

# About the Occultation

- S96 Rev 247 Saturn rings occultation
  - Telemetry OFF, Ranging OFF, 2-way/3-way mode
  - Covered by Goldstone and Canberra

- From Essam Marouf:

The Rev 247 RSS ring occultation is the first in a sequence of five chord occultations covering different ring longitudes. They capture in full or in part the A- and B-Rings, as well as the Cassini Division (the other 4 are on future Revs 248, 250, 251, and 253). The Rev 247 chord, in particular, covers the outer region of the A-Ring only. The sequence of occultations occurs near the end of the the IN-2 orbits and the start of the F-Ring Orbits when the ring opening angle is 26 to 27 degrees, close to its maximum value as seen from Earth. The large opening angle allows profiling of ring features of large optical depth within the A- and B-Rings. The chord geometry allows characterization of the rings azimuthal asymmetry, both virtual (due to gravitational wakes) and actual (due to dynamical interactions with the satellites). Collectively, the group of 5 RSS chord ring occultations, including the one on Rev 247, will provide valuable information about gravitational wakes in the A- and B-Rings and the host of density waves populating the A-Ring. Measurements at three radio wavelengths (0.94, 3.6, and 13 cm; Ka-, X-, and S-bands) will be collected throughout the observation period and will help provide information about physical properties of profiled ring structure.

# DSN Antennas

- DSN Coverage

	Pre	BOT	EOT	Post							
16 307	1630	1730	0210	0225	DSS-15 CAS	RSS 247-RIOCC	L3 6977	3638		1A1	
16 307	1745	1915	0210	0225	DSS-26 CAS	RSS 247-RIOCC	L3 6977	0681		1A1	
16 307	2020	2150	0915	0930	DSS-35 CAS	RSS 247-RIOCC	L3 6978	N750		1A1	
16 307	2040	2140	0330	0345	DSS-45 CAS	RSS 247-RIOCC	L3 6978	2695		1A1	

- All 34-m support
  - 70-m antennas (DSS-14 and DSS-43) were in conflict with Juno
- DSS-35 track continues after RSS observation for telemetry support

- Receivers scheduled

- 2 closed-loop receivers per antenna
- Open-loop receivers (RSRs, WVSRs, VSRs)
- 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

# S96 Rev 247 Open-Loop Assignment

DSS Prdx Mode	Operator	Station	Open-loop Receiver	Channels	Subchannels	Bandwidths KHz
15 2-way	Elias	rsops2	RSR1	RSR1A -> XRCP RSR1B -> SRCP	1, 2, 3, 4 1, 2, 3, 4	1, 16, 50, 100 1, 16, 50, 100
15 1-way	Danny	rsops3	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)
26 3-way	Elias	rsops2	RSR3	RSR3A -> XRCP RSR3B -> KRCP	1, 2, 3, 4 1, 2, 3, 4	1, 16, 50, 100 1, 16, 50, 100
26 1-way	Danny	rsops3	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)
45 3-way	Carlyn	rsops1	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	rsops5	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)
35 3-way	Jay	rsops1	RSR2	RSR2A -> XRCP RSR2B -> KRCP	1, 2, 3, 4 1, 2, 3, 4	1, 16, 50, 100 1, 16, 50, 100
35 1-way	Danny	rsops5	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)

# S96 Rev 247 Open-Loop Assignment cont'd

RSSG will be in Ops Room at 9:00 am on Wednesday, November 2 (307/1600)

Aseel – VOCA

Elias – Ops Room Displays

Danny – Check WVSR/VSR availability and disk space

- Any issues with RSR2 at Goldstone?

