Very first plots from Pittsburgh Nov09

- 8 channels E / 8 channels W = 16 channels
  - Dipoles + preamp + RF filters (CMU)
  - RF Ampli Boxes 40 dB (Saclay)

  - 40 m RF cables (att ~ 15 dB)

  - Analog Card (Saclay): RF filter + RF ampl + mixer
    LO=1250MHz + IF ampl +IF filter
  - ADC 500 MHz Board (LAL) 8k samples 2 cx/board
  - FPGA FFT core on the fly (Saclay+LAL) ~ 61 kHz resol
  - PCIex feed DMA on 2 Dell servers + Acq (LAL)
  - DistCLK (Saclay) time reference + trigger (rate 1kHz)

Design:

W

Dipoles: 2 4 6 8 10 12 14 16

S

N

Dipoles: 1 3 5 7 9 11 13 15

E

X

Y

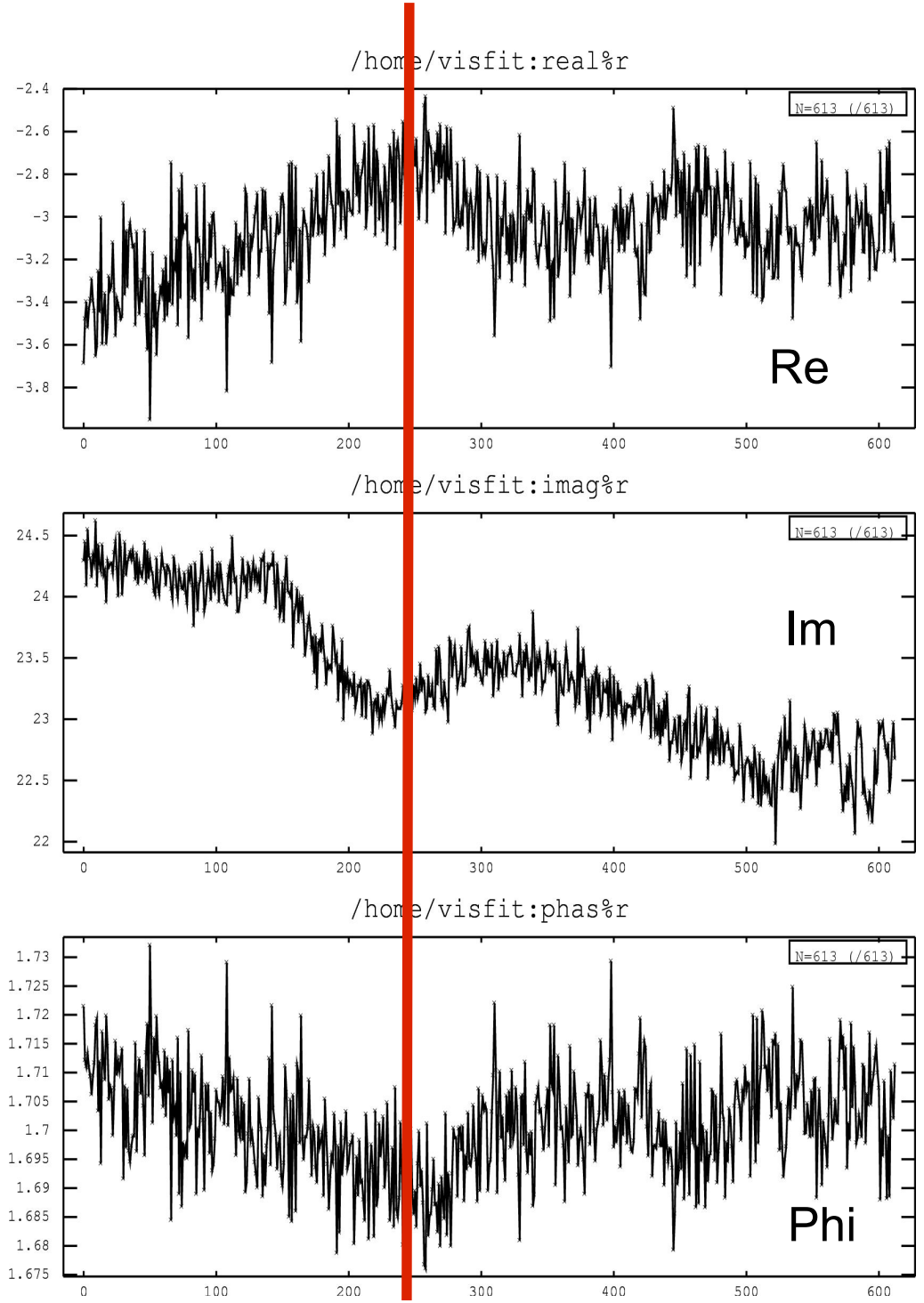
Sources

- Some tests on November 22th
- CygA on november 23th + 24th
  - Max elevation +89:39:22
- CasA on November 23th + 24th
  - Max elevation +71:32:53
- Sun on November 23th + 24th
  - Max elevation +29 d (low)

