



# Observing at BIMA

## Berkeley, Illinois, Maryland Association

- Getting time
- The array
- User tools
- Writing observe files
- Running your project
- Data quality analysis

# Getting Time on BIMA

<http://bima.astro.umd.edu>

**Call for proposals every 3 months  
(visitors getting ~30%)**  
**Only 1 year left**  
**BIMA moves to INYOs July, 2004**

# BIMA + OVRO = CARMA





# BIMA & ATCA

|                                  | BIMA   | ATCA  |
|----------------------------------|--------|-------|
| Antennas                         | 10     | 3     |
| Antenna diameter (m)             | 6      | 22    |
| Primary beamwidth (arcsec)       | 120    | 33    |
| Tuning range (GHz)               | 70-115 | 85-91 |
| Maximum bandwidth (MHz)          | 800    | 256   |
| Polarizations                    | 1      | 2     |
| Tsys (K)                         | 300    | 300   |
| Jy/K                             | 140    | 25    |
| Continuum sensitivity (mJy/beam) | 1.4    | 1.0   |

<http://astron.berkeley.edu/~plambeck/technical.html>

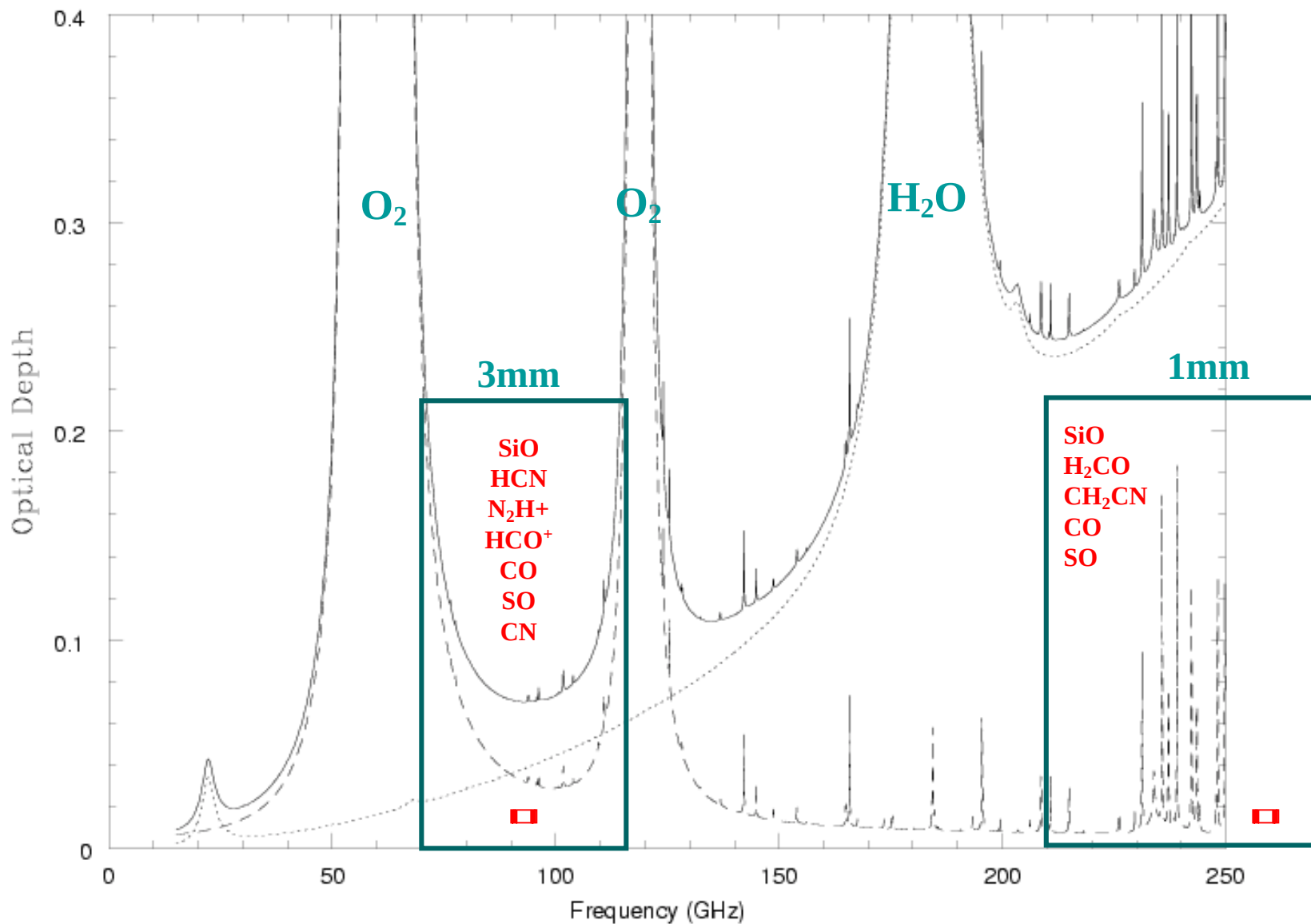
# BIMA 6m antenna



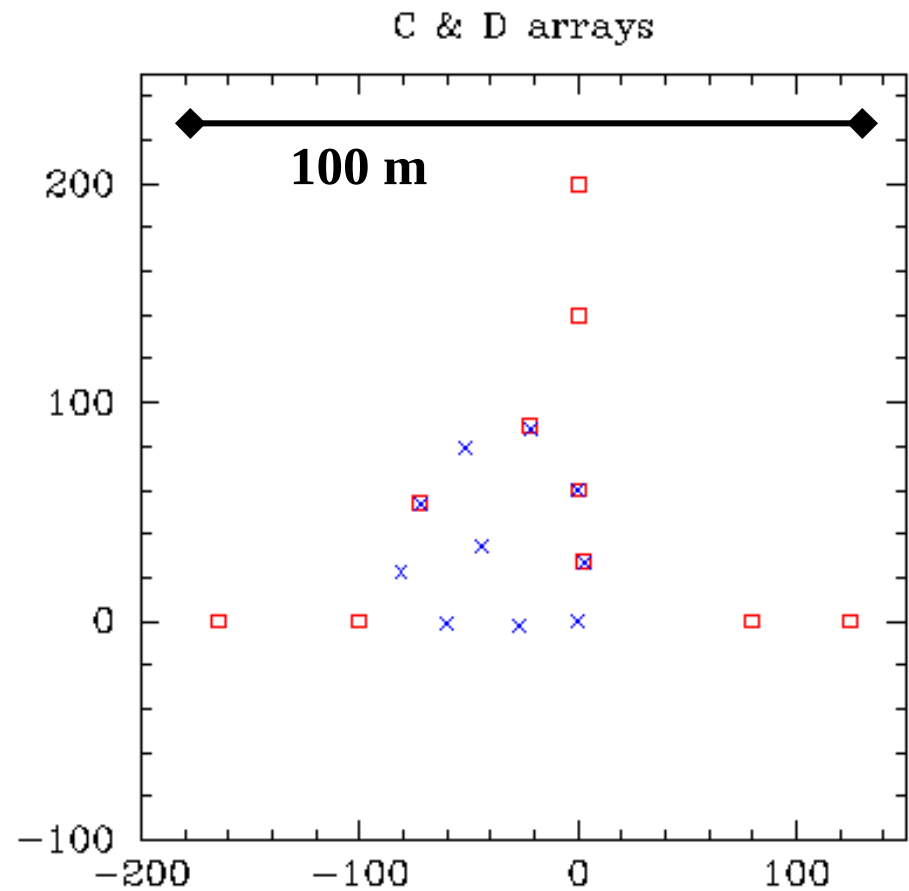
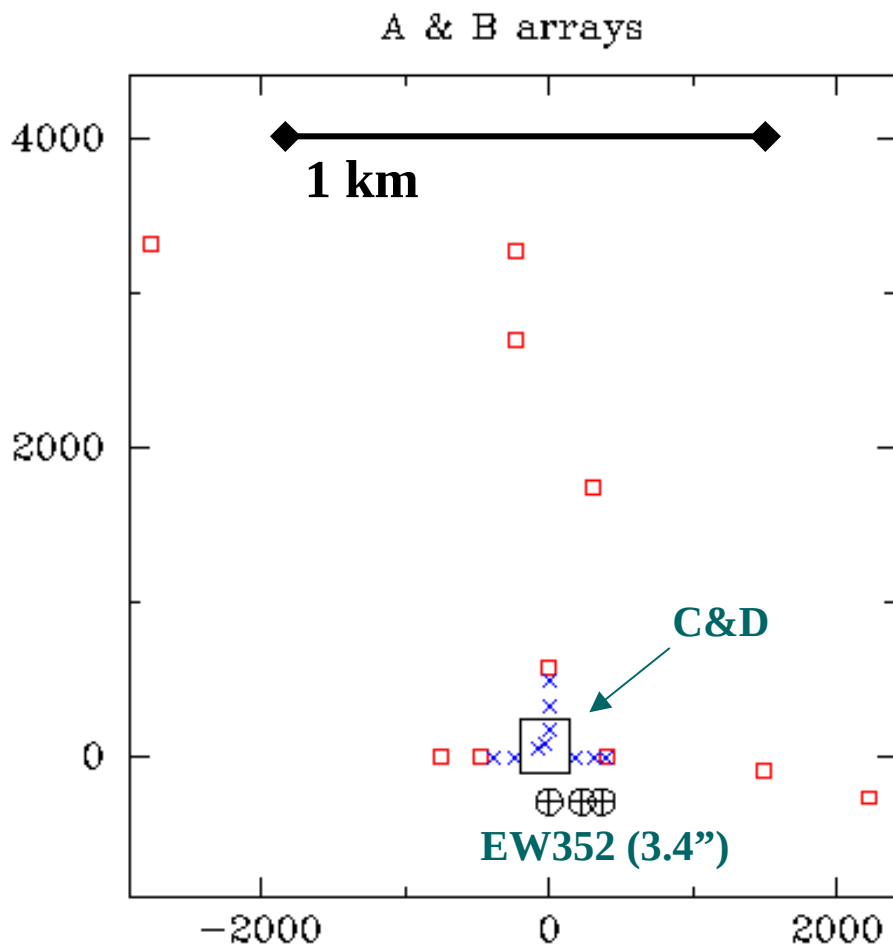
# Inside the dewar – 3 and 1 mm feeds



