



CASSINI Titan 120 SEGMENT

Rev 236 Handoff Package

Segment Boundary 2016-159T02:45:00 – 2016-161T10:30:00

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J. Pitesky

Science Highlights

Notes & Liens

This document has been reviewed and determined not to contain export controlled technical data

Science Highlights

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June 7 (DOY 159) – Near closest approach, RADAR will conduct SAR imaging (and global shape via SARTopo) of Titan’s poorly-covered southeastern quadrant. There will also be imaging of small ISS ‘lakes’ seen in the southern hemisphere and Shangri-La just to the east of the Huygens landing site. T120 is a mid Southern latitude pass in the dusk local time region for Cassini relative to Titan. INMS will be riding along with RADAR near closest approach; this observation will be compared to T71 to observe the extent of seasonal change in Titan’s atmosphere. Outbound from Titan, RADAR carries out altimetry, HiSAR and scatterometry/radiometry, with multiple overlaps to constrain Titan’s rotation state. CIRS will measure the vertical abundance profile of trace gases at the edge of Titan’s southern polar vortex at 52S latitude from two to one hours from closest approach. This is the last observation of the mission of its type, and is expected to provide important insights into the chemistry and dynamics of the boundary transition, where a strong circumpolar jet may be forming a barrier to horizontal mixing and confining enriched trace gases over the winter pole. From one hour to thirty minutes from closest approach CIRS will also measure the vertical variation of haze opacity. At greater distances on the inbound, CIRS will perform a variety of limb and nadir measurements, including two surface temperature scans to detect seasonal change at the surface that may affect retention of liquids, and maps of the inbound and outbound hemispheres in the lower stratosphere to constrain atmospheric temperatures and gas abundances. These are important for understanding the overall circulation of Titan’s atmosphere. ISS will ride along with CIRS inbound (Titan’s sub-Saturnian hemisphere at mid-southern latitudes over Tsegih) and outbound (high phase angle over Titan’s anti-Saturnian hemisphere at mid-northern latitudes) to image Titan’s surface. On the inbound, VIMS will ride along with CIRS (Titan’s sub-Saturnian hemisphere at mid-southern latitudes over Tsegih) and will observe the evolution of the South polar vortex. On the outbound (high phase angle over Titan’s anti-Saturnian hemisphere at mid-northern latitudes) VIMS will image Titan’s surface and atmosphere and will look at specular reflection on the lakes and seas of the North Pole area. T120 is an inclined south polar flyby at 975 km altitude occurring in the late midnight sector of Saturn’s magnetosphere. With SLT similar to T9, T114, T116, T117, T118 and T119, Cassini will explore the polar sector of the induced magnetosphere of Titan explored during those flybys.

Science Highlights

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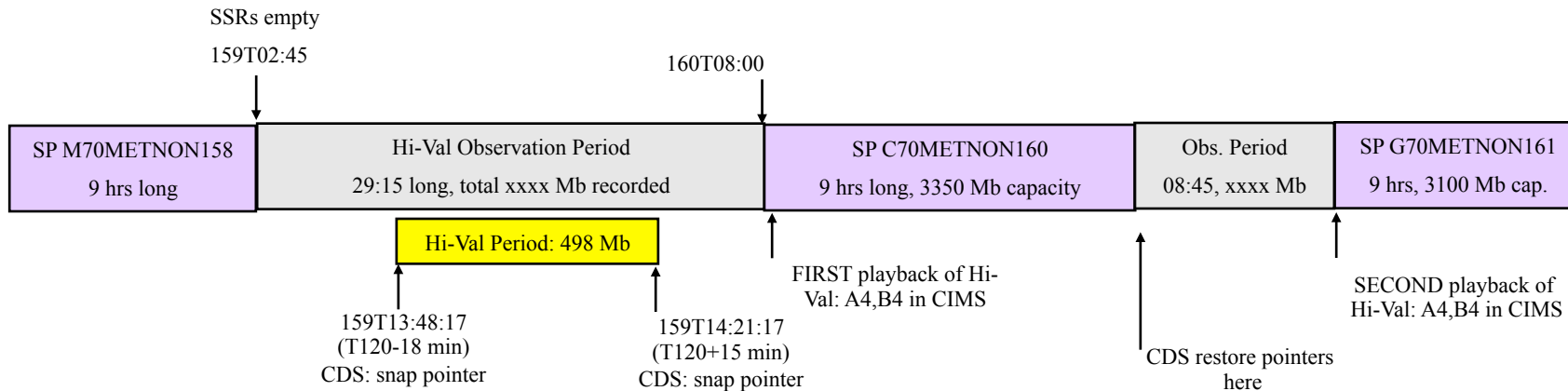
June 8 (DOY 160) For an extra day after the Titan encounter, ISS will monitor Titan to track clouds and the evolution thereof over mid-northern latitudes as northern summer approaches (TC1a, TC1b, TN1a, TN2c, TN2d).

