# About the Occultation

- S73 Rev 167 Saturn rings occultation
  - Ingress only
  - Telemetry OFF, Ranging OFF, 2-way/3-way mode
  - Covered by Madrid and Goldstone

- From Essam Marouf:

  The Rev167 ingress ring occultation will be the first ring occultation in almost two years, and the first of a group of 4 occultations during June-August 2012 specifically designed to sample a whole new range of ring opening angle (~12.5 to 13.5 degrees), while covering complementary range of ring longitudes. The 4 occultations are on Revs 167 to 170. The Rev167 occultation will be the first ring occultation ever to be conducted in 2-way and 3-way configurations, using an uplink signal from DSS-63 to provide a reference signal that replaces that provided by the Cassini UltraStable Oscillator (USO) in all previous occultations. Measurements at three radio wavelengths (0.94, 3.6, and 13 cm; Ka-, X-, and S-bands) will be collected at the setting Madrid complex (DSS-63 and DSS-55) and rising Goldstone complex (DSS-14 and DSS-25). The occultations are expected to yield high resolution radial profiles of ring structure, shedding more light on variability of dynamical ring features (waves, wakes, edges, gaps, narrow ringlets, ...) with ring longitude, opning angle, and wavelength. In addition, measurements of the strength and shape of the collective forward scattering function are expected to shed more light on physical properties of multitude of ring features (particle sizes, aggregate sizes or wakes, wake orientation, packing fraction, ring thickness, ...).

# DSN Antennas

- DSN Coverage

| | | Pre | BOT | EOT | Post | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 156 | 1830 | 1930 | 0145 | 0200 | DSS-63 CAS | RS167-RI OCC | 5361 | 2641 | 1A1 |
| 12 | 156 | 2015 | 2145 | 0145 | 0200 | DSS-55 CAS | RS167-RI OCC | 5361 | N750 | 1A1 |
| 12 | 156 | 2140 | 2310 | 0300 | 0315 | DSS-25 CAS | RS167-RI OCC | 5361 | N748 | 1A1 |
| 12 | 156 | 2210 | 2310 | 0300 | 0315 | DSS-14 CAS | RS167-RI OCC | 5361 | 1647 | 1A1 |

- 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

- Antennas Band and Polarization Capabilities

| DSS-63 | DSS-55* | DSS-14 | DSS-25** |
|---|---|---|---|
| X-RCP X-LCP | X-RCP X-LCP | X-RCP X-LCP | X-RCP X-LCP |
| S-RCP S-LCP | K-RCP K-LCP | S-RCP S-LCP | X-RCP |

*Either KLCP (switch 43 in B position) or monopulse (switch 43 in A position)

**Either RCP or LCP

  - LCP data are enhancement. Prime are RCP
  - Only RCP will be recorded
    - 2-way/3-way and 1-way modes

# RSR/VSR/WVSR Assignment

Aseel: VOCA
Don: Ops Room Displays

| DSS | Operator | Station | Open-loop Receiver | RSR Assignment |
|---|---|---|---|---|
| 63 (2-way) | Elias | rsops1 | RSR1 | RSR1A -> XRCP<br>RSR1B -> SRCP |
| 63 (1-way) | Danny | rsops3 | WVSR1 | WVSR1A -> XRCP<br>WVSR1B -> SRCP |
| 55 (2-way) | Elias | rsops1 | RSR2 | RSR2A -> XRCP<br>RSR2B -> KRCP |
| 55 (1-way) | Danny | rsops3 | WVSR2 | WVSR2A -> XRCP<br>WVSR2B -> KRCP |
| 14 (2-way) | Don | rsops2 | RSR1 | RSR1A -> XRCP<br>RSR1B -> SRCP |
| 14 (1-way) | Danny | rsops3 | WVSR1 | WVSR1A -> XRCP<br>WVSR1B -> SRCP |
| 25 (2-way) | Don | rsops2 | RSR2 | RSR2A -> XRCP<br>RSR2B -> KRCP |
| 25 (1-way) | Danny | rsops3 | WVSR2 | WVSR2A -> XRCP<br>WVSR2B -> KRCP |

RSSG will be in Ops Room at 11 am on Monday, June 4th (156/1800)