- Freq range 50 MHz from 1385 to 1435 MHz (resol ~ 61kHz)
- Pre average of visibilities (reduce data!)
  - Frequency 671 kHz
  - Time 1 sec

N-S visibility for dipoles on the same cylinder

- Lot of correlated noise between channels
  - Is correlation between dipoles ?
  - Is correlation between electronics channels ?
    - Bundle of RF cables ?
  - Is correlation on the sky ?
- What about the CMU observations ?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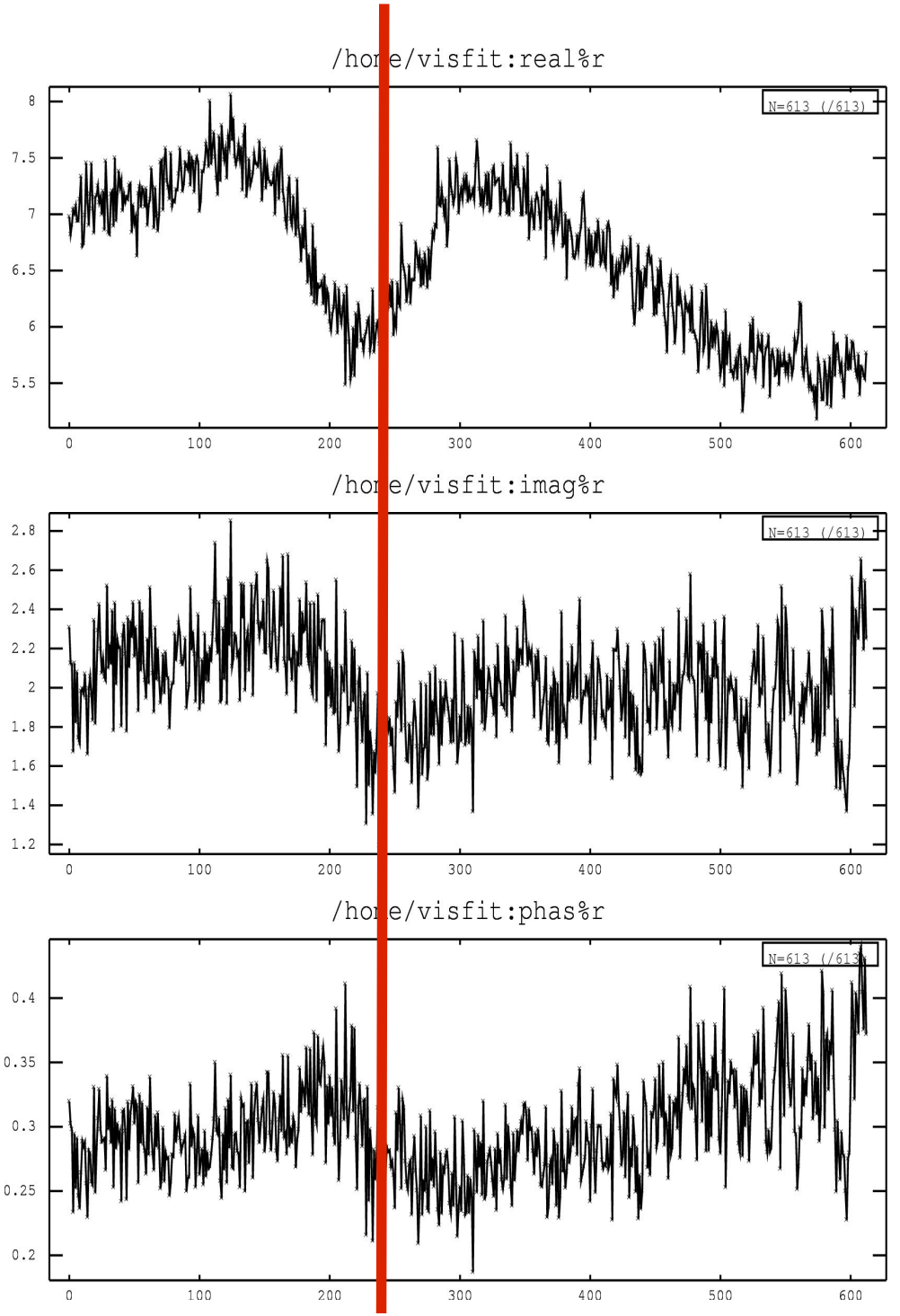
N=613 (/613)
Re
/home/visfit:imag%r
N=613 (/613)
Im
/home/visfit:phas%r
N=613 (/613)
Phi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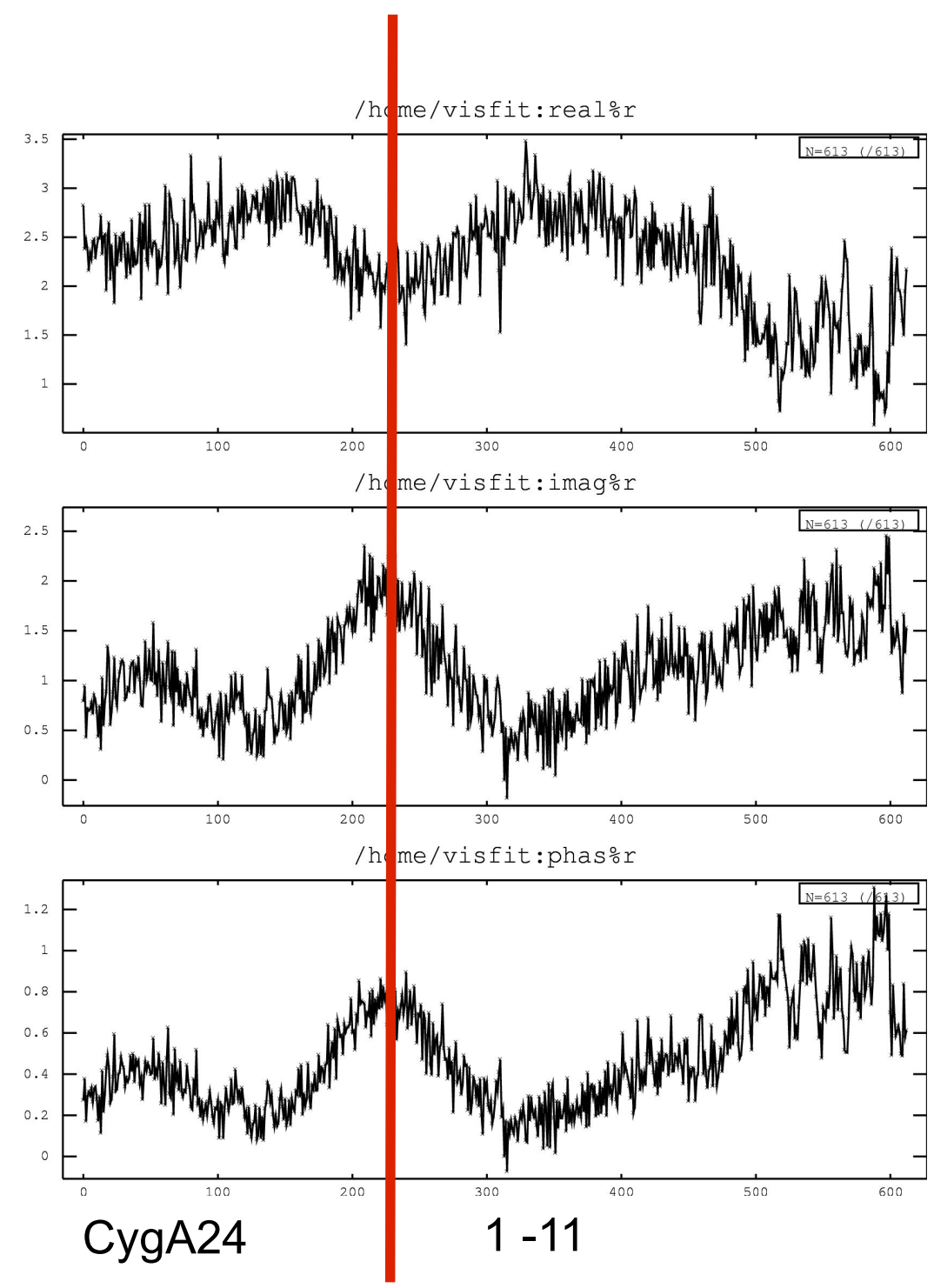
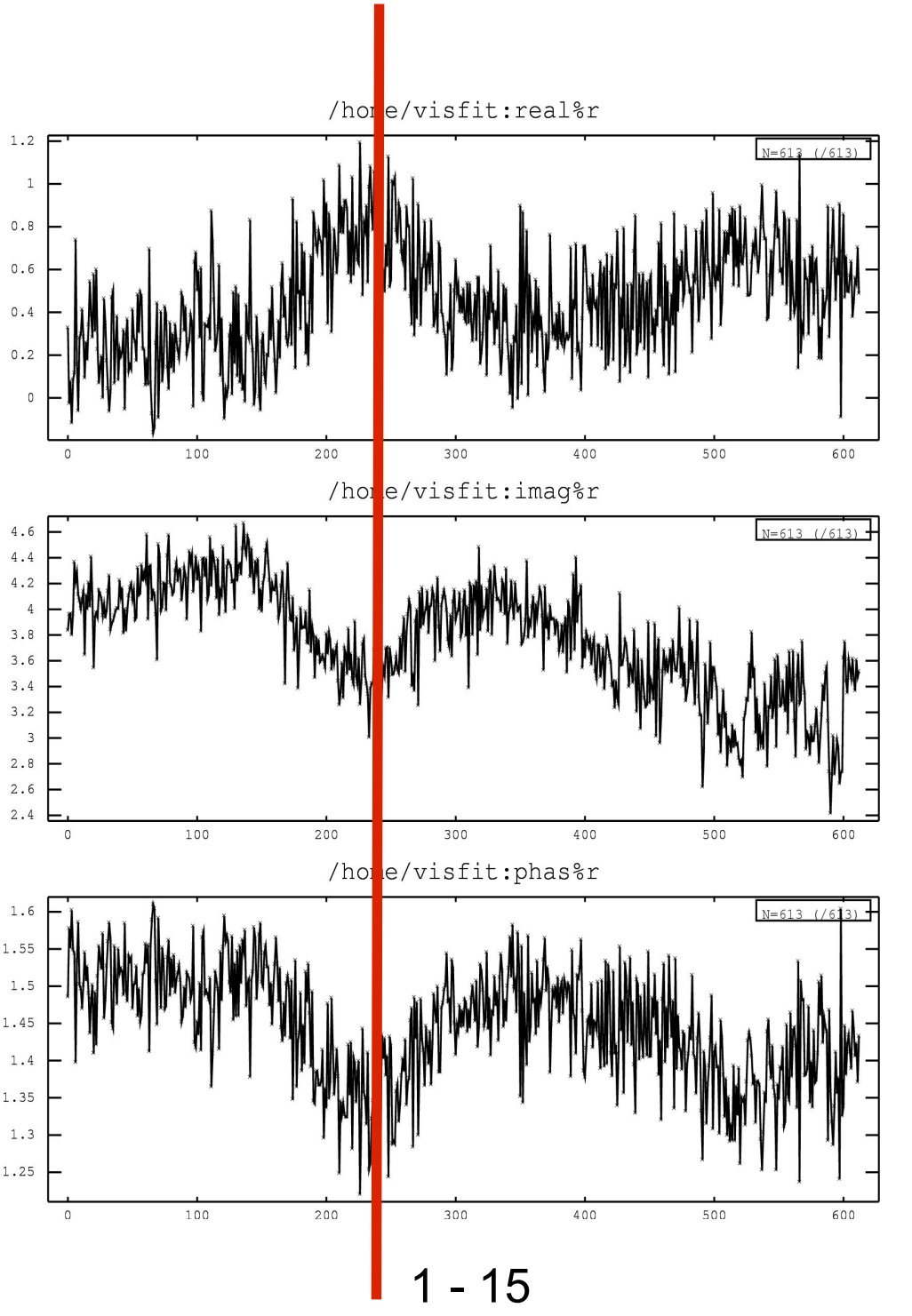
N=613 (/613)

