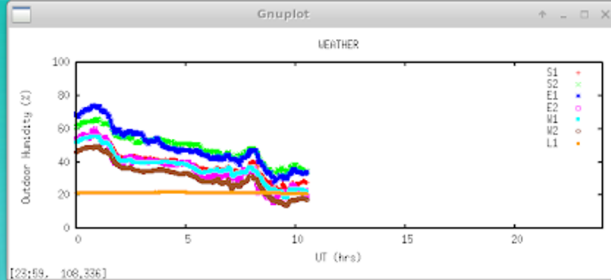
TELESCOPE S1 STATUS

Local Tr:	02:33	TT Az :	0.0660	TV Dev :	ACQU	1.87	F/S
CHARA Tr:	10:33	TT El :	-0.0780	Frms/Sec:	D- 2: 1.7	P- 2: 1.7	
Lost T/S:	0/ 0	TCS RA :	10 24 07.92	Mn/Mx/To:	34 253	0	
T/RH bnk:	9.8/ 18.0	TCS Dec :	65 34 04.88	Size/Rad:	640 480	10	
huT Stat:	Aut	Dome Pos:	+24.3	Origin :	340.00, 260.00		
Star Az :	HD 89822	TCS Az :	+23.2	Pos :	340.00, 260.00		
Sig/rate:	T/T-SOC158.0Hz	TCS El :	52.4	Az/El :	-0.000/0.000		
Period :	100	Crn Cube:	Out	BOX :	(0, 0) {639, 479}		
Servo :	Wobb 1	Sin :	No / 1.0	Tracking:	OFF		

Weather

SCOPE	UT	WIND	DIR	GUST	DIR	MEAN	Tout	Tbunk	RH	DP/P	Ttel	RHtel
✓ S1	10:32	7.0	330.5 NW	8.3	343.1	5.1	8.2	18.4	27.3	-9.7	---	---
✓ S2	10:32	0.0	194.1 S	7.3	196.9	3.1	8.6	17.0	34.6	-6.3	---	---
✓ E1	10:32	0.0	264.4 W	9.6	254.5	0.0	8.0	19.4	33.9	-7.0	---	---
✓ E2	10:32	0.0	244.7 SW	0.0	0.0	0.6	8.8	16.4	21.6	-12.1	---	---
✓ W1	10:32	0.0	33.8 NE	0.0	0.0	0.0	9.7	16.4	21.8	-11.2	---	---
✓ W2	10:32	0.0	71.7 E	0.0	0.0	0.0	8.8	15.0	16.8	-15.1	---	---
✓ L1	10:32	0.0	180.0 S	0.0	0.0	0.0	21.9	23.3	20.7	827.4	---	---

NO PLOTS DUST PING REOPEN QUIT



PICO

IR(4)568

MOVE INITIALIZE CLS CL1 CL2 PING REOPEN QUIT

X = 0 UP Y = 0 LEFT RIGHT SMALLER DOWN BIGGER 25 OK

PICO: IR23

X = 0 UP Y = 0 LEFT RIGHT SMALLER DOWN BIGGER OK

PICO: IR123A

X = 0 UP Y = 0 LEFT RIGHT

Camera alignment

OPLES

MESSAGES CONTROL SCAN OFFSETS TUNE TUNING STATUS CONFIGURE

S1 K BAND GO STOP ZERO STOP HERE

BACKWARD -1.20/-0.80 cm S1: -2nm

CENTER Pos: -0.93 cm S2: >1mm!!

