Robledo Station Report

EVN TOG Meeting, February 2016
OAN, Spain

1. Hardware and software status.

1.1. DSN digital backend.

The DSN VLBI digital backend -DSN VLBI Processor (DVP)- was declared operational on April 2014. Since then the DVP is successfully supporting JPL VLBI projects using the JPL software correlator. The DVP does not use the NASA Field System application to configure the terminal and carry out the observations. A schedule processor has been developed to generate DVP scripts from VEX schedules. Currently it records VDIF format (multi-channels data threads, 16 bytes legacy headers) on a Mark5C recorder with SDK 9.2. The DVP schedule processor (script builder) does not support yet Mark5 continuous recording. DVP recording script needs to be manually edited for continuous recording.

Robledo has supported the EVN observations performed during last observing session and out-of-session in 2015 with the DVP as the only backend. The MarkIV DAT is currently being decommissioned.

During Fiscal Year 2016 is has been approved a new delivery of the DVP software, that will solve, among others, the directory listing problem encountered with DiFX, will provide reliable total power measurements for each digital channel, will allow to record less number of channels reducing the total recording data rate, etc.

1.2. DSS-63 (70m) K-band receiver status.

Only K-LCP polarization operational. K-RCP polarization system temperature is very high. It is suspected the K-RCP path at the Post-amp & Calibration assembly unit. Lately it has been noticed a considerable drop in the signal level at both polarizations. Further troubleshooting is required.

1.3. DSS-63 (70m) L-band receiver status.

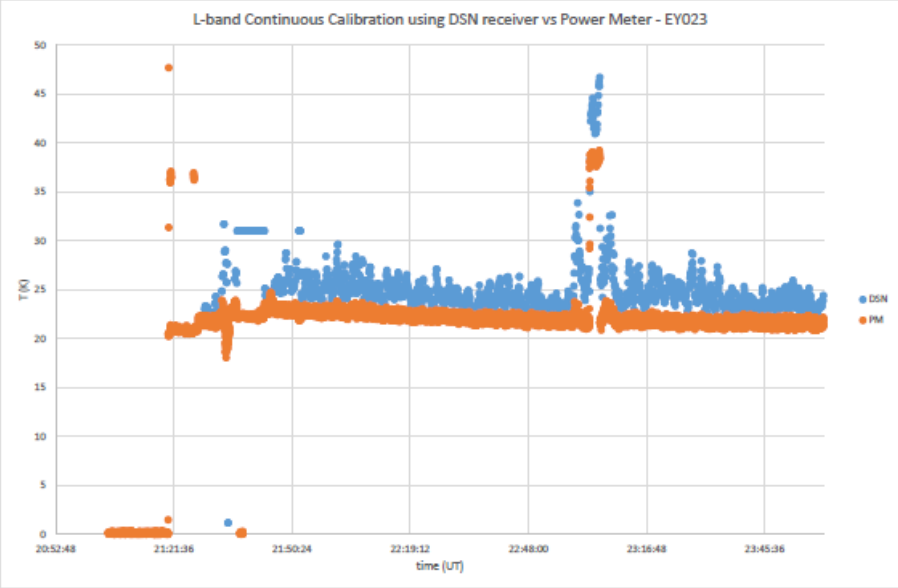
Operational. All DSN 70m antennas L-band receivers have been upgraded from 90 MHz bandwidth (1625-1715MHz sky frequency) to 500 MHz (1400-1900MHz sky frequency). The upgrade took place at just one of the LNAs, replacing the refrigerated RF filter installed before the LNA. The spare LNA has not been modified yet.

1.4. DSS-54 (34m) Q-band receiver status.

Operational.

2. Calibration.

a. DVP data calibration. Continuous calibration scheme has been tested with the DVP during EVN session III. The noise diode was modulated at 10 Hz and DSN calibration has been compared with power meter measurements (Fig.). For L-band DSN calibrations are too noise compared with the PM measurements (Fig. top). For X-band DSN calibrations are good enough (Fig. bottom). A script will be developed to derive the antabfs files from DSN or PM data.