CygA24 1 - 3 1 - 7



CygA24

1 -11



1 - 15

Fitted Model for E-W visibilities

- $\langle S1.S2^* \rangle = (M_{re}(F) + j\ M_{im}(F))$

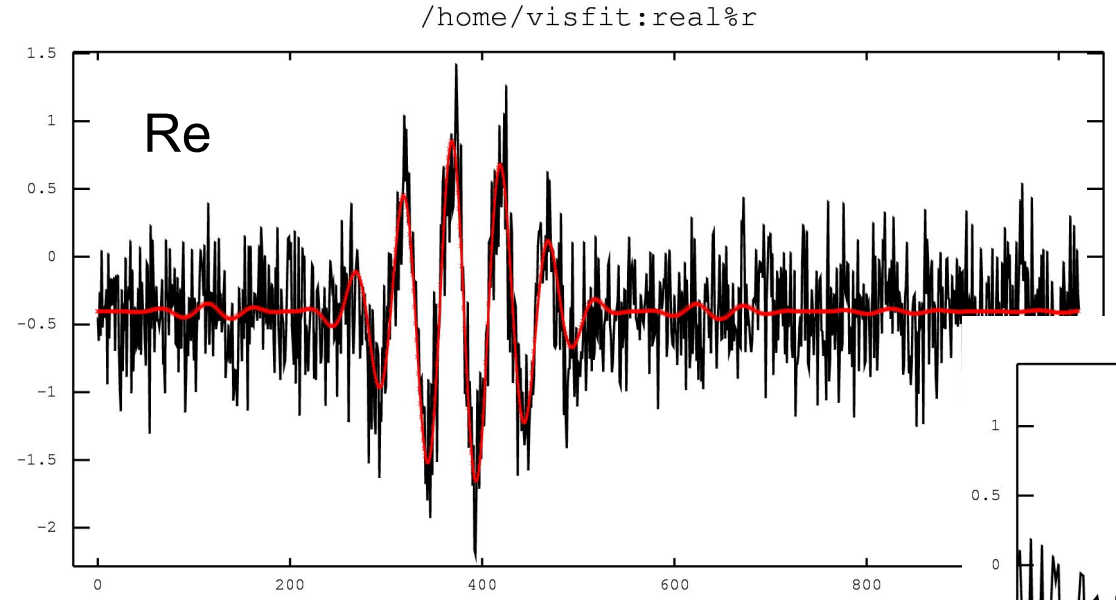
  $+ G(F) * \text{Lobe}(W_{cyl}, \theta_0)$

