

Hops Developments



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HAYSTACK DIFX MEETING
2011.12.6

Recent features in fourfit

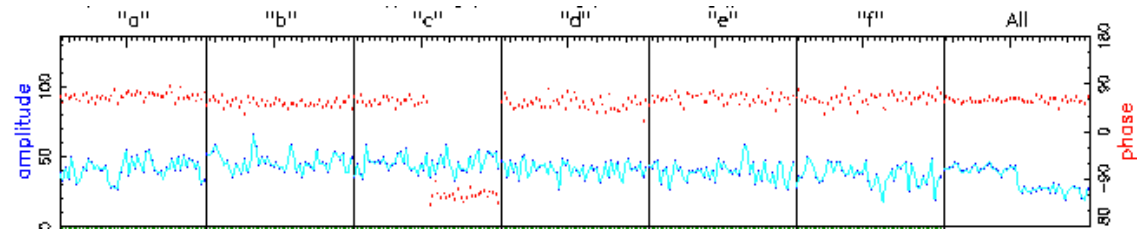


- Multitone pcal
 - time segmentation *pc_period*

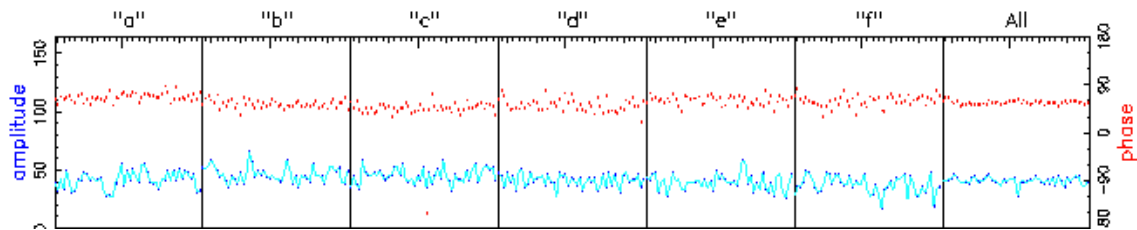
Tracking phase jumps via pcal



$T_{\text{int}} = \text{full scan}$



$T_{\text{int}} = 10 \text{ s}$



Recent features in fourfit

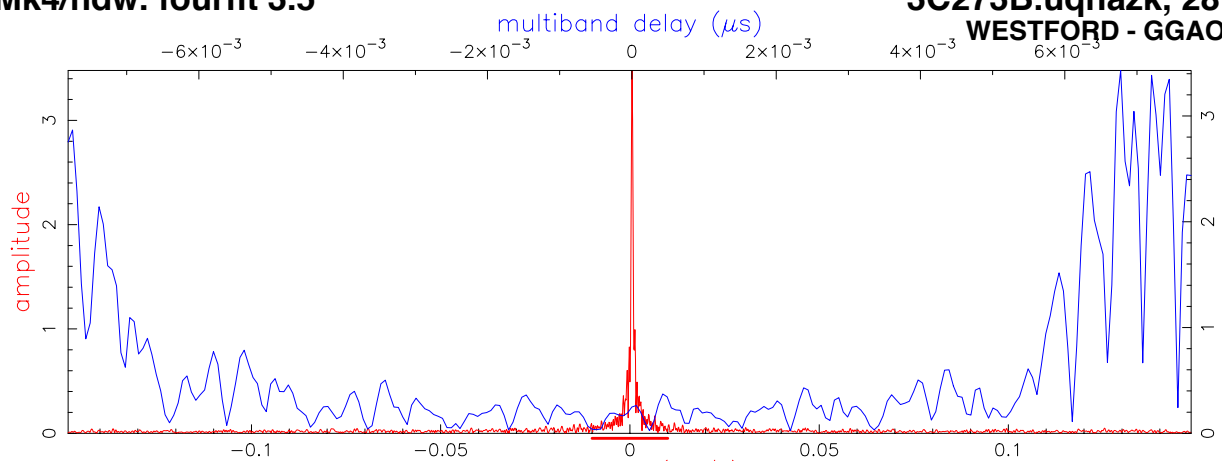


- **Multitone pcal**
 - time segmentation *pc_period*
 - masking of contaminated tones *pc_tonemask*
- **A priori ionosphere removal**
 - Values specified per-station in TEC units *ionosphere*