# Tuning range of BIMA receivers



# Standard BIMA arrays





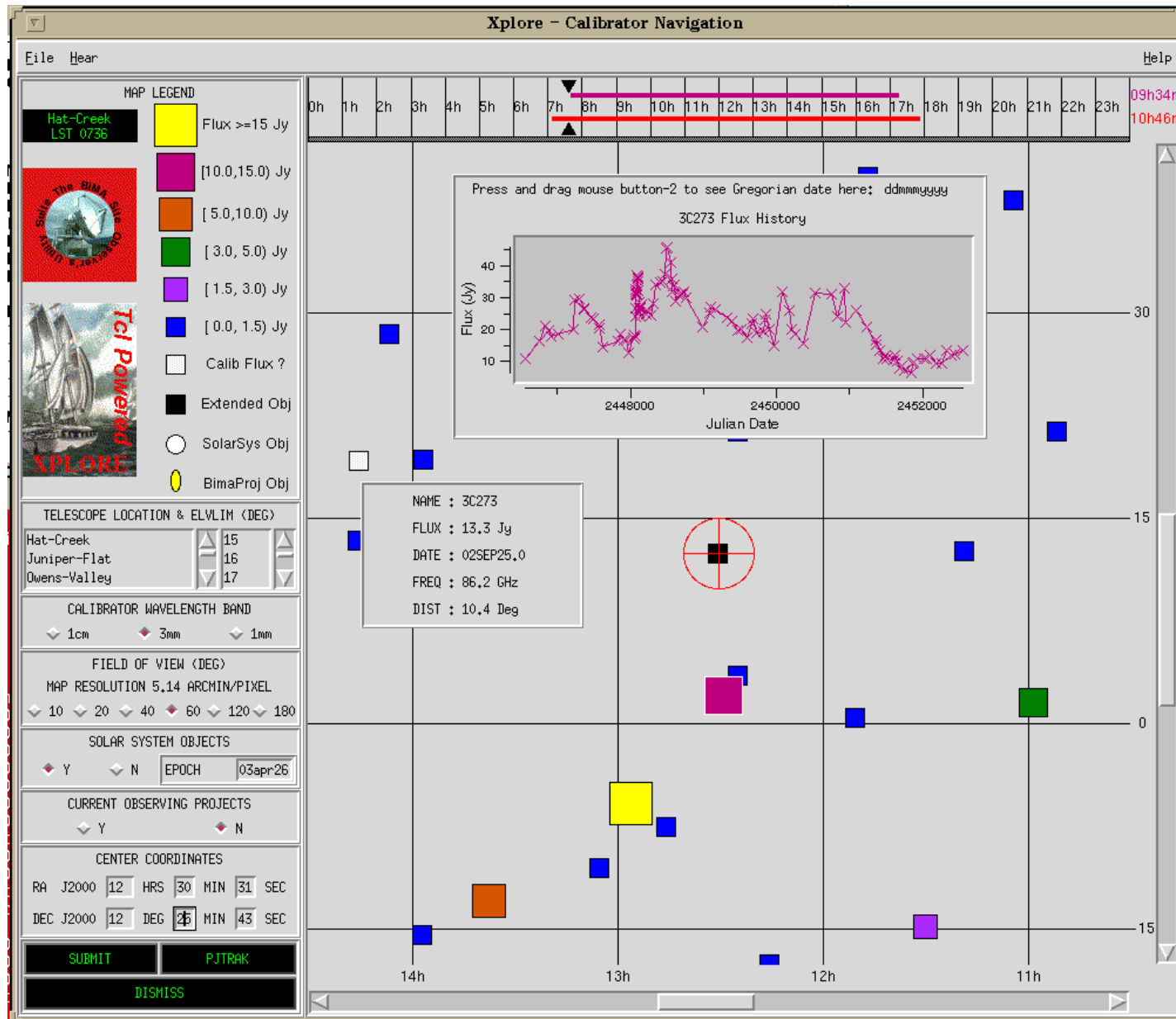
# BIMA in D-array



# XPLORE – finding calibrators

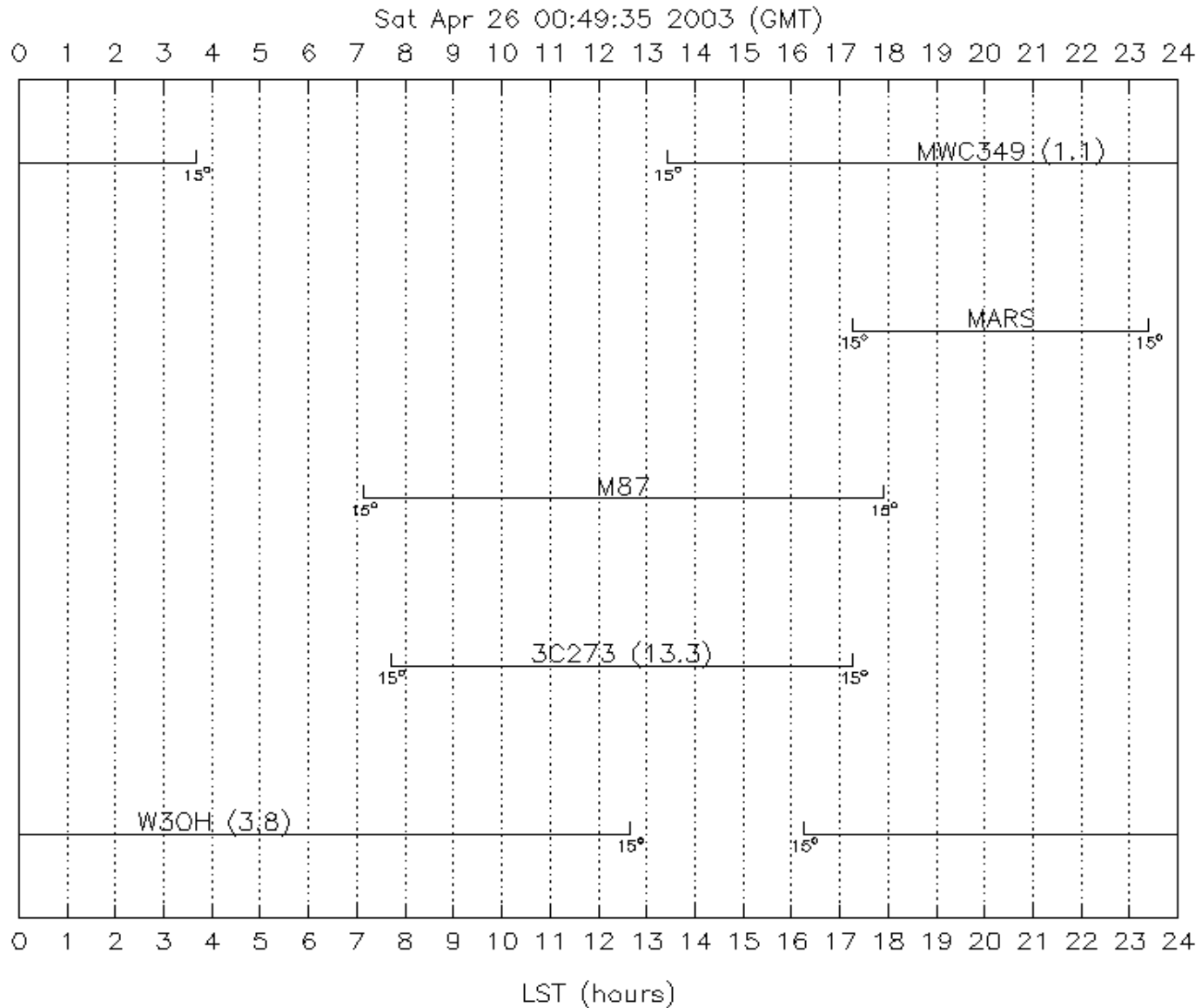
flux code

selection



HA target, calibrators & flux history

# HAPLOT – useful for planning



# Writing an observe file

**# Observing Script for m87**

**jrf-oct98**

**# Setups =====**

**setup name=tune freq=86.24344 iffreq=-750 cormode=8 corf=205**

**setup name=3c273 source=3c273 vis=3c273 itime=23 stop=+6**

**setup name=m87 source=m87 vis=m87 itime=23 stop=+30 catalog=jrf.cat**

**setup name=mars source=mars vis=mars itime=23 stop=+5 maxobs=1 elevlim=30**

**# Observing =====**

**scan setup=tune**

**loop calsetup=3c273,mars srcsetup=m87**



# Checking your observe file

| source      | nchan | #g | itime | lst0-lst1       | az0-az1     | el0-el1    | slew    | obs     |
|-------------|-------|----|-------|-----------------|-------------|------------|---------|---------|
| -----       |       |    |       |                 |             |            |         |         |
| MINT: 3c273 | 0     | 1  | 23.0  | 10:34.3-10:46.0 | -28.8--25.8 | 43.3- 44.7 | 00:04.3 | 00:07.4 |
| MINT: m87   | 0     | 1  | 23.0  | 10:46.0-11:18.0 | -26.2--18.2 | 53.4- 57.4 | 00:02.2 | 00:29.8 |
| MINT: 3c273 | 0     | 1  | 23.0  | 11:18.0-11:27.0 | -17.8--15.6 | 48.0- 48.7 | 00:02.2 | 00:06.8 |
| MINT: m87   | 0     | 1  | 23.0  | 11:27.0-11:59.0 | -16.0- -8.0 | 58.3- 60.7 | 00:02.2 | 00:29.8 |
| MINT: 3c273 | 0     | 1  | 23.0  | 11:59.0-12:08.0 | -7.6- -5.3  | 50.6- 50.9 | 00:02.2 | 00:06.8 |
| MINT: m87   | 0     | 1  | 23.0  | 12:08.0-12:40.0 | -5.7- 2.3   | 61.1- 61.5 | 00:02.2 | 00:29.8 |
| MINT: 3c273 | 0     | 1  | 23.0  | 12:40.0-12:49.0 | 2.7- 4.9    | 51.1- 51.0 | 00:02.2 | 00:06.8 |
| MINT: m87   | 0     | 1  | 23.0  | 12:49.0-13:22.0 | 4.5- 12.8   | 61.3- 59.4 | 00:02.2 | 00:30.8 |