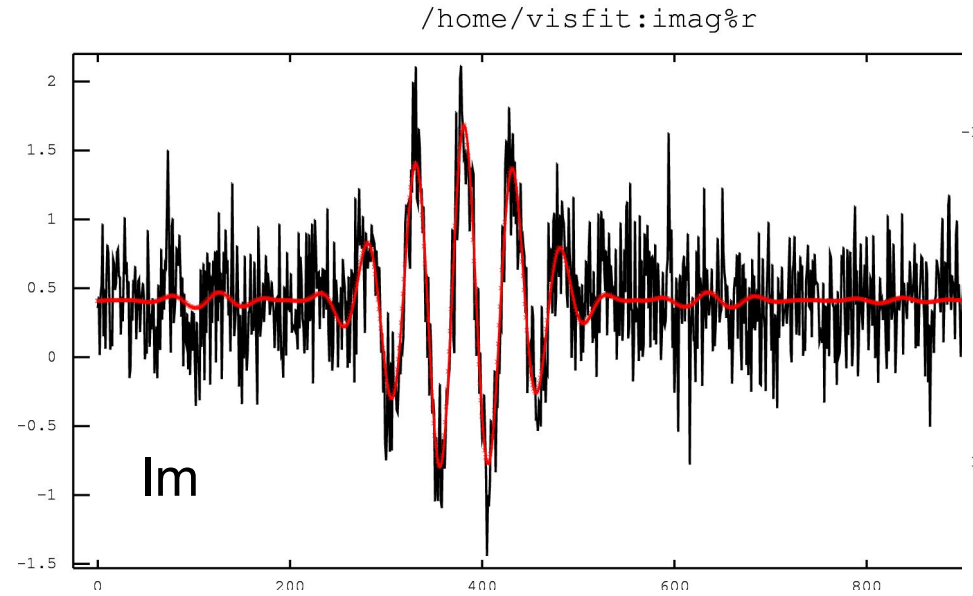
  $* \exp\{ 2 j \pi F/c * [d * (1 + d'*(F-F_0)/F_0)$

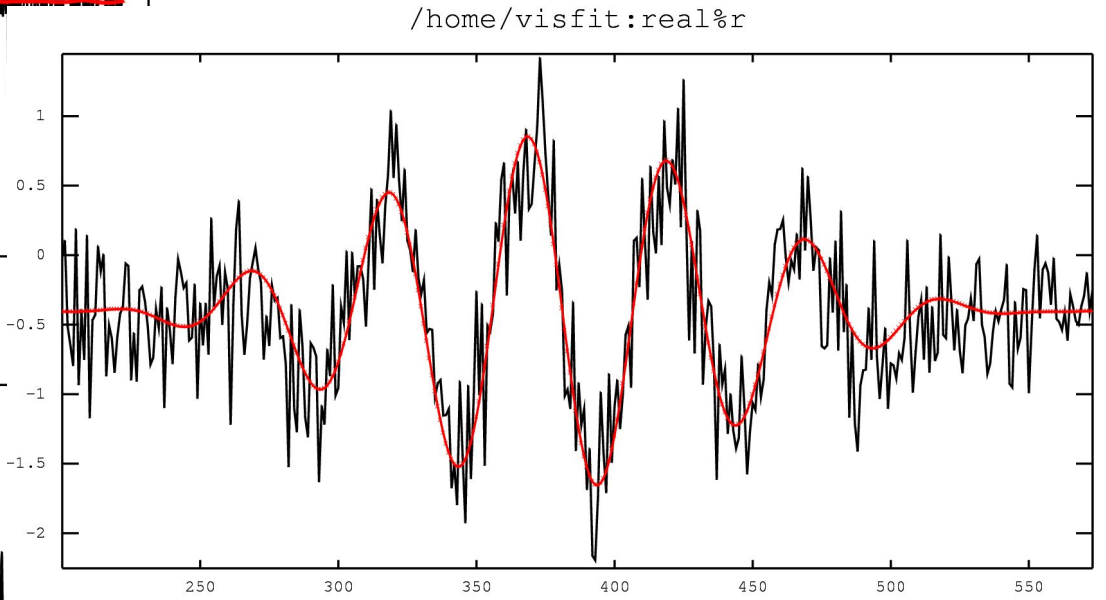
  $- (25m+D) * 1.003 * \cos(\delta) *(t-t_{max})] \}$