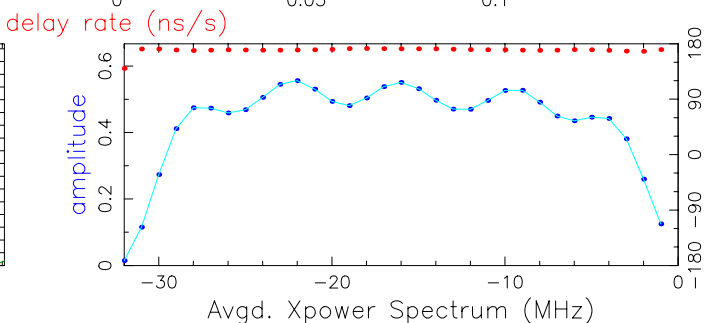
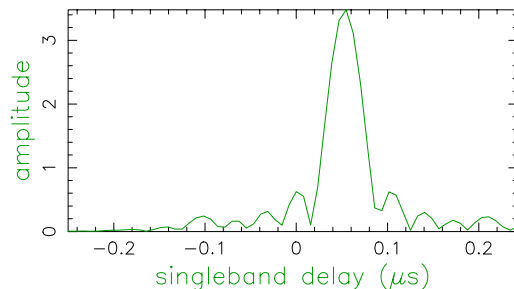
No Ionosphere

Mk4/hdw. fourfit 3.5

3C273B.uqnazk, 287-1700A, EG
WESTFORD - GGAO, fgroup X, pol LL

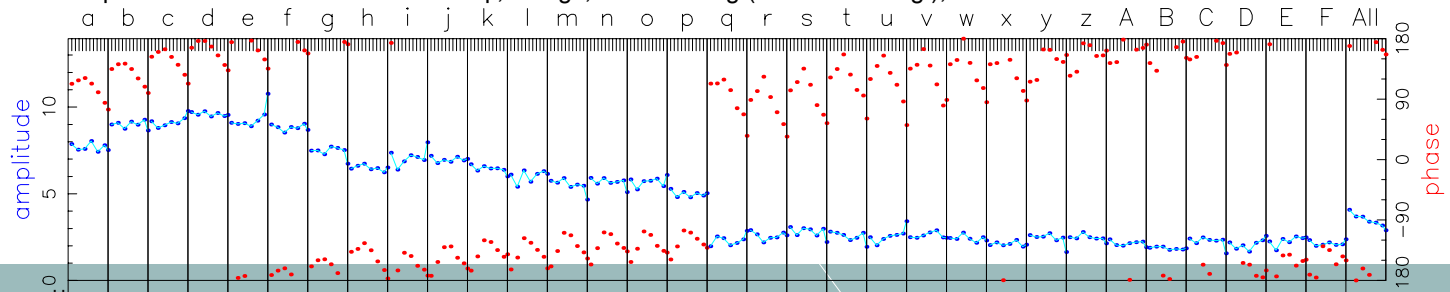


Fringe quality 4
Error code G
SNR 296.6
Intg.time 568.723
Amp 3.488
Phase 178.8
PFD 0.0e+00
Delays (us)
SBD 0.053236
MBD 0.006760
Fr. rate (Hz) 0.001890
Ref freq (MHz) 3368.4000
AP (sec) 1.000
Exp. X8_tst
Exper # 3307
Yr:day 2009:287
Start 170001.00
Stop 170930.00
FRT 170445.00
Correlation date 2009:297:164107
fourfit exec/bld: 2011:301:183803
2011:299:150920
RA & Dec (J2000) 12h29m 6.6997s +2°03' 8.598"



Avgd. Xpower Spectrum (MHz)

Amp. and Phase vs. time for each freq., 7 segs, 94 APs / seg (94.00 sec / seg.), time ticks 60 sec