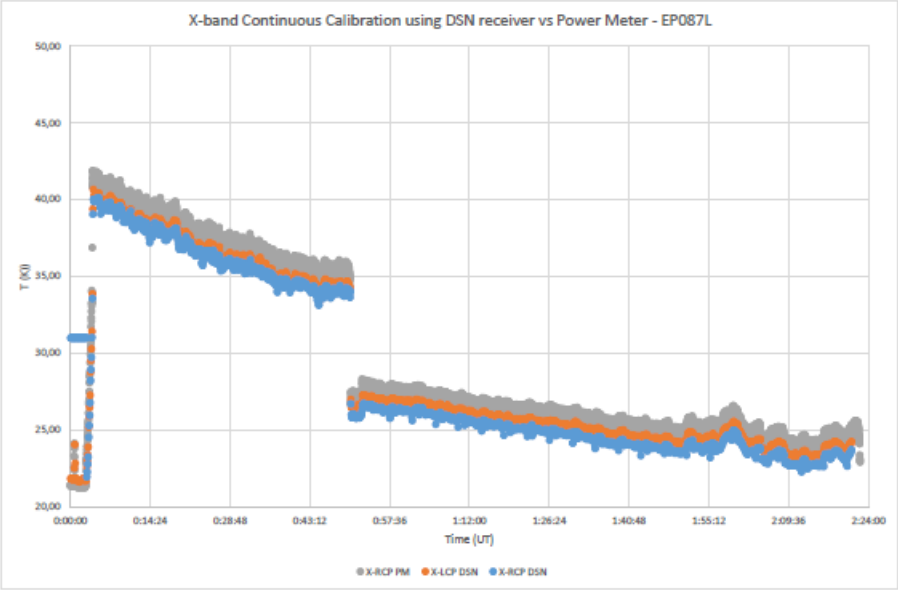


Figure . Continuous calibration testing during EVN session III.

b. DSS-63 K-band calibration. Currently there is no ambient load available so calibrations are performed using the noise diode. Noise diode calibration is regularly checked using the ground.

c. DSS-63 K-band pointing. K-band pointing models need to be improved. This task was included in past August Depot Level Maintenance DSS-63 antenna downtime. A problem with the autocollimators, still not solved, has prevented to derive the new models. Manual pointing offsets are measured and applied in real-time.

d. DSS-63 L-band beam-shape measurement. EVN has requested to provide DSS-63 beam-shapes at L-band and low antenna elevations for calibrating off-axis detections in wide field observations. Several preliminary raster scans were performed in DEC/XDEC using different sources and antenna elevations. Lack of available antenna time has avoided to continue this task.

3. Immediate and Future Plans.

DSS-63 Robledo 70m antenna will be stopped for major maintenance during weeks 20-21 (second half of May) and 29-39 (mid-July until October). Among other tasks it will be performed shimming and AZ track epoxy grouting of the last segment.

The old DSN K-band broadband receiver (18-26.5GHz, with only 70MHz baseband bandwidth per polarization) is currently being upgraded from three to four IF channels with a goal of 10 GHz instantaneous usable bandwidth at each polarization (17-27GHz), and beam switching capability for single dish spectroscopy. The actual downconverter (MMS) will be replaced by a design from the EE Department at Caltech that will down convert the IF channels into 1GHz wide USB and LSB (or into 2 GHz wide in-phase/quadrature-phase) analog data channels. It will also allow selecting linear or circular polarization. Phase I of the receiver (only 21-23GHz and 23-25GHz frequency ranges) has been installed in Canberra 70 m antenna (DSS-43) and is currently in

commissioning phase. Goldstone and Madrid receivers will be upgraded depending on available budget.

DSN L-band receiver upgrade to 1.4-1.9 GHz bandwidth: the original L-band feed is band-limited and does not allow the usage of the whole available bandwidth. The replacement corrugated type feed was installed in Canberra DSS-43 70m antenna during last August (Fig.). It is not decided yet which 70m antenna will get the new L-band feed next.

Figure . Details of the installation of the new L-band feed in Canberra, 70m antenna DSS-43.

Robledo e-VLBI activities: 300 Mbps connection from Robledo to the Spanish Research and Educational Network (RedIRIS) has not yet being upgraded to 1 Gbps.

4. Recent Robledo support to EVN observations.

Robledo has supported the EVN observations performed during 2015 with the new DSN digital backend (DVP).

During EVN session#2 2015 Robledo could not participate as the requested antennas DSS-63 and DSS-54 were busy. The available gaps did not coincide with the times requested by the EVN.

During Out of Session EVN observations, July 2015: no DSS-63 antenna time available.

During Out of Session EVN observations, October 2015: Robledo participated with DSS-63 antenna in following K-band observation, correlated at JIVE (J):

DOY START BOT EOT END FACILITY USER ACTIVITY

281 2155 2325 0230 0300 DSS-63 EGS EVN GA037B (K-band, J)

During EVN session#3 2015 Robledo participated with DSS-63 antenna in following observations in L and X bands, correlated at JIVE (J) correlator, Calibration periods were used to calibrate the noise diodes, measure pointing offsets and develop a test new automation scripts to be used by the operators:

DOY START BOT EOT END FACILITY USER ACTIVITY

288 2125 2255 0255 0325 DSS-63 EGS CALIBRATION

289 2100 2230 0230 0300 DSS-63 EGS EVN EY023 (L-band, J)

291 2115 2245 0220 0250 DSS-63 EGS EVN EK036A (L-band, J)

294 2115 2245 0115 0145 DSS-63 EGS CALIBRATION

296 2045 2215 0115 0145 DSS-63 EGS CALIBRATION

298 2315 0045 0220 0250 DSS-63 EGS EVN EP087I (X-band, J)

Best regards,

Cristina García Miró

VLBI/technical friend

cgmiro@mdscc.nasa.gov

Madrid Deep Space Communication Complex -MDSCC-
Robledo Tracking Station NASA/INTA
Tel +34-91-867-7130
Fax +34-91-867-7185