EVN Performance and Reliability

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NETWORK

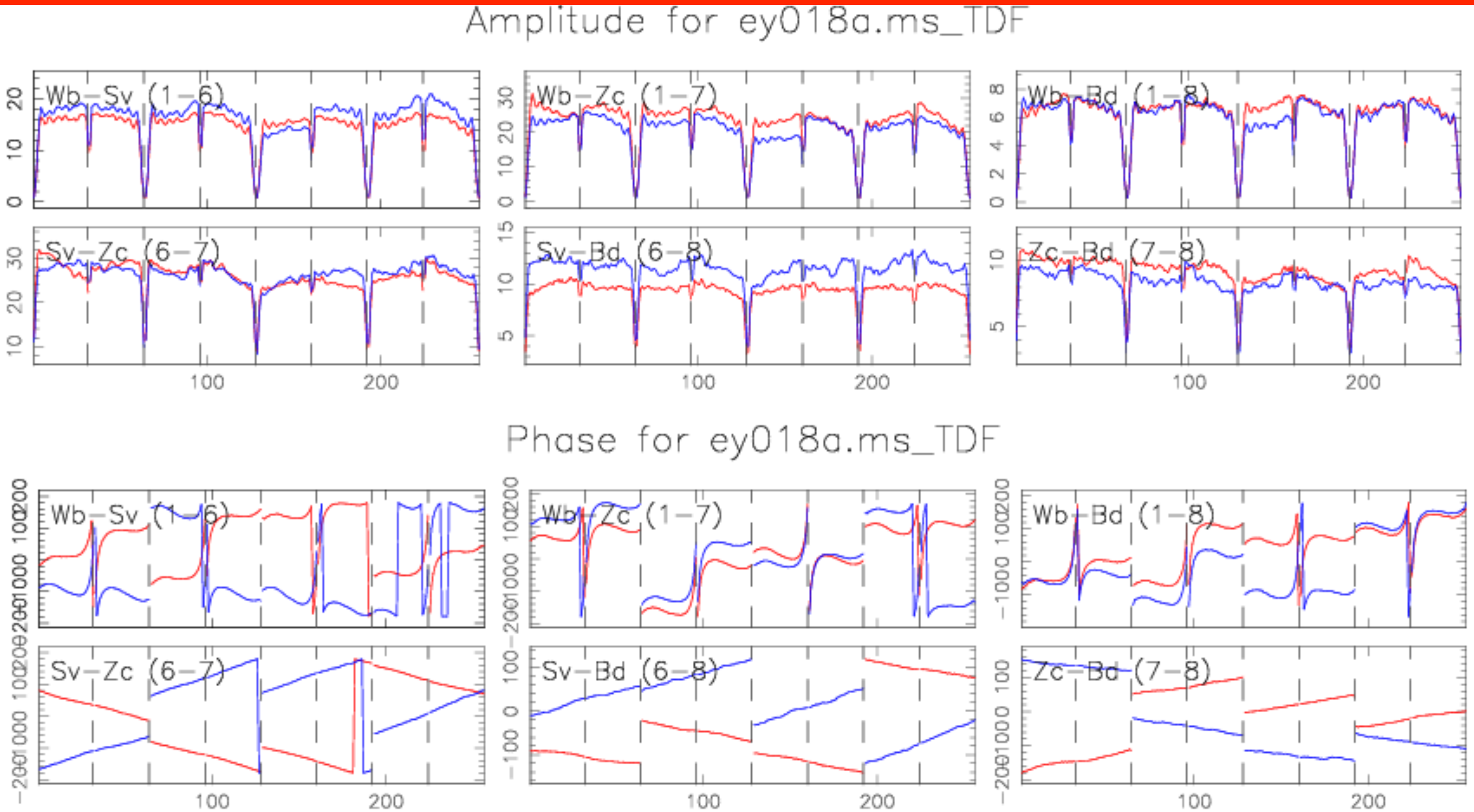
Outline

- ✪ **Recent EVN Highlights**
- ✪ **Early view of Session 2/2012**
- ✪ **Summary of Session 1/2012**
- ✪ **Summary of Session 3/2011**