| MINT: 3c273 | 0     | 1  | 23.0  | 13:22.0-13:31.0 | 13.2- 15.4  | 49.4- 48.8 | 00:02.2 | 00:06.8 |

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Estimates of Slewing and Observing (in minutes) plus their ratio

| Source | Slew | Obs | Ratio |
|--------|------|-----|-------|
| -----  |      |     |       |
| 3c273  | 13   | 34  | 0.379 |
| m87    | 8    | 120 | 0.073 |
| -----  |      |     |       |
| Total  | 21   | 154 | 0.141 |
| -----  |      |     |       |

# XSCRIBE – schedule page

available projs  
scheduler  
info  
PI  
buttons

notes  
PI  
buttons  
graphical schedule

Xscribe Project Scheduler - Session 12083 on Host hat - READ ONLY

File Edit Settings Help

Schedule Summary Tactical

```
*** get_avail_proj.f version 25-Jan-00
*** Opening project database file dbase_last_save.in
*** Projects observable in priority order (3mm lambda ; 15 deg elev limit) at 038 d 06 h 02 m : 31
*** NOTICE: t538c115.2976n is a FILLER TRACK.
*** File t687c101.ori1 FOUND in /obs/bima/obs/c03.
```

| PROJECT NAME   | PROJECT START TIME    | PROJECT STOP TIME     | PROJECT DELTA TIME | PROJ INFO: scroll w/ mouse mid button |
|----------------|-----------------------|-----------------------|--------------------|---------------------------------------|
| t687c101.ori1  | 038 DAY 01 HRS 48 MIN | 038 DAY 10 HRS 18 MIN | 008 HRS 30 MIN     | UIUC/Friedel,Do//FOUND                |
| t538c115.2976n | 038 DAY 10 HRS 18 MIN | 038 DAY 15 HRS 18 MIN | 005 HRS 00 MIN     | UCB/Bolatto/Filler Item/FOUND         |

ELVLIM

ADJUST EDGE  
DIVIDE EDGE  
INSERT 24HR  
REMOVE 24HR  
SHOWME DATE

PROJECTS UP AT 038 d 06 h 02 m

1mm 3mm all

Graph Sched Master Script Master Script Preface Project Queue Comment Block Project Database

LST 0--1--2--3--4--5--6--7--8--9--10--11--12--13--14--15--16--17--18--19--20--21--22--23--24

Day 038 75n.. / t687c101.ori1..... / t538c115.2976n / t671c086.puc1..... Sa 26

Day 039 ./ \_un/ t672c089.puc1..... / t538c115.2976s.. / t713c115.m116..... Su 27

