

Cassini T119 (Rev 235): RSS Egress Titan Occultation & Bistatic Surface Scattering Observations

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Activity	ERT UTC OWLT = 01:15:58	SCET UTC	PDT ERT - 7 hrs	Comments
DOY 2016-127 ERT				
Spacecraft is not Earth Pointed				
RSSG: Load 1-Way Free-Space Predicts				
DSS-43: Start Pre-Cal	12:15:00	10:59:02	05:15:00	Keep antenna at stow after completing the set up activities
DSS-43: Start Pre-Cal Bistatic Calibrations	TBD			Guided by real-time instructions from Radio Science
RSSG: Begin DSS-43 1 & 16 KHz Open-Loop Recording				
DSS-35: Start Pre-Cal	14:50:00	13:34:02	07:50:00	Keep antenna at stow after completing the set up activities
DSS-35: Switch 43 in B Position	TBD			When requested by Radio Science after station completes set up activities
DSS-35: Start Pre-Cal Bistatic Calibrations	TBD			Guided by real-time instructions from Radio Science
RSSG: Begin DSS-35 1 & 16 KHz Open-Loop Recording				
RSSG: Begin OL Recording (All DSS-43 channels)				
DSS-43: Beginning Of Track	15:15:00	13:59:02	08:15:00	No S/X downlink detectable
RCP/LCP SNT Measurement (DSS-43)	15:20:00	14:04:02	08:20:00	Radio Science to confirm start time
DSS-43 Transmitter ON, 18 kW, LCP, RAMP, NO SWEEP	15:31:00	14:15:02	08:31:00	Time = surface - RTLT- 20m 38s. Differs from DKF
Start Bistatic Mini Cal 1 (DSS-43)	15:35:00	14:19:02	08:35:00	Radio Science to confirm start time
X-Band OFF	15:52:36	14:36:38	08:52:36	per PEF. For ORS observations. Spacecraft is not Earth pointed
Spacecraft RWA Bias	15:53:22	14:37:24	08:53:22	Spacecraft is not Earth pointed
DSS-43 Transmitter OFF	16:05:39	14:49:41	09:05:39	ERT Time = ERT End Egress Occ Time - RTLT
X-Band ON	16:13:29	14:57:31	09:13:29	per PEF. Spacecraft is not Earth pointed. No X downlink detectable
S-Band ON	16:13:37	14:57:39	09:13:37	per PEF. Spacecraft is not Earth pointed. No S downlink detectable
Ka-Band ON	16:18:33	15:02:35	09:18:33	per PEF. Spacecraft is not Earth pointed. No Ka downlink detectable
Start Thermal Stabilization Period	16:18:34	15:02:36	09:18:34	
RSSG: Begin Recording All Subchannels	17:45:00	16:29:02	10:45:00	
DSS-35: Beginning Of Track	17:50:00	16:34:02	10:50:00	No Ka/X downlink detectable
RCP/LCP SNT Measurement (DSS-43 & DSS-35)	17:52:00	16:36:02	10:52:00	Radio Science to confirm start time
Start INMS Ingress Observation	17:55:35	16:39:37	10:55:35	
Start Bistatic Mini Cal 2 (DSS-43 & DSS-35)	18:00:00	16:44:02	11:00:00	Radio Science to confirm start time. Must end by 18:10:00
Behind Titan	18:08:30	16:52:32	11:08:30	
Closest Approach (C/A)	18:10:35	16:54:37	11:10:35	
EGRESS ATMOSPHERIC OCCULTATION				
RSSG: Load Coherent Egress Occultation Predicts	18:15:00	16:59:02	11:15:00	