Collection Highlights

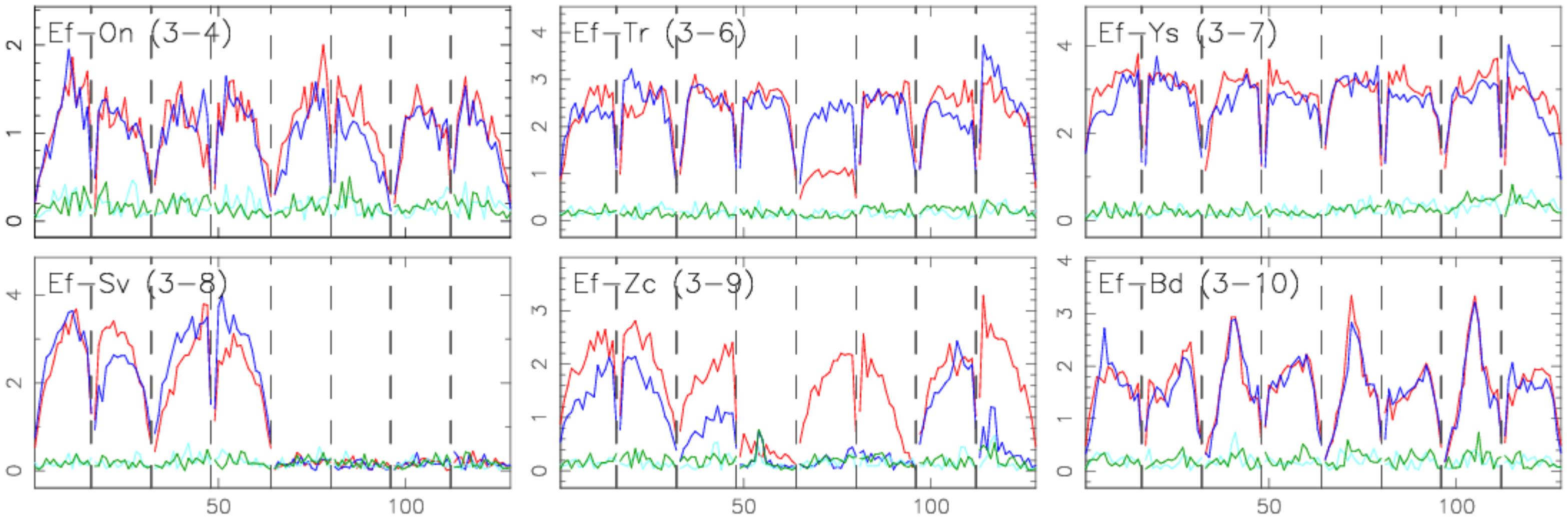
- ☺ First EVN fringes to Irbene in FR012 on 2012 Apr 12.
- ☺ First 22GHz EVN fringes to Urumqi new receiver, Zc, Sv in F12K1 on 2012 Feb 28.
- ☺ Noto back to the EVN Sessions since Session 2/2012 after being out for nearly two years.
- ☺ First real-time e-VLBI fringes to Hart on 2011 Aug 6 and the KVN (Korea VLBI Network) on 2011 Oct 9.
- ☺ More stations (On, Hh, Ys, Bd, Sv, Zc, Sh) have fringes to their new digital BBC backends.
- ☺ All the non-eEVN experiments are correlated by JIVE software correlator SFXC since 2012 —— EVN Sensitivity is improved by a factor of 1.15 as no fringe-rotation loss.
- ☺ South Africa joins JIVE.

Fringes to Sv, Zc, Bd since Session 1/2012
--Significantly optimized with their new digital backend R1002



Correlation amplitude and phase vs frequency in scan 15, EY018A (1 Gbps, 5 GHz).
Red: RR, Blue: LL. Correlated by JIVE software correlator SFXC.

Before 2012: Fringes to Sv, Zc, Bd



Plots of Correlation amplitude vs frequency in a scan of EV018B (1 Gbps, 5 GHz).

Red: RR, Blue: LL, Green: RL, Cyan: LR, No Van Vleck correction, .

Sv: Signal in upper 4 IFs (> 5 GHz) was filtered out by its receiver

Zc: Low correlation amplitude in LCP channels.

Strong RFIs in IF 3L, IF 4L&R, IF 8L.

Bd: Unusual bandpass shape in LSB IFs.

FTP Fringe Test in May/June 2012

N12X2 & N12SX1: Fringes to all the stations.

N12C2: No fringes to **JB1** as its Mk5 connection was hanging. The problem was fixed after the last ftp scan. **Ys** had problems with LO reference frequency and fixed it before the last ftp scan. **Ir** had fringes again on 4C39.25 while with very low SNR.

N12K2: No fringes to **Nt, Jb, Mh** even on the bright sources 4C 39.25 and 3C273.

N12L2: Tr stopped observations to repairs the serious failures of its telescope control system. **Nt** had no fringes in BBC 6. No fringes to **Ir** was likely again due to significantly sensitivity loss.