FORWARD Scan: 1/30 E1: 14nm

DECREASE File: 000

EDGE Vel: 151.54 um/S

INCREASE Time: 8 S

S1: 17.91m Err -14nm E1: 37.30m Err 6nm W1: 4.00m Err 0nm

ALL OFF START STOP BLS OPLESYNC PING REOPEN QUIT

Global fringe scan

CLIMB

MAIN SETUP NIRO CLIMBCAM DITHER PICTURE ALIGNMENT TWO BEAM THREE BEAM STATUS CONFIGURE

LAB Save Data SkipLow WGT Targ Memory START STOP

2018_12_12_HD_89822_climb1_001.fit DATA SCAN 9 Scans 297 SERVO ON

V12 0.51 10.061 V23 0.62 38.755 V31 0.43 64.612 Gain A -0.70 Gain B 0.70

Pos 4.9 Targ 0.0 Pos -8.4 Targ 0.0 Pos -3.4 Targ 0.0 Minwgt 1.00 Maxerr 3.000

S1: -9575.3um E1: -3334.4um Counts: 43.1 37.5

POSA-- POSA++ POSB-- POSB++ SMALL LARGE BIG HUGE

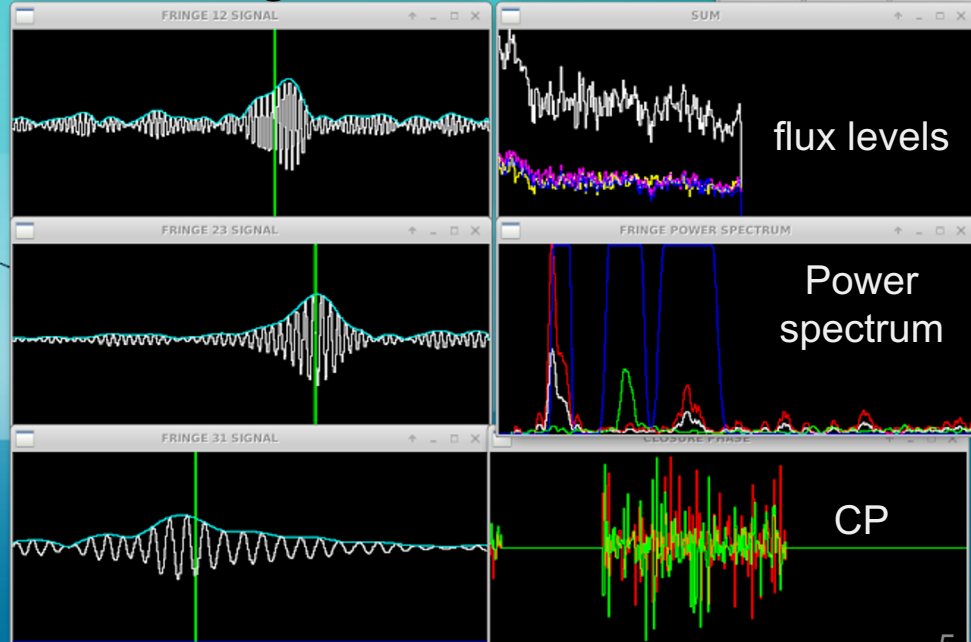
SERVO SAVE DIFF/SIG FILT AUTO UP DN FRGTRCK ABORT

MINWGT++ MINWGT-- MAXERR++ MAXERR-- G++ G-- DIR A DIR B PSN

CAMCOMM PING REOPEN CLEAR DISP VME QUIT

Fine tuning & start exposure

Fringes!



Reduction 1. Start the pipeline

John Monnier's code:

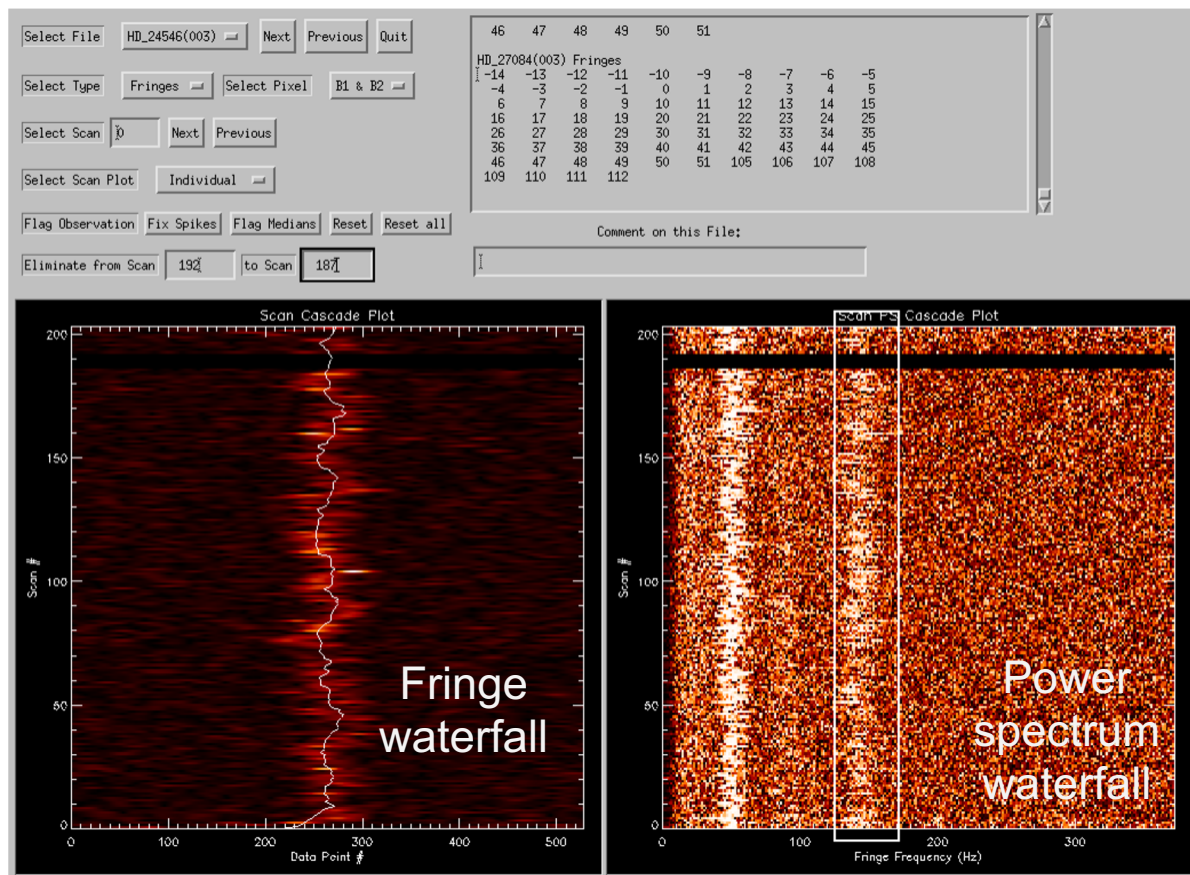
Run IDL script in .../Libraries/NIRO/CLIMB (where his programs are).

```
>> .run start_climb.pro
```

