

S77 Titan T89 Gravity

- S77 Rev181 T89 Titan Gravity Experiment
 - C/A 048/03:16 ERT, Altitude 1978 km
 - Telemetry ON, Coherent mode (2-way and 3-way)
 - Covered by all complexes
 - Goldstone -> Canberra -> Madrid -> Goldstone
- Last Titan gravity experiment was T74 in February, 2011
- Next are T99 in March, 2014 and T122 in August, 2016
- Science Highlights

T89 is one of four RSS gravity flybys in the Solstice Mission. During the Solstice Mission, the main science objectives of gravity measurements at Titan support the Titan Interior Oceans Campaign. Additional gravity flybys are required to confirm or deny the presence of an ocean and determine whether the interior is soft or rigid. Additional RSS gravity observations will help determine if Titan's crust is thick and rigid, or still thin. The latter would support ongoing dehydration today.

DSN Antennas

- DSN Coverage

	Pre	BOT	EOT	Post								
13 046	2315	0045	0940	0955	DSS-55 CAS	TP RS181-TI	GSE	5618 N750	1A1	GSE		
13 046	2345	0045	0945	1000	DSS-63 CAS	TKG PASS		5618 N003	1A1	GSE		
13 047	1030	1200	1730	1745	DSS-25 CAS	RS181-T89	GRAV	5618 N748	1A1	Grav		
13 047	1130	1300	0100	0115	DSS-34 CAS	RS181-T89	GRAV	5619 N750	1A1	Grav		
13 047	2300	0030	0935	0950	DSS-55 CAS	RS181-T89	GRAV	5619 N750	1A1	Grav		
13 048	0620	0750	1545	1600	DSS-25 CAS	RS181-T89	GRAV	5619 N748	1A1	Grav		
13 048	2300	0030	0930	0945	DSS-55 CAS	RS181-TI	GSE	5620 N750	1A1	GSE		
13 048	2330	0030	0815	0830	DSS-63 CAS	T/P T89PB		5620 N003	1A1	GSE		

Prime gravity is DSN Level 3 activity

- Receivers scheduled

- 2 closed-loop receivers per BWG antenna
- Open-loop receivers
- Closed-loop data are prime. Open-loop data are backup
- LCP not required. Only RCP

S77 T89 Open-Loop Assignment

DSS Prdx Mode	Operator	Station	Open-loop Receiver	Channels	Subchannels	Bandwidths KHz
25	Elias/ Danny	rsops1	RSR2	RSR1A -> XRCP RSR1B -> KRCP	1, 2, 3, 4 1, 2, 3, 4	1, 8, 16, 50 1, 8, 16, 50
34	Elias/ Danny	rsops1	RSR2	RSR2A -> XRCP RSR2B -> KRCP	1, 2, 3, 4 1, 2, 3, 4	1, 8, 16, 50 1, 8, 16, 50
55	Gregory/ Aseel	rsops1	RSR2	RSR1A -> XRCP RSR1B -> KRCP	1, 2, 3, 4 1, 2, 3, 4	1, 8, 16, 50 1, 8, 16, 50
25	Aseel/ Elias	rsops1	RSR2	RSR1A -> XRCP RSR1B -> KRCP	1, 2, 3, 4 1, 2, 3, 4	1, 8, 16, 50 1, 8, 16, 50

RSSG will be in Ops Room at 2:00 am on Saturday, February 16 (047/1000) until 8:00 am Sunday, February 17 (048/1600)

-> 3 hour coverage!!

RSSG shifts:

Gregory: Fri 6/15 3:15 pm – 8:00 pm (Inbound GSE)

Elias: Sat 2/16 2 am – 7 am

Danny: Sat 2/16 6:30 am – 3:30 pm

Gregory: Sat 2/16 3:00 pm – 7:45 pm

Aseel: Sat 2/16 7:00 pm – Sun 2/17 2:15 am

Elias: Sun 2/17 2:00 am – 8:00 am

Gregory: Sun 2/17 3:00 pm – 8:00 pm (Outbound GSE)

ORTs

All Completed

ORT on DOY 034 (Feb 3) over DSS-34, X- and Ka-band

13 034 1345 1515 0020 0035 DSS-34 CAS RS180-GRVORT MC 5606 N750 1A1

- Also prime tracking pass
- Nominal. Verified monopulse, acquired pointing data

ORT on DOY 040 (Feb 9) over DSS-25, X- and Ka-band

13 040 0700 0830 1730 1745 DSS-25 CAS RS181-GRVORT MC 5611 N748 1A1

- Also prime tracking pass
- Nominal. Verified monopulse, acquired pointing data

ORT on DOY 042 BOT (Feb 11) over DSS-55, X- and Ka-band

13 041 2330 0100 0645 0700 DSS-55 CAS RS181-GRVORT MC 5613 N750 1A1

13 042 0000 0100 1000 1015 DSS-63 CAS T/P FSW NORM 5613 N003 1A1

- DSS-63 prime
- Elias reported: Station performed an on point phase calibration at BOT, which was completed at 01:05:10 and monopulse was enabled at 01:06:00. Station had to disable monopulse at 01:30:00, due to significant fluctuations in the K-band PcNo (~ 2 dB) and a second on point phase calibration was performed which was completed at 01:37:18. Monopulse was enabled at 01:38:00. However, fluctuations in the K-band 1-way PcNo of ~ 1 dB persisted. After switching 3-way/63, the fluctuations decreased

