

About the Occultation

- S97 Rev 257 Saturn rings and atmospheric egress occultations on DOY 017
 - Telemetry OFF, Ranging OFF, 2-way/3-way mode
 - Covered by Madrid, Goldstone, and Malargue
- From Essam Marouf:

The Rev 257 Radio Science observations include an egress Saturn atmospheric occultation followed by an egress ring occultation. The former is the last of 3 egress atmospheric occultations captured during the Cassini F-Ring Orbits . It probes a northern latitude of 28.3. The upper region of the troposphere and the stratosphere are observed mixed with the tenuous inner two thirds of Ring C, thus requiring special processing to separate observed frequency/phase changes due to each of the two media. In addition, the full Ring C and the inner ~38% of Ring B are observed mixed with the ionosphere. The egress ring occultation captures the outer ~62% of Ring B, the Cassini Division, and Ring A free of interference. A large ~26.7° ring opening angle at the time allows reliable profiling of large optical depth ring structure. Comparison of the structure observed at multiple Earth relative and inertial longitudes will help characterize the rings azimuthal asymmetry, both virtual (due to gravitational wakes) and actual (due to dynamical interactions with the satellites). Collectively, the group of RSS ring occultations, including the one on Rev 257, will provide information about azimuthal variability of ring structure and physical properties of resolved features.

DSN and ESA Antennas

- DSN Coverage

	Pre	BOT	EOT	Post								
17 017	0500	0600	1400	1415	DSS-63 CAS	RS 257	RISAOC L3	7053	1647	1A1		
17 017	0710	0840	1350	1405	DSS-55 CAS	RS 257	RISAOC L3	7053	N750	1A1		
17 017	1015	1100	1605	1620	DSS-84 CAS	RS 257	RI/SA OCC	7053	0142	1A1		
17 017	1145	1315	1625	1640	DSS-25 CAS	RS 257	RISAOC L3	7053	N748	1A1		
17 017	1215	1315	1625	1640	DSS-14 CAS	RS 257	RISAOC L3	7053	1647	1A1		

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-84 PRSR not yet fully operational

- NTP only issue

PRSR at Canberra is red

VSR at Madrid is red

S97 Rev 257 Open-Loop Assignment

DSS Prdx Mode	Operator	Station	Open-loop Receiver	Channels	Subchannels	Bandwidths KHz
63 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
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)
63 1-way	Danny	rsops4	PRSR	PRSR -> XRCP	1, 2 3, 4	1, 16 16, 50 (with offset)
55 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
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, 16, 50, 100 1, 16, 50, 100 (with offset)
14 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
14 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)
14 1-way	Jay/Danny	rsops3	VSR	VSR1A -> XRCP VSR1B -> SRCP	1, 2 3, 4 1, 2 3, 4	1, 16 16, 50 (with offset) 1, 16 16, 50 (with offset)

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S97 Rev 257 Open-Loop Assignment Cont'd

DSS Prdx Mode	Operator	Station	Open-loop Receiver	Channels	Subchannels	Bandwidths KHz
25 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
25 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)
84	Aseel	MAC/ rsops6/ psdg5	PRSR 168.96.250.72	PRSR -> KRCP	1, 2 3 4	16, 50 (3-way) 16 (1-way with offset) 16 (1-way)

RSSG will be in Ops Room at **8:45 pm** PST on Monday, January **16 (017/0445)**

Aseel – VOCA

Elias – Ops Room Displays

Danny – Check WVSR/VSR availability and disk space

Backup Receivers

- VSR at Canberra
- PRSR at Madrid

Predicts

- Last NAV OD delivery prior to occultation?
 - January 9
 - Use that for predicts generation
- SPE has been drifting since the DSS-14 track the night before the Rev 256 occultation on January 10
- BLF was raised by 3000 Hz today
 - from 7,175,025,800 to 7,175,028,800 Hz
- First track after change is later today
17 013 0010 0110 0440 0455 DSS-35 CAS TKG PASS 7049 N103 1A1
- Waiting for BLF change to take effect before asking SPS to generate predicts
- DSS-63 uplink (ETX) predicts will be modified by RSS to compensate for Doppler shift due to Saturn's atmosphere
 - DSS-55 can provide backup uplink. Modify ETX as well?
- 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/3-way) with atmospheric compensation: generated using Nicole's PREDICTs software and SPS nominal (unmodified) ETX
 - #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 between Rev 256 on January 10th and Rev 257 on January 17th