Backup Receivers

- VSR at Goldstone and Canberra
- PRSR at Canberra is red

# Predicts

- NAV's last OD prior to occultation was October 3
  - Next delivery is Nov 3
- DSS-15 uplink (ETX) predicts will **not** be modified by RSS
- 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)
  - #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

ORT on DOY 298 (October 24) over DSS-35, X- and Ka-band Completed

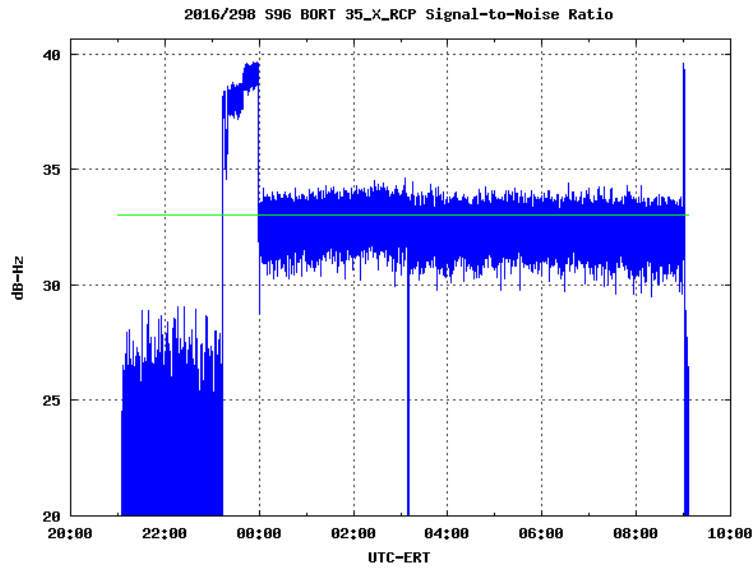
16 298 2100 0000 0900 0915 DSS-35 CAS TP RS BISTORT MC 6969 N750 1A1

- Also prime TP
- Bistatic ORT
  - Practiced bistatic calibrations – Team C
  - Did not verify XLCP in real-time
    - Required SFRO not entered in narrow bandwidth
    - XLCP signal verified during post-pass data processing
  - Did not verify KLCP
    - Switch 43 was in A position throughout – Monitored Monopulse error channel
- Monopulse enabled and worked nominally – Pointing data acquired
  - No jump in signal power when Monopulse was enabled