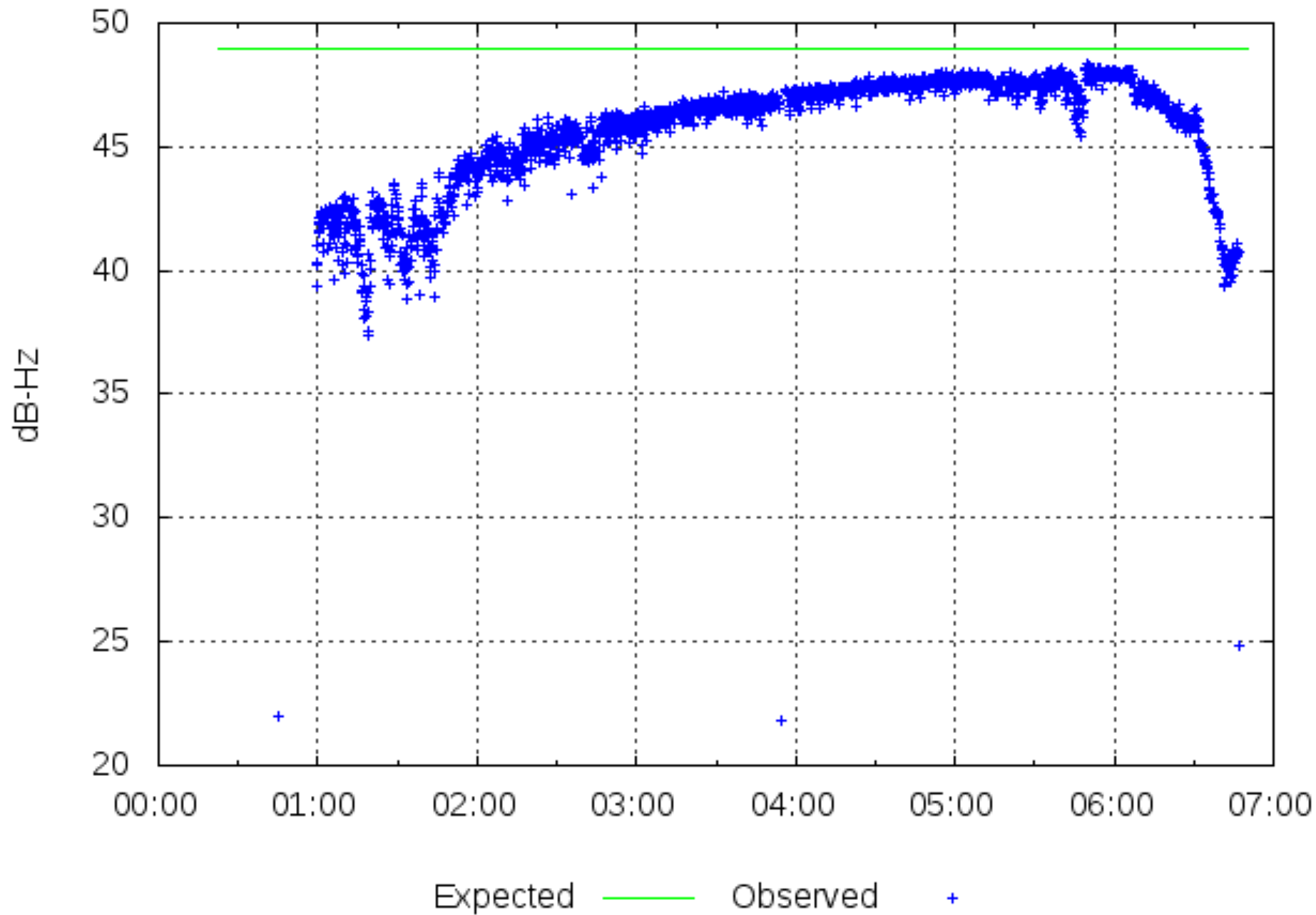
ORT on DOY 043 BOT (Feb 12) over DSS-55, X- and Ka-band