EVN Feedback in May/June 2012

There is feedback from Sv, Zc, and Bd since 2012.

Ys: Fringes in the latest e-VLBI experiment EG063A were quite weak and useless (likely associated with BBCs). Problems with MK5B in GB073.

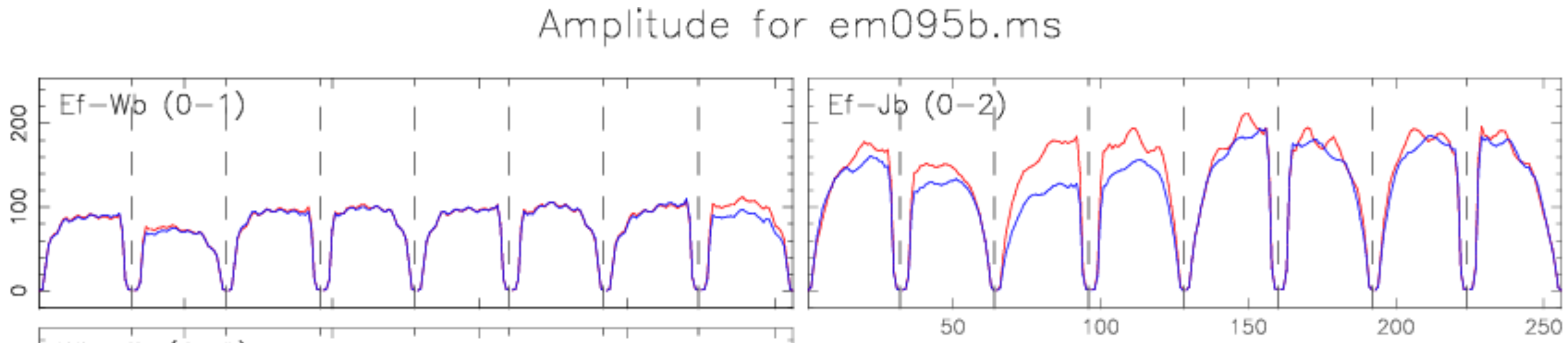
Mc: Problems with MK5A in GF018A (loss 7 hours).

Tr: Out for EG049E due to serious problems with telescope control system (probably associated with the recent upgrade of the angle encoder in azimuth).

Sv: Warm receiver in EG049E.

Ef: Loss time: 65% in EG061B and 25% in EE008D due to a broken oil pump.