- No opportunities

Last DSS-55 ORT was on 2016-362 (December 27) and was nominal

16 362 0630 0800 1430 1445 DSS-55 CAS TP RSS KA ORT 7032 0676 1A1

Last DSS-25 ORT was on 2016-346 (December 11)

16 346 1935 2105 2330 2345 DSS-25 CAS RSS OCCORT MC 7016 0683 1A1

Misc

Uplink Strategy

- DSS-63, 18 kW, ramped

Will meet with SCO on Monday, January 16 at 1 pm to finalize uplink plan (offset? sweep?)

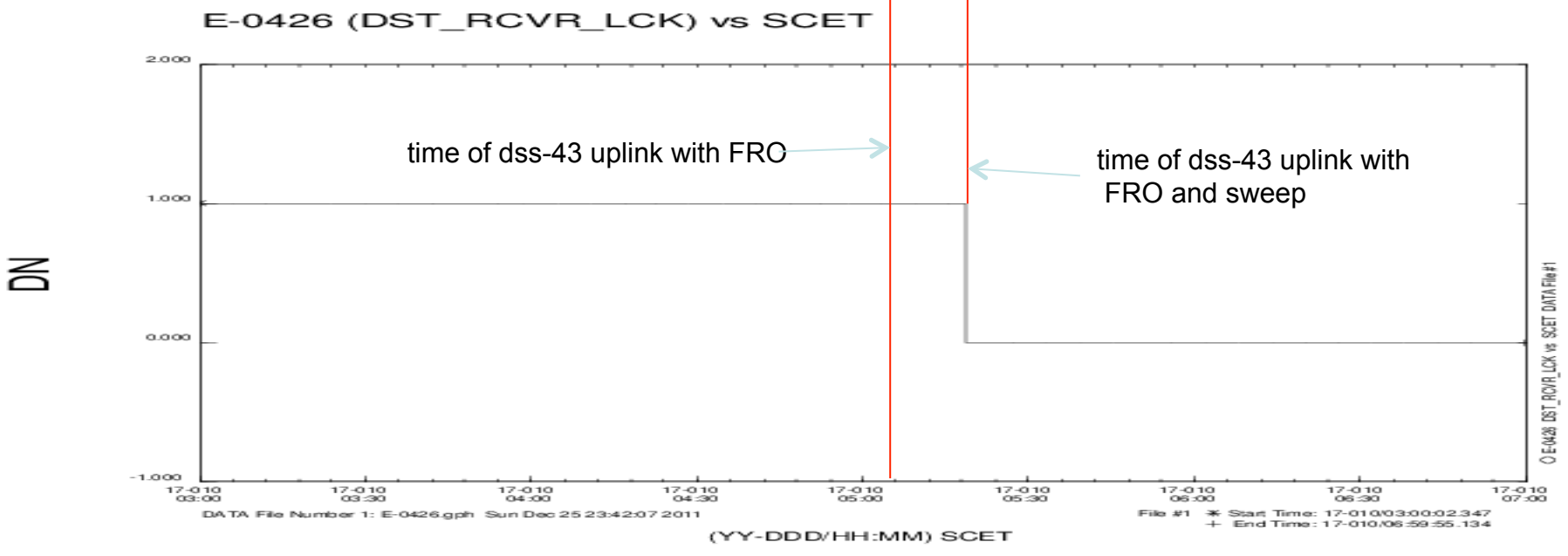
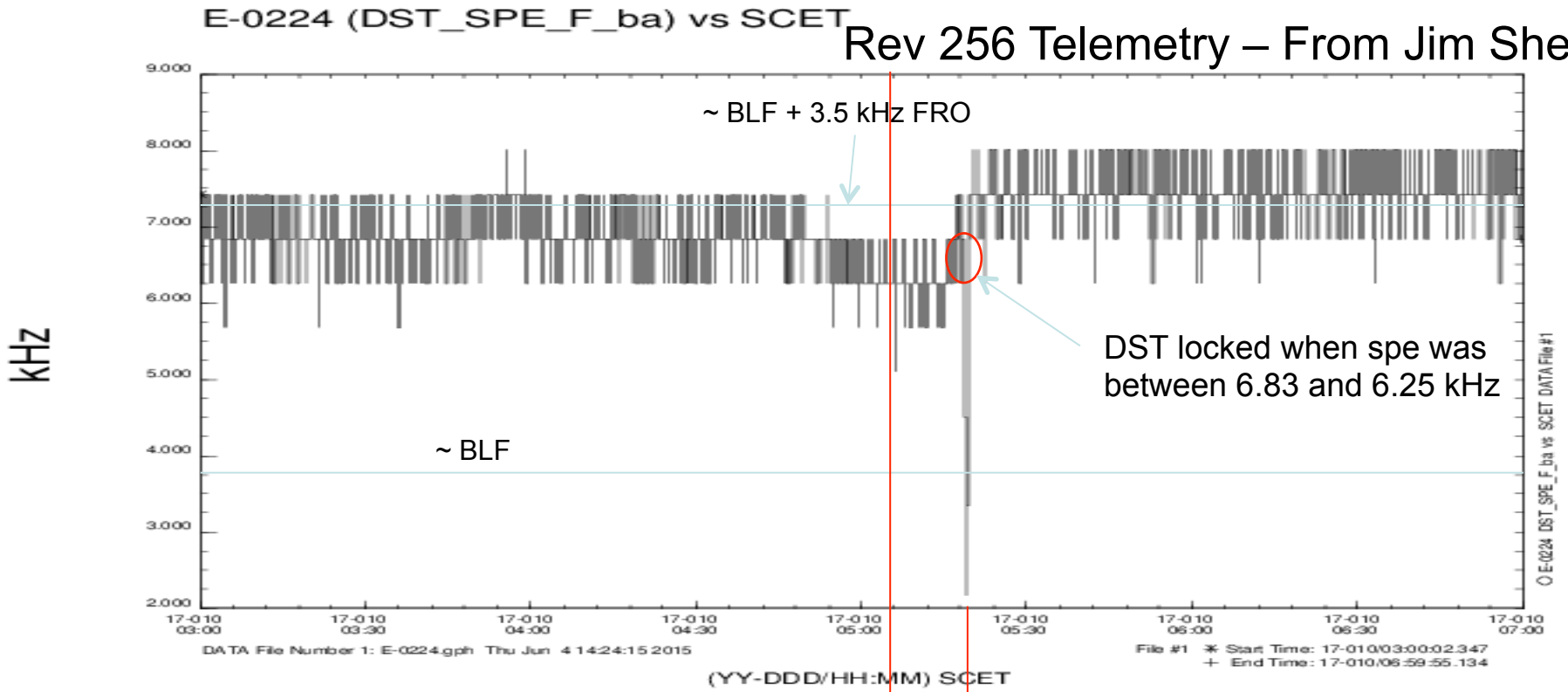
For Rev **256** on Jan 10, applied 3.5 KHz FRO and did sweep ~13 minutes after transmitter on

- Sweep delayed until time when stronger signal levels were expected
 - Concern about pushing DST frequency away from BLF if levels were too weak
- DST did not lock up with FRO, but was close
- DST locked up during sweep ~3.5 minutes after X-band 1-way signal was observed

Plan for updating DSS-55 and DSS-25 Cassini Specific 4th Order Pointing Model?

- Will check with David Rochblatt
- DSS-55 model last updated 12/16/16
 - One new set of DSS-55 data since last update
- DSS-25 last from David: "DSS-25 data was very good with MRE's of 2.89 and 3.36-mdeg respectively for DOY's 343 and 346, we don't usually do much better than this, so the model at DSS-25 stays as is"
 - No new DSS-25 data

Rev 256 Telemetry – From Jim Shell



Misc

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

DSS-63 track starts too early

- Track was scheduled assuming earlier uplink was required
- Changing it now will require . Will keep as is

NOPEs - Equipment Status?

There will be a v2 of timeline and figure