About the Occultation

- S95 Rev 238 Saturn rings and atmospheric occultations
  - Telemetry OFF, Ranging OFF, 2-way/3-way mode
  - Covered by Madrid, Goldstone and Canberra

- From Essam Marouf:

  The Rev 238 Radio Science observations are similar observations to those on Rev 237. They include an ingress and egress ring occultations and an egress Saturn atmospheric occultation. The latter is the second of only two atmospheric occultations captured during the Cassini IN-2 orbits (2nd inclined orbit sequence). It probes near-equatorial latitude of 10°N, 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 with characterization of any temporal/ seasonal variations of the atmosphere. The ring occultations capture the full ring system on the egress side and only the A ring and Cassini Division on the ingress side (the B and C rings are observed mixed with Saturn's atmosphere). A large ~25.9° ring opening angle at the time will allow reliable profiling of the structure of ring features of large optical depth. Comparison of ring structure observed on Revs 237 and 238 will help characterize structure driven by Saturn's orbiting satellites (similar observation geometry but different satellites locations at the different observation times).

DSN Antennas

- DSN Coverage

		Pre	BOT	EOT	Post				
16	205	2100	2200	0050	0105	DSS-65 CAS	RS 238 RI OCC L3	6875 2695	1A1
16	205	2250	2350	0835	0850	DSS-14 CAS	RS 238 RI OCC L3	6875 1647	1A1
16	205	2255	0025	0835	0850	DSS-25 CAS	RS 238 RI OCC L3	6875 N748	1A1
16	206	0245	0415	1010	1025	DSS-35 CAS	RS 238 RI OCC L3	6876 N750	1A1
16	206	0310	0410	1010	1025	DSS-43 CAS	RS 238 RI OCC L3	6876 1643	1A1

- Madrid is uplink only support
- DSS-63 unavailable (down for maintenance). Using DSS-65 at Madrid for uplink
- DSS-65 and DSS-14 will be providing the uplink

- 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

S95 Rev 238 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	RSR2	RSR2A -> XRCP RSR2B -> KRCP	1, 2 3, 4 1, 2 3, 4	1, 16 1, 16 (with offset) 1, 16 1, 16 (with offset)
43 3-way	Jay	rsops1	RSR2	RSR2A -> XRCP RSR2B -> SRCP	1, 2, 3, 4 1, 2, 3, 4	1, 16, 50, 100 1, 16, 50, 100
43 1-way	Danny	rsops5	WVSR2	WVSR2A -> XRCP WVSR2B -> 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	RSR1	RSR1A -> XRCP RSR1B -> KRCP	1, 2, 3, 4 1, 2, 3, 4	1, 16, 50, 100 1, 16, 50, 100
35 1-way	Danny	rsops5	VSR1 PRSR	VSR1A -> XRCP PRSR -> KRCP	1, 2 3, 4 1, 2, 3, 4 5, 6, 7, 8	1, 16 1, 16 (with offset) 1, 16, 50, 100 1, 16, 50, 100 (with offset)

S94 Rev 236 Open-Loop Assignment cont'd

RSSG will be in Ops Room at 1:45 pm on Saturday, July 23 (205/2045)

