

About the Occultation

- S97 Rev 255 Saturn rings and atmospheric egress occultations
 - Telemetry OFF, Ranging OFF, 2-way/3-way mode
 - Covered by Canberra and New Norcia
 - First observation in 2017 – Happy New Year!

- From Essam Marouf:

The Rev 255 Radio Science observations include an egress Saturn atmospheric occultation followed by an egress ring occultation. The former is the first of 3 egress atmospheric occultations captured during the Cassini F-Ring Orbits . It probes a low northern latitude of 8.7° , important for characterization of the impact of Saturn's fast equatorial winds on thermal structure of the atmosphere. Comparison with other near-equatorial occultations early in the Cassini mission will help characterize likely temporal/seasonal variations of the atmosphere. The egress ring occultation captures the full ring system. A large $\sim 26.8^\circ$ ring opening angle at the time allows reliable profiling of large optical depth ring structure. Comparison of the structure observed at multiple Earth relative and inertial longitudes will help characterize the rings azimuthal asymmetry, both virtual (due to gravitational wakes) and actual (due to dynamical interactions with the satellites). Collectively, the group of RSS ring occultations, including the one on Rev 255, will provide information about azimuthal variability of ring structure and physical properties of resolved features.

DSN and ESA Antennas

- DSN Coverage

	Pre	BOT	EOT	Post									
17 002	2015	2115	0705	0720	DSS-43	CAS	RS 255	OCCS L3	7039	1645	1A1		
17 002	2235	0005	0650	0705	DSS-34	CAS	RS 255	OCCS L3	7039	N750	1A1		
17 003	0230	0315	0715	0730	DSS-74	CAS	RS 255	OCCS L3	7040	0142	1A1		
17 003	0600	0700	1120	1135	DSS-63	CAS	TKG	PASS	7039	N003	1A1	Downlink pass	

- Occultation experiment is immediately followed by downlink pass over DSS-63
 - Spacecraft continues to be Earth pointed
- Using DSS-34 at Canberra instead of DSS-35
 - Due to scheduling conflicts over DSS-35 with GTL

Receivers scheduled

2 closed-loop receivers per antenna

Open-loop receivers (RSRs, WVSRs, VSRs, PRSRs)

Open-loop data are prime. Closed-loop data are backup

- Will need ramp info in closed-loop data for processing

Only RCP will be recorded

- 2-way/3-way and 1-way modes

~~DSS-74 PRSR cannot be accessed remotely~~

PRSR can now be accessed remotely

PRSR at Canberra is red

S97 Rev 255 Open-Loop Assignment

DSS Prdx Mode	Operator	Station	Open-loop Receiver	Channels	Subchannels	Bandwidths KHz
43 2-way	Elias/ Carlyn	rsops2	RSR1	RSR1A -> XRCP RSR1B -> SRCP	1, 2, 3, 4 1, 2, 3, 4	1, 16, 50, 100 1, 16, 50, 100
43 1-way	Danny/Jay	rsops4	WVSR1	WVSR1A -> XRCP WVSR1B -> SRCP	1, 2, 3, 4 5, 6, 7, 8 1, 2, 3, 4 5, 6, 7, 8	1, 16, 50, 100 1, 16, 50, 100 (with offset) 1, 16, 50, 100 1, 16, 50, 100 (with offset)
34 3-way	Elias	rsops2	RSR2	RSR2A -> XRCP RSR2B -> KRCP	1, 2, 3, 4 1, 2, 3, 4	1, 16, 50, 100 1, 16, 50, 100
34 1-way	Danny/Jay	rsops4	WVSR2	WVSR2A -> XRCP WVSR2B -> KRCP	1, 2, 3, 4 5, 6, 7, 8 1, 2, 3, 4 5, 6, 7, 8	1, 16, 50, 100 1, 16, 50, 100 (with offset) 1, 2, 16, 50 1, 2, 16, 50 (with offset)
74 3-way/ 1-way	Danny/Jay	rsops4/ psdg5	PRSR 134.159.181.84	PRSR -> XRCP	1, 2, 3, 4 5, 6, 7, 8	1, 16, 50, 100 (3-way) 1, 16, 50, 100 (1-way)

S97 Rev 255 Open-Loop Assignment Cont'd

RSSG will be in Ops Room at 12:00 pm PST on Monday, January 2 (002/2000)

- Jan 2 is JPL holiday

Aseel – VOCA

Elias – Ops Room Displays

Danny – Check WVSR/VSR availability and disk space

Backup Receivers

- VSR at Canberra

Predicts

- Last NAV OD delivery prior to occultation?
- Which delivery to use for predicts generation?
 - Plan was to use NAV delivery on Dec 20, but BLF was updated on Dec 29. Some predicts were re-generated using NAV OD delivered on Dec 30
- DSS-43 uplink (ETX) predicts will be modified by RSS to compensate for Doppler shift due to Saturn's atmosphere
- Elias and Danny will generate and verify the open-loop downlink predicts
- RSS usually uses three sets of downlink predicts in the open-loop receivers for occultations:
 - #1: Coherent (2-way/3-way) with atmospheric compensation: generated using Nicole's PREDICTs software and SPS nominal (unmodified) ETX
 - #2: 1-way coherent: 1-way predicts offset in real-time to coherent downlink frequency
 - #3: 1-way (no offset): For 1-way baseline and the times when the DST loses lock

ORTs

No official ORTs, but SCE passes in December over DSS-34 and DSS-43

16	350	0010	0140	0555	0610	DSS-34	CAS	TP	RSS	SCE13	7020	N750	1A1
16	352	1905	2005	2325	2340	DSS-43	CAS	TP	RSS	SCE13	7023	1645	1A1
16	355	2010	2115	0345	0400	DSS-43	CAS	TP	RSS	SCE13	7026	1645	1A1
16	356	1950	2050	0320	0335	DSS-43	CAS	TKG	PASS		7027	N003	1A1
16	357	1915	2045	0545	0600	DSS-34	CAS	TP	RSS	BORESIGHT	7028	N750	1A

Misc

Uplink Strategy

- DSS-43, 18 kW, ramped, SWEEP or NO SWEEP?
- Stop uplink for ~14 minutes to acquire 1-way baseline RTLTL later
- DSS-74 resumes uplink, with SWEEP

Ensure that tracking mode changes during following DSS-63 track remain per the DKF not to impact SP and playback

- DSS-63 BOTs 3-way with DSS-74!

DKF – Does not have the correct uplink or AOS/LOS times. Use times in RSS timeline

Plan for updating DSS-34 Cassini Specific 4th Order Pointing Model?

- Will check with David Rochblatt

NOPEs - Equipment Status?

There will be a v2 of timeline and figure