RSSG: Enter Coherent Frequency Offsets	18:15:05	16:59:07	11:15:05	Pre-determined offsets
RNG OFF	18:19:14	17:03:16	11:19:14	
TLM OFF	18:19:15	17:03:17	11:19:15	
Start turn to Occultation IVD (T1)	18:19:16	17:03:18	11:19:16	
End Turn to Occultation IVD	18:19:54	17:03:56	11:19:54	
Start Tracking Occultation IVD	18:21:14	17:05:16	11:21:14	
Behind Titan				
At Titan's Surface (~2575 km rad)	18:23:34	17:07:36	11:23:34	S/X signal intensity builds up quickly; egress lat = 39.75
DSS-43: Begin X- and S-Band 2-Way Acquisition				
DSS-35: Begin X- and Ka-Band 3-Way Acquisition				
Ka-band appears (~10 km alt)	18:23:51	17:07:53	11:23:51	Ka-band signal intensity builds up quickly
Near tropopause (0.01° BA)	18:24:30	17:08:32	11:24:30	PC/N0 ~ 54, 48, & 42 dB-Hz for X-, Ka-, S-Band
Top of Atmosphere (~200 km alt)	18:25:06	17:09:08	11:25:06	PC/N0 ~ 54, 48, & 42 dB-Hz for X-, Ka-, S-Band
Titan's Ionosphere (~1500 km alt)	18:31:23	17:15:25	11:31:23	The ionosphere primarily affects the signal freq/phase
~Top of Ionosphere (~3000 km alt)	18:35:18	17:19:20	11:35:18	
End Egress Earth Occultation	18:37:35	17:21:37	11:37:35	
RSSG: Clear Coherent Frequency Offsets	18:37:35	17:21:37	11:37:35	
EGRESS BISTATIC OBSERVATION				
RSSG: Load 1-Way Free-Space Predicts	18:37:36	17:21:38	11:37:36	
DSS-43: Begin X- and S-Band 1-Way Acquisition	18:37:36	17:21:38	11:37:36	
DSS-35: Begin X- and Ka-Band 1-Way Acquisition	18:37:36	17:21:38	11:37:36	
RSSG: Enter Open-Loop 1-way Frequency Offsets as Needed				Based on real-time monitoring of open-loop frequency residuals
Start 7min 1-Way Free-Space Baseline	18:37:50	17:21:52	11:37:50	
End 7min 1-Way Free-Space Baseline	18:44:50	17:28:52	11:44:50	
Start Turn to Titan Surface (T2)	18:45:15	17:29:17	11:45:15	Quick loss of of the Ka/X/S carrier signals
RSSG: Load Bistatic Egress Predicts	18:48:00	17:32:02	11:48:00	
End Turn to Titan Surface	18:49:06	17:33:08	11:49:06	HGA boresight is pointed to Titan's surface
Start Egress Bistatic Observations	18:49:50	17:33:52	11:49:50	Potential weak echo from Ligiea Mare
End Egress Bistatic Observations	19:52:50	18:36:52	12:52:50	
Start turn to egress baseline (T3)	19:52:52	18:36:54	12:52:52	
RSSG: Load 1-Way Free-Space Predicts	19:55:00	18:39:02	12:55:00	
End turn to egress baseline	19:57:03	18:41:05	12:57:03	
Start 15 minutes free-space baseline	19:57:35	18:41:37	12:57:35	PC/N0 ~ 54, 48, & 42 dB-Hz for X-, Ka-, S-Band
End 15 minutes free-space baseline	20:12:35	18:56:37	13:12:35	
Start Spacecraft turn to handoff attitude	20:12:37	18:56:39	13:12:37	
End of T119 RSS Observations	20:12:38	18:56:40	13:12:38	Spacecraft starts turning to handoff attitude
End Spacecraft turn to handoff attitude (T4)	20:20:02	19:04:04	13:20:02	End of RSS T119 Observations
TLM ON	20:20:29	19:04:31	13:20:29	
RNG ON	20:20:33	19:04:35	13:20:33	

S-Band OFF	20:20:35	19:04:37	13:20:35	per PEF
Ka-Band OFF	20:20:37	19:04:39	13:20:37	per PEF
Start Bistatic Mini Cal 3	20:25:00	19:09:02	13:25:00	Radio Science to confirm start time.
DSS-43 & DSS-35 RCP/LCP SNT Measurement	20:40:00	19:24:02	13:40:00	SNT measurements must end by 20:50:00
DSS-43 & DSS-35: End-of-Track	20:50:00	19:34:02	13:50:00	
DSS-43 & DSS-35: Start of Post-Cal	20:50:00	19:34:02	13:50:00	
DSS-43 & DSS-35: Start of Post-Cal Bistatic Calibrations	TBD			Guided by Real-Time Instructions from RSS Ops-Room
RSSG: Continue Recording 1 & 16 KHz Only				Disable recording of all other subchannels on all receivers
DSS-35: Switch 43 in A Position	TBD			When requested by Radio Science after completion of bistatic calibrations
DSS-43 & DSS-35: End of Post-Cal	22:50:00	21:34:02	15:50:00	
RSSG: End 1 & 16 KHz Open-Loop Recordings				

Times are based on the T119 Ref Traj 150901

Canberra DSS-43 & DSS-35 Related Activities

Behind Titan

Mini Calibration; SNT Measurements