DCR Stability Monitoring of L-band Receiver
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1 Setup

The DCR was used to record the total power from the L-band (Rcvr1-2) receiver, as detected in the IF Rack and in the Analog Filter rack. The center sky frequency was 1.4GHz, and front-end RF filters 1.30-1.45 GHz, as well as the radar notch filter, were selected. IF Rack 3000/80MHz filters were selected. Both linear polarizations were recorded.

DCR $tau = 1s$, $ScanTime = 120s$, $BlankingTime = 2mS$, and switching mode Total Power with Cal were used. Weather conditions were clear, temperature 20F, and winds of 5-10mph. M&C version 3.10 was active.

2 Measurements

2.1 GBT Tracking

The system was configured so that the receiver IFs were connected to Optical Driver modules 1 and 3. The corresponding Optical Receiver outputs were then connected through two independent Converter and Sampler/Filter module paths. 200MHz filters were selected in the SF modules. Data from detectors in the ODM and SF modules was recorded by the DCR.

Connections:
L-X → ODM1 → OR1 → CM1-2 → SF1-2 → DCR ch9-10
L-Y → ODM3 → OR3 → CM5-6 → SF5-6 → DCR ch13-14

DCR channels 1,3,9,10,13, and 14 were recorded.

The GBT was set to track RA 02:38; Dec 36:18. Elevation and azimuth were approximately 70 and 22 degrees respectively.

Scan 23 st @ 22:06:45 → Scan 37 fi @ 22:38:39.

Discussion: Figure 1 shows the total power detected at the IF Rack. The step in the XL channel at minute 13 appears to be localized to the ODM 1

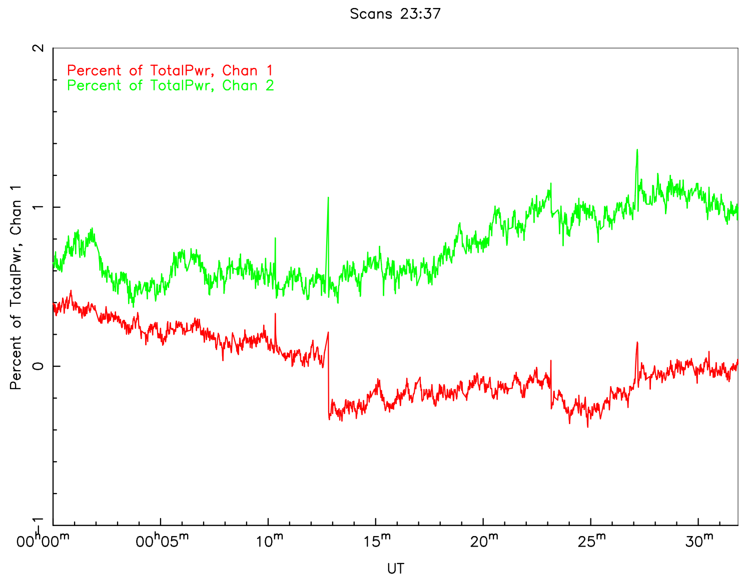

Figure 1: Total Power from L-Band channels XL (red) and YR (green) as measured at detectors in ODM 1 and 3. The green trace is offset by 0.75% for clarity.

detector. Figure 2 shows the total power for XL as also detected in the Analog Filter rack, and these do not show the step. Figure 3 shows the total power for YR as also detected in the Analog Filter rack. All three track quite well.

Figure 4 shows the T_{sys}/T_{cal} for both polarizations. The published T_{cal} values for XL and YR channels are 1.57K and 1.62K, indicating measured T_{sys} of 18.2K and 17.7K respectively.

3 Summary

Total power data was recorded for thirty minutes from both polarizations of the L-band receiver, as the GBT tracked what appeared to be cold sky. A half percent step in detected power was noted in one channel, but appears to be localized to the detector in ODM1. Fluctuations of a few tenths of a percent which were uncorrelated across the polarizations were seen. The fluctuations before the IF Rack appeared to dominate any fluctuations in the fiber IF or Equipment Room equipment. Some spikes in total power correlated in the two polarizations were seen, and probably were RFI.

