About the Experiment

- S96 Rev248 T124 Titan Bistatic Observation
  - The last in the mission!
  - 1-way mode
  - Telemetry OFF, Ranging OFF
  - Covered by Canberra

Science Highlights (from Essam Marouf)

The T124 RSS bistatic scattering observation is one of two opportunities throughout the Cassini Mission lifetime of observation geometry ideally suited for capturing potential mirror-like surface echoes from Titan's high northern seas (the other was T106 in 2014). The T124 bistatic ground track covers the surface region close to Titan's North pole (68°N to 87°N latitude) and stretches over about 140° arc centered on about 30°W longitude. The track crosses Punga Mare – the first and only time a bistatic observation covers this sea -- and other likely liquid-filled close by regions, and ends over the western part of Kraken Mare, a region not explored before by RSS. If successful, the measurements will offer unique opportunity to compare physical properties of Titan's three major northern seas, and also characterize potential differences among different regions of the vast Kraken Mare. As for T106, two major geometry aspects make the observations on T124 special: observing near closest approach, hence enhancing chances of weak echo detectability, and observing close to the Brewster(or polarization) angle of liquid hydrocarbons, hence enhancing chances of dual-polarization echo detectability. The latter is key for unambiguous determination of the dielectric constant, hence constraining the liquid composition. In addition, reliable measurements of the absolute echo power and echo spectral shape will constrain physical properties of capillary and gravity waves, if present and are detectable.

DSN Antennas

- DSN Coverage

	Pre	BOT	EOT	Post						
16 318	1915	2220	0420	0550	DSS-43 CAS	RSS T124 BIST L3	6989	1647		1A1
16 318	1920	2220	0420	0620	DSS-35 CAS	RSS T124 BIST L3	6989	N750		1A1

- No uplink

- Receivers scheduled
  - 2 closed-loop receivers per antenna
  - Open-loop receivers (RSRs, WVSRs, PRSR). VSR is red
  - Open-loop data are prime. Closed-loop data are backup
  - RCP and LCP will be recorded
    - 1-way mode

S86 T106 Open-Loop Receivers Assignment

DSS	Operator	Station	Open-loop Receiver	Channels	Subchannels	Bandwidths KHz
43	Dustin	rsops1	RSR1	RSR1A -> XRCP RSR1B -> XLCP	1, 2, 3, 4 1, 2, 3, 4	1, 16, 50, 100 1, 16, 50, 100
43	Elias	rsops2	RSR2	RSR2A -> XRCP RSR2B -> SLCP	1, 2, 3, 4 1, 2, 3, 4	1, 16, 50, 100 1, 16, 50, 100
34	Danny	rsops4	WVSR1	WVSR1A -> KRCP WVSR1B -> KLCP	1, 2, 3, 4 1, 2, 3, 4	1, 16, 50, 100 1, 16, 50, 100

STILL BEING WORKED

RSSG will be in Ops Room at 10:00 am on Sunday, November 13 (318/1800)

Aseel – Will be supporting from Canberra
Dustin - Ops Room Displays
Danny – Check WVSR availability & RSR/WVSR/PRSR disk space

Bistatic Calibrations

- Calibrations will be performed during
  - Pre-cal (antennas at stow)
    - 3-hr pre-cal periods are scheduled
  - Observation (mini-cals)
    - Pre-determined and carefully selected times (during turns)
    - Must be completed within 6-8 minutes
  - SNT Measurements
    - Completed within 3-4 minutes
  - Post-Cal (antennas at stow)
    - 2-hr post-cal periods are scheduled
- Pre-cal calibrations are the longest

- Will be updating last version of bistatic calibrations procedure
  - DSS-35 calibrated diodes. Can now use 12.5K and 0.5K (for SNT measurement) instead of 50K and 4K, respectively