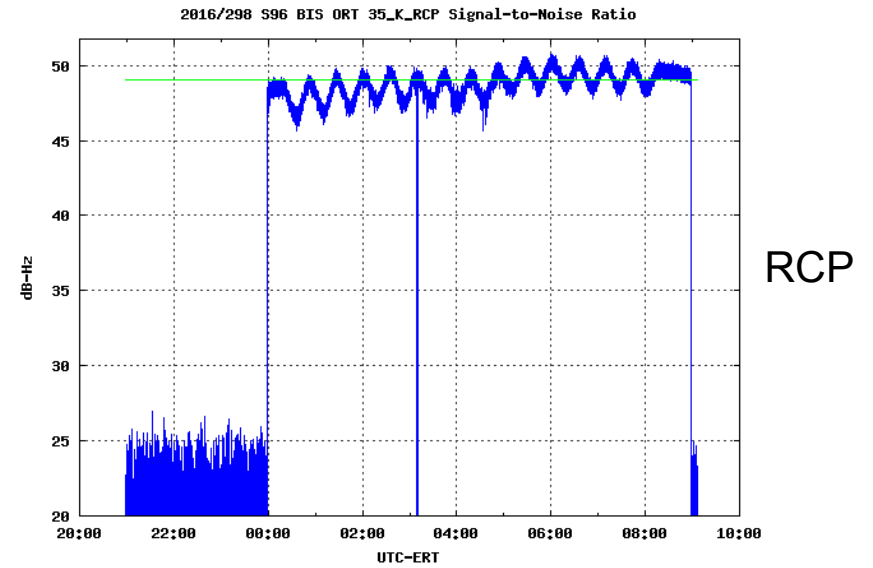
# ORTs cont'd

- DOY 298 DSS-35 ORT cont'd

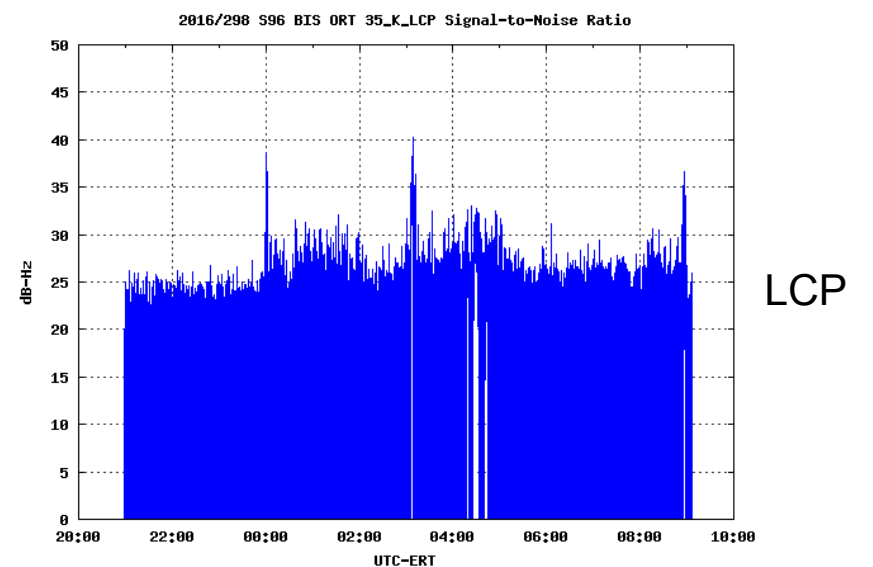
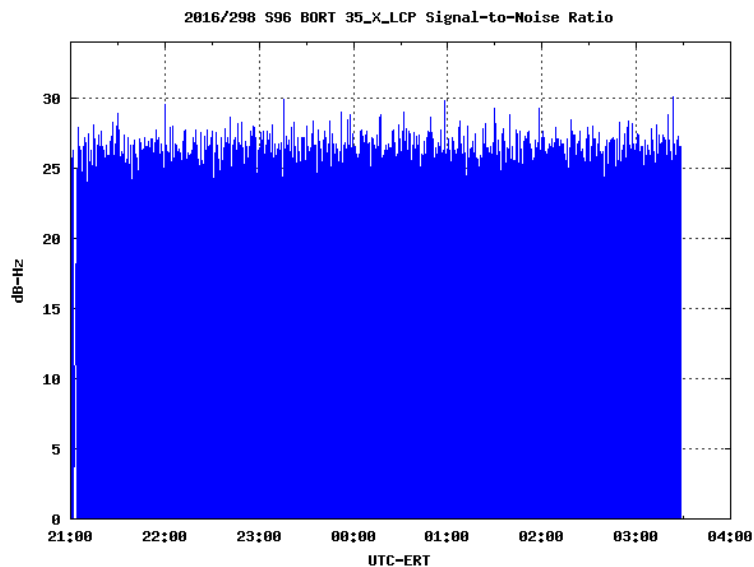
X-band