Day 040 ./ t702c115.omc1n..... / t538c115.29 / t671c089.puc1..... / t7 Mo 28

PST 0941-----1240-----1540-----1839-----2139-----0038-----0338-----0637-----0937

LST 0--1--2--3--4--5--6--7--8--9--10--11--12--13--14--15--16--17--18--19--20--21--22--23--24

Day 041 04c110. / t600c089.hh43..... / tx73c098.gr/ t697c092.I1818... / t686c11 Tu 29

Day 042 1.w7/ t600c093.hh43..... / t706c115.n3801..... / t712c093.8540..... We 30

Day 043 .. / t600c098.hh43..... / t706c115.n38/ t710c110.g4546..... Th 01

Day 044 / \_una/ t600c109.hh43..... / unassigned..... / t697c092.I1941..... / Fr 02

Day 045 u/ t702c115.omc1n..... / unassigned.. / t712c093.4134..... / un Sa 03

TCL POWERED

X S C R I B E

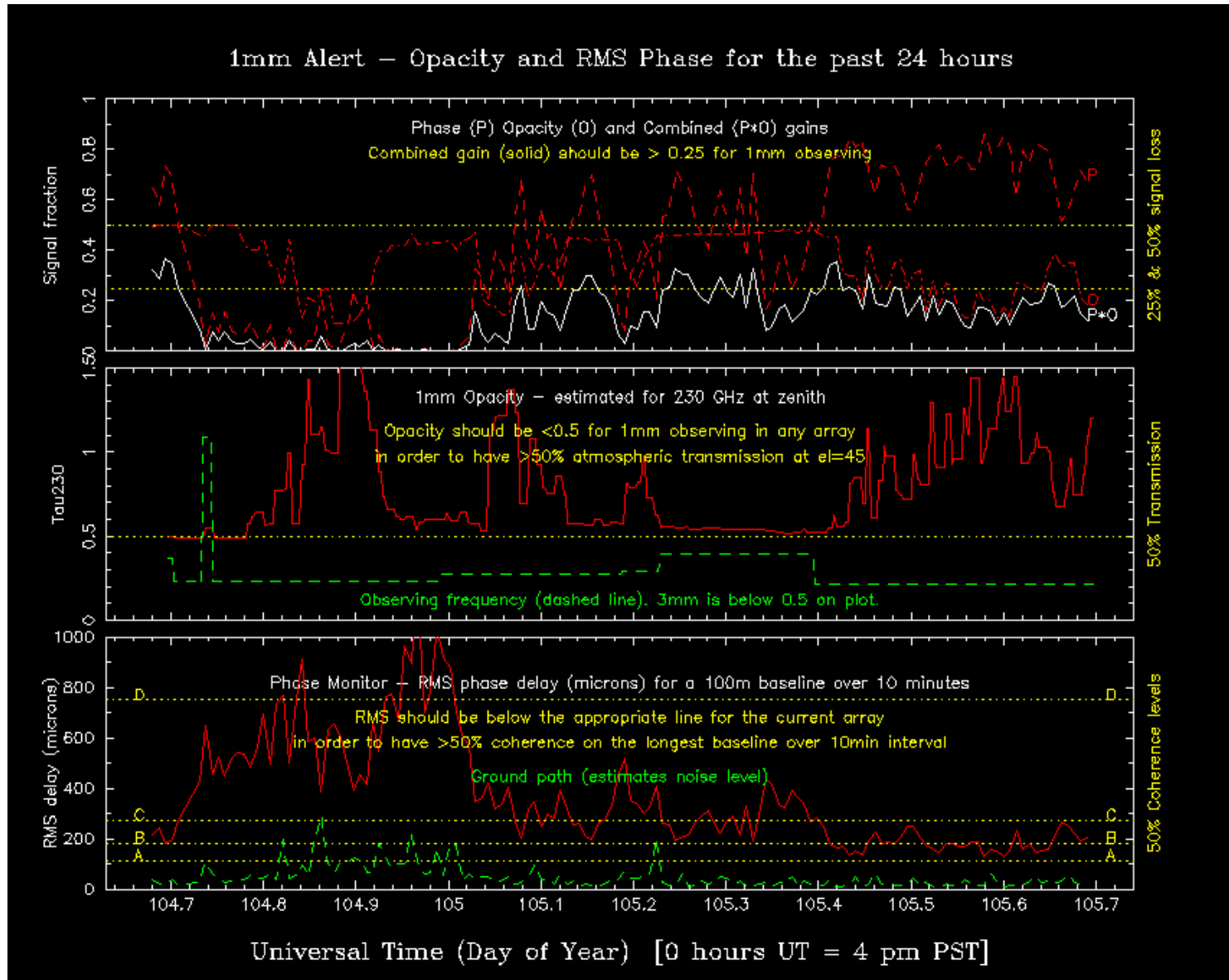
Day 038  
WEATHER

clear  
ptclr  
cldy  
ptedy  
cirrus

AUTOSYS  
PHASRMS

# 1mm alert – how's the weather?

Total gain  
Opacity  
RMS path

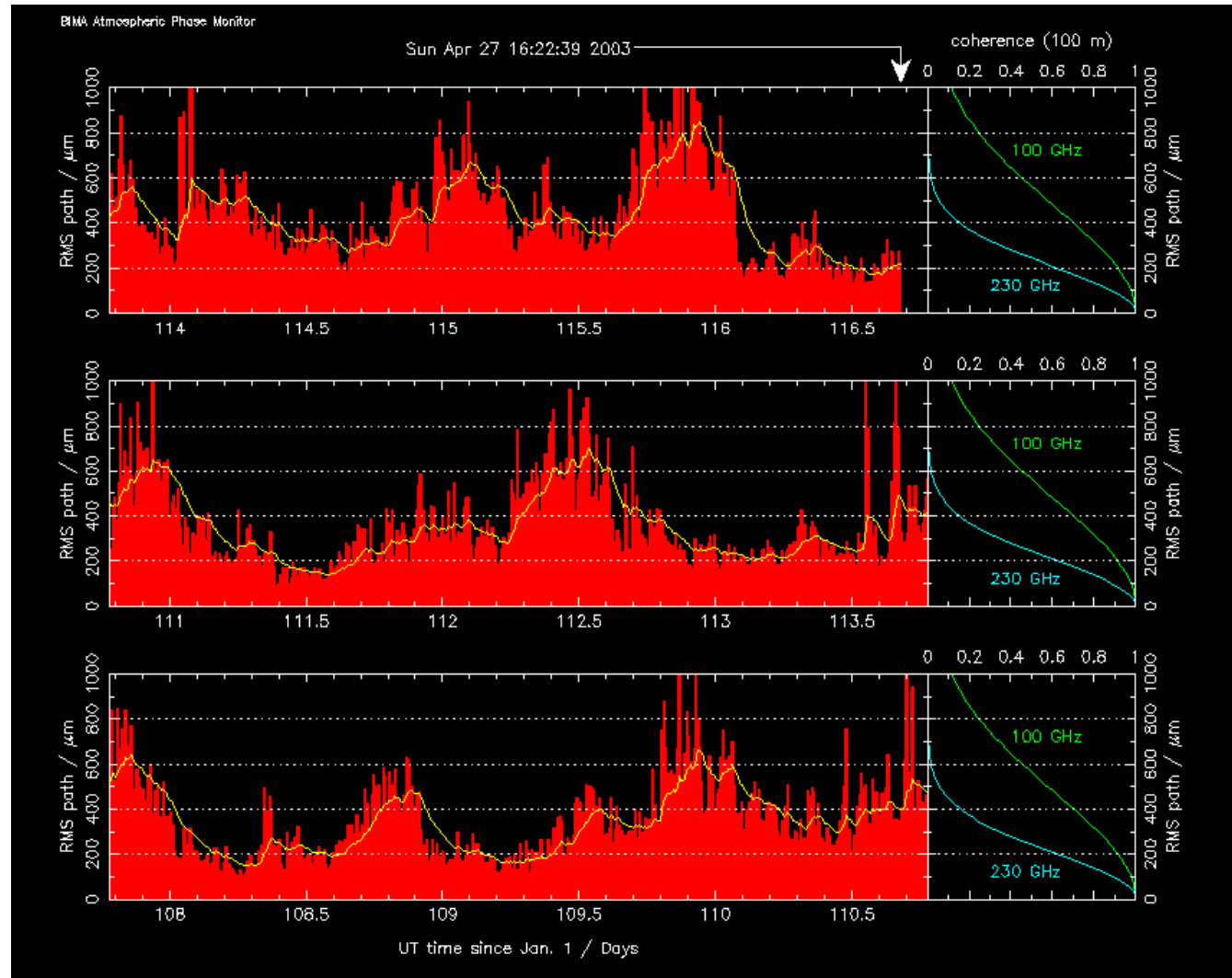


If coherence\*transmission  $> 25\%$  it's good enough!

# Atmospheric Phasemonitor



- Oliver Lay design
- 2 identical systems
- 12 GHz DTV satellite
- 100 m baseline
- 1 sec integrations
- 10 min rms calculated



**RMS path in microns vs time (9 days)**



# XSCRIBE – summary page

search

hits

choose project

time, grade, comments

detailed listing

Xscribe Project Scheduler – Session 3207 on Host hat – WRITE PRIVILEGE ENABLED

File Edit Settings Help

Schedule Summary Tactical

SEARCH SUMMARY : orikl 60

\*SUMMARY SEARCH HITS\*

|       |              |      |     |    |    |                                                                                                                                                                                       |
|-------|--------------|------|-----|----|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 04/13 | t687c089.ori | 0125 | 8.0 | 10 | B- | Rmspath=209.74 Tau230=1.36 H20=14.06 Short track taken during some pretty stable weather. Phases look great. I'll upgrade it to a B-, since it's Orion KL and lines are clearly seen. |
| 04/14 | t597c080.ori | 0123 | 8.0 | 10 | B+ |                                                                                                                                                                                       |
| 04/15 | t687c094.ori | 0523 | 4.7 | 10 | B- |                                                                                                                                                                                       |