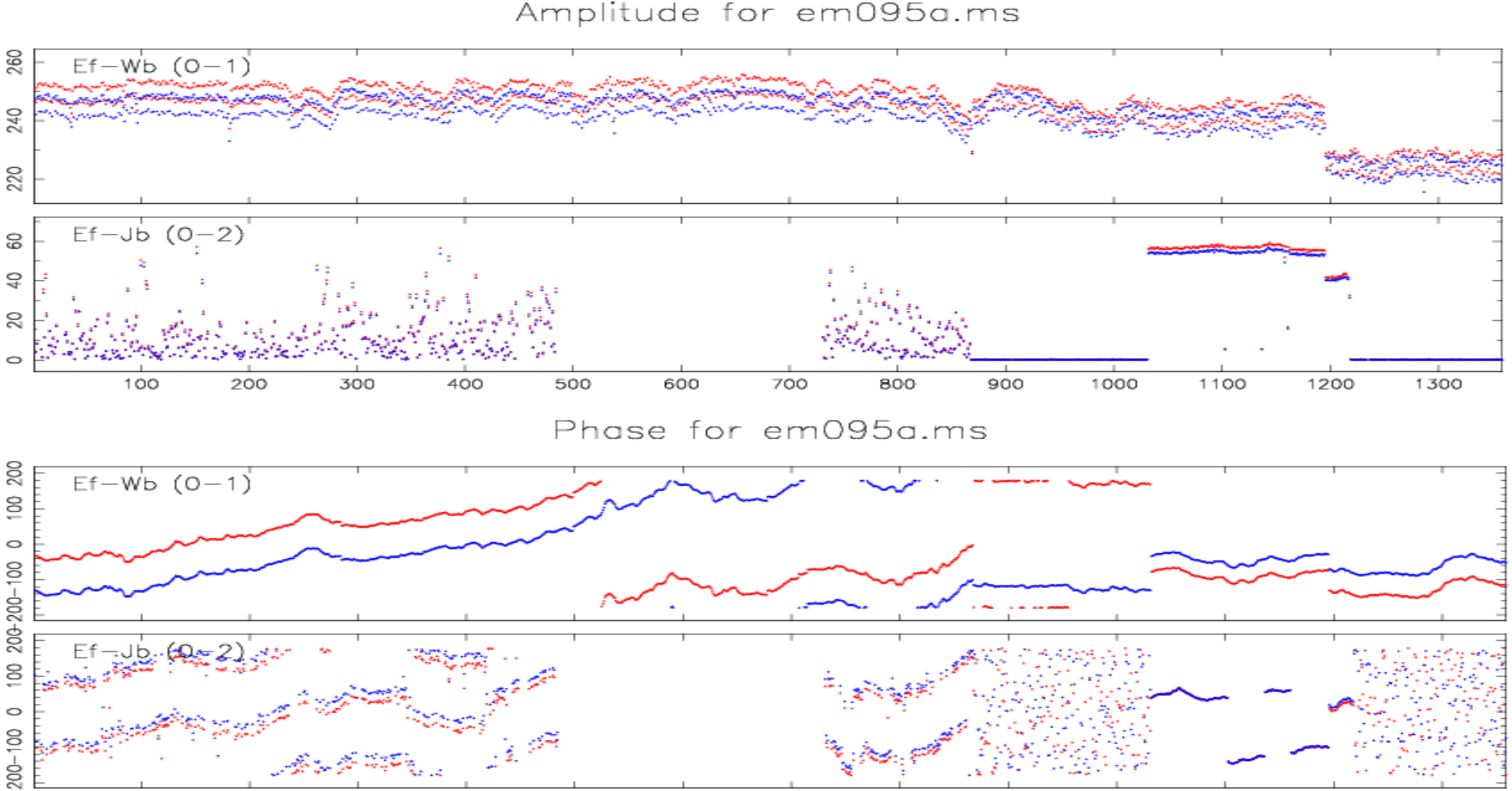
Jb1@18/21cm: Its L-band sensitivity was back to normal (Tsys ~ 40 K, earlier 80 K) according to the latest e-VLBI experiment RY003 and EP083 results. This is because the super L-Band receiver has been installed since 2012 Jan after a year or two out of service, reported by John Edgley.



Source: compact calibrator 4C39.25
EM095B: 18cm 1Gbps e-EVN observations on 2012 Jun 8

Note that Jb-Ef has slightly higher correlation amplitude than Wb-Ef.

Jb1@6cm: Its C-band receiver has a T_r ~ 20K now (previous 30 K) since Session 2/2012, reported by John Edgley. However, Jb1 had receiver problems and thus low and varing amplitude in the e-VLBI experiment EM095A on 2012 Jun 1.

