CASSINI T124 SEGMENT

Rev 248 Handoff Package

Segment Boundary 2016-318T06:29:00 – 2016-321T06:14:00

21 MAR 2016

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SMT Report and SPASS

Science Highlights

Notes & Liens

SMT Report

DATA VOLUME SUMMARY --- TRANSFER FRAME OVERHEAD INCLUDED (80 BITS PER 8800-BIT FRAME)

			OBSERVATION_PERIOD							DOWNLINK_PASS							
			P4						P5	RECORDED		PLAYBACK					
DOWNLINK PASS NAME	Start doy hh:mm	End doy hh:mm	START (Mb)	SCI (Mb)	HK+E (Mb)	TOTAL (Mb)	CPACTY (Mb)	MRGN (Mb)	OPNAV (Mb)	SCI (Mb)	ENGR (Mb)	TOTAL (Mb)	CPACTY (Mb)	MARGN (Mb)	NET_MARGN (Mb)	(%)	CAROVR (Mb)
SP_248EA_C70METSEQ319_PRIME	319 19:44	320 07:14	0	2734	193	2927	3322	395	0	258	68	3252	3477	224	224	6%	0
SP_249EA_C34BWGSEQ320_PRIME	320 21:14	321 06:14	0	363	59	422	3322	2900	0	83	53	558	558	-1	0	0%	0

DATA VOLUME REPORT --- TRANSFER FRAME OVERHEAD NOT INCLUDED

Event	Start doy hh:mm	End doy hh:mm	CAPS (Mb)	CDA (Mb)	CIRS (Mb)	INMS (Mb)	ISS (Mb)	MAG (Mb)	MIMI (Mb)	RADAR (Mb)	RPWS (Mb)	UVIS (Mb)	VIMS (Mb)	PROBE (Mb)	ENGR (Mb)	TOTAL (Mb)
OBSERVATION_NOR	318 06:29	319 19:44	0.0	70.3	388.7	23.5	808.0	108.9	123.3	0.0	844.6	21.7	320.0	0.0	191.2	2900.2
SP_248EA_C70METSEQ319_PRIME	319 19:44	320 07:14	0.0	21.7	113.4	4.1	0.0	20.5	35.2	0.0	54.2	6.3	0.0	0.0	0.0	255.4
DAILY TOTAL SCIENCE	318 06:29	320 07:14	0.0	92.0	502.1	27.6	808.0	129.4	158.5	0.0	898.8	28.1	320.0	0.0	191.2	
OBSERVATION_NOR	320 07:14	320 21:14	0.0	26.4	0.0	5.0	216.0	12.4	30.2	7.6	45.8	0.0	16.0	0.0	58.5	418.0
SP_249EA_C34BWGSEQ320_PRIME	320 21:14	321 06:14	0.0	17.0	0.0	3.2	0.0	8.0	19.4	0.0	29.4	4.9	0.0	0.0	0.0	82.0
DAILY TOTAL SCIENCE	320 07:14	321 06:14	0.0	43.4	0.0	8.3	216.0	20.5	49.7	7.6	75.2	4.9	16.0	0.0	58.5	

	CAPS (Mb)	CDA (Mb)	CIRS (Mb)	INMS (Mb)	ISS (Mb)	MAG (Mb)	MIMI (Mb)	RADAR (Mb)	RPWS (Mb)	UVIS (Mb)	VIMS (Mb)	PROBE (Mb)
TOTAL RECORDED (OPNAV data not included)	0.0	135.3	502.1	35.9	1024.0	149.8	208.2	7.6	974.0	33.0	336.0	0.0

Science Highlights

Nov. 13 (DOY 318) – **ISS** will acquire global-scale mosaics of Titan's sub-Saturnian and leading hemisphere at mid-southern latitudes. ISS will also ride along with CIRS and VIMS inbound to image Titan's surface and atmosphere. **CIRS** will make thermal maps to monitor seasonal changes in global temperatures, as well as a surface temperature map to determine the seasonal changes in sunlight reaching the surface, and the response of the surface to this insolation. **VIMS** will acquire a mosaic that includes the eastern part of Xanadu, Hotei Arcus, Menrva, and the North Pole. It will monitor cloud activity and the evolution of the south polar vortex. **UVIS** will ride along with CIRS to measure aerosol scattering and gaseous absorption features in the atmosphere. **RSS** will perform one of only two (the other was T106) ideal bistatic experiment observations during the Cassini Mission to capture the potential mirror-like surface echoes from Titan's high northern seas. The T124 bistatic ground track covers the surface region close to Titan's North pole (68N to 87N degrees latitude) and stretches over about 140 degrees arc centered on about 30W longitude. It 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 and for constraining 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 detectable. **MIMI** will ride along with RSS to constrain energetic ion and electron energy input to atmosphere.

