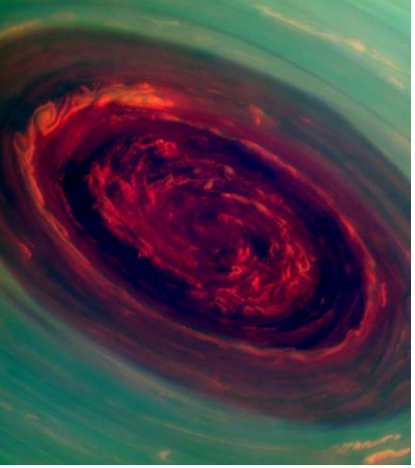

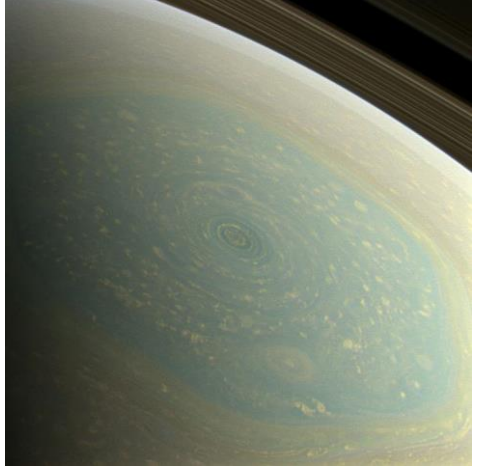
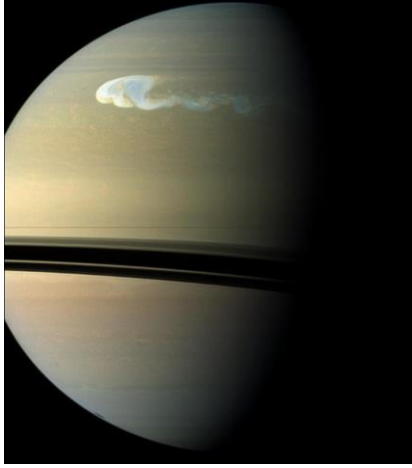

Science Planning & Sequence Team
CASSINI

SATURN TARGET WORKING TEAM

Rev 257_258 Segment Legacy Package

Segment Boundary: Jan 11, 2017– Jan 23, 2017
2017-011T20:25:00 – 2017-023T04:15:00 (SCET)

Integration Began 01/25/2016
Segment Delivered to S97 Sequence 06/03/2016
Lead Integrator was Martin Brennan

Legacy Package Assembled by Martin Brennan

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Segment Overview and Final Products

Segment Summary

- Saturn 257/258 is a segment spanning a full orbit within the F-Ring Orbits period, with a periapse of 2.464 R_S , starting ~5 day before Rev 257 perikrone and end ~6 days after (just before Rev 258 perikrone).

- The high inclination F-Ring segment begins on the night side just before apokrone, approaching the N. Pole, then passing through perikrone on the day side, where the POST science was planned, including a CIRS illuminated limb integration of Saturn and the highest resolution Daphnis observation of the mission.

- A pre-integration agreement was reached to include 4 UVIS EUV/FUV observations throughout the long segment to observe at varying latitudes.

- Just after periapse, the Sun is occulted by Saturn, which provides high phase angle observation opportunities, requiring CMT management for –Y to Sun angles <12 deg.

- RSS Saturn and Ring occultation is performed following periapse, using RSS3BRWAS opmode with RWA-Slow rates and an Live Movable Block (LMB).

- VIMS_257SA_SHEMHIRES001_PRIME required a 20 min quiescent period be inserted due to target motion requirements.

- UVIS_257SA_AURSTARE002_PRIME required a redesign during Port 1 of implementation to use the RWA-Slow rates due to the following RSS occultation activity.