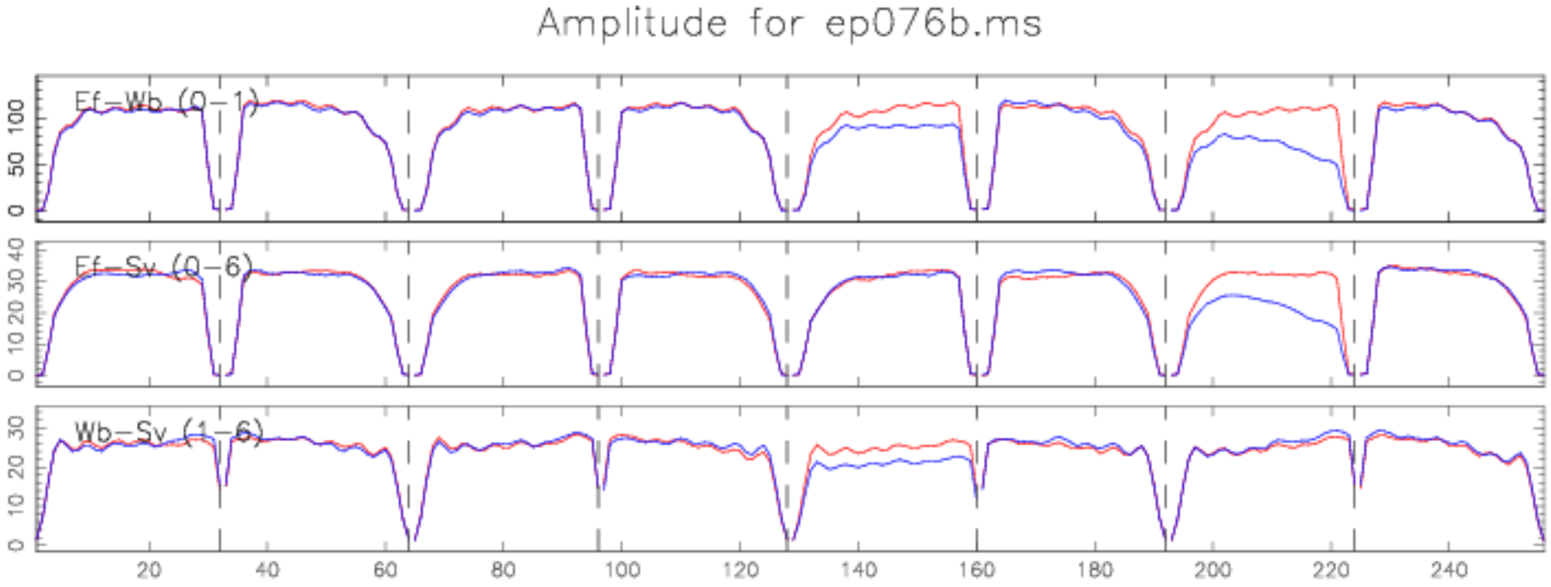


Source: 4C39.25. Note that the x-axis is integration rather than time

February/March Session of 2012

Ef: DBBC can only provide ~13 MHz bandwidth and BBC 8 LSB had low correlation amplitude in the experiments that requested 16 MHz filters.

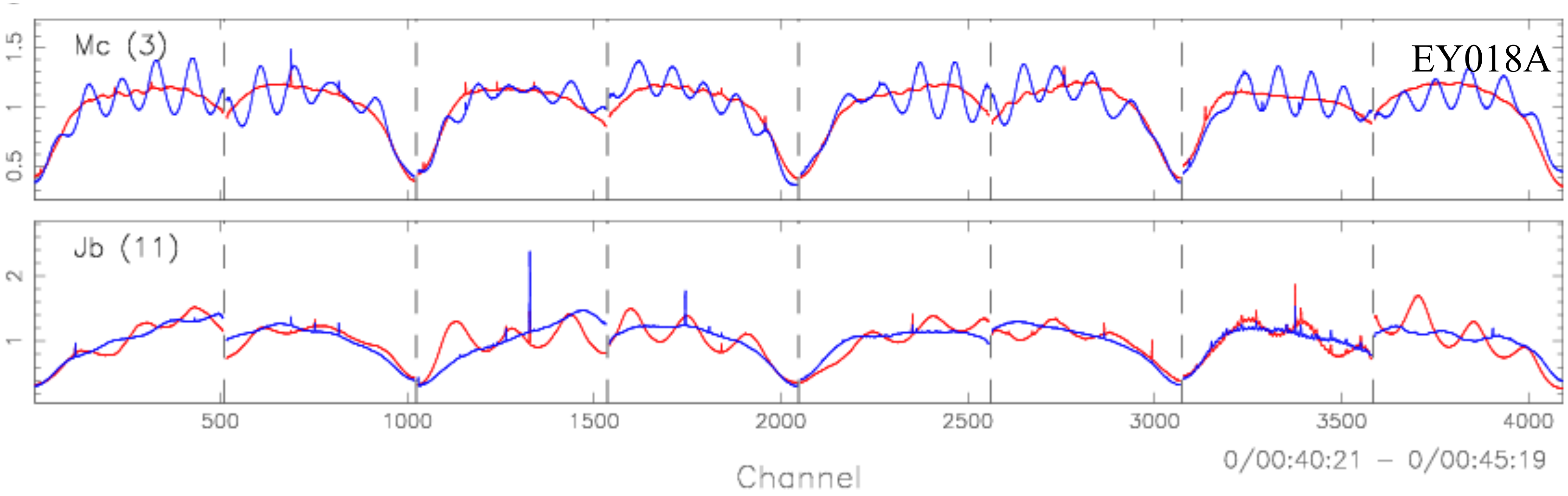
Wb: The 5th channel of LCP light path had low correlation amplitude in all the experiments with 16 MHz filters.



Mc: No fringes in EY018A likely due to wrong frequency setup. There was significantly sensitivity loss after a report of computer problems in EY071D.

Jb1: Fringes were quite weak in N12L1.

Mc—LCP and Jb1-RCP: There was an oscillating pattern in the C-band auto-correlation plots.



Ur: As data in a disk module were somehow lost, out for the correlation of EG049D and the last hour of EP076B.

Ys: Out for 8 hours in EG061A and 8.5 hours in EY018A due to an antenna control problems. There were bad recording (also saw scan_check "E" report, totally ~4 hours no fringes) in EP076B again.