13 042 2330 0100 0730 0745 DSS-55 CAS RS181-GRVORT MC 5614 N750 1A1

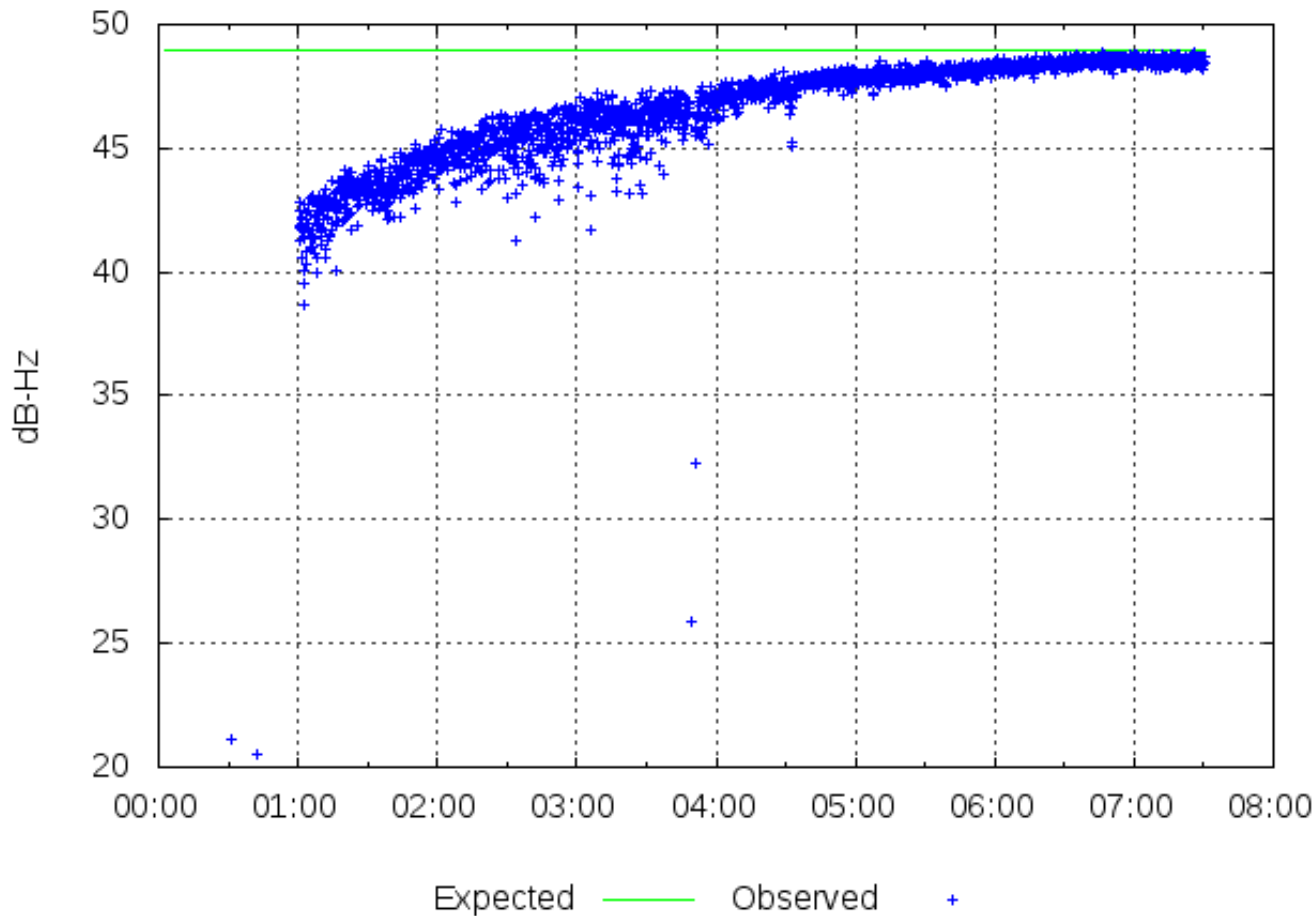
13 043 0000 0100 0945 1000 DSS-63 CAS TKG PASS 5614 N003 1A1

- DSS-63 prime
- Fluctuations in Ka-band during 1-way? Visible in post-pass 1-way plot.

2013/042 S77 ORT 55_K_RCP



2013/043 S77 GRV ORT 55_K_RCP



Misc

Possible use of unramped uplink predicts?

GSEs will be partially supported

Uplink Plan

- Per SOE/DKF, except very last transmitter off
 - DKF has DSS-25 TXR off at 048/123757. Use 048/124300
- Gap due to transmitter limits during Canberra-Madrid overlap (no uplink transfer)
 - DSS-34 transmitter OFF 048/004000
 - DSS-55 transmitter ON 048/005500
 - DSS-55 could have had transmitter ON at 048/005200, but was too late to make change to sequence
 - Coherent gap RTL later is 048/031723 to 048/033223

Pointing Plan

- Enable monopulse throughout observation. If problematic, stay with blind pointing
- Disable 1-2 minutes before 1-way to 2-way mode changes over first DSS-25 track, re-enable after 2-way acquisition
 - No need to disable before mode changes during coherent gap over DSS-55
- Stations to wait for RSSG to request monopulse enable/disable
- Watch for monopulse enables at low Elevation angles. Wait till ~10 degrees

Equipment status?

- NOPEs? (DSS-25, DSS-34, DSS-55)

SNT

- Enable at all throughout

Misc Cont'd

Closed-loop Receivers during closest approach

- High signal dynamics. Widen carrier loop bandwidth?

AWVR Status

- As of today, ready at Madrid
- Elias – Goldstone?