Observation Overview

Thank you for Rev 275!
Rough support!!

- S100 Rev 276 Saturn chord rings occultation
  - Telemetry OFF, Ranging OFF, 2-way/3-way mode
  - Covered by Canberra, Madrid, New Norcia and Malargue
  - Goldstone track following the observation for telemetry and uplink support

- This is an occultation only observation. The next gravity and occultation observations are on DOY 160-162 (June 9-11)

Science Highlights

- From Essam Marouf:

The Rev 276 RSS ingress/egress chord ring occultation is the fourth opportunity in a 'campaign' of Grand Finale (Proximal Orbits) Cassini radio occultations of Saturn's ring system (the short periapse ring occultation is not implemented on Rev 276). The campaign takes advantage of occultation track geometry that systematically sweeps across the ring system. Collectively, the set of occultation tracks were selected to capture a spread in: 1) Earth relative longitude , and 2) inertial ring longitudes. The first allows characterization of the virtual azimuthal ring asymmetry due to gravitational wakes, known to permeate the A and B rings. The second allows characterization of true azimuthal ring asymmetry driven by ring dynamics. Also unique about the campaign is that the rings are close to their maximum opening angle (B~26-27°) as seen from the Earth, possible only near the 2017~ epoch of the Proximal Orbits. The large B-angle allows maximum possible penetration of the radio signals of optically thick features, especially Ring B. The same is true for regions of optical depth enhancements within the many density and bending waves known to populate Ring A and the few in Ring B, and for the confined optically thick ringlets across the ring system including the plateaus of Ring C. Radio occultations enjoy the advantage of three coherent observation frequencies (Ka/X/S bands) allowing not only profiling of ring structure but also constraining the structures physical properties.

DSN and ESA Antennas

- DSN Coverage

		Pre	BOT	EOT	Post					
17	148	1630	1730	2150	2205 DSS-43 CAS	RSS 276 OCC L3	7185	1647	1A1
17	148	1630	1715	2300	2315 DSS-74 CAS	RSS 276 OCC L3	7186	0142	1A1
17	148	1740	1910	2150	2205 DSS-35 CAS	RSS 276 OCC L3	7185	N750	1A1
17	148	2005	2135	0525	0540 DSS-55 CAS	RSS 276 OCC L3	7185	N750	1A1
17	148	2030	2130	0530	0545 DSS-63 CAS	RSS 276 OCC L3	7185	1647	1A1
17	149	0015	0100	0510	0525 DSS-84 CAS	RSS 276 OCC L3	7185	0142	1A1
17	149	0345	0445	1315	1330 DSS-14 CAS	TKG PASS	7185	N003	1A1

- DSS-14 track continues after the RSS observation for telemetry support
  - Not a Level 3 support
- DSS-43, DSS-74 and DSS-63 will be providing the uplink for the occultations
- DSS-14 will be providing the uplink for the downlink period that follows

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

S100 Rev 276 Open-Loop Receivers Assignment

DSS Prdx Mode	Operator	Station	Open-loop Receiver	Channels	Subchannels	Bandwidths KHz
74 1-/3-way	Aseel	rsops6/ psdg5	PRSR 134.159.181.84	PRSR -> XRCP	1, 2, 3, 4	1, 16, 50, 100
43 1-/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	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 1-/3-way	Clement	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	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)
63 3-/2-way	Elias	rsops1	RSR1/RSR2	RSR1B -> XRCP RSR2A -> SRCP	1, 2, 3, 4 1, 2, 3, 4	1, 16, 50, 100 1, 16, 50, 100
63 1-way	Jay	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)

