

Cassini T46: Titan Radio Occultation & Bistatic Scattering Observations

November 3 (DOY 308), 2008

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	ERT UTC OWLT = 1:22:24	SCET UTC	PST ERT - 8 hrs 8:00:00	Comments
Start Precals DSS 25 & 26	13:00:00	11:37:36	5:00:00	
Start Precals DSS 14	13:15:00	11:52:36	5:15:00	
Start Precals DSS 43	14:30:00	13:07:36	6:30:00	
Start Precals DSS 34	14:40:00	13:17:36	6:40:00	See separate Precals timeline
Load Free-Space Predicts	15:00:00	13:37:36	7:00:00	
RSS3RCS Op-Mode ON	15:27:47	14:05:23	7:27:47	
Begin-of-Track DSS 25 & 26	16:00:00	14:37:36	8:00:00	
Begin-of-Track DSS 14	16:15:00	14:52:36	8:15:00	
SNT Measurement (All Stations)	TBD			Allow for 10 min between SNT measurements & minical 1
Start Bistatic Minical 1 All Stations)	TBD			Completed 'on-point' close to the observation start time;
End Bistatic Minical 1 (All Stations)	TBD			see separate Minical 1 timeline
Begin-of-Track DSS 47 (Narrabri)	17:30:00	16:07:36	9:30:00	
Begin-of-Track DSS 43	17:30:00	16:07:36	9:30:00	No Cassini downlink signals till shortly before 17:36:24
TWNC ON	17:31:48	16:09:24	9:31:48	
Start turn to Earth point	17:31:51	16:09:27	9:31:51	
TLM OFF	17:31:53	16:09:29	9:31:53	
Start 5 minutes free-space baseline	17:36:24	16:14:00	9:36:24	PC/N0 ~ 54, 48, & 42 dB-Hz for X-, Ka-, S-Band
Enable Monopulse: DSS 25, 26	TBD			Enable monopulse when asked to do so by Radio Science
Disable Monopulse: DSS 25, 26	TBD			Keep or Clear the offset decision before 18:43:48
Begin-of-Track DSS 34	17:40:00	16:17:36	9:40:00	Try to have DSS-34 on-point before 17:36:00
Enable Monopulse: DSS 34	TBD			Enable monopulse when asked to do so by Radio Science
Disable Monopulse: DSS 34	TBD			Keep or Clear the offset decision before 18:43:48
End free-space baseline	17:41:24	16:19:00	9:41:24	
Start turn to Titan surface	17:41:29	16:19:05	9:41:29	Quick loss of of the carrier signals
SNT Measurement (All Stations)	17:43:00	16:20:36	9:43:00	SNT measurements have to end by 17:48:00