- This segment contained a “jumpstart” period. Due to the challenging geometry and unique science of this phase of the mission, the timeline for the days around periapse was decided in advance of full segment integration. Detailed pointing analysis, constraint checking, and reaction-wheel bias optimization (RBOT) was performed on the periapse period. Changes were required, see RBOT summary on page 31

Final Sequenced SPASS (1 of 2)

E/FUV 1

Gap 1

Gap 2

Rev257/258 Jumpstart

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End	Primary	Secondary	Comments
Sequence 597, length = 72 days		2016-328T05:43:00		072T01:22:00	2017-034T07:05:00			
SATURN_257_258 Segment		2017-011T20:25:00		011T07:50:00	2017-023T04:15:00			
SP_256SA_WAYPTTURN011_PRIME		2017-011T20:25:00		000T00:40:00	2017-011T21:05:00	ISS_NAC to Saturn	POS_Z to 190.2/31.9	
NEW WAYPOINT		2017-011T21:05:00		000T19:32:00	2017-012T16:37:00	ISS_NAC to Saturn	POS_Z to 190.2/31.9	
ISS_256TI_M120R2HZ011_PRIME	C, V	2017-011T21:05:00		000T01:30:00	2017-011T22:35:00	ISS_NAC to Titan	POS_Z to 190.2/31.9	No Preference to Secondary pointing
UVIS_256SA_EUVFUV001_PRIME	C, U, V	2017-011T22:35:00		000T17:22:00	2017-012T15:57:00	UVIS_FUV to Saturn	POS_Z to 190.2/31.9	
SP_256EA_DLTURN012_PRIME		2017-012T15:57:00		000T00:40:00	2017-012T16:37:00	XBAND to Earth	NEG_Y to 154.0/-37.4	
NEW WAYPOINT		2017-012T16:37:00		000T11:10:00	2017-013T03:47:00	XBAND to Earth	NEG_Y to 154.0/-37.4	
ENGR_256SC_KPTYBIAS012_PRIME		2017-012T16:37:00		000T01:30:00	2017-012T18:07:00	NEG_Z to DELTA_H (0.0,0.0,-32.0 deg. offset)	NEG_X to Sun	
SP_256EA_C34BWGNON012_PRIME	C	2017-012T23:37:00		000T03:30:00	2017-013T03:07:00	XBAND to Earth	NEG_Y to 154.0/-37.4	MIMI. NEG_Y to SAT (0.0,-9.5)
Apoapse Per = 7.2 d, Inc = ...		2017-012T23:37:12		000T00:00:01	2017-012T23:37:13			
SP_257SA_WAYPTTURN013_PRIME		2017-013T03:07:00		000T00:40:00	2017-013T03:47:00	ISS_NAC to Saturn	POS_Z to INSP	
NEW WAYPOINT		2017-013T03:47:00		000T12:42:00	2017-013T16:29:00	ISS_NAC to Saturn	POS_Z to INSP	
ISS_257TI_M120R2HZ013_PRIME	C, V	2017-013T03:47:00		000T01:30:00	2017-013T05:17:00	ISS_NAC to Titan	POS_Z to INSP	No Preference to Secondary pointing
UVIS_257IC_ALPVIR001_PRIME	I	2017-013T05:17:00		000T01:40:00	2017-013T06:57:00	UVIS_FUV to 201.298/-11.161	POS_Z to INSP	
CIRS_257SA_COMPSIT001_PRIME	U, V	2017-013T06:57:00		000T08:52:00	2017-013T15:49:00	CIRS_FP1 to Saturn	POS_Z to INSP	
SP_257EA_DLTURN013_PRIME		2017-013T15:49:00		000T00:40:00	2017-013T16:29:00	XBAND to Earth	NEG_Y to 153.4/-38.4	
NEW WAYPOINT		2017-013T16:29:00		000T11:10:00	2017-014T03:39:00	XBAND to Earth	NEG_Y to 153.4/-38.4	
SP_257EA_YGAP013_PRIME		2017-013T16:29:00		000T01:30:00	2017-013T17:59:00	XBAND to Earth	NEG_Y to 153.4/-38.4	
SP_257EA_C70METNON013_PRIME	C	2017-013T17:59:00		000T09:00:00	2017-014T02:59:00	XBAND to Earth	NEG_Y to 153.4/-38.4	MIMI. NEG_Y to SAT (0.0,-9.5)