| 04/18 | t687c094.ori | 0134 | 4.5 | 9  | B+ |                                                                                                                                                                                       |
| 04/19 | t711c091.ori | 0134 | 3.7 | 10 | A- |                                                                                                                                                                                       |
| 04/20 | t687c095.ori | 0128 | 8.4 | 10 | B- |                                                                                                                                                                                       |
| 04/21 | t711c092.ori | 0105 | 5.0 | 10 | B- |                                                                                                                                                                                       |

\*SCHEDULE SEARCH HITS\*

|   |              |    |      |    |      |   |
|---|--------------|----|------|----|------|---|
| I | t687c089.ori | 26 | 1.30 | 26 | 9.30 | 8 |
| I | t597c080.ori | 27 | 1.30 | 27 | 9.30 | 8 |
| I | t687c094.ori | 28 | 5.13 | 28 | 9.97 | 4 |
| I | t687c094.ori | 31 | 1.50 | 31 | 6.07 | 4 |
| V | t711c091.ori | 32 | 1.50 | 32 | 5.47 | 3 |
| I | t687c095.ori | 33 | 1.40 | 33 | 9.80 | 8 |
| V | t711c092.ori | 34 | 1.30 | 34 | 9.30 | 8 |

SEARCH QUALITY : orikl 60

04/24 t687c101.ori 0448 1.7 10 B- Rmspath=282.00 Tau230=1.42 H20=11.32 Track interrupted due to snow. About an hour of data, which may or may not be useful.

04/25 t680c115.ho2b 1221 3.0 10 B+ Rmspath=437.53 Tau230=0.49 H20=9.61 Some nice weather crept up overnight! Best track for a few days. Is the phase calibrator a bit weak? There may have been some residual snow on some of the dishes which may affect the beam.

04/25 t694c110.g589 1523 5.0 10 A- Rmspath=337.86 Tau230=0.48 H20=9.14 Another excellent track. Weather was marginal 1mm at times. Same snow comment as above applies.

04/24 t687c101.ori 0448 1.7 10 GRADE: C- D- NOTE: to snow. About an hour of data, which may or may not be useful.

PROJECT=t687c101.ori DATE=03APR24 Q\_RUN\_TIME(hat)=Fri Apr 25 17:57:26 GMT 2003

Frequency Set-up  
Source: ORION-KL UT: 225129 LST: 045548  
Line Code: unknown Rest Freq: 101.5400 GHz IF Freq: -1870.000 MHz  
Velo Code: VELO-LSR Antenn Vel: 46.76 km/s First LO: 103.3939 GHz