Science Highlights

Nov. 14 (DOY 319) – **RSS** bistatic observations continue; see previous day's description for details. Outbound from closest approach, **ISS** will acquire global-scale mosaics outbound of Titan's trailing hemisphere at mid-northern latitudes. ISS will also ride along with CIRS and VIMS inbound to image Titan's surface and atmosphere. **CIRS** will make thermal maps to monitor seasonal changes in global temperatures, as well as a surface temperature map to determine the seasonal changes in sunlight reaching the surface, and the response of the surface to this insolation. In addition, atmospheric limb sounding will be performed, allowing measurements of the vertical profile of trace constituent gases, such as hydrocarbons and nitriles. **VIMS** will ride along with CIRS and will look for specular reflection on Kraken Mare to monitor the evolution of the liquid hydrocarbon reservoirs. Additionally, there will be cooperative observation during a CIRS observation to look for specular reflection, in particular on the South of Kraken where a RADAR-dark body--potentially liquid--may be present. **UVIS** will ride along with CIRS to measure aerosol scattering and gaseous absorption features in the atmosphere.

Nov. 15 (DOY 320) – **ISS** and **VIMS** will monitor Titan to track clouds and the evolution thereof, in the northern hemisphere, looking for possible seasonal changes as northern summer arrives on Titan.

Master Timeline

Start Time	End Time	Prime Activity	Obs. Detail	Op Mode	TLM Mode	Comments
2016-318T06:29:00	**2016-318T07:09:00**	SP Turn to WP	NEG_Y to Titan/NEG_X to NTP	DFPW Normal	S_N_ER_3	MAPS_248 secondary NEG_X to 257.2/-28
2016-318T07:09:00	C/A-16:31:56	OD Uncertainty Dead Time		DFPW Normal	S_N_ER_3	
C/A-16:31:56	-14:00	CIRS	A truncated (Tc1b)	DFPW Normal	S_N_ER_3	
-14:00	-12:00	ISS	TN2c (Could also use TN1c for limb haze layer, depending on geometry if along limb, or TN2d, depending on timing.))	DFPW Normal	S_N_ER_3	
-12:00	-09:00	CIRS	D2 (TN1c)	DFPW Normal	S_N_ER_3	
Begin Custom Period				DFPW Normal	S_N_ER_3	
-09:00	-05:00	VIMS	I (TC1a and TN2c)	DFPW Normal	S_N_ER_3	ISS rider.
-05:00	**-03:26**	VIMS	Y modified (TC1a, TN1a (depending on pointing) and TN2c)	DFPW Normal	S_N_ER_3	
-03:26	**-03:25**	RWA to RCS Transition		ORSRCS	S_N_ER_3	Transition was moved. Deadband (0.5, 0.5, 0.5) RSS+VIMS.
-03:25	**-02:43**	VIMS	(TN2c)	ORSRCS, begin RSS3RCS at -03:05		On thrusters.
-02:43	**-01:00**	**RSS warm up**		RSS3RCS	S_N_ER_3	
-01:00	**0**	**RSS Bistatic**	(TN1a)	RSS3RCS	S_N_ER_3	
2016-318T23:55:56		**CLOSEST APPROACH**	**XBAND to Titan, LUB (Tc2a)**			Good Bistatic Opportunity over Lakes (Exit). Changed C/A from 2016-319T00:01:44
0	**+02:10**	**RSS Bistatic**	(TN1a)	RSS3RCS	S_N_ER_3	
+02:10	**+02:32**	RCS to RWA Transition		DFPW Normal	S_N_ER_3	
+02:32	**+05:00**	**CIRS**	T (TN2c (surface temperature))	DFPW Normal	S_N_ER_3	
+05:00	+09:00	CIRS	R (TN1c or Tc1b, decided in implementation)	DFPW Normal	S_N_ER_3	VIMS Collaborative Rider
+09:00	+12:00	CIRS	D2 (TN1c)	DFPW Normal	S_N_ER_3	
End Custom Period				DFPW Normal	S_N_ER_3	
+12:00	+14:00	ISS	D2 (TC1a, TC1b, TN1a, TN2c (Could also use TN1c for limb haze layer, depending on geometry if along limb, or TN2d, depending on timing.))	DFPW Normal	S_N_ER_3	
+14:00	C/A+18:53:04	CIRS	M3 (Tc1b (TN1c on outbound))	DFPW Normal	S_N_ER_3	ISS Collaborative Rider
C/A+18:53:04	2016-319T19:04:00	OD Uncertainty Dead Time				
2016-319T19:04:00	**2016-319T19:44:00**	SP Turn to Earth for downlink	XBand to Earth/MIMI.NEG_Y to Saturn (0,0,-9.5)	DFPW Normal	S_N_ER_3	
2016-319T19:44:00	**2016-320T07:14:00**	Canberra 70M		DFPW Normal	RTE_N_SPB	
2016-320T07:14:00	**2016-320T07:54:00**	SP Turn to WP	NEG_Y to Titan/NEG_X to NTP	DFPW Normal	S_N_ER_3	
2016-320T07:54:00	2016-320T11:54:00	ISS	4h ISS mosaic	DFPW Normal	S_N_ER_3	
2016-320T11:54:00	2016-320T16:04:00	ISS	4h10 ISS mosaic	RADWU	S_N_ER_5A at 11:54 for 15 minutes, then S_N_ER_3	Radar warmup at start, agreed by ISS
2016-320T16:04:00	2016-320T16:34:00	ISS	*30 min ISS mosaic*	RADWU	S_N_ER_3	
2016-320T16:34:00	2016-320T18:34:00	RADAR	*2 hr Radiometry Calibration*	RADWU	S_N_ER_5A	
2016-320T18:34:00	2016-320T19:04:00	ISS	*30 min ISS mosaic*	DFPW Normal	S_N_ER_3	
2016-320T19:04:00	**2016-320T19:44:00**	SP Turn to Earth for downlink	XBand to Earth/MIMI.NEG_Y to Saturn (0,0,-9.5)	DFPW Normal	S_N_ER_3	
2016-320T19:44:00	2016-320T21:14:00	Ybias window		DFPW Normal	S_N_ER_3	
2016-320T21:14:00	**2016-321T06:14:00**	Canberra 34M		DFPW Normal	RTE_N_SPB	