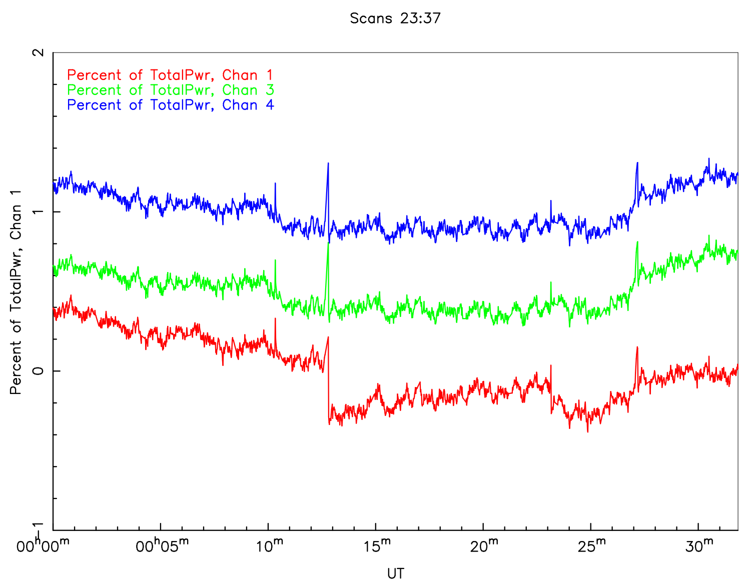

Figure 2: Total Power from L-Band channel XL as measured at the ODM 1 (red), SF1 (green), and SF2 (blue) detectors. The traces are offset by 0.5% for clarity.

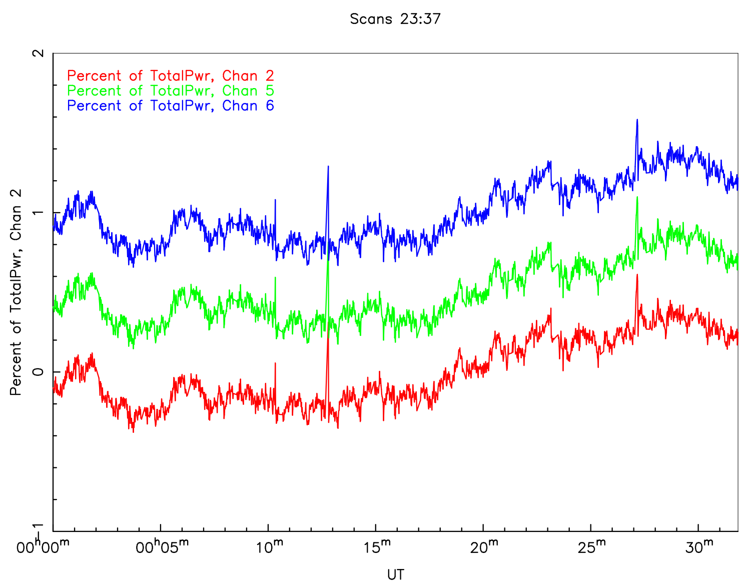

Figure 3: Total Power from L-Band channel YR as measured at the ODM 3 (red), SF5 (green), and SF6 (blue) detectors. The traces are offset by 0.5% for clarity.

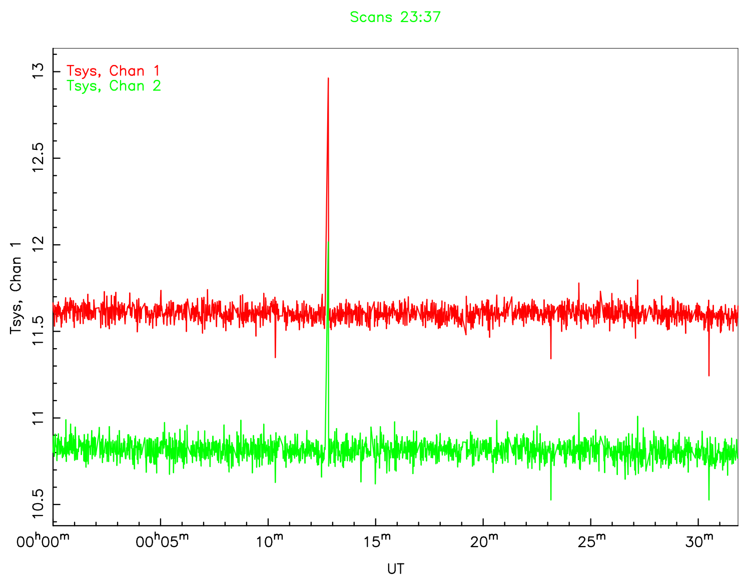

Figure 4: T_{sys}/T_{cal} from L-Band channel XL (red) and YR (green) as measured at the IF Rack detectors.