ORTs

ORT on DOY 298 (October 24) over DSS-35, X- and Ka-band Completed

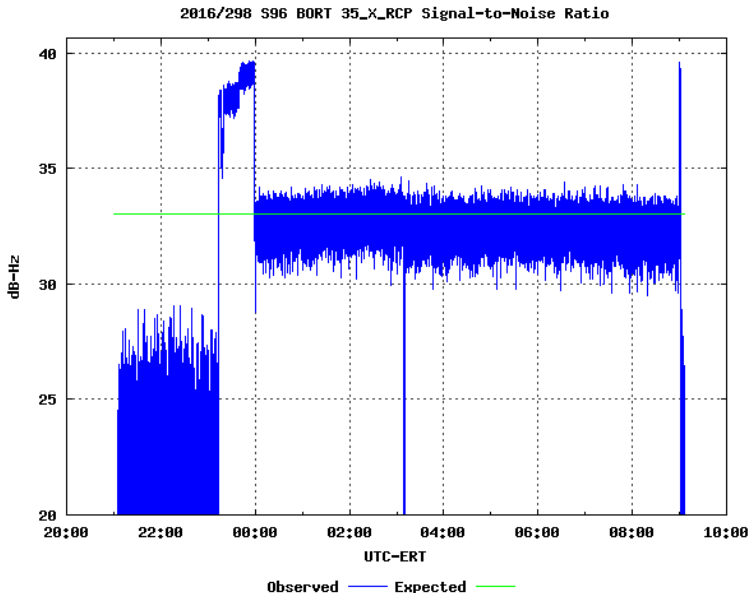
16 298 2100 0000 0900 0915 DSS-35 CAS TP RS BISTORT MC 6969 N750 1A1

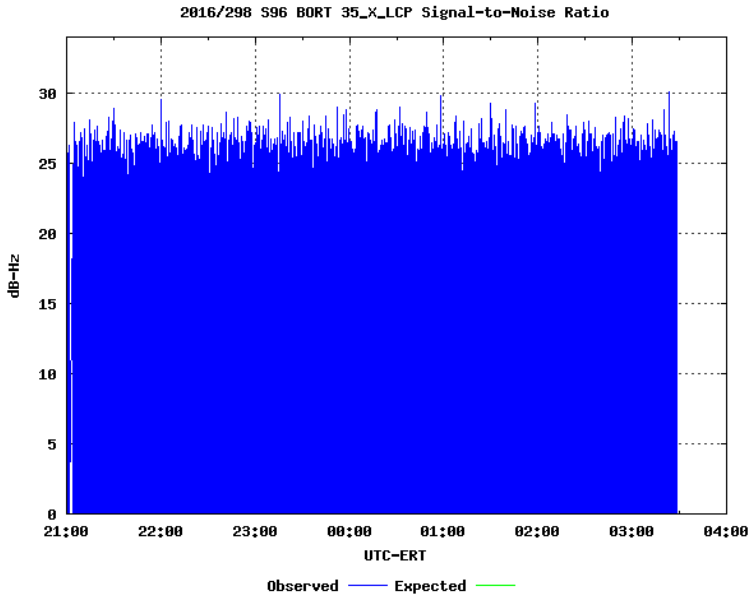
- Also prime TP
- Bistatic ORT
  - Practiced bistatic calibrations – Team C
  - Did not verify XLCP in real-time
    - Required SFRO not entered in narrow bandwidth
    - XLCP signal verified during post-pass data processing
  - Did not verify KLCP
    - Switch 43 was in A position throughout – Monitored Monopulse error channel
- Monopulse enabled and worked nominally – Pointing data acquired
  - No jump in signal power when Monopulse was enabled