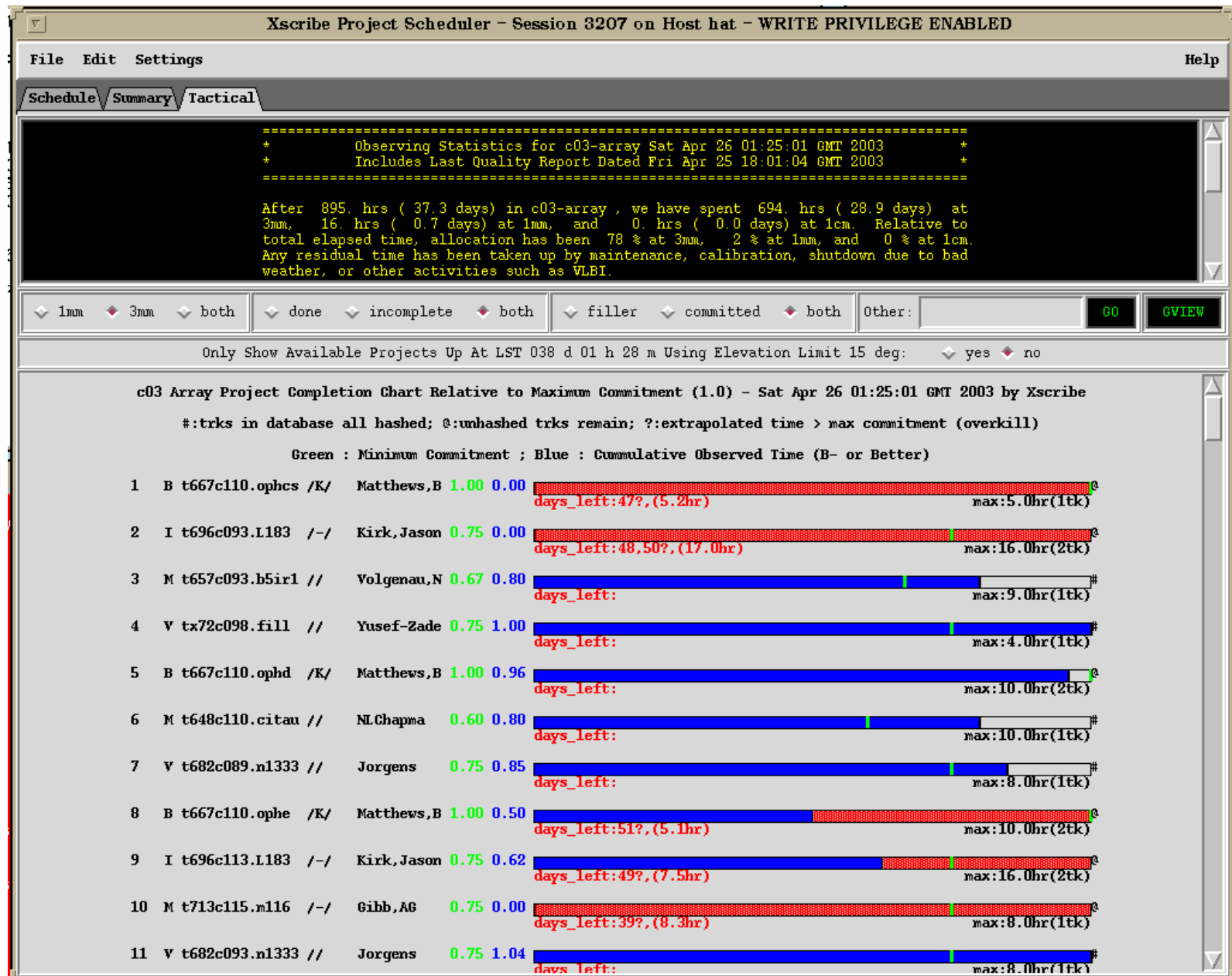
Chronology of Observations on 03APR24

| Source   | UT     | Dur  | Elev | BW(1,2) | Corr | Sys | Temps (K) |
|----------|--------|------|------|---------|------|-----|-----------|
|          | hhmmss | min  | deg  | MHz     | mode | 1   | 2         |
| 0423-013 | 224424 | 4.6  | 48.  | 100.    | 100. | 8   | 446       |
| ORION-KL | 225129 | 12.6 | 44.  | 50.     | 50.  | 4   | 474       |
| ORION-KL | 230525 | 10.0 | 44.  | 50.     | 50.  | 4   | 474       |
| 0423-013 | 231756 | 4.6  | 47.  | 100.    | 100. | 8   | 538       |
| 0423-013 | 232533 | 4.6  | 46.  | 100.    | 100. | 8   | 651       |
| ORION-KL | 233229 | 12.6 | 45.  | 50.     | 50.  | 4   | 643       |
| ORION-KL | 234625 | 10.4 | 44.  | 50.     | 50.  | 4   | 643       |
| 0423-013 | 235920 | 4.6  | 43.  | 100.    | 100. | 8   | 578       |
| ORION-KL | 000618 | 10.0 | 44.  | 50.     | 50.  | 4   | 790       |
| 0423-013 | 001848 | 4.6  | 40.  | 100.    | 100. | 8   | 738       |

Record of Focus Values  
At LST: 044841 Focus= 6.8 -3.1 -0.4 12.9 -3.6 20.1 2.9 4.1 2.0 19.0