MK5B recording: scan_check report ending with “E”

Session 1/2012

Wb — el042, n12m1, eb051, ej010, ep076a, ep076b, ep081a, ep081b
Ef - f12x1, ep081a, ep081b, ep081c
Hh — ee008c,
Bd –- ep076a, ep076b
Sv –- ep076a
Zc - ep076b
Ys— ep076b (quite frequently)

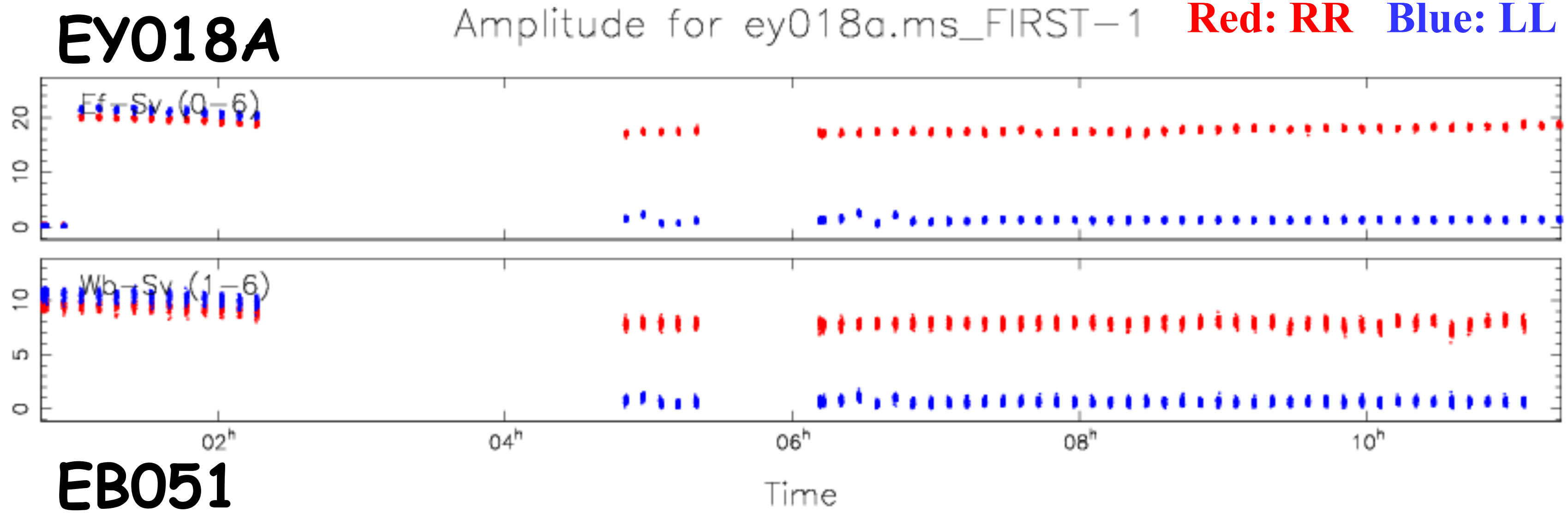
Session 2/2012

Wb –- et024b, ey018b, n12x2, ed038, ep075c, ep075d, ey015c, gf018a
Ef –- ed038, ep075c, gf018a, n12l2
Ys –- n12sx1, gf018a
Ur –- gf018a, eg061b
Bd –- ep075d
Hh –- ro004a

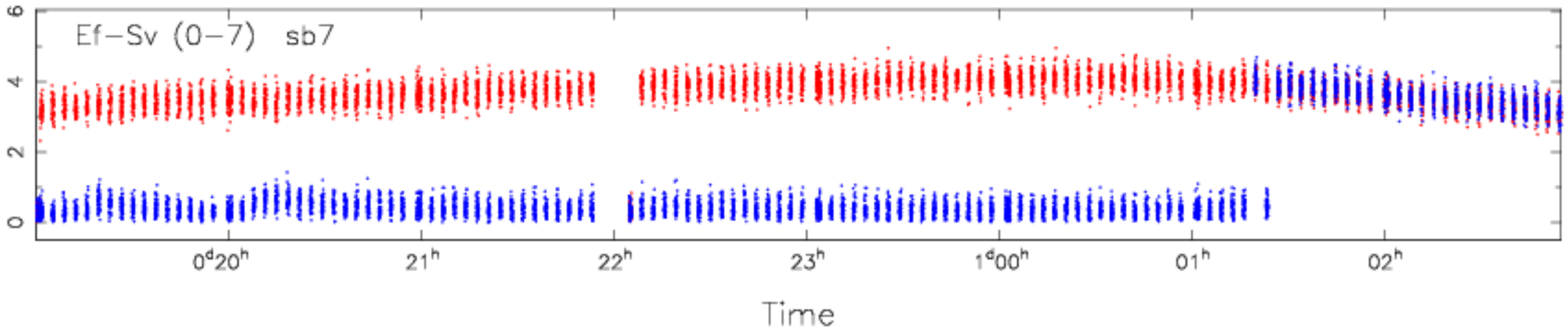
Sv: (1) LCP Correlation amplitudes jumped down in EY018A, through N12C1 and then back to normal in EB051.