Dual Playback

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Flyby	BEGHIVAL	ENDHIVAL	P4 Dual Playback Data Volume	SSR empty before hi-val observation period? (if not verify any carryover on A fits with Hi-Val data)	SSR-A empty after first playback?	PPL set to A4,B4 for first AND second playbacks?	SSRs empty after second playback? (if not does any Hi-Val data carry over?)
T120	T120-18 min	T120+15 min	498 Mb	Yes	Yes	Yes	Yes

Playbacks NOT contiguous:



Reminder - ALL instruments' data is played back twice during P4 dual playback periods

Notes

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- Pointing:
 - No YGAP window following c/a downlink as flyby is on thrusters
 - Deadband strategy starts with (0.5, 2.0, 0.5) for CIRS, and then switches to (0.5, 0.5, 2.0) for RADAR.
- Data Volume:
 - Unusual playback tables warning due to dual playback
- DSN:
 - No issues
- Resource checker:
 - SCO to change custom handoff information to match surrounding observations.
- Opmodes:
 - During RADRWA from +00:30 to +02:15 ISS and VIMS are in sleep (during post-outbound-transition RADAR)
 - During outbound transition (+00:30 to +00:52) UVIS in “no HDAC” configuration, and no CDA articulation
- Hydrazine:
 - KPT estimate: 328 g (per L. Andrade estimate)
 - FSDS estimate: 274 g
- Special Activities:
 - Dual playback

Liens

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Sequence Liens (should all be SPLAT items):

- List any Liens to be worked in SIP, ie
 - Dual Playback (SPLAT item exists)

Master Timeline

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236TI_T120 975

Start Time	End Time	Prime Activity	Obs. Detail	Op Mode	TLM Mode	Comments
2016-159T02:45:00	2016-159T03:25:00	SP Turn to WP	NEG_Y to Titan/NEG_X to NTP	DFPW Normal	S_N_ER_3	From XBAND to Earth/NEG_Y to Saturn (0,0,-9.5)
2016-159T03:25:00	C/A-10:26:18	OD Uncertainty Dead Time				
Begin custom period						
C/A-10:26:18	-09:00	CIRS	F extended (TC1b OR TN1c)	DFPW Normal	S_N_ER_3	
-09:00	-05:00	CIRS	F (TC1b OR TN1c)	DFPW Normal	S_N_ER_3	
-05:00	-02:30	CIRS	E (TN2c (surface temperature))	DFPW Normal, RADWU @ -05:00	S_N_ER_3, S_N_ER_5a for 00:15 @ -05:00	RADAR Warm-up @ -05:00
-02:30	-01:15	CIRS	TN1c	RADWU	S_N_ER_3	
-01:15	-01:14	RWA to RCS Transition		RADRCSS	S_N_ER_3	0.5, 2.0, 0.5 deadband
-01:14	-00:30	CIRS	CIRS turns to RADAR attitude	RADRCSS	S_N_ER_3	
-00:30	-00:18	RADAR	TN2b	RADRCSS	S_N_ER_8	0.5, 0.5, 2.0 deadband
-00:18	0	RADAR SAR	TN1a, TN1b, TN2b, TN2c	RADRCSS	S_N_ER_8	
2016-159T14:06:18		CLOSEST APPROACH	NEG_Z to Titan, NEG_X to RAM (Tc2a)			Global shape area 3 (substitute for T68)
0	+00:15	INMS	TN1c, TC2a	RADRCSS	S_N_ER_8	RADAR rider (though designing)
+00:15	+00:30	RADAR	TN1c, TC2a	RADRCSS	S_N_ER_8	
+00:30	+00:52	RCS to RWA Transition		RADRWA	S_N_ER_8	ISS, VIMS sleep. UVIS in "no HDAC" config; no CDA articulation
+00:52	+01:37	RADAR HiSAR	TN1a, TN1b, TN2b, TN2c	RADRWA	S_N_ER_8	ISS, VIMS sleep.
+01:37	+02:15	RADAR scatterometry/radiometry	TN1a	RADRWA	S_N_ER_8	ISS, VIMS sleep.
End custom period						
+02:15	+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	
+09:00	+13:00	CIRS	N1 (Tc1b, TN1c aerosol)	DFPW Normal	S_N_ER_3	
+13:00	C/A+16:58:42	CIRS	M4 (Tc1b (TN1c on outbound))	DFPW Normal	S_N_ER_3	
C/A+16:58:42	2016-160T07:20:00	OD Uncertainty Dead Time				
2016-160T07:20:00	2016-160T08:00:00	SP Turn to Earth for downlink		DFPW Normal	S_N_ER_3	XBAND to Earth/NEG_Y to Saturn (0,0,-9.5)
2016-160T08:00:00	2016-160T17:00:00	Canberra 70M			RTE_N_SPB	
2016-160T17:00:00	2016-160T17:40:00	SP Turn to WP		DFPW Normal	S_N_ER_3	NEG_Y to Titan, NEG_X to NSP
2016-160T17:40:00	2016-160T18:40:00	ISS	(TN2c, TN2d)	DFPW Normal	S_N_ER_3	
2016-160T18:40:00	2016-160T20:40:00	CIRS	(TN2c, TN2d)	DFPW Normal	S_N_ER_3	
2016-160T20:40:00	2016-160T21:40:00	ISS	(TN2c, TN2d)	DFPW Normal	S_N_ER_3	
2016-160T21:40:00	2016-160T22:40:00	CIRS	(TN2c, TN2d)	DFPW Normal	S_N_ER_3	
2016-160T22:40:00	2016-160T23:35:00	ISS	(TN2c, TN2d)	DFPW Normal	S_N_ER_3	
2016-160T23:35:00	2016-161T00:15:00	SP Turn to Earth for downlink		DFPW Normal	S_N_ER_3	
2016-161T00:15:00	2016-161T01:45:00	Ybias window		DFPW Normal	S_N_ER_3	
2016-161T01:45:00	2016-161T10:30:00	Goldstone 70M			RTE_N_SPB	Dual playback for RADAR, -00:18 to +00:15