About the Occultation

- S98 Rev 266 Saturn rings occultation
  – Telemetry OFF, Ranging OFF, 2-way/3-way mode
  – Covered by Canberra

- From Essam Marouf:

The Rev 266 RSS ring occultation is the first in a sequence of three ingress occultations that sample different ring longitudes (Revs 266, 268, and 270) and about the same ring opening angle of 26.4 degrees. They capture in full the A- and B-Rings, and in part the C-Ring (the inner region of the C-Ring is mixed with Saturn's troposphere). The sequence of occultations occurs at the end of the the F-Ring orbits when the ring opening angle is 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 multiple longitudes allow characterization of the rings azimuthal asymmetry. Collectively, the group of RSS ring occultations, will provide 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. The Rev 266 ring occultation is one of few in the mission during which the spacecraft is rolling. The roll is designed to be around the HGA Ka-band boresight to minimize fluctuations in the power levels of the three transmitted reference signals.

DSN Antennas

- DSN Coverage

		Pre	BOT	EOT	Post						
17	081	1220	1320	2330	2345	DSS-43 CAS	RS 266 RI OCC L3	7118	1647	1A1
17	081	1310	1440	2330	2345	DSS-35 CAS	RS 266 RI OCC L3	7118	N750	1A1

- DSS-43 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

Receivers status

- PRSR at Canberra is red

S98 Rev 266 Open-Loop Assignment

DSS Prdx Mode	Operator	Station	Open-loop Receiver	Channels	Subchannels	Bandwidths KHz
43 2-way	Clement	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/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)
35 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
35 1-way	Jay/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, 16, 50, 100 1, 16, 50, 100 (with offset)

RSSG will be in Ops Room at 5:15 am on Wednesday, March 22 (081/0515)

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

Backup Receivers
- VSR

Predicts

- Use NAV's OD delivery on Monday, March 15 to generate predicts
  - Last before occultation
- DSS-43 uplink (ETX) predicts will not be modified
- Last part of observation is rings mixed with atmosphere that will likely drag DST frequency away from BLF
  - Curious to see DST behavior
  - 15 hours before next downlink track, so enough time for the DST frequency to drift back
    - Occultation track EOT 081/2330
    - Next track BOT 082/1505
      17 082 1405 1505 0010 0025 DSS-43 CAS   TKG PASS   7119 N003   1A1
- Lu: Please ask SPS to deliver uplink predicts
- Elias and Danny will start predicts generation
- 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 times when the DST loses lock