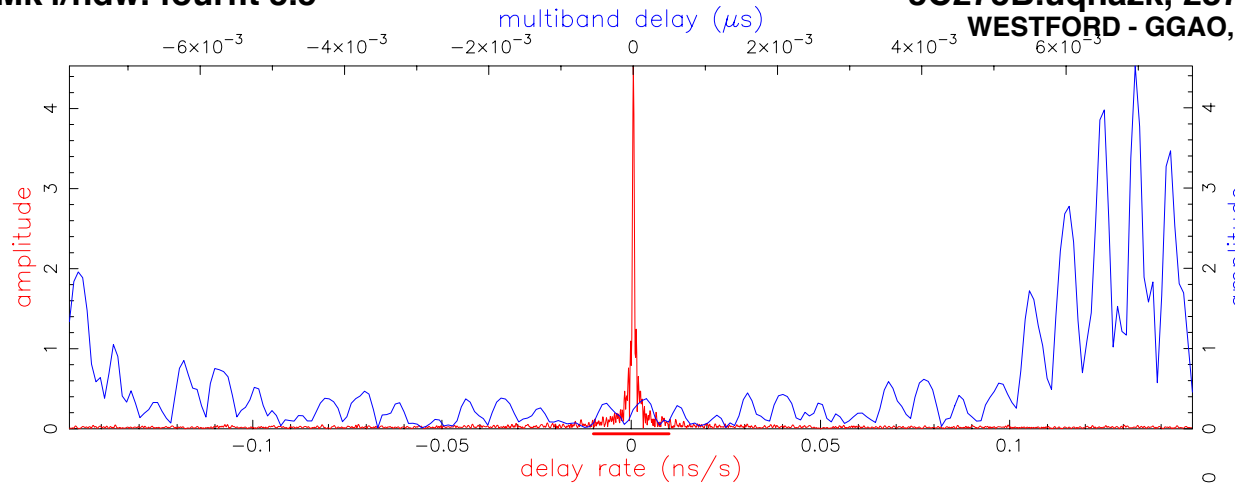


With differential ionosphere of 5.13 TEC units

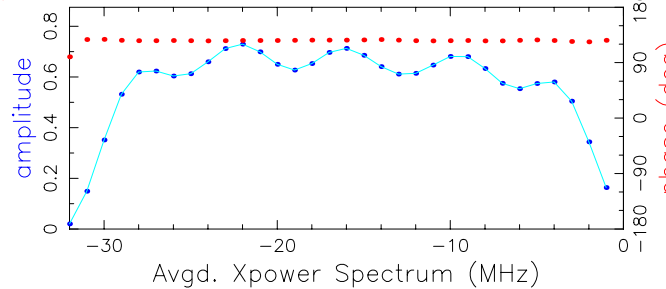
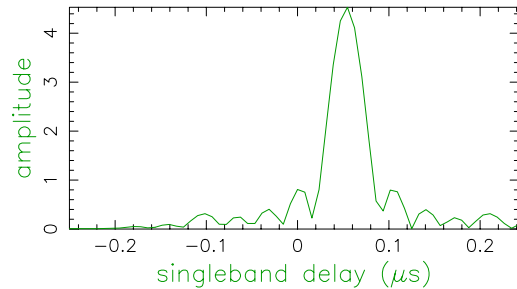
Mk4/hdw. fourfit 3.5