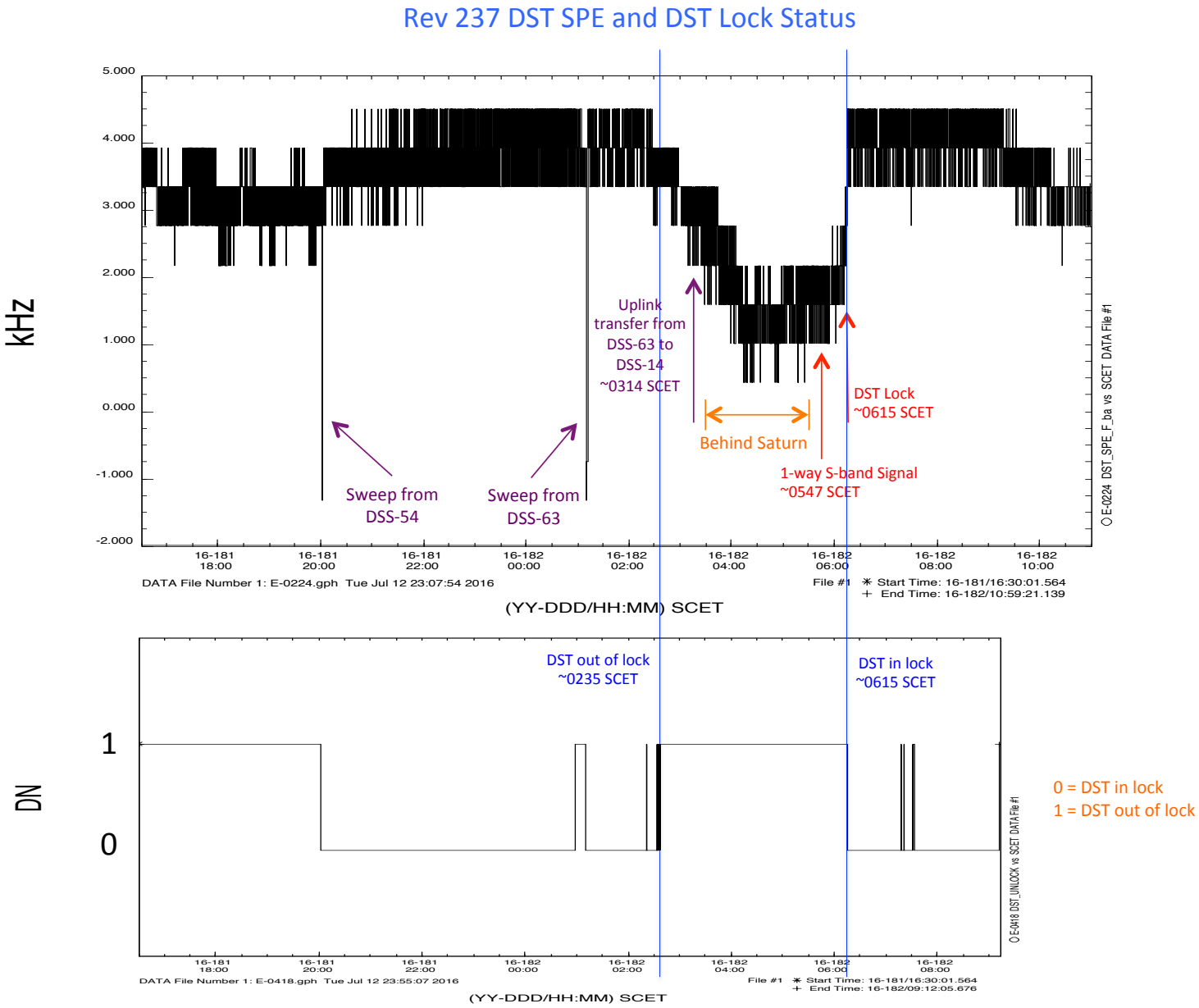
Aseel – VOCA
Elias - Ops Room Displays
Danny – Check WVSR/VSR availability & RSR/WVSR/VSR disk space
- Danny reported only one WVSR will be available at Goldstone and Canberra
- Scheduling conflicts

Backup Receivers
- VSR at Goldstone

Predicts

- Used NAV's OD delivery on July 14 to generate predicts
- DSS-65 and DSS-14 uplink (ETX) predicts will be modified by RSS to compensate for Doppler shift due to Saturn's atmosphere
- DSS-25 uplink predicts will also be modified as backup
- Elias and Danny are in the process of generating and verifying the open-loop downlink predicts
- RSS usually uses three sets of downlink predicts in the open-loop receivers for occultations:
  - #1: Coherent with atmospheric compensation: generated using Nicole's PREDICTs software and SPS nominal (unmodified) ETX
  - #2: 1-way coherent:1-way predicts generated using PREDICTS and the Doppler file produced by Paul, 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