ORTs

ORT on DOY 069 (March 10) over DSS-34, X- and Ka-band   Completed

17 069 1435 1605 0045 0100 DSS-34 CAS   TP RSS OCCORT MC 7106 N750   1A116 195
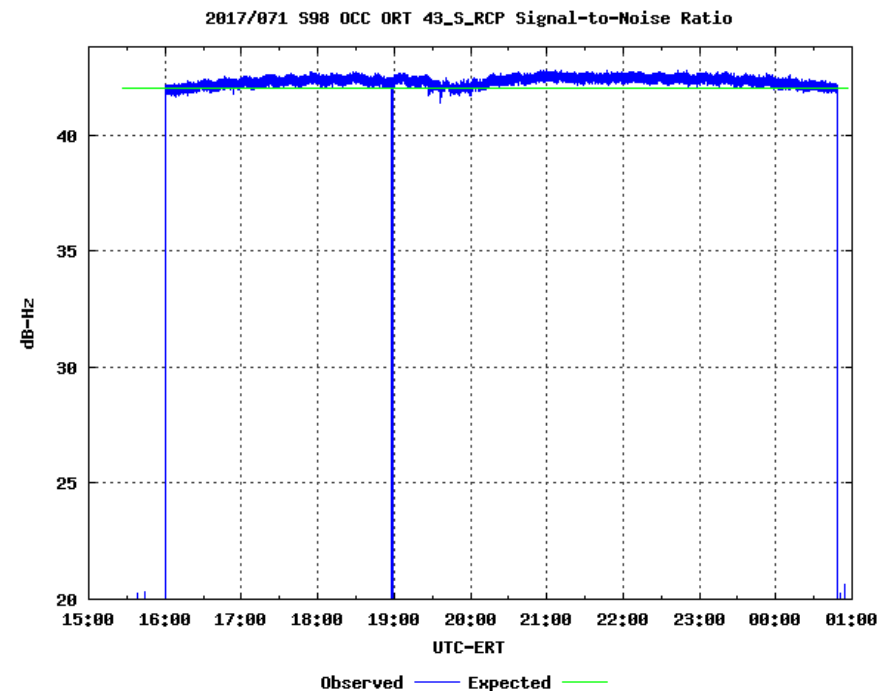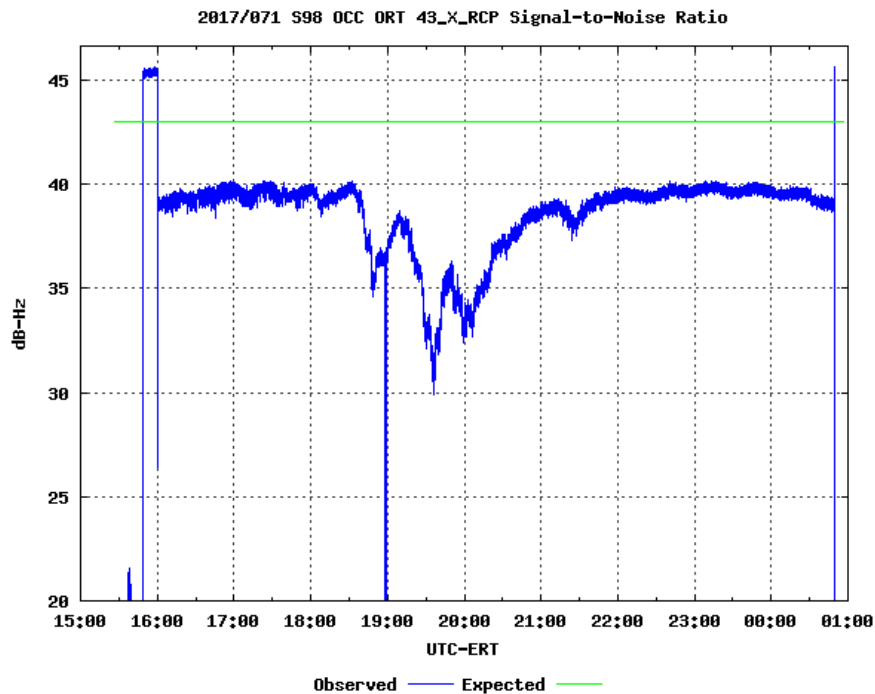
- Originally over DSS-35, but track was switched to DSS-34

ORT on DOY 71 (March 12) over DSS-43, X- and S-band   Completed

17 071 1500 1600 0050 0105 DSS-43 CAS   TP RSS OCCORT   7108 1647   1A1

- Also prime TP
- X- and S-band signals verified
- Data degradation due to heavy rain storm (DR# C112582)