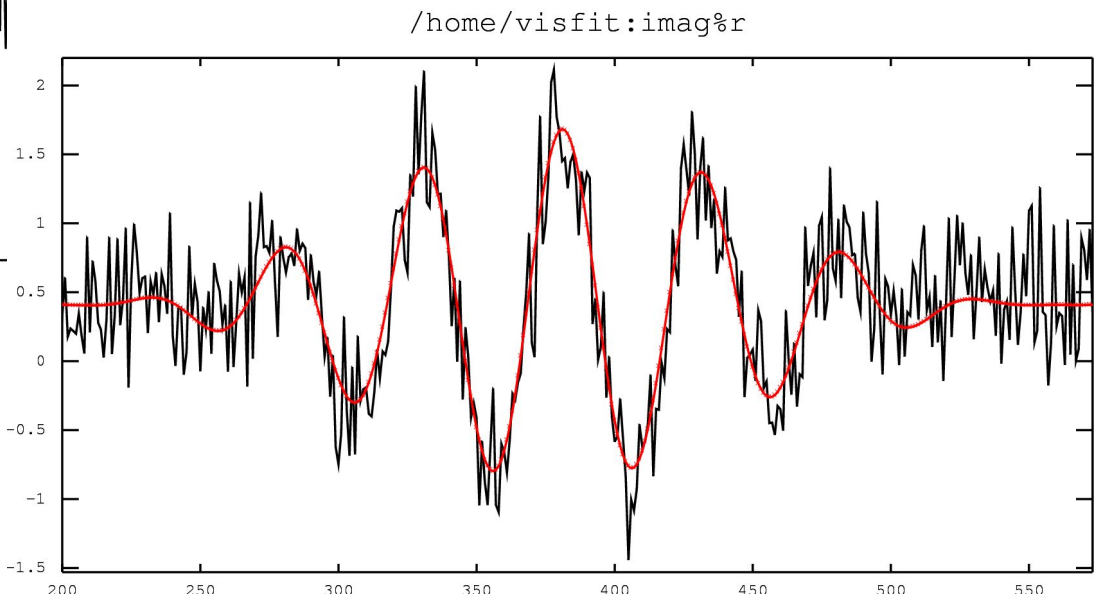
  - t = time, t_{max} = time of transit
  - F = frequency , F_0 = central frequency
  - Lobe = lobe E-W = sin(x)/x
    - $X = \pi\ W_{cyl} / \lambda * (1.003 * \cos(\delta) *(t-t_{max}) + \theta_0)$
  - d = path N-S + electronic delay , d' = freq depend delay
  - D = extra path delay E-W (w.r.t. 25m)
- Fit 1D in (t) by averaging in <F>
- OR Fit 2D in (t,F)

CygA24 <1-2*> 1D fit <16 MHz>









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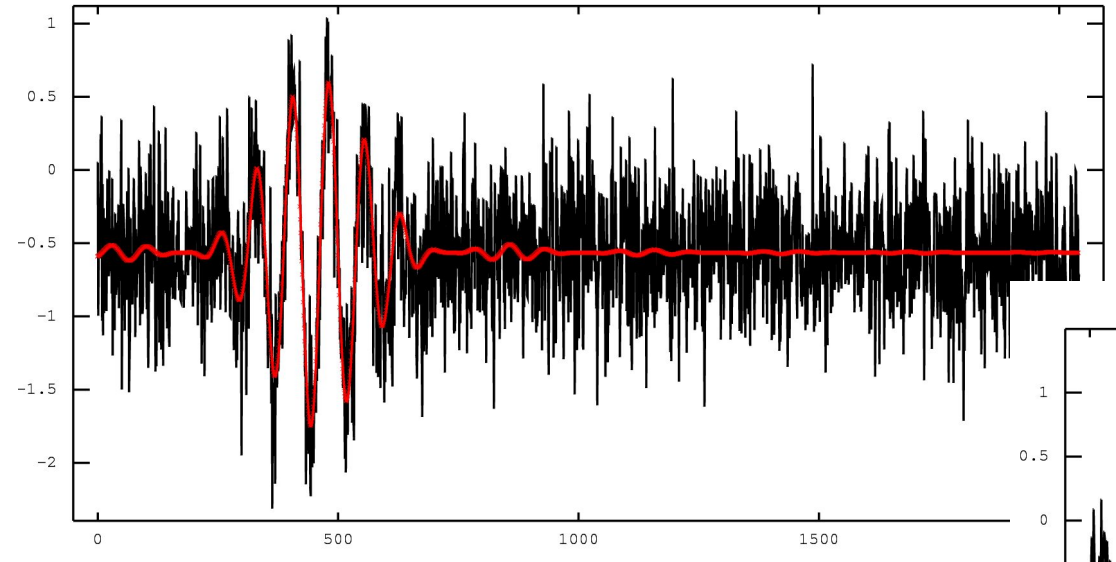