Late DST Lock Up During Rev 237



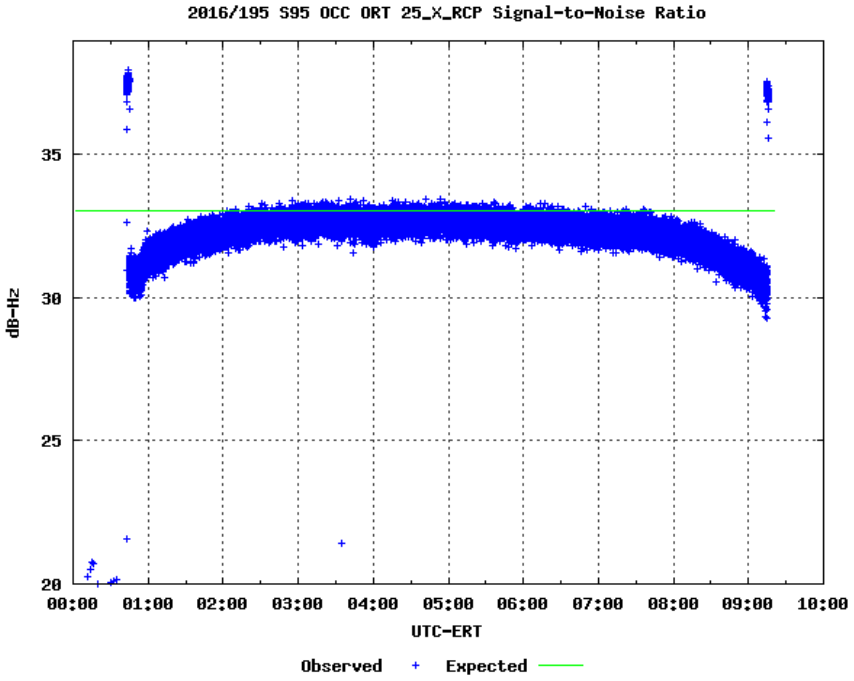
ORTs

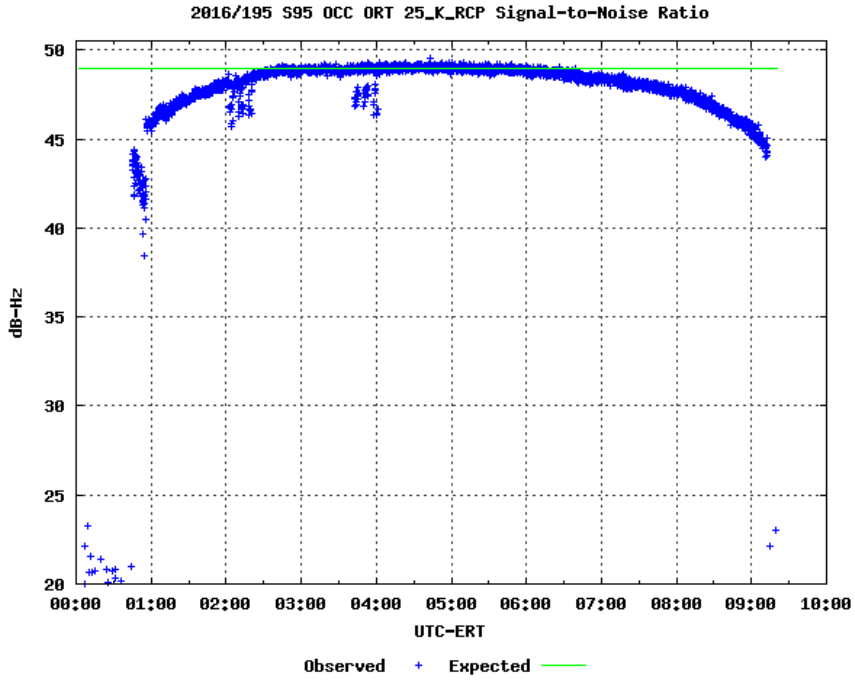
ORT on DOY 194-195 (July 12-13) over DSS-25, X- and Ka-band Completed

16 194 2315 0045 0915 0930 DSS-25 CAS TP RS OCCORT MC 6864 N748 1A1

16 195 0330 0500 0915 0930 DSS-34 CAS TP RSS MONCAL MC 6865 N750 1A116 162

- DSS-25 prime TP
- Monopulse cal over DSS-34
- On-point phase cals conducted
- Monopulse enabled and worked nominally – Pointing data acquired