3C273B.uqnazk, 287-1700A, EG

WESTFORD - GGAO, fgroup X, pol LL

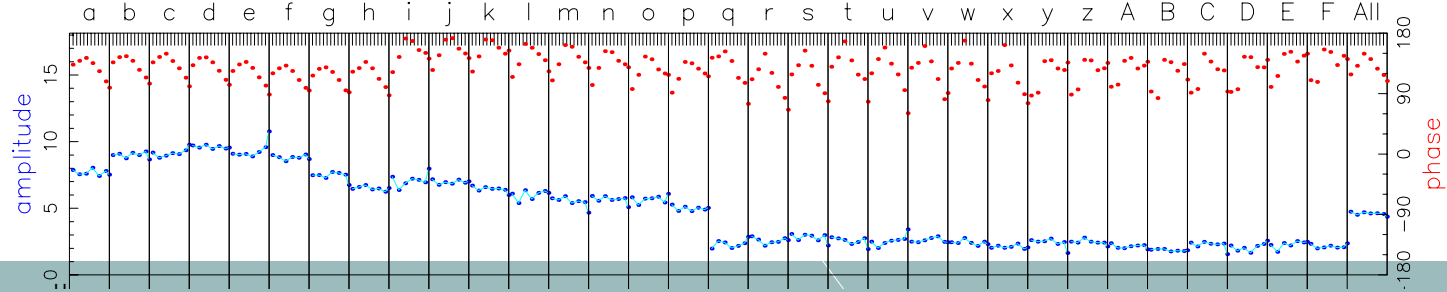


Fringe quality 6
 Error code G
 SNR 386.5
 Intg.time 568.723
 Amp 4.536
 Phase 130.7
 PFD 0.0e+00
 Delays (us)
 SBD 0.053886
 MBD 0.006964
 Fr. rate (Hz) 0.001868
 Ref freq (MHz) 3368.4000
 AP (sec) 1.000



Exp. X8.tst
 Exper # 3307
 Yr:day 2009:287
 Start 170001.00
 Stop 170930.00
 FRT 170445.00
 Correlation date 2009:297:164107
 fourfit exec/bld: 2011:301:183933
 2011:299:150920
 RA & Dec (J2000) 12h29m 6.6997s +2°03' 8.598"

Amp. and Phase vs. time for each freq., 7 segs, 94 APs / seg (94.00 sec / seg.), time ticks 60 sec



Recent features in fourfit

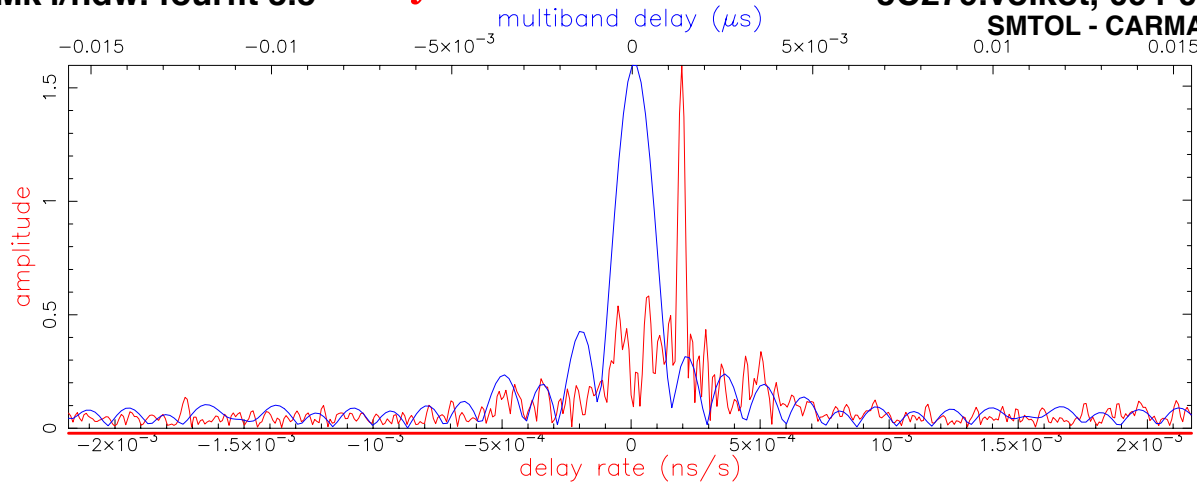


- Multitone pcal
 - time segmentation *pc_period*
 - masking of contaminated tones *pc_tonemask*
- A priori ionosphere removal
 - Values specified per-station in TEC units *ionosphere*
- Sampler-based delay correction to phases

Uncorrected sampler delay

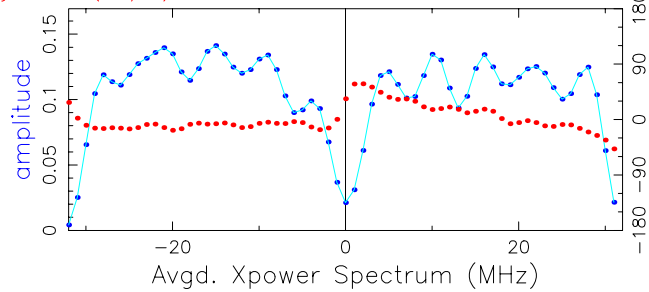
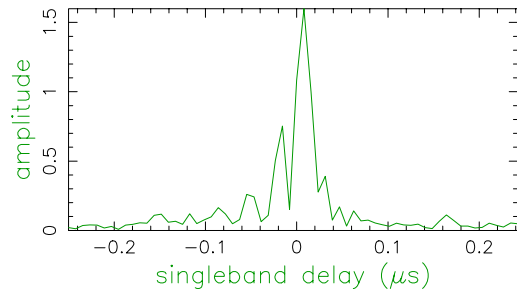
Mk4/hdw. fourfit 3.5