Load Bistatic Ingress Predicts	17:45:00	16:22:36	9:45:00	
End Turn to Titan surface	17:48:58	16:26:34	9:48:58	HGA boresight is pointed to Titan's surface
Start Bistatic Observations	17:49:33	16:27:09	9:49:33	Potential weak surface echoes centered within the
End Bistatic Observations	18:38:58	17:16:34	10:38:58	observations bandwidth
Start turn to Earth point	18:39:01	17:16:37	10:39:01	Carrier signals should re-appear shortly before 18:43:48
Load Occultation Ingress Predicts	18:41:00	17:18:36	10:41:00	
End Turn to Earth Point	18:43:48	17:21:24	10:43:48	PC/N0 ~ 54, 48, & 42 dB-Hz for X-, Ka-, S-Band
Enable Monopulse: DSS 25, 26	TBD			Enable monopulse when asked to do so by Radio Science
Enable Monopulse: DSS 34	TBD			Enable monopulse when asked to do so by Radio Science
Top of Ionosphere (~3000 km alt)	18:44:12	17:21:48	10:44:12	
Titan's Ionosphere (~1500 km alt)	18:48:22	17:25:58	10:48:22	The ionosphere primarily affects the signal freq/phase
Top of Atmosphere (~200 km alt)	18:51:57	17:29:33	10:51:57	The atmosphere affects signal intensity/frequency/phase
Near tropopause (0.01° BA))	18:52:15	17:29:51	10:52:15	Signal intensity drops quickly in Titan's troposphere
Ka-band absorbed (~10 km alt)	18:52:41	17:30:17	10:52:41	Ka-band is absorbed before the signal reaches the surface
At Titan's Surface (~2575 km rad)	18:52:49	17:30:25	10:52:49	Hard-limb diffraction may cause the signals to continue to
Behind Titan				be observed very briefly after 18:52:50
End Limb-track for occ'n ingress	18:54:48	17:32:24	10:54:48	
Monopulse Offsets Decision	18:55:00	17:32:36	10:55:00	Keep or clear the monopulse offsets for egress occultation?
Load Occultation Egress Predicts	18:55:00	17:32:36	10:55:00	
Start Bistatic Minical 2	18:55:10	17:32:46	10:55:10	8.5 min total time; start with X/S 70m; end with Ka 34m
Titan Closest Approach (C/A)	18:57:47	17:35:23	10:57:47	CIMS GMB_E091_Titan46 epoch
End Bistatic Minical 2	19:03:40	17:41:16	11:03:40	End time should not exceed 19:03:58 (start of LMBTRK)
Start Limb-track for occ'n egress	19:03:58	17:41:34	11:03:58	
Behind Titan				S/X signals may appear briefly before 19:06:03
At Titan's Surface (~2575 km rad)	19:06:02	17:43:38	11:06:02	S/X signal intensity builds up quickly
Ka-band reappears (~10 km alt)	19:06:12	17:43:48	11:06:12	Ka-band signal intensity builds up quickly
Near tropopause (0.01° BA)	19:06:40	17:44:16	11:06:40	Signals are back to near full strength
Top of Atmosphere (~200 km alt)	19:07:00	17:44:35	11:07:00	PC/N0 ~ 54, 48, & 42 dB-Hz for X-, Ka-, S-Band
Titan's Ionosphere (~1500 km alt)	19:10:32	17:48:08	11:10:32	The ionosphere primarily affects the signal freq/phase
Top of Ionosphere (~3000 km alt)	19:14:39	17:52:15	11:14:39	
End Occultation Observations	19:16:48	17:54:24	11:16:48	short free-space baseline
SNT Measurement (All Stations)	19:18:00	0:34:12	8:34:12	SNT measurements have to end by 19:20:30

Load Bistatic Egress Predicts	19:19:30	17:57:06	11:19:30	
Secondary Axis Turn Ends	19:20:44	17:58:20	11:20:44	Signal level may not be steady during the secondary turn
Start turn to Titan surface	19:20:47	17:58:23	11:20:47	Quick loss of of the Ka-X/S carrier signals
End turn to Titan surface	19:21:05	17:58:41	11:21:05	HGA boresight is pointed to Titan's surface
Start Bistatic Observations	19:21:34	17:59:10	11:21:34	Potential weak surface echoes centered within the
End Bistatic Observations	20:02:21	18:39:57	12:02:21	observations bandwidth
Start turn to egress baseline	20:02:27	18:40:03	12:02:27	
Load Free-space Predicts	20:05:30	18:43:06	12:05:30	
Start 5 minutes free-space baseline	20:08:24	18:46:00	12:08:24	PC/N0 ~ 54, 48, & 42 dB-Hz for X-, Ka-, S-Band
Enable Monopulse: DSS 34	20:12:00	18:49:36	12:12:00	Enables assessment of Ka-band pointing quality
Enable Monopulse: DSS 25, 26	20:12:00	18:49:36	12:12:00	
End of T46 RSS Observations Period	20:13:24	18:51:00	12:13:24	
TLM ON	20:13:34	18:51:10	12:13:34	X-Band signal level drops
TWNC OFF	20:13:38	18:51:14	12:13:38	Loss of S- & Ka-band signals
Start turn away from Earth point	20:13:42	18:51:18	12:13:42	Quick loss of X-band signal
End-of-Track DSS 47 (Narrabri)	20:30:00	19:07:36	12:30:00	
Start Bistatic Minical 3	TBD			Completed 'on-point' shortly after the observations end
End Bistatic Minical 3	TBD			see separate Minical 3 timeline
SNT Measurement (All Stations)	TBD			Allow for 10 min between minical 3 & SNT measurements
End-of-Track DSS 25, 26, 14	21:15:00	19:52:36	13:15:00	
End-of-Track DSS 34, 43	21:15:00	19:52:36	13:15:00	
End-of-Postcals 25, 26, 14	22:15:00	20:52:36	14:15:00	See separate detailed Postcals timeline
End of Postcals DSS 34, 43	22:15:00	20:52:36	14:15:00	See separate detailed Postcals timeline

Atmopsheric times are based on OTM-169 OD (10/27/08)

Goldstone Activities
Canberra Activities
Narrabri Activities
Switching of Frequency Predicts
Behind Titan
Mini Calibration; SNT Measurements