# ORTs

ORT on DOY 143-144 (May 22-23) over DSS-63 and DSS-14, X- and S-band

12 143 1615 1715 0215 0230 DSS-63 CAS   RS-OCCORT T83PB  5348 1639    1A1

12 144 0030 0130 0315 0330 DSS-14 CAS   TP RS166-OCCORT1 5348 1647    1A1

- To verify X- and S-band signals
- X-band signals slightly fluctuating (see power plots)
    - Weather clear at both stations
    - Bias during DSS-63 track, but nothing else to cause fluctuations
    - Was not reported in real-time – Didn't look too serious


ORT on DOY 147-148 (May 26-27) over DSS-25, X- and Ka-band

12 147 2300 0030 0930 0945 DSS-25 CAS   RS166-OCCORT2 MC 5352 N748    1A1

- Clear, high winds (20-30 mph)
- Station asked if should enable monopulse under such windy conditions
- Aseel looked at old emails about wind & monopulse suggested to enable monopulse – ACE OK-d
- Station requested and performed 1-way and 2-way on-point phase cals
- Monopulse worked nominally
    - ~0.5 dB jump in power at mono enabled in 1-way mode. ~1 jump in 2-way mode
    - Signal power was more stable after monopulse was enabled (see power plot)


ORT on DOY 149-150 (May 28-29) over DSS-25, X- and Ka-band

12 149 2245 0015 0915 0930 DSS-25 CAS   RS167-OCCORT1 MC 5354 N748    1A1

- Nominal
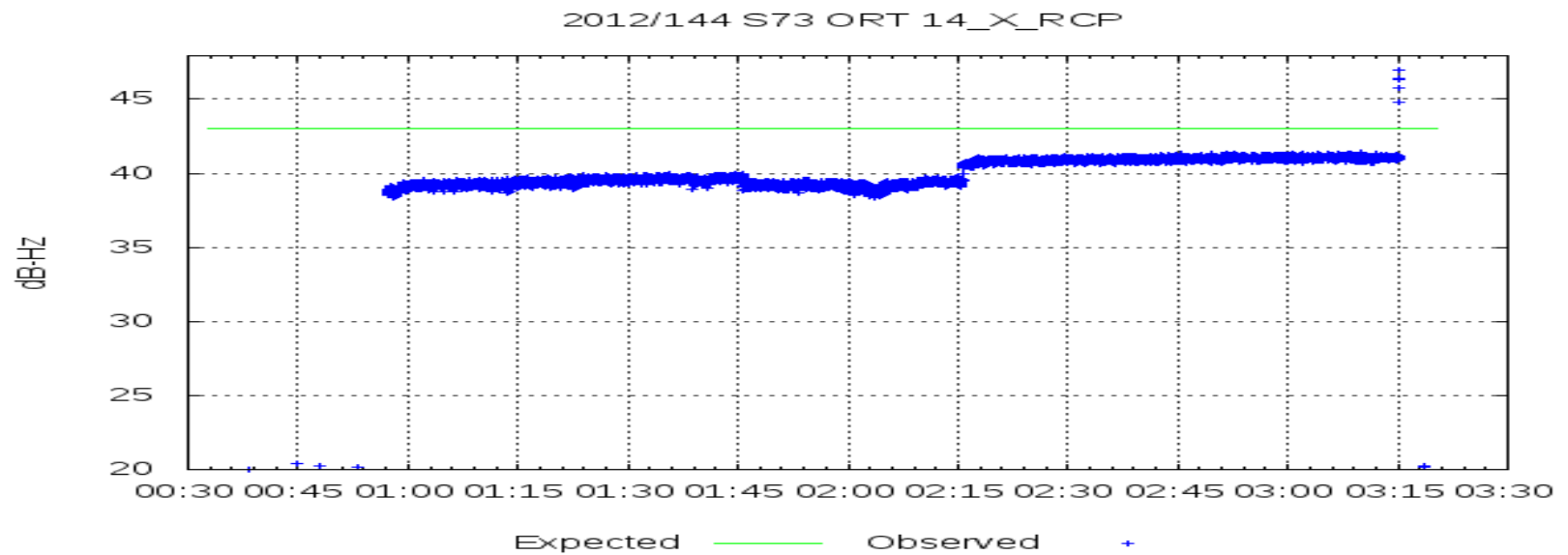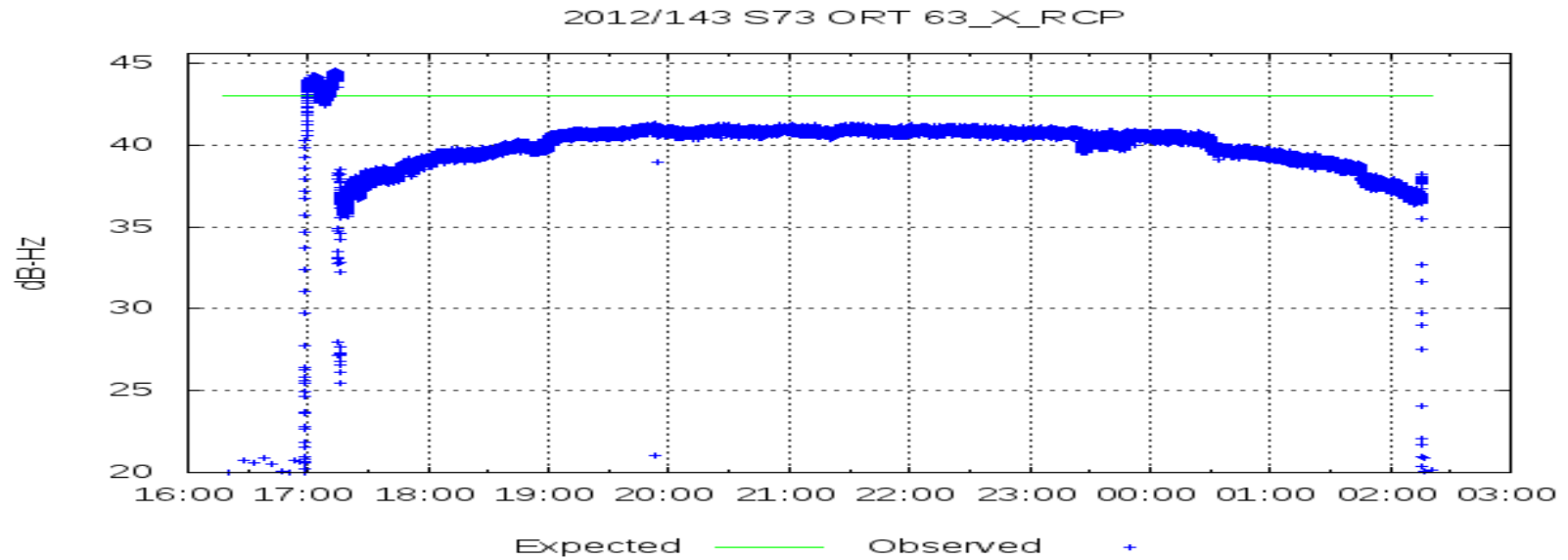- ~1.5 dB jump in power when monopulse was first enabled