3C279.voikot, 094-0839_JOIN, SD
SMTOL - CARMAR, fgroup U, pol LL



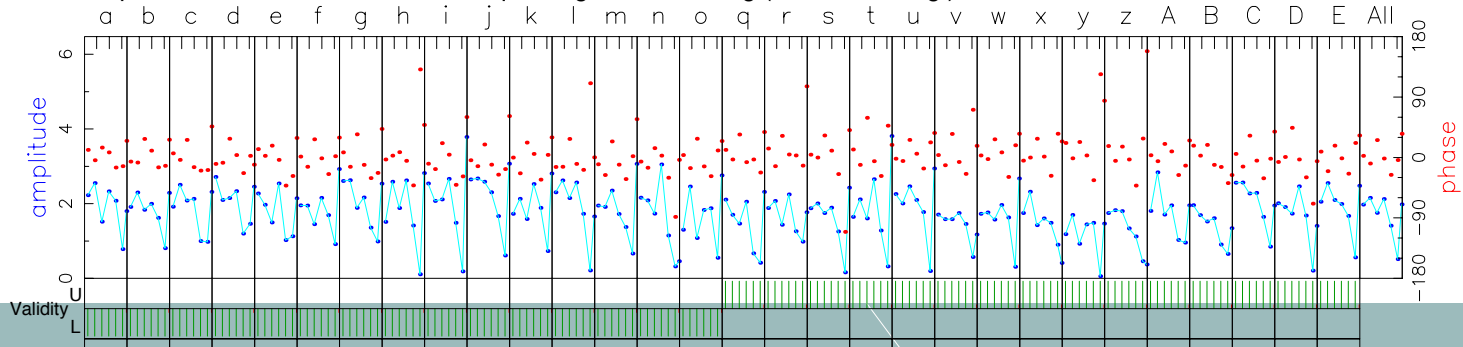
Fringe quality 7

SNR 73.9
Intg.time 177.817
Amp 1.619
Phase -0.2
PFD 0.0e+00
Delays (us)
SBD 0.006603
MBD 0.000049
Fr. rate (Hz) 0.045417
Ref freq (MHz) 229345.0000
AP (sec) 1.000



Exp. mm093
Exper # 3365
Yr:day 2011:094
Start 083902.00
Stop 084200.00
FRT 084030.00
Correlation date 2011:107:232052
fourfit exec/bld: 2011:301:190442
2011:299:150920
RA & Dec (J2000) 12h56m11.1665s -5°47'21.524"

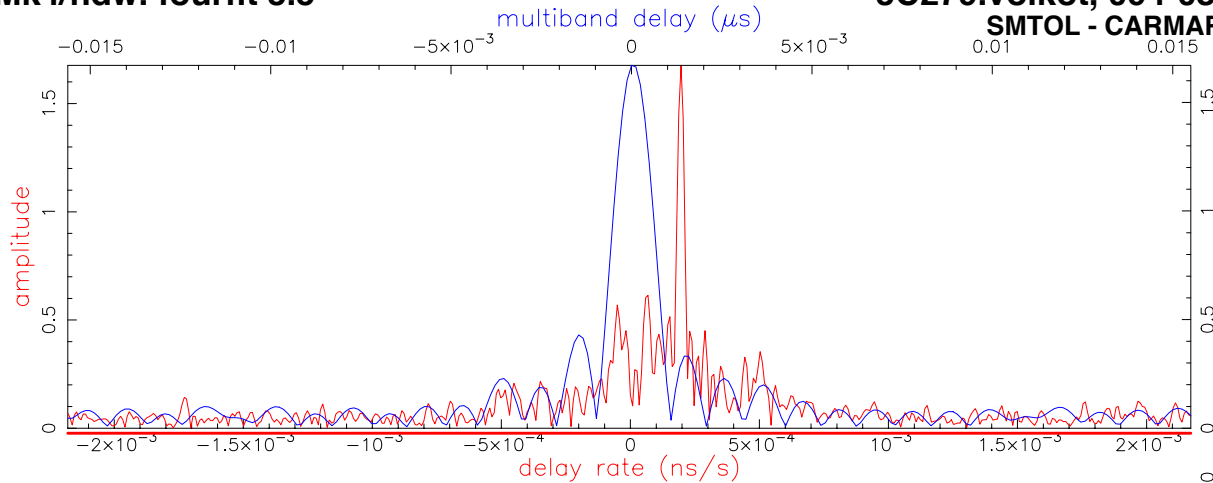
Amp. and Phase vs. time for each freq., 7 segs, 29 APs / seg (29.00 sec / seg.), time ticks 60 sec



