

S77 Rev183 R4 Rhea Gravity Observation

- Telemetry ON, Coherent mode (2-way and 3-way)
- Covered by all complexes
 - Madrid -> Goldstone -> Canberra -> Madrid
- Observation consists of three segments: Inbound, Closest Approach, and Outbound
 - Inbound was moved earlier to avoid occultation

- Science Highlights (From Luciano less)

Rhea R4 is the second and last Rhea flyby dedicated to RSS gravity. Gravity provides crucial information on the interior structure of planetary bodies. The only radio science flyby of Rhea (R1, Nov. 26, 2005) provided a crude determination of the quadrupole field. However, the results depend significantly on the constraints used in the solution, to the point that it is difficult to assess with sufficient confidence if Rhea is partially differentiated or undifferentiated. The much more precise determination of the quadrupole field made possible by combining R1 and R4 data will provide a much more robust solution for the gravity field and a better understanding of the moon's interior structure. In addition, there are good chances that the mass deficiency associated to the Tirawa impact basin could be measured. This will allow to infer the reorientation of Rhea's principal axes and shed light on the post-impact dynamical processes

DSN Antennas

- DSN Coverage

	Pre	BOT	EOT	Post							
13 067	0515	0645	1545	1600	DSS-25 CAS	RS183-GSEORT	MC	5638	N748	1A1	GSE
13 067	0515	0645	0820	0835	DSS-55 CAS	RS183-GRVORT	MC	5638	N750	1A1	GSE
13 067	0545	0645	1545	1600	DSS-14 CAS	TKG PASS		5638	N003	1A1	GSE
13 068	0345	0515	0820	0835	DSS-55 CAS	TP RS183-R4	GRAV	5639	N750	1A1	R4 Gravity
13 068	0500	0630	1200	1215	DSS-25 CAS	TP RS183-R4	GRAV	5639	N748	1A1	R4 Gravity
13 068	1320	1450	2335	2350	DSS-34 CAS	TP RS183-R4	GRAV	5640	N750	1A1	R4 Gravity
13 068	2135	2305	0400	0415	DSS-55 CAS	TP RS183-R4	GRAV	5640	N750	1A1	R4 Gravity
13 069	0515	0645	1545	1600	DSS-25 CAS	TP RS183-RH	GSE	5640	N748	1A1	GSE
13 069	0545	0645	1545	1600	DSS-14 CAS	T/P R4PB		5640	N003	1A1	GSE

- 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 R4 Open-Loop Assignment

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

RSSG will be in Ops Room at 7:30 pm on Friday, March 8 (068/0330) until 8:15 pm on Saturday, March 9 (069/0415)

RSSG shifts:

Gregory: Thu 3/7 10:00 pm – 2:15 am (Inbound GSE)

Aseel: Thu 3/7 10:00 pm – 12:30 am (Inbound GSE)

Elias: Fri 3/8 7:30 pm – Sat 3/9 2:30 am

Gregory: Sat 3/9 2:00 am – 7:15 am

Aseel: Sat 3/9 7:00 am – 1:15 pm

Danny: Sat 3/9 1:00 pm – 8:15 pm

Elias: Sat 3/9 9:00 pm – Sun 3/10 2:00 am (Outbound GSE)

ORTs

Ongoing

ORT on DOY 063 (Mar 4 PST) over DSS-25 and DSS-34, X- and Ka-band

13 063 1145 1315 1625 1640 DSS-25 CAS RS183-GRVORT MC 5634 N748 1A1

13 063 1145 1315 2115 2130 DSS-34 CAS RS183-GRVORT MC 5635 N750 1A1

- DSS-34 prime
- Both stations to verify monopulse, conduct on-point phase cals as needed, and acquire pointing data
- DSS-25 track completed
 - Nominal
 - 1 dB jump in power when monopulse first enabled
- DSS-34 track ongoing
 - 0.5 jump in power when monopulse first enabled

Upcoming

ORT (also GSE) on DOY 067 (Mar 7 PST) over DSS-25 and DSS-55, X- and Ka-band

• 13 067 0515 0645 1545 1600 DSS-25 CAS RS183-GSEORT MC 5638 N748 1A1

• 13 067 0515 0645 0820 0835 DSS-55 CAS RS183-GRVORT MC 5638 N750 1A1

• 13 067 0545 0645 1545 1600 DSS-14 CAS TKG PASS 5638 N003 1A1

• DSS-14 priime

- DSS-25 and DSS-55 to verify monopulse, conduct monopulse on-point phase cals as needed, acquire pointing data
- Also DSS-54 checkout track

Misc

Support schedule:

- GSEs will be partially supported and then scripted
- Prime R4 gravity fully supported

SPS Predicts – Ramped

- Based on analysis by NOPEs, unramped predicts not possible

Uplink Plan

- Per SOE/DKF, except add 5 minutes to transmitter off during prime gravity
- Gap due to transmitter limits during Canberra-Madrid overlap (no uplink transfer)
 - DSS-34 transmitter OFF 068/231545
 - DSS-55 transmitter ON 068/233000
 - Coherent gap RTLTL later is 069/014811 to 069/020226

Equipment status?

- NOPEs? (DSS-25, DSS-34, DSS-55)
- DSS-55 monopulse/pointing problems?

Pointing Plan

- Enable monopulse throughout gravity observation. If problematic, stay with blind pointing
 - Are 4th-order pointing models good? Need good models in case monopulse is problematic
 - Danny to send data to David Rochblatt from recent ORTs
- There should be no monopulse enables at low Elevation angles (less than 10 degrees)
 - All segments are at elevation angles higher than 10 degrees

SNT - Enable at all throughout

RSSG: Ensure AWVR units at Goldstone and Madrid are ready