2017/071 S98 OCC ORT 43_X_RCP Signal-to-Noise Ratio

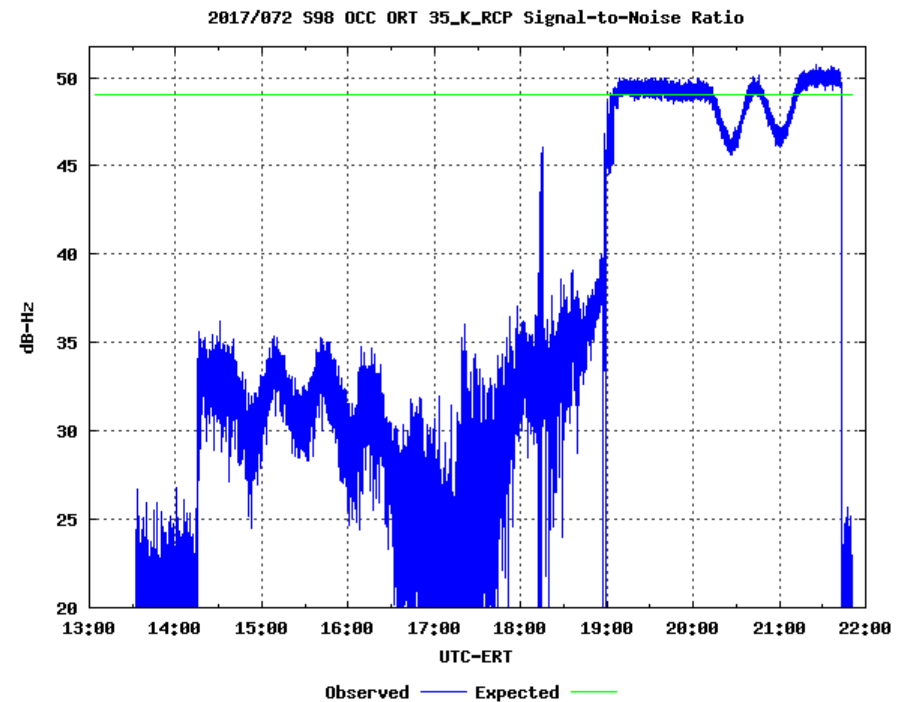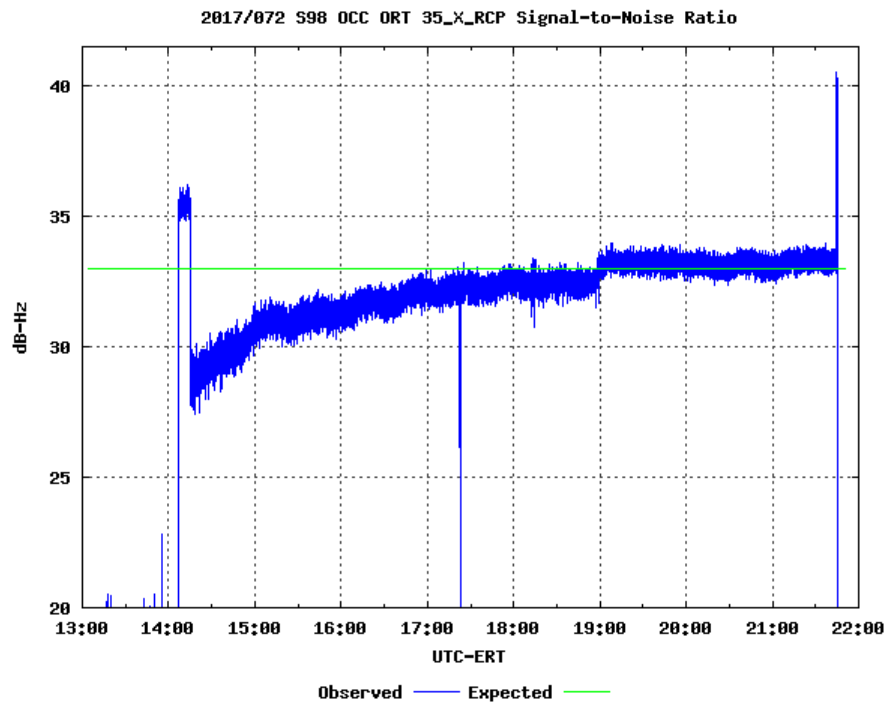2017/071 S98 OCC ORT 43_S_RCP Signal-to-Noise Ratio

ORTs cont'd

ORT on DOY 072 (Mar 13) over DSS-35, X- and Ka-band   Completed

17 072 1245 1415 2145 2200 DSS-35 CAS   TP RSS OCCORT MC 7109 N750   1A1

- Also prime TP

- Ka-band translator problem (DR# C112584)

  - Station said will not Monopulse, but RSS requested that they try

- Ka-band signal about 20 dBs lower than expected. Very high Monopulse corrections

  - Suspected that station was in lock on sidelobe

  - NOA asked station to scan on X-band. Ka-band signal power improved. Monopulse enable and worked nominally

  - Less than 3 hours of pointing data acquired

2017/072 S98 OCC ORT 35_X_RCP Signal-to-Noise Ratio

2017/072 S98 OCC ORT 35_K_RCP Signal-to-Noise Ratio

ORTs cont'd

Upcoming

ORT on DOY 076 (Mar 17) over DSS-35, X- and Ka-band

17 076 1350 1520 0055 0110 DSS-35 CAS   TP RSS OCCORT MC 7113 0681   1A1

- Also prime TP
- Verify Monopulse
- Acquire pointing data

Misc

Uplink Strategy
- DSS-43, 18 kW, ramped, sweep

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

DSS-43 S-band spur at 2.299 GHz
- Last report from the station (Jan 23) was that they tracked down the source of the spur (X-band PCG), but had to check that other users are not impacted before powering down the PCG
- Issue only if RSR S-band downlink predicts cross 2.299 GHz

Plan for updating DSS-35 Cassini Specific 4th Order Pointing Model?
- Pointing data sent to David. One more data set on March 17

NOPEs - Equipment Status?