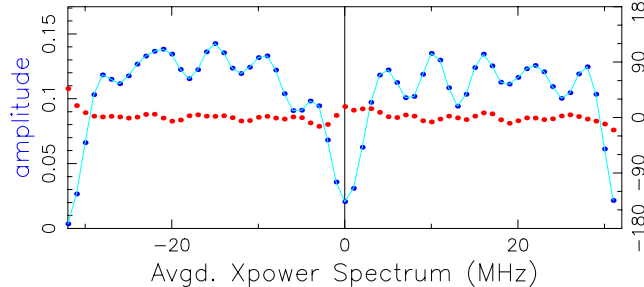
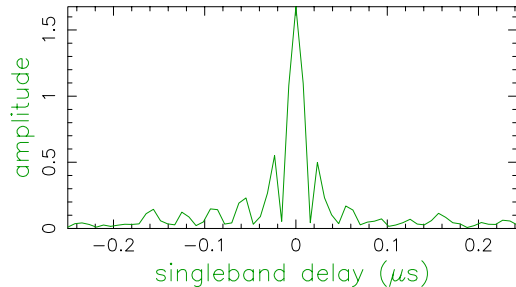
With sampler delay offset

Mk4/hdw. fourfit 3.5

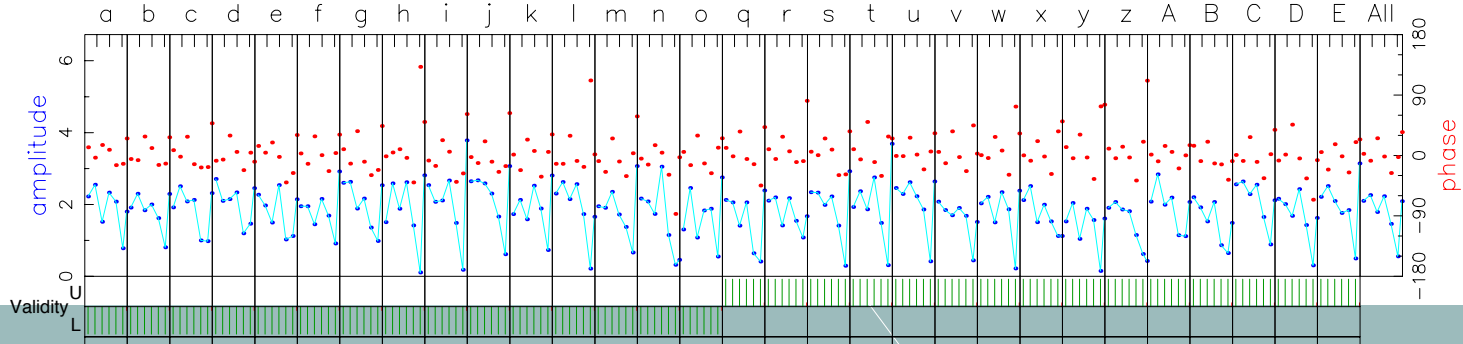
3C279.voikot, 094-0839_JOIN, SD
SMTOL - CARMAR, fgroup U, pol LL



Fringe quality 7
SNR 77.4
Intg.time 177.817
Amp 1.683
Phase 0.0
PFD 0.0e+00
Delays (us)
SBD 0.000199
MBD 0.000051
Fr. rate (Hz)
0.045422
Ref freq (MHz)
229345.0000
AP (sec) 1.000
Exp. mm093
Exper # 3365
Yr:day 2011:094
Start 083902.00
Stop 084200.00
FRT 084030.00
Correlation date
2011:107:232052
fourfit exec/bld:
2011:301:191646
2011:299:150920
RA & Dec (J2000)
12h56m11.1665s
-5°47'21.524"