S100 Rev 276 Open-Loop Receivers Assignment

DSS Prdx Mode	Operator	Station	Open-loop Receiver	Channels	Subchannels	Bandwidths KHz
55 3-way	Elias	rsops2	RSR1/RSR2	RSR1A -> XRCP RSR2B -> KRCP	1, 2, 3, 4 1, 2, 3, 4	1, 16, 50, 100 1, 16, 50, 100
55 1-way	Jay	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)
55 3-way	Danny	rsops4	PRSR	PRSR -> KRCP	1, 2, 3, 4	1, 16, 50, 100
84 3-way	Aseel	rsops6/ psdg5	PRSR 168.96.250.72	PRSR -> KRCP	1, 2, 3, 4 5, 6, 7, 8	1, 16, 50, 100 (3-way) 1, 16, 50, 100 (1-way w/ offset)
14 3-/2-way	Elias	rsops2	RSR1	RSR1A -> XRCP	1, 2, 3, 4	1, 16, 50, 100

Don't record

DSN Open-Loop Receiver Status
Email from Danny on 5/18

Goldstone

RSR1 – Green (tone occurs at 0.5 MHz multiples near RF_TO_IF_LO + DDCLO)

RSR2 – Green with date rate != num_samples warnings

RSR3 – Green

VSR1A – "Orange" - DP Internal Error Error may occur; try restarting; reliability in question

VSR1B – "Red" - DP Internal Error Error may occur; try restarting; reliability in question

WVSR1 – Green w/ with fgain bug

WVSR2 – Green w/ with fgain bug

No PRSR

Canberra

RSR1 – Green

RSR2 – Green

VSR1 – Green

PRSR1 –Red

WVSR1 – Green w/ with fgain bug

WVSR2 – Green w/ with fgain bug

Madrid

RSR1A – Red but can be used by overriding dig vfy test

RSR1B - Green

RSR2A – Green

RSR2B – Digitizer test fails due to unknown cause. Can be used by overriding dig vfy test

VSR1 – Red

PRSR1 – Green

WVSR1 – Green w/ with fgain bug

WVSR2 - Green w/ with fgain bug

Real-Time Support

RSSG will be in Ops Room at 9:15am on Sunday, May 28 PDT (148/1615)
- Last L3 post-cal ends at 10:45 pm on Sunday, May 28 PDT (148/0545)
- 13.5 hours
    - Piece of cake! ☺

NOA support?

ACE support?

Predicts

- Last NAV OD delivery was on May 19
  - NAV doesn't have another one scheduled until June 12
- Lu: Can you please ask SPS to provide uplink predicts
- RSS will not be modifying the uplink predicts
- 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)
  - #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 when the DST loses lock (for example, dense ring regions)

Post Rev 275 Comments

- Too many to list!
- Main issues is ESA uplink
  – Up until recently, ESA uplink and uplink transfers were successful
  – Still trying to understand what happened during Rev 275
  – It appears that in an attempt to narrow the downlink channels recording bandwidths, the uplink was impacted
  – Lu and I are in the process of discussing with ESA
  – Go back to old configuration!