EY018A

Red: RR Blue: LL



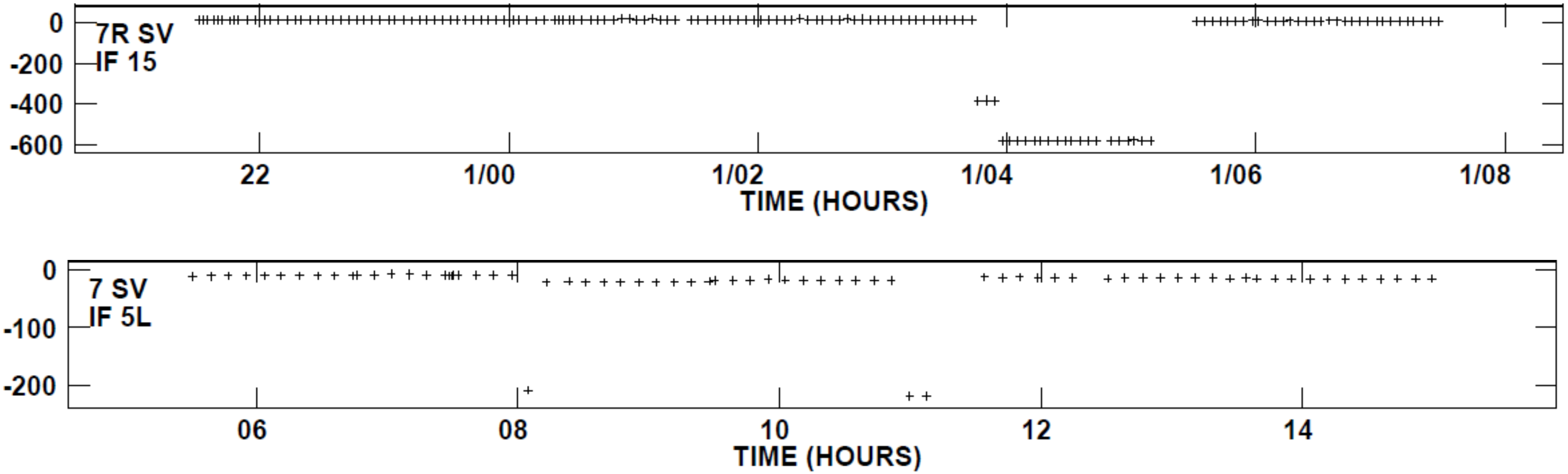
EB051



Sv: (2) Clock jumps in ET024A and EP076A

Fringe fitting delay solutions (ns) versus UT time.

Top: ET024A, Bottom: EP076A



EL042: Sv, Bd, Zc had wrong frequency setup.

Oct/Nov Session of 2011

Ur: New 22GHz receiver was tested. No fringes as its receiver synthesizers did not work properly.

Jb1&2: Again had significantly sensitivity loss although no operational issues.

Ef: There were some minor losses because of failures with elevation control system and IF power drop.

Mc: Problems with recording in EF023B, GV020G, EG049C, EM084D.

Sv: Playbacking failure on EM084C disk module.

FS Clock Jumped back to 2010

---- Most likely “Day 49” bug, explained by Ed Himwich

# Session 2/2012: None
# Session 1/2012: EM071D and EM081A at Mc
# Session 3/2011: GB072 at Ef, EA046 at Hh, N11X2 at Ys
# Session 2/2011: EV018D at Wb.
# Session 1/2011: EG051A at Sh

Solutions
Rebooting FS every month, proposed by Ed Himwich.