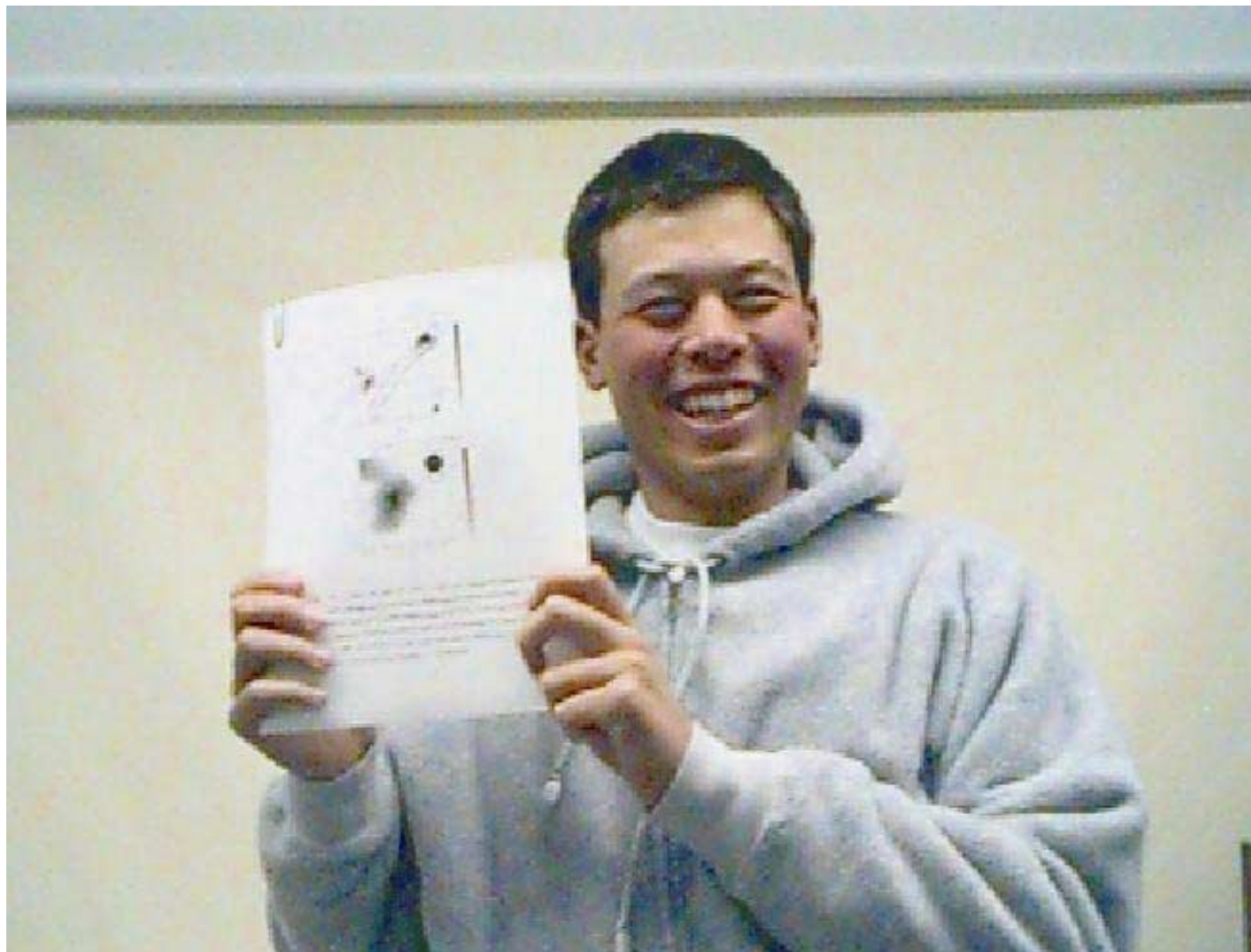
# XSCRIBE – tactical page

Projects scheduled for time

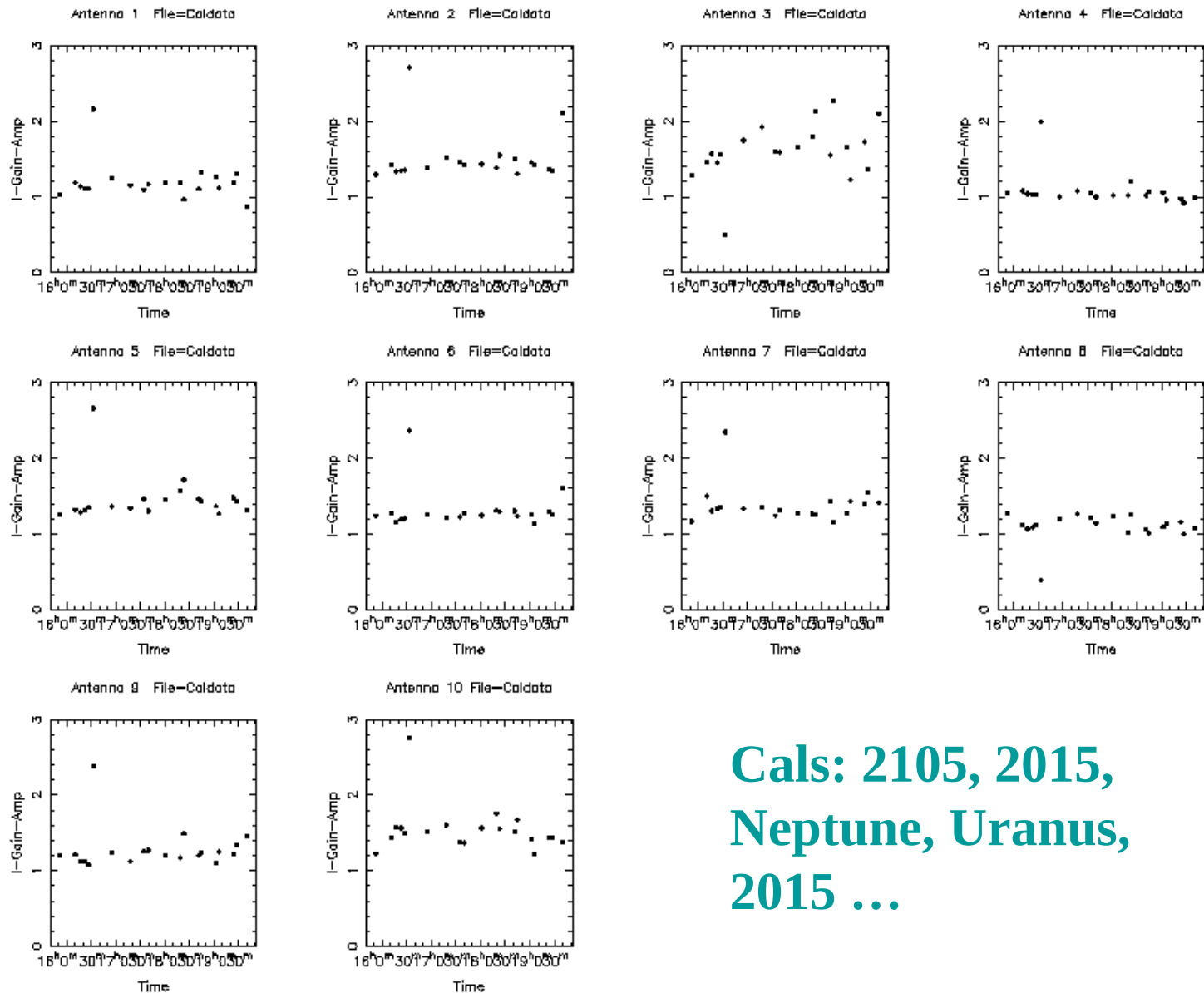


scheduled passed

# Ted Yu – (Xplore, Xscribe, etc)

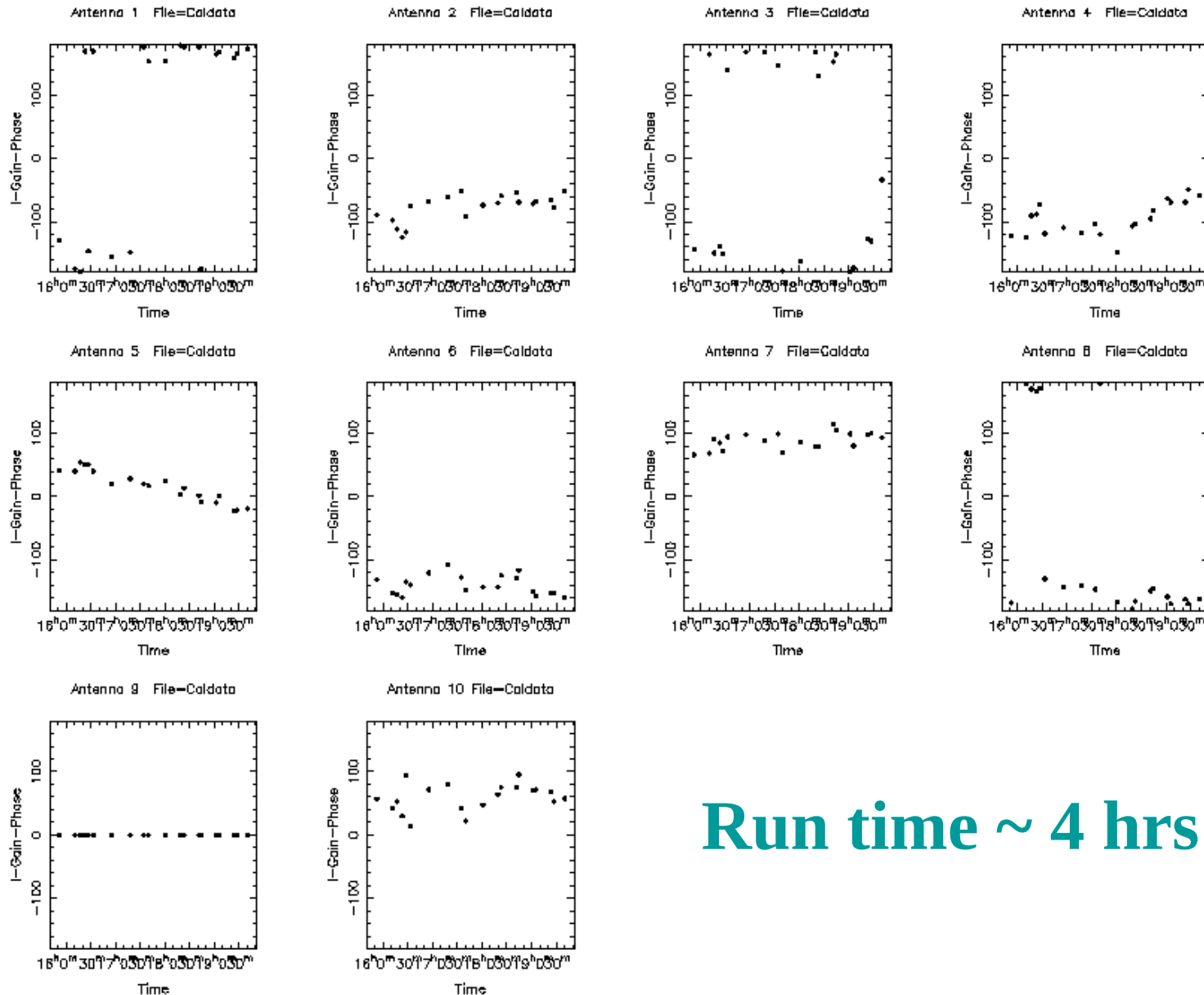


# Antenna gain vs time



Cals: 2105, 2015,  
Neptune, Uranus,  
2015 ...