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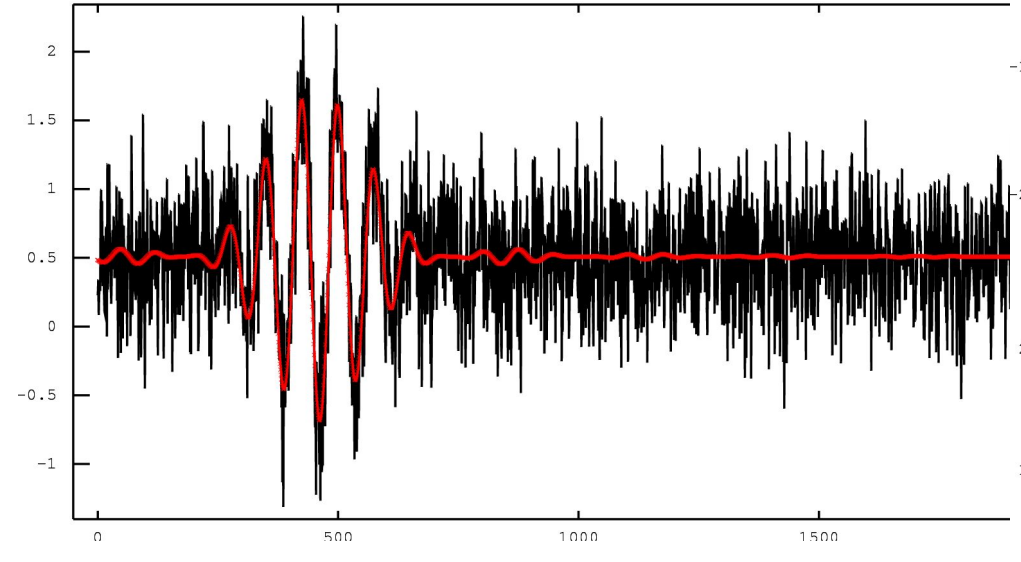

CasA23 <1-2*> 1D fit <16 MHz>

CasA24 <1-2*> 1D fit <16 MHz>

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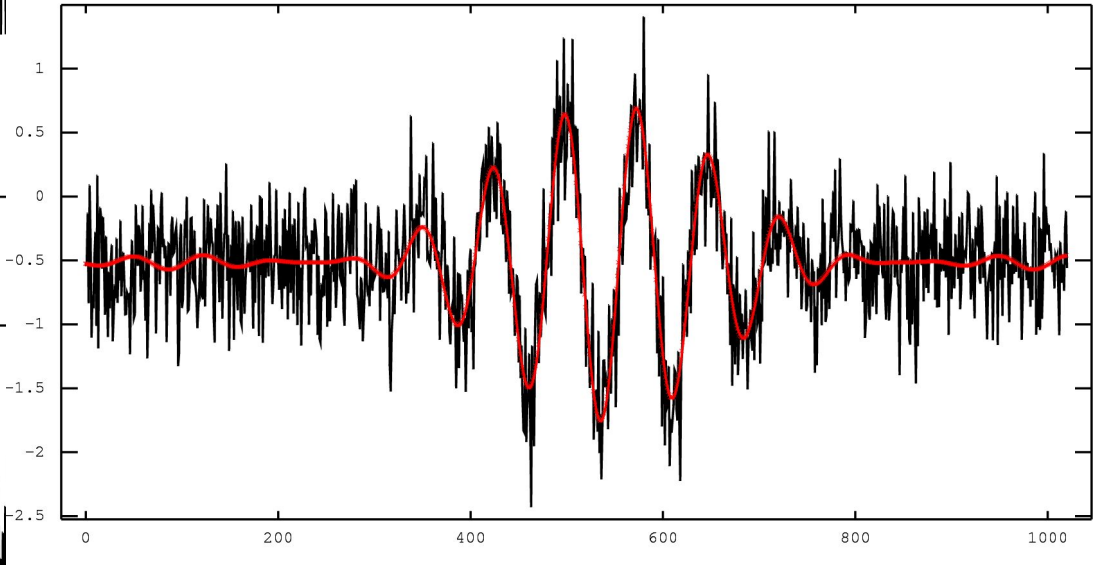