**Upcoming**

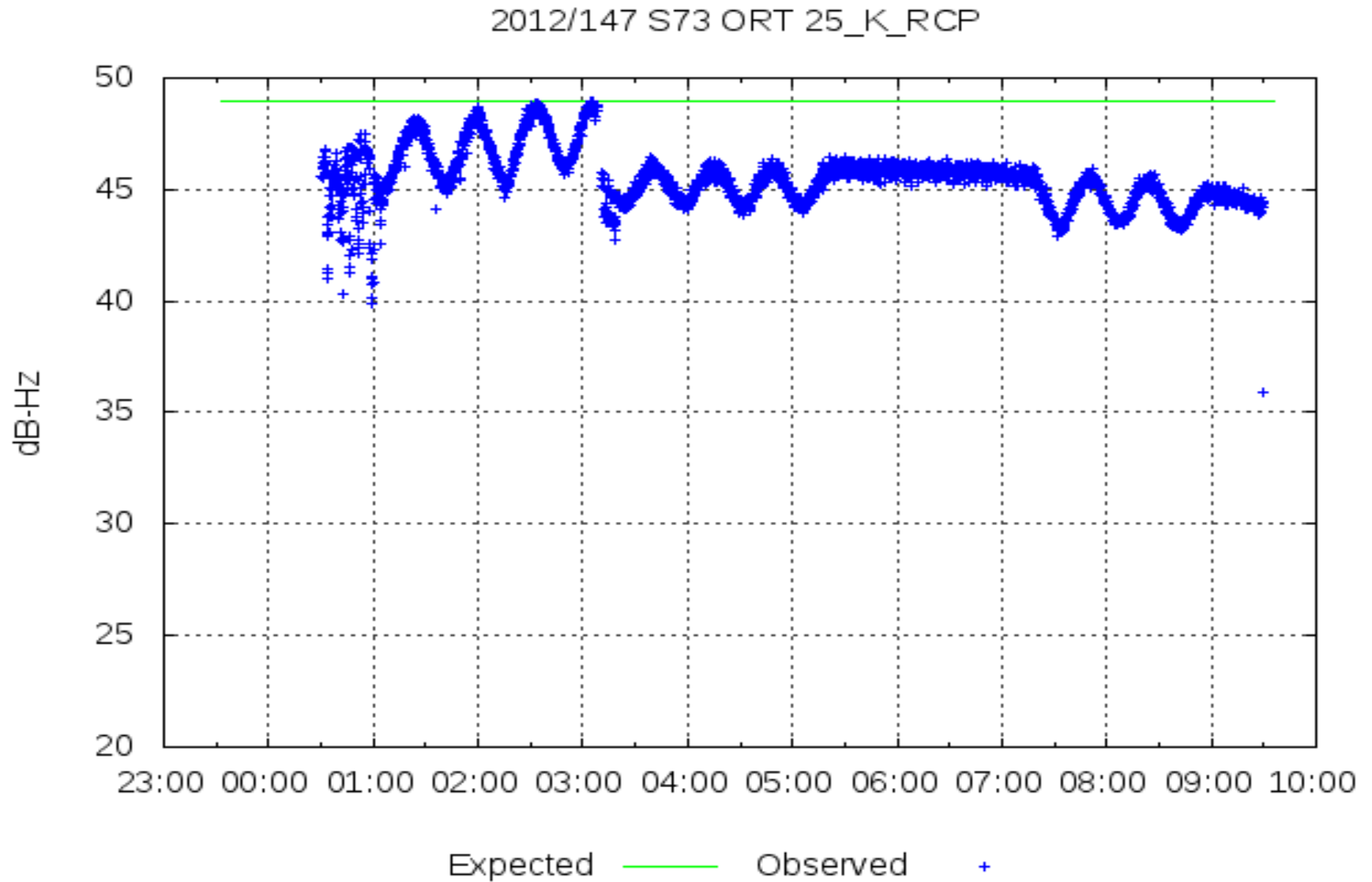ORT on DOY 153 (June 1) over DSS-55, X- and Ka-band

12 153 1745 1915 0115 0130 DSS-55 CAS   RS167-OCCORT3 MC 5358 N750    1A1

DSS-55 Ka-band ORT originally scheduled on DOY 152 was deleted due to scheduling conflicts

# Power Plots from DOY 143-144 ORTs



2012/143 S73 ORT 63_X_RCP



2012/144 S73 ORT 14_X_RCP

# Power Plot from DOY 147-148 ORT



2012/147 S73 ORT 25_K_RCP

# Misc

Uplink at DSS-63: 18 kW
- ACE log sometimes shows uplink slightly below 18 kW. What is reason for that?

DKF – May not have accurate AOS/LOS and uplink times

Monopulse
- Was there a change in Tau value at DSS-25?

NOPEs - Equipment Status?

Plan for Cassini Specific 4th Order Pointing Models
- Don to send David pointing data from ORTs

Plan for predicts generation?
- RSS will need uplink predicts

SNT
- Enable X only at DSS-55 and DSS-25 throughout
- Conduct SNT measurements

Open-loop Recording bandwidths
- In the past we used: 1, 16, 50, 100 KHz
- Use the same for 1-way and 2-way/3-way?
  - Note Ka-band 1-way signal may be at edge of 1 KHz bandwidth due to AUX OSC frequency drift
  - Also consider 2-way Ka-band carrier spreading (see plots)

Closed-loop receiver lock-up - Will be intermittent during Ring B

# RSR 2-way Carrier Spreading
## (1, 2, 8, 50 KHz Bandwidths)