Rev 275 SPE Telemetry
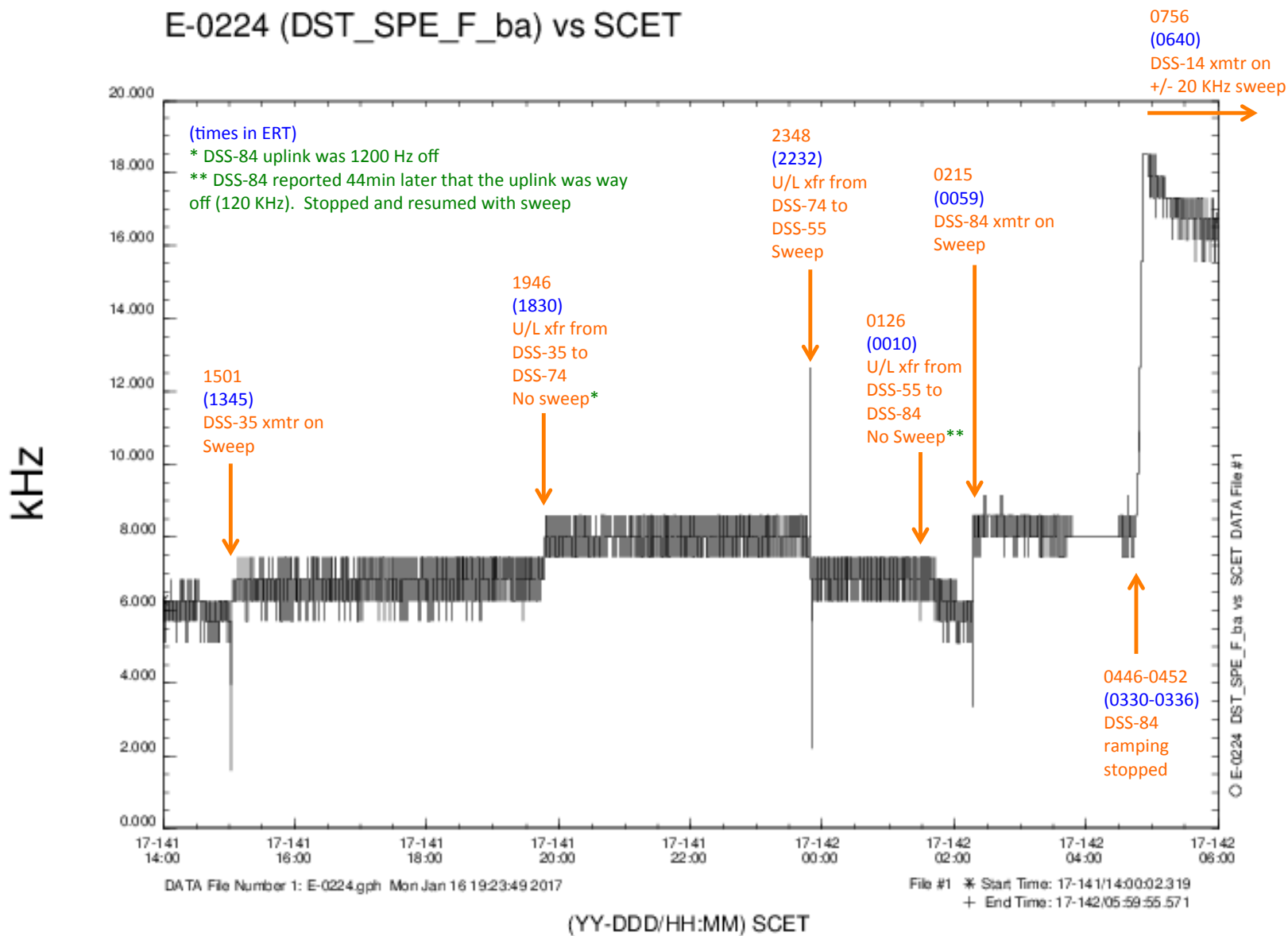
Misc

Uplink Strategy
- DSS-43, 18 kW, ramped, sweep
- DSS-74, 18 kW, ramped, no sweep
    - DSS-74 used to primarily close the uplink gap between Canberra and Madrid
- DSS-63, 18 kW, ramped, no sweep
- DSS-14, 18 kW, ramped, sweep   (per DKF)

Asked ESA to update DSS-74 track times
From 17:15 – 23:00
To 19:00 – 00:00
They changed EOT but waiting to hear back if they changed BOT as well

Subreflector moving at all stations

Monopulse
- Per timeline
    - Stations to enable and disable Monopulse only when requested by RSS
- Rising stations - Wait for ~10 degrees elevation to enable Monopulse

DKF – Does not have the correct uplink or AOS/LOS times. Use times in RSS timeline
Follow DKF after RSS observation is complete

Misc Cont'd

4th Order Blind Pointing Models
- Data sent to David
- Graham Baines at Canberra has been checking the DSS-35 pointing model

Timeline
- There will be a v2
- Comments are welcome

NOPEs - Equipment Status?
- DSS-43 Master Equatorial red
- DSS-43 S-band spur
- Others?

SCO activity at beginning of Canberra & New Norcia tracks that will result in s/c going off earth-point