

About the Gravity Observation

- S42 Rev78 T45 Titan Gravity Observation
 - First gravity experiment in extended mission
 - Telemetry ON, Coherent mode (2-way and 3-way)
 - Covered by all complexes
 - Madrid -> Goldstone -> Canberra -> Madrid -> Goldstone

- From Gravity DG:

T45 is the fourth flyby allocated to Radio Science for the determination of Titan's gravity field. The first three flybys were T11, T22, and T33

Can Cassini detect a subsurface ocean in Titan from gravity measurements?

If the higher degree field (higher than 2) does not interfere with the determination of the quadrupole field:

- With T11+T22+T33+T45, one would estimate the real part of k_2 with a one sigma accuracy of 0.14 and the imaginary part of k_2 with a one sigma accuracy of 0.12.
- This would allow to determine the presence or absence of a subsurface ocean if the viscosity is $> 5E13$ Pa-sec.

The gravity field is more complex than was expected from the analysis of T11 and T22. T45 will add significantly to the sampling of the satellite and to the determination of the degree and order 3 gravity field.

DSN Antennas

- DSN Coverage

Station	Pre-cal	BOT	EOT	Post-Cal
DSS-55	212/1120	212/1250	212/2010	212/2025
DSS-54	212/1400	212/1530	212/2010	212/2025
DSS-26	212/1400	212/1600	213/0345	213/0400 Array
DSS-25	212/1430	212/1600	213/0345	213/0400 Array
DSS-45	212/2235	212/2340	213/0905	213/0920
DSS-47	212/2235	212/2330	213/0830	213/0900
DSS-55	213/0650	213/0820	213/1730	213/1745 Array
DSS-54	213/0900	213/1100	213/1730	213/1745 Array
DSS-24	213/1545	213/1715	214/0215	214/0230 Array GSE
DSS-25	213/1545	213/1715	214/0215	214/0230 Array GSE

First time DSS-45 is used during an RSS gravity. Originally DSS-34

DSS-45 will provide uplink and X-band downlink support

First time DSS-47 is used during gravity observation

- Receivers scheduled

- 2 closed-loop receivers per BWG antenna
- All open-loop receivers at each complex are scheduled, RSR at Narrabri
 - Total: 15 open-loop receivers
- Closed-loop data are prime. Open-loop data are backup
- LCP not required. Only RCP

ORTs

ORT on DOY 202 (July 20) over DSS-54, X- and Ka-band

08 202 0840 1010 1845 1900 DSS-54 CAS TP RSR77-OCCORT1 3942 N750 1A1

- Originally over DSS-55 but switched to DSS-54 because 55 monopulse was red
- Monopulse problems due to misconfiguration. Failed to verify monopulse

USO/ORT on DOY 207 (July 25) over DSS-25 and DSS-55, X- and Ka-band

08 207 1600 1730 0330 0345 DSS-25 CAS TP RSR78-USOPIM1 3947 N748 1A1

08 207 1600 1730 2030 2045 DSS-55 CAS TP RSR78-OCCORT2 3947 N750 1A1

- DSS-25 prime
- Verify monopulse

ORT on DOY 208 (July 26) over DSS-26 and DSS-55, X- and Ka-band

08 208 1600 1730 0040 0055 DSS-26 CAS TP RSR78-OCCORT1 3948 N750 1A1

08 208 1750 1850 2025 2040 DSS-55 CAS TP RSR78-ORT D/L 3948 N750 1A1

- DSS-14 prime
- DSS-55 added late
- Verify monopulse
- **Predicts for DSS-55? (not in DKF)**

Misc

Status of:

DSS-55 monopulse

DSS-54

AWVR at Goldstone

Pointing plan: Use monopulse. If not, how good are Cassini specific 4th order pointing models?

Watch for early monopulse enable (low elevation angles)

SNT - Enable at all throughout

Receivers during closest approach (high dynamics)

SPS Predicts – Unramped?

RSS will be in Ops room around 4 am on Wed