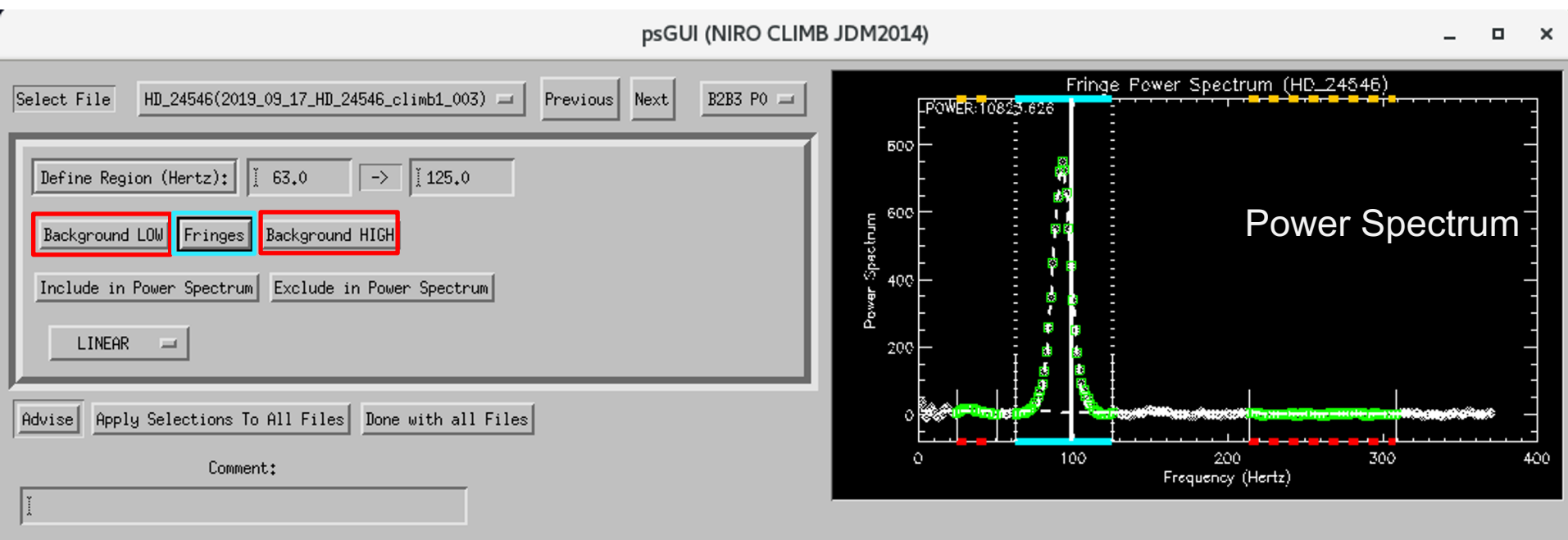
Reduce all exposures for one target simultaneously.

... will ask you where the data live and which stars are OBJ vs CAL

Reduction 2. Remove bad scans using waterfall plot



Reduction 3. Set PS integration range



Reduction 4. Visibilities & calibration

Calculate raw V^2 and uncertainty from PS using bootstrapping.

Calibrate V^2 using linear fit to the calibrator visibilities.

$$\textit{corrected } V_{obj}^2 = \textit{raw } V_{obj}^2 \times \frac{\textit{predicted } V_{cal}^2}{\textit{raw } V_{cal}^2}$$

Reduction 5. Output

Saves results in “.oifits” files.

see <http://chara.gsu.edu/analysis-software/oifits-data-format>

Read into analysis programs & do science!