

About the T52 Titan Bistatic Observation

- S49 Rev107-108 T52 Titan Bistatic and Occultation Experiment
 - Telemetry OFF, 1-way mode
 - Covered by Madrid and Goldstone

- About the science – From Essam Marouf

The RSS observations on T52 include ionospheric and atmospheric occultations and bistatic surface scattering on both the inbound and outbound sides. The T52 egress atmospheric occultation is one of the highest priority RSS occultation of the Extended Mission. It will be the first Cassini occultation (in fact the first since Voyager in 1980) to probe near-equatorial latitude (~0 degs), while the ingress occultation probes mid-northern latitude (~57 degs). The occultations will shed more light on latitudinal variability of the electron density profile of the ionosphere, temperature/pressure profile, extinction profile, and small scale-structure of the neutral atmosphere. The T52 inbound bistatic scattering observation will probe for the first time high-northern latitude regions of Titan's surface (55-70 degs; ~0-10 degs west longitude), and the outbound bistatic will probe mid-southern latitude region (~-40 degs; ~260-300 degs west longitude). The incidence angle for both sides is close to the Brewster angle range of likely surface compositions. Same- and cross-polarized components of the quasi-specular surface echo, if detectable, provide information about the dielectric constant and physical state of the surface region probed.

Antennas Supporting T52

Yr	DOY	Pre-	BOT	EOT	Post-	DSS						
09	093	2145	0045	0500	0600	DSS-14 CAS	TP	RS107-BISTAT	4200	1639	1A1	
09	093	2155	0100	0430	0600	DSS-63 CAS	TP	RS107-BISTAT	4200	1639	1A1	
09	093	2200	0100	0500	0600	DSS-25 CAS	TP	RS107-BISTAT	4200	N748	1A1	
09	093	2200	0100	0420	0600	DSS-55 CAS	TP	RS107-BISTAT	4200	N750	1A1	

Originally requested DSS-26 as well, but had to release to Kepler

Potential changes to DSS-14 track. Agreement with Spitzer:

- Cassini yields pass in real-time if Spitzer enters standby mode during bistatic experiment
- If Spitzer is in standby mode prior to bistatic experiment, Cassini may or may not get DSS-14. Could get a shortened DSS-14 pass

Equipment Scheduled

- Two close-loop receivers per antenna
- All RSRs, and some WVSRs/VSR
- Open-loop data are prime. Closed-loop are backup

RSR/VSR/WVSR Assignment

DSS	Operator	Station	Open-loop Receiver	RSR Assignment
14	Don	rsops3	RSR3 and VSR1	RSR3A -> XRCP RSR3B -> XLCP VSR1A -> SRCP VSR1B -> SLCP
25	Elias	rsops2	RSR2 and RSR1	RSR2A -> XRCP RSR2B -> KRCP RSR1A -> XLCP
63	Danny	rsops1	WVSR1 and WVSR2	WVSR1A -> XRCP WVSR1B -> XLCP WVSR2A -> SRCP WVSR2B -> SLCP
55	John	Laptop through rsops2	RSR1 and RSR2	RSR1A -> XRCP RSR1B -> XLCP RSR2A -> KRCP RSR2B -> KLCP

-VSRs available as backup

-RSSG will be in Ops room at 2:00 pm on Friday April 3 (DOY 093/2100)

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)
 - SNT Measurements
 - Post-Cal (antennas at stow)
 - 1-hr post-cal periods are scheduled
 - Will likely start shortly after observation is over and before post-cal
- Pre-cal calibrations are the longest

ORTs

Since T51 and T52 are a few days apart, some T52 ORTs were combined with T51 ORTs and were completed prior to T51 on DOY 086 (March 27th)

Goldstone

No additional ORTs after T51. Bistatic calibrations during T51 were nominal and stations followed procedure exceptionally well

Madrid

DSS-63 bistatic calibrations were practiced during ORT on DOY 076:

09 076 1815 1915 0415 0615 DSS-63 CAS RSR106-BISTATORT 4183 1639 1A1

- First attempt at SLCP ambient load resulted in loss of IF source to RSR. Station switched to "A1" ambient load in place of "A2" which resolved the problem

DSS-55 ongoing ORT:

ORT: DOY 089 (Mon, Mar 30) over DSS-55, X- and Ka-band:

09 089 1530 1830 0330 0345 DSS-55 CAS TP RS107-BORT1 4196 N750 1A1

- Also prime pass
- Practice bistatic calibrations during 3-hr pre-cal
- Collect pointing data (monopulse) to update the 4th order pointing model
- Check for oscillations

GSE: DOY 093 (Thu, April 2-3 local) over DSS-25 and DSS-55, X- and Ka-band:

09 093 0015 0145 1045 1100 DSS-25 CAS TP RS107-KDWN2 4199 N748 1A1

09 093 0015 0145 0425 0440 DSS-55 CAS TP RS107-KDWN2 4199 N750 1A1

09 093 0300 0345 1045 1100 DSS-14 CAS TKG PASS N/R 4199 N001 1A1

- DSS-14 prime
- Test pointing models (or acquire more pointing data) at DSS-25 and DSS-55

Misc

- Plans to update 4th order pointing models at DSS-25 and DSS-55
 - DSS-25
 - ~1.5 dB jump in power when monopulse was enabled during T51 on DOY 086
 - David should have data from DOY 085 GSE to update DSS-25 model as needed
 - Note: Default model was used on DOY 085 even though updated model was available due to problems loading pointing model
 - DSS-55
 - Data from DOY 085 is available, plus data from DOY 089 (today) ORT will be available by tomorrow morning
- Azimuth angles at DSS-55 range from ~243 to ~274 degrees
 - Exceed 260 degrees. Cannot use LQG Coefficients
- DSS-55 Oscillations
 - No visible oscillations during DOY 085 track
 - Will wait for ops report for DOY 089 track
 - Are spikes that were reported at DSS-54 present at DSS-55?
- Don't expect closed-loop receivers to be in lock during bistatic part
- Be prepared for changes to DSS-14 track
 - Could be shorter track or loss of entire track
- Status of RSR1B at Goldstone