Amp. and Phase vs. time for each freq., 7 segs, 29 APs / seg (29.00 sec / seg.), time ticks 60 sec



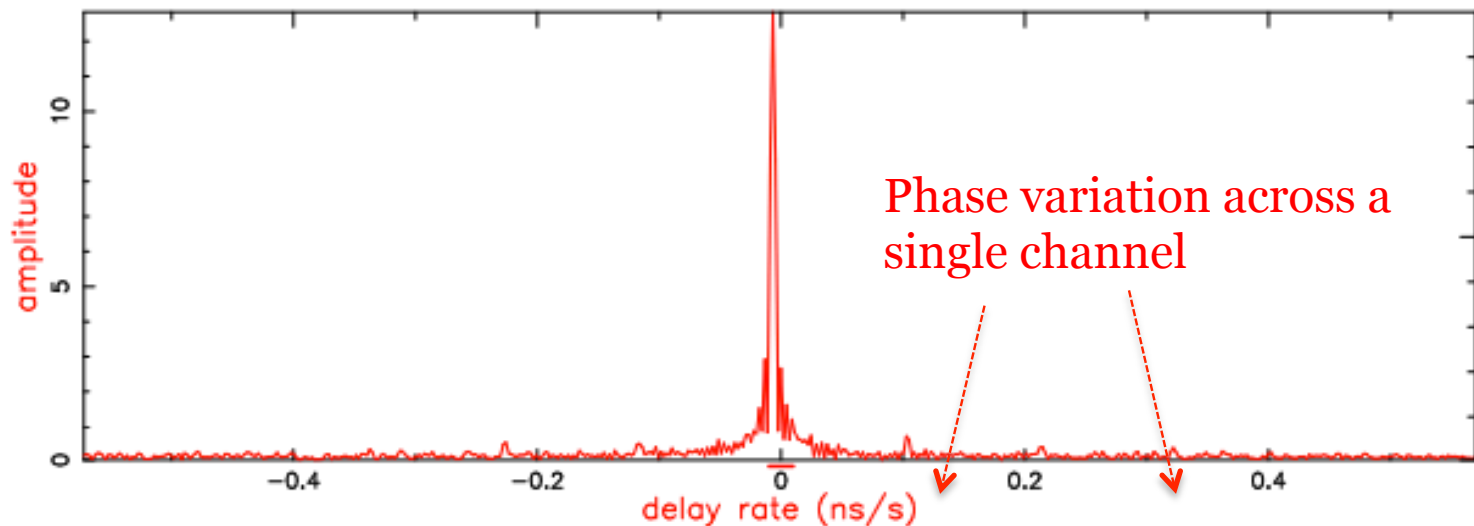
Future features in fourfit



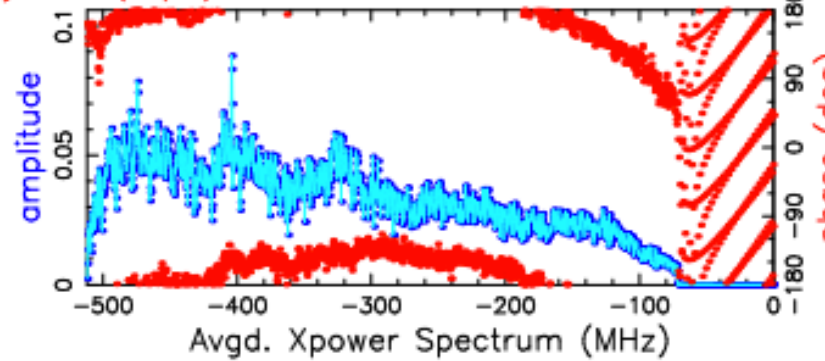
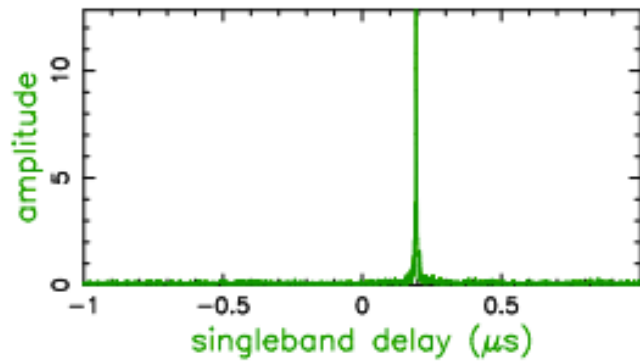
- Combination of full Stokes polarization products
 - e.g. $\{VxV, HxH, VxH, HxV\}$ or $\{RxV, RxH, LxV, LxH\}$
 - Initially: $I \cong (HxH+VxV) \cos\Delta + (HxV-VxH) \sin\Delta$ (need to return az and el from *calcif2* in order to calculate parallactic angle Δ)
 - General combinations: Use parallactic angle and user-specified phase and/or instrumental cal. phase
- Automated ionosphere estimation and removal
- Ad hoc file-based phase correction, $\Delta\Phi(t)$
- Higher order instrumental phase correction within each channel (necessary for wider channels)

