About the Occultation

- S94 Rev 236 Saturn rings occultation
  - Chord rings occultation
  - Telemetry OFF, Ranging OFF, 2-way/3-way mode
  - Covered by Madrid (uplink only), Goldstone and Canberra

- From Essam Marouf:

  The Rev 236 PIE ring occultation is the first RSS ring occultation since September 1, 2013 (on Rev 197), and the first in a sequence of five ring occultations captured on the second set of inclined orbits during the Cassini Solstice Mission (the IN-2 orbits). It's a chord occultation that captures the full ring system on the inbound side and most of the ring system on the outbound side (part of the B-Ring will be inrefered with by Saturn's upper atmosphere). The chord crosses north of Sarurn's globe, sampling ring longitudes not sampled on any previous RSS ring occultation. An ~26° ring opening angle at the time is close to the largest attainable as seen from Earth (~27°). It allows reliable profiling of ring features of large optical depth. The chord geometry allows characterization of the rings azimuthal asymmetry, especially as related to gravitational wakes, density and bending waves, sharp ring edges, and confined narrow ringlets. 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					
16 158	0100	0200	0400	0415	DSS-63 CAS	RSS 236 RIOCC L3 6827	1647	1A1
16 158	0210	0310	1155	1210	DSS-14 CAS	RSS 236 RIOCC L3 6827	1647	1A1
16 158	0245	0415	1155	1210	DSS-25 CAS	RSS 236 RIOCC L3 6827	N748	1A1
16 158	0605	0735	1315	1330	DSS-35 CAS	RSS 236 RIOCC L3 6828	N750	1A1
16 158	0630	0730	1315	1330	DSS-43 CAS	RSS 236 RIOCC L3 6828	2659	1A1

- DSS-63 and DSS-14 will provide the uplink

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

S94 Rev 236 Open-Loop Assignment

DSS Prdx Mode	Operator	Station	Open-loop Receiver	Channels	Subchannels	Bandwidths KHz
14 3-/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
14 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)
25 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
25 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)
43 3-way	Jay	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)

S94 Rev 236 Open-Loop Assignment cont'd

RSSG will be in Ops Room at 7:00 pm on Sunday, June 6 (158/0200)
- At DSS-63 BOT. Can ACE cover pre-cal and let me know if there are problems?

Aseel – VOCA
Elias - Ops Room Displays
Danny – Check WVSR/VSR availability & RSR/WVSR/VSR disk space

Backup Receivers
- RSR2 at Goldstone
    - Hasn't been very reliable
- VSR at Goldstone?
- VSR at Canberra was red in May during T119. Status now?

Predicts

- DSS-63 and DSS-14 uplink (ETX) predicts will **not** be modified by RSS
- NAV's last OD delivery prior to the occultation was May 20 (OTM-45)
- NAV is willing to make another delivery tomorrow, June 1
- Which OD to use for predicts generation?
- RSS usually uses three sets of downlink predicts in the open-loop receivers:
  - #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 the times when the DST is not in lock on the uplink

ORTs

ORT on DOY 139 (May 18) over DSS-25 and DSS-35, X- and Ka-band Completed

16 139 0315 0445 1315 1330 DSS-25 CAS TP RSS ORT MC 6808 N748 1A1

16 139 0725 0855 1315 1330 DSS-35 CAS RSS ORT MC 6809 0677 1A1

DSS-25

- DSS-25 prime TP
- DSS-25 high Ka-band SNT values (218, 168, 149 Kelvin …)
- Using 0.25K diode for Ka-band. Tried 1K during pre-cal and made no difference
- DR# G117174 for high Ka-band SNT
- Delay in enabling Monopulse due to concern with high SNT
- Monopulse enabled 4 hours after BOT and worked nominally
- No jump in Ka-band signal power when Monopulse was enabled

DSS-35

- During pre-cal, station reported Monopulse was possibly green and will give it a try
- High Ka-band SNT. Switched from 0.25K to 2K diode and stabilized SNT
  - 2K was actually providing 0.25K
- Station enabled Conscan on X-band then conducted Monopulse on-point phase cals

ORTs cont'd

ORT/Boresight Cal on DOY 140 (May 19) over DSS-25, X- and Ka-band Completed

16 140 0300 0430 1300 1315 DSS-25 CAS TP RSS BORESIGHT 6809 N748 1A1

- Also prime TP
- High Ka-band SNT
- Asked station for calibrated diode values, but said that values are not available since this cannot be done during evening hours (probably misunderstood the request)
- No jump in Ka-band signal power when Monopulse was enabled

ORT on DOY 142 (May 21) over DSS-25, X- and Ka-band Completed

16 142 0300 0430 1300 1315 DSS-25 CAS TP RSS ORT MC 6811 N748 1A1

- Also prime TP
- Ka-band SNT much better than last support
- No jump in Ka-band signal power when Monopulse was enabled

ORT on DOY 146 (May 25) over DSS-35, X- and Ka-band Completed

16 146 0845 1015 1725 1740 DSS-35 CAS TP RSS ORT MC 6816 0681 1A1

- Also prime TP
- Monopulse worked nominally
- Station conducted on-point phase cals

ORTs cont'd

Upcoming

ORT on DOY 155 (June 3) over DSS-43 and DSS-14, X- and S-band

16 155 0830 0930 1130 1145 DSS-14 CAS RSS ORT 6824 1647 1A1

16 155 0830 0930 1630 1645 DSS-43 CAS TP RSS ORT 6825 1647 1A1

- DSS-43 prime
- Verify X- and S-band signals

Misc

Uplink Strategy
- DSS-63, 18 kW, ramped, sweep
- DSS-14, 18 kW, ramped, no sweep

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

Plan to replace XKa-HEMT at DSS-35 in the next few days!
- JPL engineering and station don't want to wait until Level3 support

Plan for updating DSS-25 and DSS-35 Cassini Specific 4th Order Pointing Model?
- DSS-25 pointing model seemed good during ORTs
- DSS-35 data acquired during ORTs are no good?

High SNT at DSS-25
- Signal levels are as expected

NOPEs - Equipment Status?