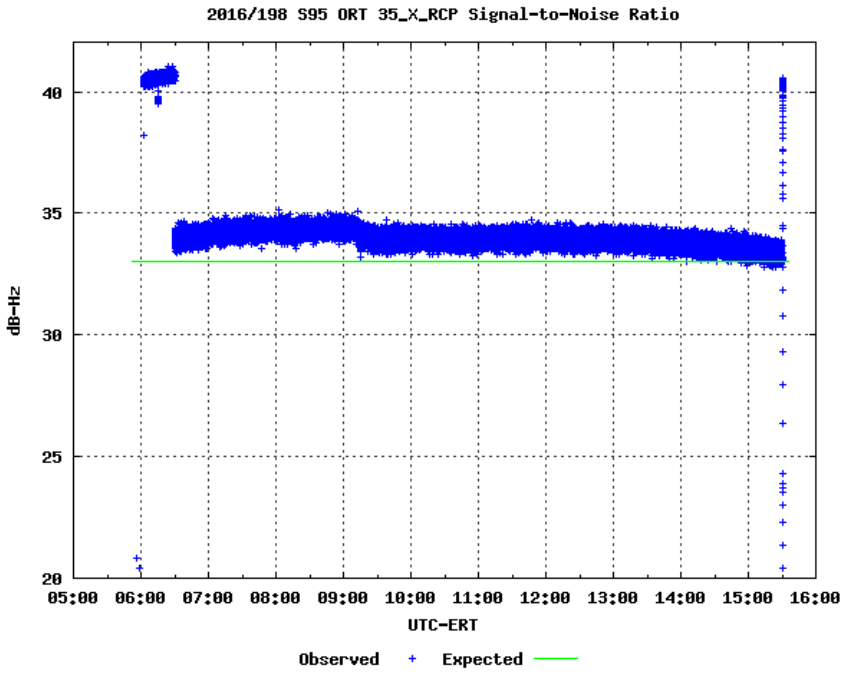


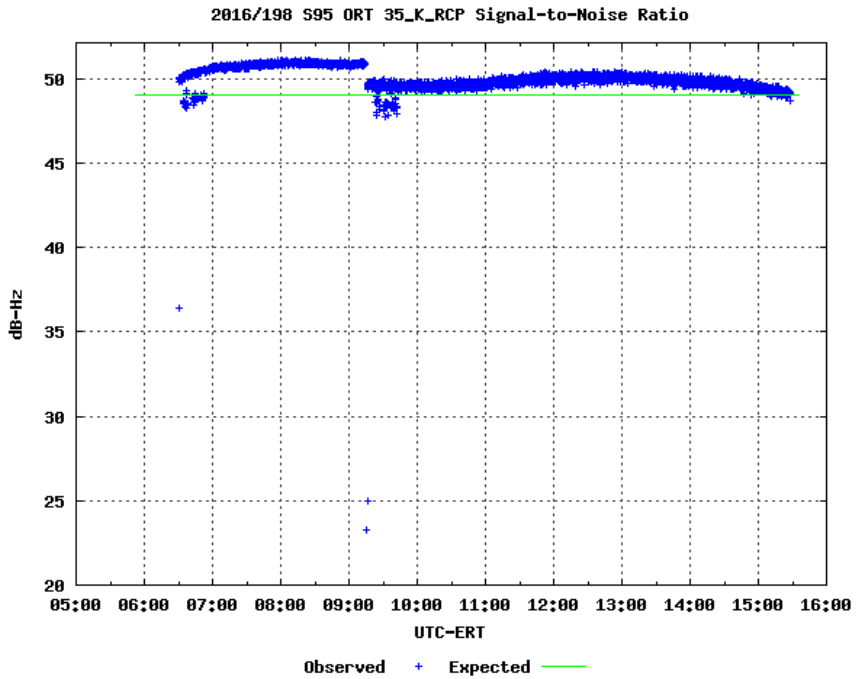
ORTs cont'd

ORT on DOY 198 (July 16) over DSS-35, X- and Ka-band Completed

16 198 0500 0630 1530 1545 DSS-35 CAS TP RS OCCORT MC 6868 N750 1A1

- Also prime TP
- On-point phase cals conducted
- Monopulse enabled and worked nominally – Pointing data acquired





ORTs cont'd

Upcoming

ORT on DOY 201 (July 19) over DSS-35, X- and Ka-band

16 201 0335 0505 1135 1150 DSS-35 CAS TP RS OCCORT MC 6871 N750 1A1

- Also prime TP
- Verify Monopulse
- Acquire pointing data

Misc

Uplink Strategy
- DSS-65, 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

Spurs at DSS-43
- Any updates?

Tone on RSR1 at Canberra at 2.299 GHz
- Will not be using RSR1 for S-band

Plan for updating DSS-25 and DSS-35 Cassini Specific 4th Order Pointing Model?
- Pointing data sent to David
- Also included DSS-25 data from DOY 189 (July 7) Monopulse cal and DOY 193 (July 11) AUXPIM

NOPEs - Equipment Status?