ORTs cont'd

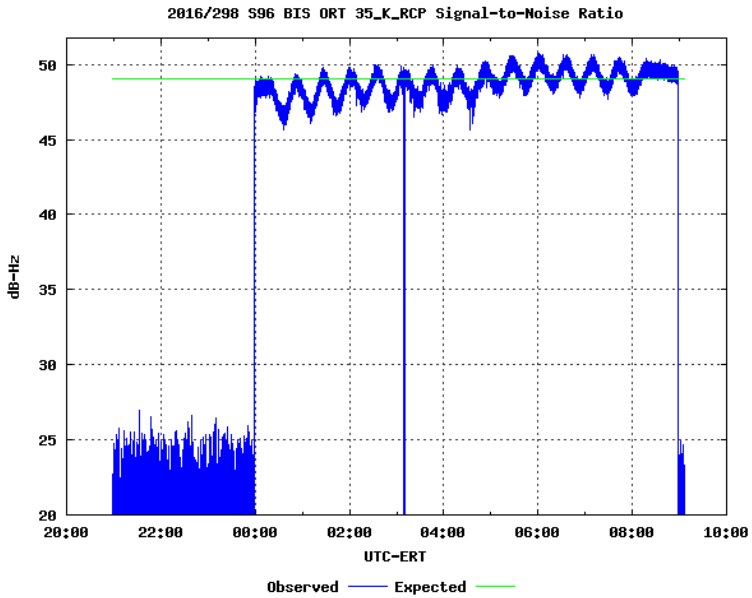
- DOY 298 DSS-35 ORT cont'd

X-band

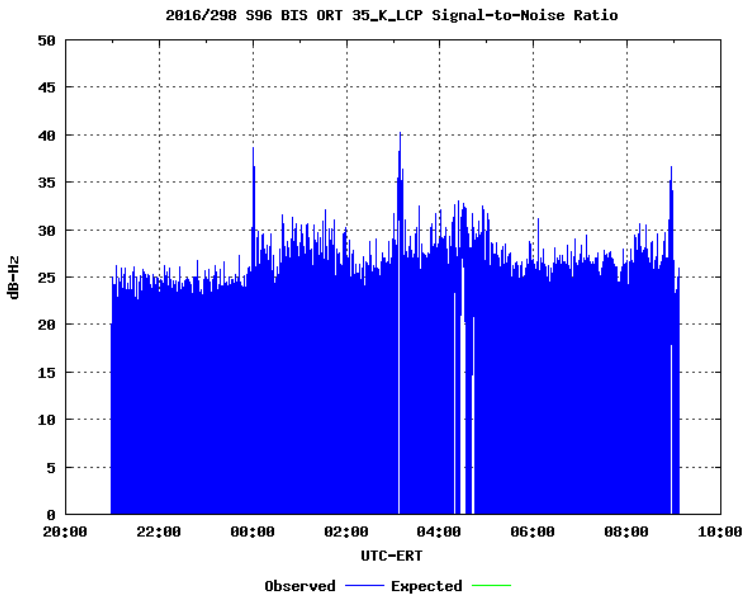




Ka-band



RCP



LCP

ORTs cont'd

Upcoming

Use ESA uplink test track on DOY 312 (Nov 7) to verify DSS-35 LCP signals

16 312 0530 0700 1020 1035 DSS-35 CAS ESA UL TEST RSS 6982 N750 1A1

- Configure for RCP and LCP on both X- and Ka-band

ORT on DOY 315 (Nov 10) over DSS-43, X- and S-band

16 315 2100 2300 0800 0815 DSS-43 CAS TP OTM-463 BU 6986 N003 1A1

- Also prime TP
- Prior to PTMBU pass
  - Only time could find for ORT
- Will practice bistatic calibrations during 2hr Pre-cal
  - Allow time for standard pre-cal activities and antenna to go to point

Ops Room Displays

- Aseel will be supporting from Canberra
  - Project Management (Earl, Julie) will be monitoring
  - CDSCC management
  - Environment, Science, Technology, and Health Officer from U.S. Embassy in Canberra
  - DSN management?

- Filming will be taking place in the ops room as well as at Canberra

- Displays
- Usual RSR displays
- Skype with Canberra
- Jeff's Cosmographia display
- Animated ground track

Misc

No uplink

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

Don't expect closed-loop receivers to lock up during bistatic experiments

T124 Live update process kicks off today

Predicts
NAV's last OD delivery prior to observation is?

Plan for DSS-35 Cassini Specific 4th Order Pointing Model?

- Crucial to have good pointing models since we can't utilize monopulse during the bistatic experiments

Canberra noise diodes require calibration

- Canberra is aware
- Lu is checking if it's been completed

Jeff Boyer's displays in ops room?