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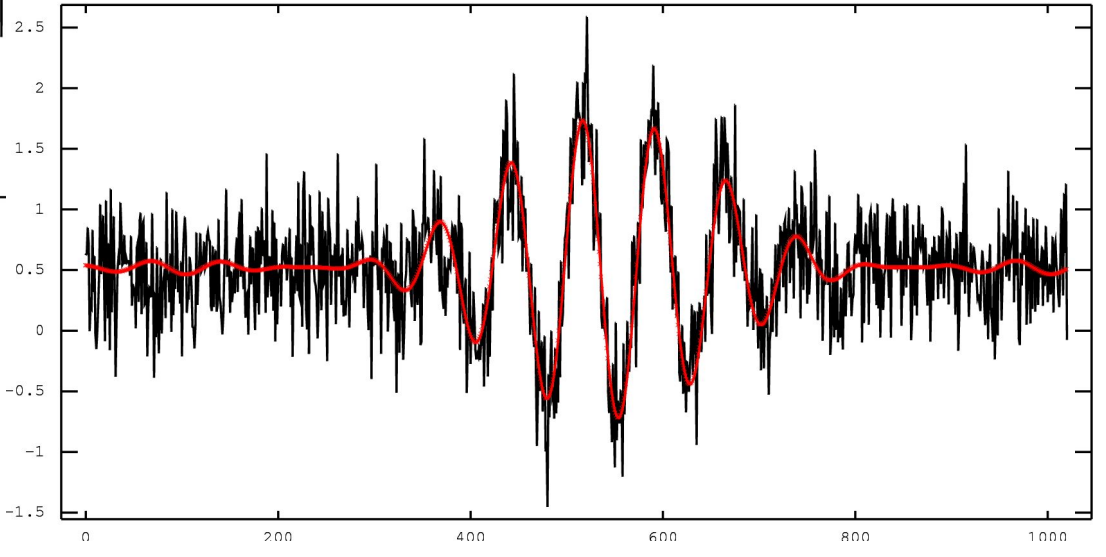
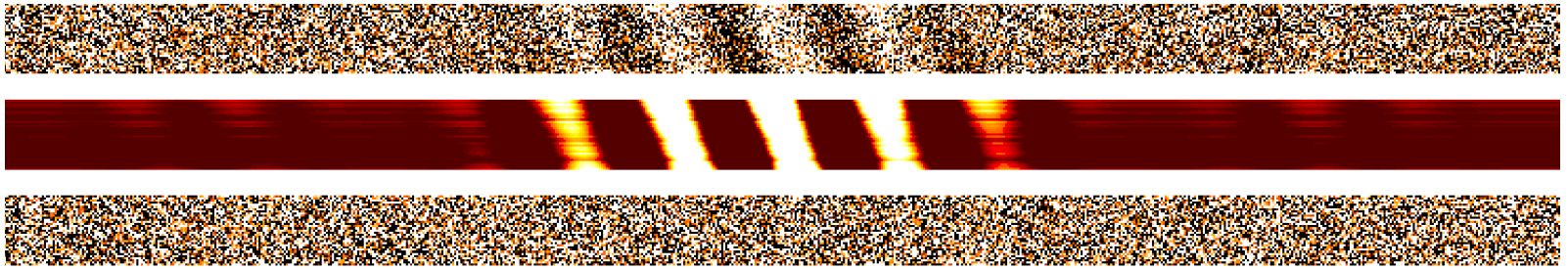
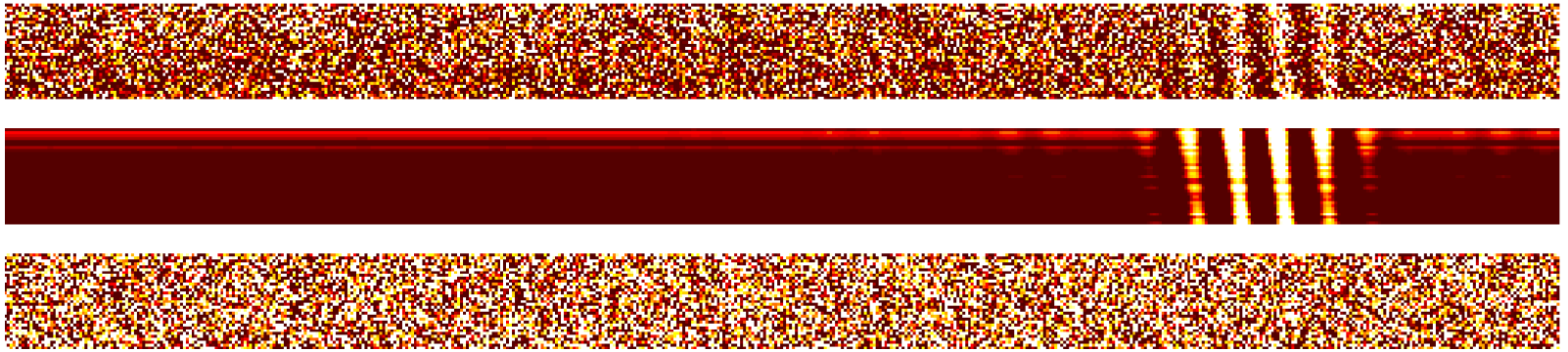




CygA24 <1-2*> 2D fit freq resol 671 kHz



CygA23 <1-2*> 2D fit freq resol 671 kHz

- Fit seems OK (Xi2R ~ 2-3 but crude estimate of the errors)
- Check E-W = 25m (D ~= few 0.1 m)
- Check Lobe point to zenith (Th0 ~= few 0.1 deg)
- Wcyl fitted to 6 – 7 m but fit gibe very smal errors (few 10 cm) and we have large value dispersion / visi pairs and observations
  - Need understand correlation between fitted parameters
  - Correlation: (Wcyl,G) ~ 50% , (d,D) ~ 30%

To be done

- Origin of the correlated noise ?
- Fitted parameters coherence tests
  - 136 “Visib”: 64 E-W , 56 N-S , 16 powers
- Separate delay from path difference from those of electronic (cables/filter/amp...)
- What precision of dipole position (X,Y) will be reached
  - Challenge in X (N-S) ?
  - To what precision in Y (E-W) ?
- Lobe model for cylinders? Pure sin(x)/x probably not ?
- Probably need better S/N (trigger rate), more sources with lot of different elevations
- Try a flux (mJy) calibration ?

- We hope to be back in ~ June 2010 with :
  - 32 channels (16 E + 16 W)
  - A correlator for 2x12 (may be 2x16) cx
    - Reach ~ 0 % dead time ???
- Bruce, Jeff and Kevin:

Thanks very much for your help

real workers

tired (?) workers