About the Occultation

- S97 Rev 251 Saturn rings occultation
  - First RSS occultation in the F-ring orbits!
    - F-ring orbits begin today, November 30th
  - Telemetry OFF, Ranging OFF, 2-way/3-way mode
  - Covered by Canberra, Madrid, and New Norcia

- From Essam Marouf:

  The Rev 251 RSS ring occultation is the fourth in a sequence of five chord occultations that sample different ring longitudes (Revs 247, 248, 250, 251, and 253), and the first of two PIE chord occultations on the F-Ring orbits (Revs 251 and 253). The group of occultations capture in full or in part the A- and B-Rings, as well as the Cassini Division. The Rev 251 chord, in particular, captures the full A-Ring and Cassini Division and the outer ~80% of the B-Ring. The ring opening angle is 26.7°, 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 five RSS chord ring occultations, including the one on Rev 251, 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 and ESA Antennas

- DSN Coverage

	Pre	BOT	EOT	Post					
16 339	1915	2045	0845	0900	DSS-34 CAS	TP OTM467B RS L3 7010	N750	1A1	OTM BU + RSS
16 340	0030	0130	0845	0900	DSS-43 CAS	RS RV251 RIOC L3 7010	1647	1A1	
16 340	0045	0130	0915	0930	DSS-74 CAS	RS REV251 RI OCC 7011	0142	1A1	
16 340	0655	0825	1430	1445	DSS-55 CAS	RS RV251 RIOC L3 7010	N750	1A1	
16 340	0725	0825	1430	1445	DSS-63 CAS	RS RV251 RIOC L3 7010	1647	1A1	

- Occultation experiment is immediately preceded by OTM backup passes
  - OTM-467
  - Duane Roth said that OTM-467 must be executed
    - Maneuver size triples (to 3 m/s) if they to use the backup opportunity
    - Will uplink the maneuver a day early to protect against needing the backup opportunity

- Using DSS-34 at Canberra instead of DSS-35
  - DSS-35 down from Nov 20 to Dec 16 (DOY 321-351) for the AZ encoder cover replacement

- First official ESA science support
  - All supports to date have been scheduled as ORTs

DSN and ESA Antennas Cont'd

- 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 is installed and working, but still having issues with remote connection
    - Getting closer to resolving connectivity issues!

- PRSR at Canberra is red

- RSR1B, PRSR and VSR at Madrid are red

S97 Rev 251 Open-Loop Assignment

DSS Prdx Mode	Operator	Station	Open-loop Receiver	Channels	Subchannels	Bandwidths KHz
43 3-way	Elias	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	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	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)
63 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
63 1-way	Danny	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)
55 3-way	Jay	rsops3	RSR2	RSR2A -> XRCP RSR2B -> KRCP	1, 2, 3, 4 1, 2, 3, 4	1, 16, 50, 100 1, 16, 50, 100
55 1-way	Danny	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)

S97 Rev 250 Open-Loop Assignment cont'd

RSSG will be in Ops Room at 4:15 pm PST on Sunday, December 4 (340/0030)

Aseel – VOCA
Elias – Ops Room Displays
Danny – Check WVSR/VSR availability and disk space
       RSR Disk space becoming a challenge due to more frequent observations

Backup Receivers
- VSR at Canberra
- None at Madrid as of today

Predicts

- Last NAV OD delivery prior to occultation?
- Which delivery to use for predicts generation?
- 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

None scheduled as ORTs, but SCE#13 is ongoing and the tracks are over the antennas that will be used to support the occultation

70-m are X&S

34-m are X&Ka

Completed

16 333 2130 2300 0540 0555 DSS-34 CAS   TP RSS SCE13   7004 N750   1A1

Upcoming

16 336 0255 0355 0845 0900 DSS-43 CAS   TP RSS SCE13   7006 1647   1A1
16 336 0740 0840 1045 1100 DSS-63 CAS   TP RSS SCE13   7006 1647   1A1
16 336 2115 2245 0530 0545 DSS-34 CAS   TP RSS SCE13   7007 N750   1A1
16 338 0445 0545 0845 0900 DSS-43 CAS   TP RSS SCE13 L3 7008 1647   1A1
16 338 0735 0835 1630 1645 DSS-63 CAS   TP RSS SCE13 L3 7008 1647   1A1

Misc

Uplink Strategy
- DSS-34, 18kW, ramped, sweep. Per DKF
- DSS-43, 18 kW, ramped, no sweep during transfer, sweep after uplink gap
- DSS-74, 18 kW, ramped, no sweep
- DSS-63, 18 kW, ramped, no sweep

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

DSS-43 spurs observed during Rev 250 on Nov 28/DOY 333?

Plan for updating DSS-34 and DSS-55 Cassini Specific 4th Order Pointing Model?
- DSS-34 model was updated prior to Rev 250 occultation, but only one set of pointing data was available
    - Monopulse corrections were large at times and fluctuating
    - Manual offsets were used
    - Will have two new sets before the Rev 251 occultation to check the model and update if needed
- DSS-55 model was last updated prior to Rev 248 occultation on Nov 12/DOY 317
    - Pointing on DOY 317 was good
    - During Rev 250, Monopulse corrections were large, likely an indication that the model had degraded
    - No new data sets to update the model

Misc Cont'd

If OTMBU pass is not used, S- and Ka-band will be powered ON via real-time commands to give RSS the usual 2-hr warm-up/thermal stabilization period

- Commands currently in the background sequence execute at the official start of the observation
    - No warm-up!

NOPEs - Equipment Status?

Still some times TBD in the timeline. There will be a v3