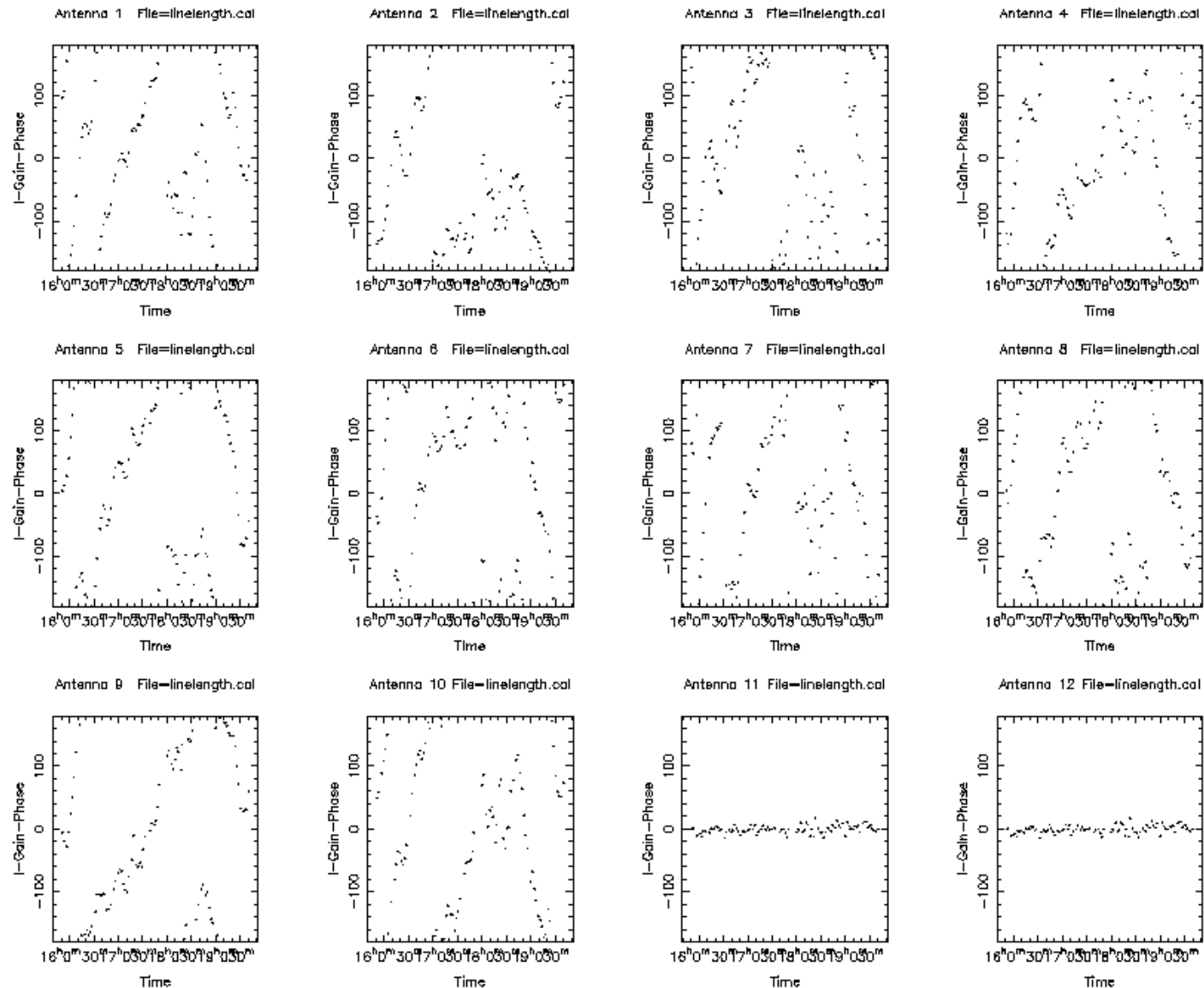
# Antenna phase vs time



Run time ~ 4 hrs

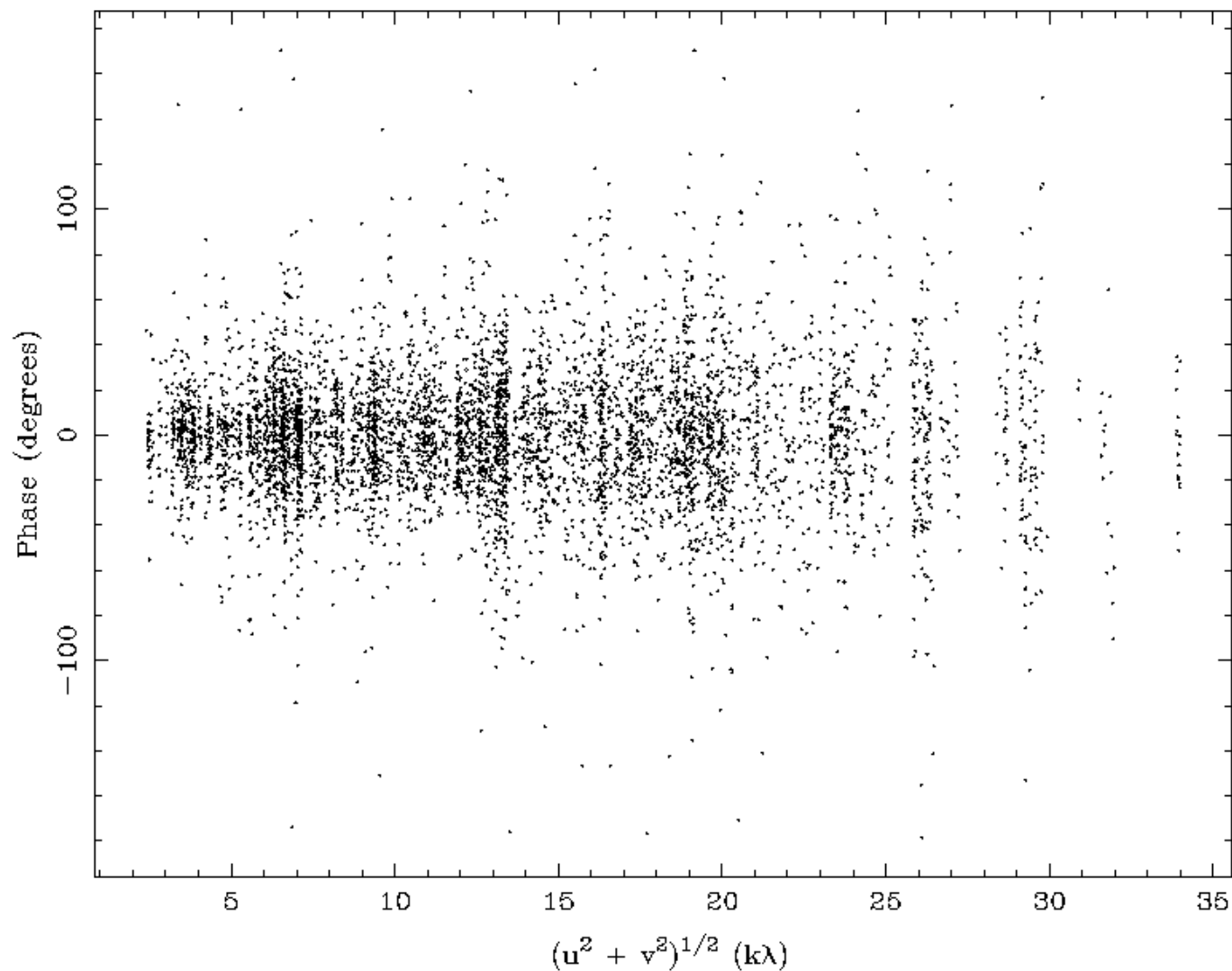


# Linewidth phase correction



# Phase vs UVdistance

YY Caldata 115.5800 GHz



# Quality grade – environmental impact

Phasemonitor  
(rmspath)

**rmspath (microns) ...**

| Median        | Mean   | Rms   | Min    | Max    |
|---------------|--------|-------|--------|--------|
| <b>316.00</b> | 317.95 | 77.28 | 190.00 | 492.00 |

Opacity  
(Tsys)

**tau230...**

| Median      | Mean | Rms  | Min  | Max  |
|-------------|------|------|------|------|
| <b>0.57</b> | 0.63 | 0.14 | 0.47 | 0.95 |

~~X~~  
Mean score

Using mean values for source Caldata  
PHASE SCORE:  $100 - (\text{rmspath}/25) = 87.3$   
OPACITY SCORE:  $100 - 13 * (e^{\text{tau230}} - 1) = 88.6$

Array

The median baseline length for this track is 41.04 m...  
Using **C-array** (33/67) weighting for phase/opacity  
COMPOSITE SCORE = 88.2

Final  
grade

PHASE GRADE: B+  
OPACITY GRADE: B+  
COMBINED GRADE: **B+**

# Tony Wong – Quality analyst