High Priority Observations

Sequence T124: Summary of PIEs and Other High Priority Observations

Discipline	CIMS Request Name	Start Time	End Time	Flexibility in secondary pointing	Comments (e.g., pointing tolerance, uniqueness; relative priority)	Science Traceability Matrix Code(s)	Pointing designer POC
Titan	RSS_248TI_BISTATIC001_PRIME	2016-318T22:55:57 GMT	2016-319T02:05:57 GMT	Significant Science Impact if Secondary Changed	On thrusters, so attitude should stick	TN1a	jeffrey.s.boyer @jpl.nasa.gov

Y bias and RSS

No Biases during (overlapping) the RSS bistatic science observations.

Notes

- Pointing:
  - Custom Period from -9 to +12 hrs.
  - Deadband of (.5, .5, .5) in support of RSS and VIMS. 3 steps for walking deadband.
  - RSS bistatic is not at waypoint attitude
  - Turn to initial waypoint has CIRS (waivable) heating

- Data Volume:
  - Warning for RADAR_249OT_WU4RADCAL135_RIDER data not recorded at S_N_ER_3 not an issue (RADAR warmup)
  - Carry over in agreement with SATURN_249 allowed for 90 Mb, but not needed (P.O.C. Kyle Cloutier)
- DSN:
  - Post-flyby 70m pass SP_248NA_C70METSEQ319_SP occurs during weekly maintenance; TOST requests that the maintenance be moved/waived. Could not move downlink earlier (G70 maintenance).
  - DSS-35 and -43 passes in support of the RSS bistatic—the final RSS observation of Titan, and the only RSS bistatic of Punga Mare—should be Level 3. Duration in CIMS is 05:55 for these passes, but in SEG file rounds up to 06:00.

- Resource checker:
  - ENGR to update custom pickup/handoff info in CIMS
  - CIRS handing off to itself, so PIC secondary is OK
  - RSS bistatic uses LUB not GMB, which is OK/expected
  - Telemetry mode change during ISS observation in caboose is OK (RADAR warmup)
- Opmodes:
  - Nothing of note
- Hydrazine:
  - TOST estimate currently 198g; KPT analysis being done right now
- Special Activities:
  - None

Liens

Sequence Liens (should all be SPLAT items):

- List any Liens to be worked in SIP, ie
  - None