Ka-band



RCP



LCP

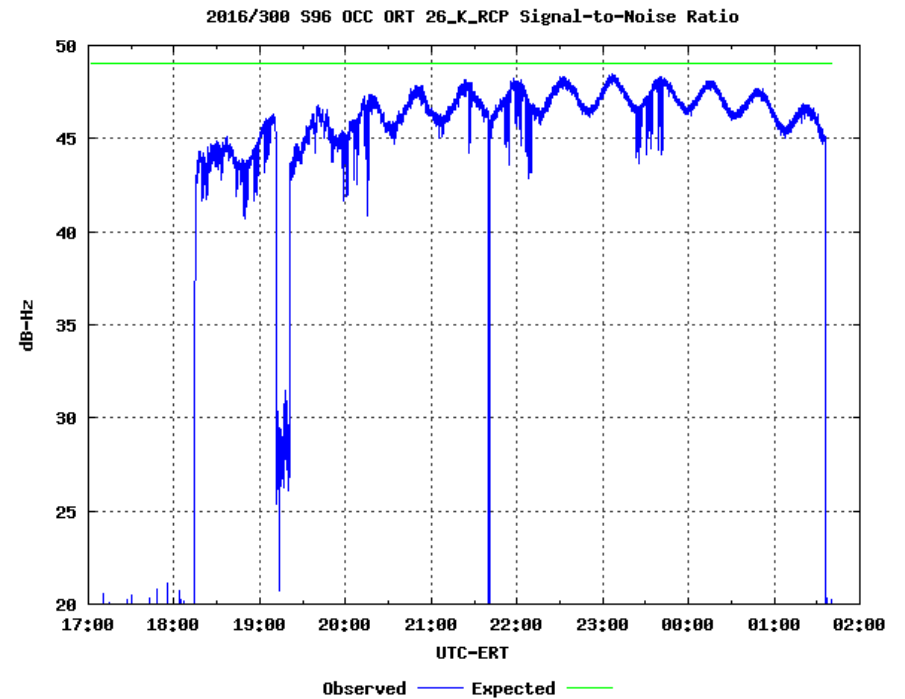
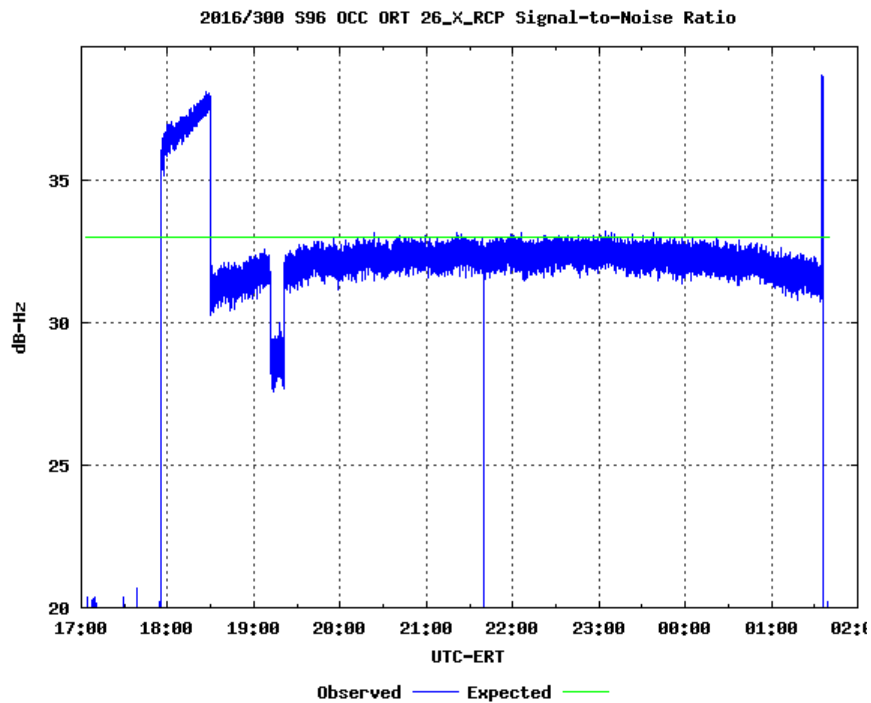
# ORTs cont'd

ORT on DOY 300 (October 26) over DSS-26, X- and Ka-band

Completed

16 300 1700 1830 0135 0150 DSS-26 CAS TP RSS OCCORT MC 6970 N750 1A1

- Also prime TP
- On-point phase calcs conducted
- Monopulse enabled and worked nominally – Pointing data acquired
  - Station left offsets from last cal
  - Caused 15 dB drop in Ka-band signal power
  - Singal power restored after station cleared the offsets





# ORTs cont'd

## Upcoming

ORT on DOY 304 (October 30) over DSS-55, X- and Ka-band

16 304 0900 1030 1825 1840 DSS-55 CAS RS OCCORT MC 6974 0681 1A1

- Also prime TP
- Verify Monopulse
- Acquire pointing data

ORT on DOY 305 (October 31) over DSS-63, X- and S-band

16 305 0930 1030 1830 1845 DSS-63 CAS TP RSS OCCORT 6975 1645 1A1

- Also prime TP
- Verify X- and S-band signals

## Note:

A DSS-25 ORT was completed on DOY 294 (October 20), but station not supporting this occultation

16 294 1700 1830 0230 0245 DSS-25 CAS TP RSS MONCAL MC 6964 N748 1A1

# Misc

## Uplink Strategy

- DSS-15, 18 kW, ramped, sweep
- DSS-35, 18 kW, ramped, no sweep?
  - Still discussing with SP
  - This uplink is for the period following RSS observations
  - Telecom sent email just prior to meeting and recommended a sweep
    - Will update timeline

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

Plan for updating DSS-26 and DSS-35 Cassini Specific 4th Order Pointing Model?

- Pointing data sent to David

NOPEs - Equipment Status?