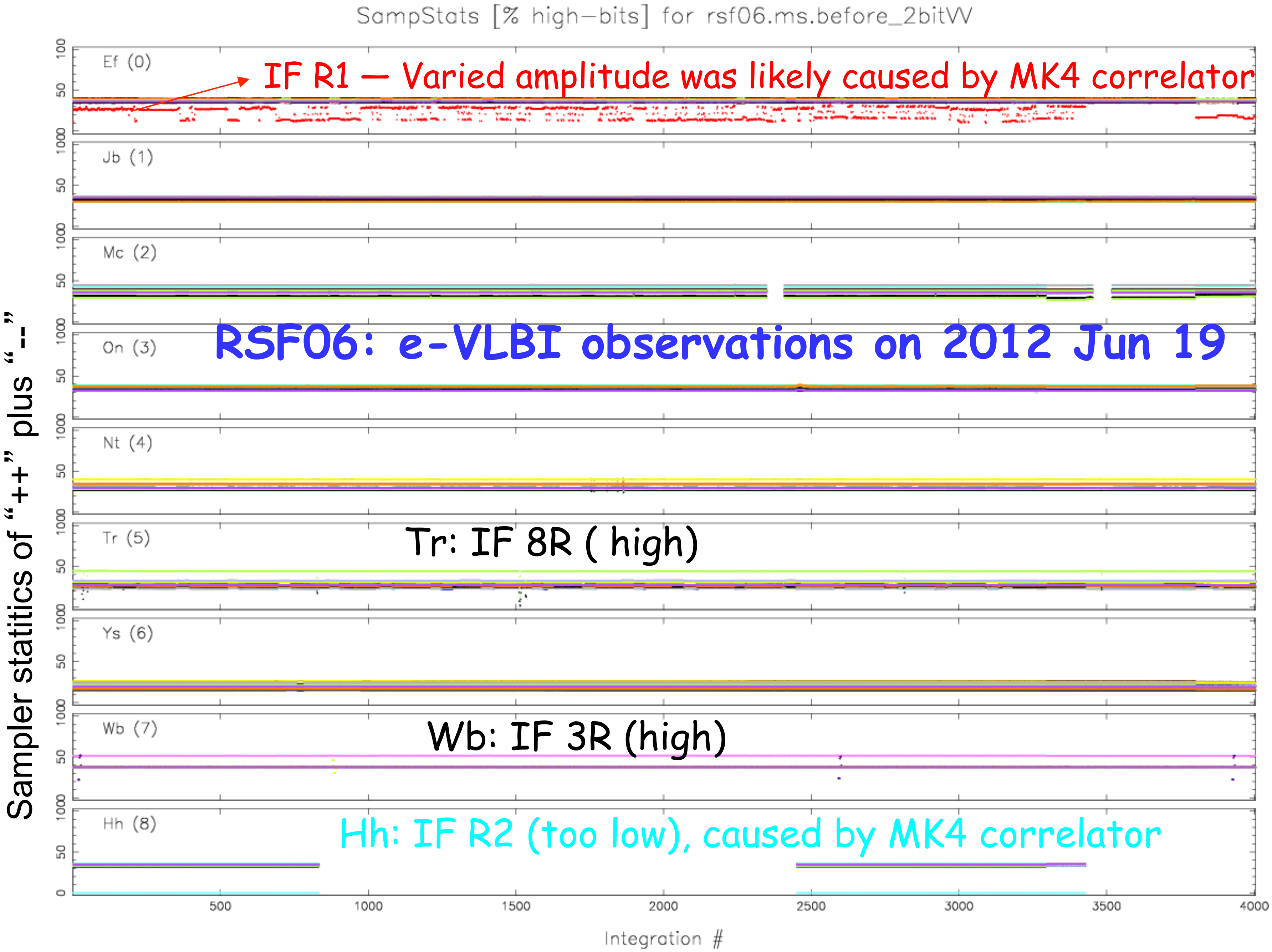
Reference Email
FS "setcl" issue with Linux kernel 2.6+ (FSL7) on 2009 Feb 12.

Sampler statistics

- ✡ It has been monitored by the ftp fringe tests since session 1/2010.
- ✡ Wb TADUmax: A slightly high DC component ("--" is ~20%; "++" is ~16%) at 18cm and 6cm.
- ✡ Van Vleck correction is done by JIVE software correlator SFXC
- ✡ Channels with poor sampler statistics were less seen.
- ✡ New digital backends

DBBC and R1002 — Bad sampler statistics was not seen at Ef, Bd, Sv, Zc.

CDAS — Sampler statistics was monitored and optimized by the internal program.



RSF06: e-VLBI observations on 2012 Jun 19

IF R1 — Varied amplitude was likely caused by MK4 correlator

Tr: IF 8R (high)

Wb: IF 3R (high)

Hh: IF R2 (too low), caused by MK4 correlator