Status of EVN Amplitude Calibration

Session 2/2012

The following table shows the median absolute amplitude error for EVN stations in the second session of 2012 (May/Jun). These results were derived from the pipeline amplitude self-calibration results. The number in brackets after each entry is the number of experiments that were used to determine the median error for that entry.

Station	18 cm	3.6 cm	6 cm
Jb1	0.05(8)		Failure*
Jb2			
Ef	0.03(8)	0.03(3)	0.03(6)
Mc	0.12(8)	0.05(3)	0.05(6)
On	0.08(8)	0.04(3)	0.05(4)
Tr	0.08(7)		0.04(5)
Wb	0.03(8)	0.08(3)	0.03(6)
Ys		0.04(3)	0.04(5)
Nt	0.08(8)	0.10(3)	0.10(6)
Hh	0.12(2)		0.04(2)
Ur	0.11(4)*	0.18(3)*	0.03(5)
Sh			
Bd	0.07(4)	0.10(2)*	0.04(4)
Sv	0.09(4)	0.14(2)*	0.17(4)*
Zc	0.11(4)	0.06(2)	0.07(4)

The blank entries indicates insufficient data. The numbers above are the median absolute error in the antenna gain amplitude (as calculated from pipeline amplitude self calibration). A value above 0.1 indicates a significant error which should be investigated. In addition to the absolute errors summarized here, the EVN pipeline provides details on every experiment processed at JIVE including the sign and time variability of the errors. In each experiment, the self-calibration results of a bright and compact source were used to get the reliable results. Note that nominal SEFDs, listed in the EVN status table, were used to make antab files for Bd, Sv, Zc.

*Jb1: The super L-band receiver was re-installed after two year of out of service. Its 18cm sensitivity is back to normal (Tsys ~ 40-50 K) since Session 2/2012. Its 6cm data were not useful as there were a great number of phase jumps during each scan.

*Mc: Tsys was slightly higher (~1.1x) at 18cm.

*Ur: Tsys slighty higher in all subbands at 18cm (~1.2x) and 3.6cm (~1.3x).

*Sv and Bd at 3.6cm: Nominal SEFD provided by stations should be slightly modified.

*Sv at 6cm: There were two experiments EP075C and GF018A in which Sv had no/very weak fringes in LCP BBC channels. If the two experiments are excluded, Sv will have a median error 0.08(2).

*Hh: Median error 0.08 in the user expriment EM095B. The other experiment is N12L2. No good calibration on DA193 is likely due to low elevation in N12L2.

K-band EVN observations

There are 12 EVN stations (Ef, Ro70, Ys, Jb2, On, Nt, Mh, Sv, Zc, Ur, Sh, Hh) available at 1.3cm now. Torun new 22 GHz receiver is ready for searching for fringes in N12K4. Three Korean antenna will participate N12K4 to test their compatibility with the EVN. Note that these Korean stations provide not only long baselines but also short baselines for the EVN observations. There will be 15 stations totally in the ftp fringe test N12K4, which is another record in the EVN history.

There were 9 user experiments (including Session 3) totaly in 2012. Ef, Ys, On, and Sh have started to provide opacity-free gain curves. Onsala uses different way (Chopper Wheel) to measure Tsys and its Tsys data have already included opacity correction. Thus, it is not necessary to solve for opacity any more in the post data reduction for Onsala. As the EVN pipeline does not solve for opacity according to the Tsys data, usually, Onsala has AIPS gain solutions around 0.85 after the amplitude self-calibration. Jb2 has proper total power measurment in the FS log files, while there were no propoer Tcal measurments in the rxg file. Sv and Zc are still using nominal SEFD and a flat gain curve in the antab files. Mh was found to have a SEFD ~4500 in N11K1, a factor of 1.5 higher than the nominal SEFD because an extra noise was added by a blow-up power supply in 5 MHz H-maser reference. Before Session 3/2012, Mh fixed the problem. Ur has a new 22GHz receiver with a SEFD 850 Jy. Hh is using a room-temperature receiver and may have problems with pointing. Ro70 is as sensitive as Ef at 22 GHz and also provides a short baseline to Yebes. Ro70 has a new K-band receiver and put it in the user experiment EE008D for a test. However, there were no high-SNR fringes out because of tracking error. Onsala had some instrumental issues which caused its sesitivity varing significantly on time scales of minutes in Session 2/2012. Besides all these issues from stations, it is hard to find a compact source with known total flux density at 22 GHz. Thus, it is hard to get the EVN pipeline to properly deal with all these station and experiment-dependent issues and to give a reasonable

calibration solutions.

It will be helpful to use 1024 Mbps (8 BBCs, USB and LSB, 16 MHz filter) recording rate in NME to take care of these less-sensitive stations (Mh, Hh, Sh, Jb2). Ftp fringes
to them are usually weak. With better sensitivity, it will be easier for JIVE support scientist to search for ftp fringes and identify all kinds of issues. Moreover, this
high-sensitivity mode matchs most EVN user experiments, which is very helpful to investigate the problem thta found in the user experiment.

Jun YANG for the Science Operation and Support Group (JIVE)