Mk4/DiFX Fringe Plot

4C39_25.vumkx, 297-1556, KW
 S001_Kk - S004_Ww, fgroup X, pol RR

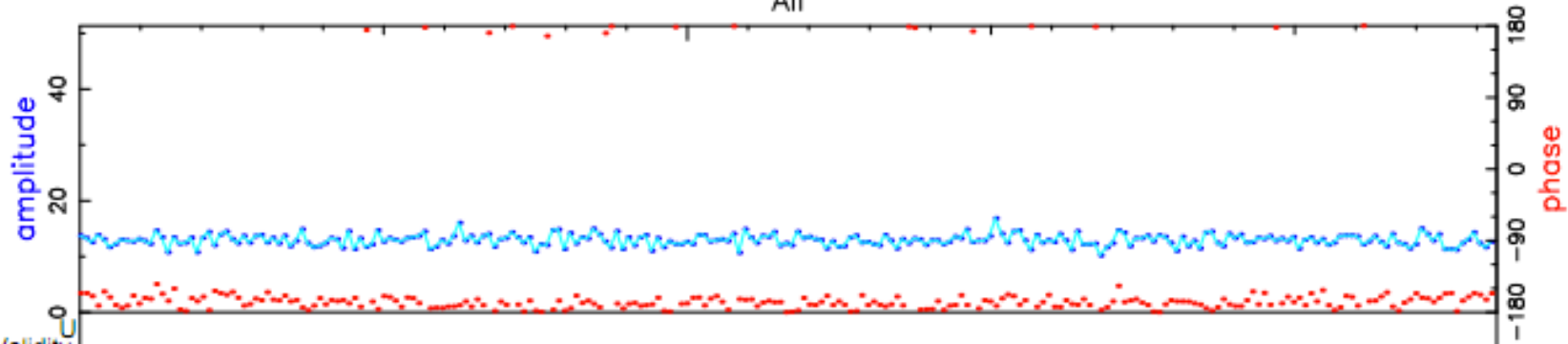


Fringe quality 9
 Error code H
 SNR 156.7
 PFD 0.0e+00
 Intg.time 23.328
 Amp 12.839
 Phase -168.2
 Sbdelay (us) 0.193381
 Mbdelay (us) 0.000000
 Fr. rate (Hz) -0.055561
 Ref freq (MHz) 9104.0000
 AP (sec) 0.096



Exp. x02
 Exper # 4002
 Yr:day 2011:297
 Start 155650.00
 Stop 155713.33
 FRT 155702.00
 Correlation date 2011:296:171620
 Fourfit date: 2011:297:171625
 Position (J2000) 09h27m 3.0139s +39°02'20.852"

Amp. and Phase vs. time for each freq., 243 segs, 1 APs / seg (0.10 sec / seg.), time ticks 1 sec
 All



Future features in fourfit (cont'd)



- Go from 3D search on $(\tau_{sb}, \tau_{mb}, \dot{\tau})$ to 2D $(\tau_{mb}, \dot{\tau})$ over the full frequency range
- Amplitude weighting for fine fit