SP_257SA_WAYPTTURN014_PRIME		2017-014T02:59:00		000T00:40:00	2017-014T03:39:00	ISS_NAC to Saturn	NEG_X to INSP	
NEW WAYPOINT		2017-014T03:39:00		001T06:51:00	2017-015T10:30:00	ISS_NAC to Saturn	NEG_X to INSP	
ISS_257TI_M90R2CLD014_PRIME	V	2017-014T03:39:00		000T01:30:00	2017-014T05:09:00	ISS_NAC to Titan	NEG_X to INSP	No Preference to Secondary pointing
VIMS_257SA_NHEMMAP001_PRIME	C	2017-014T05:09:00		000T05:41:00	2017-014T10:50:00	ISS_NAC to Saturn	NEG_X to INSP	
UVIS_257SA_AURDSTARE001_PRIME	C, U, V	2017-014T10:50:00		000T06:00:00	2017-014T16:50:00	UVIS_FUV to Saturn	NEG_X to INSP	Collaborative Rider(s): V/IMS.
UVIS_257SA_AURSLEW001_PRIME	C, V	2017-014T16:50:00		000T06:00:00	2017-014T22:50:00	UVIS_FUV to Saturn	NEG_X to INSP	Collaborative Rider(s): V/IMS.
VIMS_257SA_NPOLMOV001_PRIME	C	2017-014T22:50:00		000T11:00:00	2017-015T09:50:00	ISS_NAC to Saturn	NEG_X to INSP	
SP_257EA_DLTURN015_PRIME		2017-015T09:50:00		000T00:40:00	2017-015T10:30:00	XBAND to Earth	POS_X to 13.0/-42.0	
NEW WAYPOINT		2017-015T10:30:00		000T15:04:00	2017-016T01:34:00	XBAND to Earth	POS_X to 13.0/-42.0	
ENGR_257SC_KPTYBIAS015_PRIME		2017-015T10:30:00		000T01:30:00	2017-015T12:00:00	NEG_Z to DELTA_H (0.0,0.0,-40.0 deg. offset)	NEG_X to Sun	
SP_257EA_G70METNON015_PRIME	C, M	2017-015T14:34:00		000T05:25:00	2017-015T19:59:00	XBAND to Earth	3_Hr_Delayed_Rolling	
SP_257EA_C70METNON015_PRIME	M	2017-015T23:04:00		000T02:00:00	2017-016T01:04:00	XBAND to Earth	Rolling/SRU	SRU. MAG Range 1.4 Roll Requested.
SP_257SA_WAYPTTURN016_PRIME		2017-016T01:04:00		000T00:30:00	2017-016T01:34:00	ISS_NAC to Saturn	POS_Z to INSP	
NEW WAYPOINT		2017-016T01:34:00		001T06:03:00	2017-017T07:37:00	ISS_NAC to Saturn	POS_Z to INSP	
VIMS_257SA_NPOLMAP001_PRIME	C, U, U	2017-016T01:34:00		000T03:59:00	2017-016T05:33:00	ISS_NAC to Saturn	POS_Z to INSP	
CIRS_257SA_LIMBMAP001_PRIME	I, M, U	2017-016T05:33:00		000T06:00:00	2017-016T11:33:00	CIRS_FP3 to Saturn	NEG_X to INSP	
Begin Custom Period		2017-016T11:33:00		000T00:00:01	2017-016T11:33:01	ISS_NAC to Saturn	POS_Z to INSP	
ISS_257DA_DAPHNIS001_PIE	C, M, U, V	2017-016T11:33:00		000T02:30:00	2017-016T14:03:00	ISS_NAC to Daphnis	NEG_Z to Sun	Collaborative Rider(s): CIRS. Pick up at ISS_NAC to Saturn, POS_Z to INSP; Hand off at ISS_NAC to Saturn, NEG_Z to INSP.
Periapse R = 2.464 Rs, lat = ..		2017-016T13:33:06		000T00:00:01	2017-016T13:33:07			
VIMS_257SA_SHEMHIRES001_PRIME	C, E, M, U	2017-016T14:03:00		000T03:28:00	2017-016T17:31:00	ISS_NAC to Saturn	NEG_Z to INSP	Pick up at ISS_NAC to Saturn, NEG_Z to INSP; Hand off at ISS_NAC to Saturn, NEG_Z to INSP.
CIRS_257SA_LIMBINT001_PIE	U, V	2017-016T17:31:00		000T04:00:00	2017-016T21:31:00	CIRS_FP3 to Saturn	PIC	Pick up at ISS_NAC to Saturn, NEG_Z to INSP; Hand off at ISS_NAC to Saturn, NEG_Z to INSP. Saturn Equator, North Limb
VIMS_257SA_SPOLMAP001_PRIME	C, U	2017-016T21:31:00		000T02:29:00	2017-017T00:00:00	ISS_NAC to Saturn	NEG_Z to INSP	Pick up at ISS_NAC to Saturn, NEG_Z to INSP; Hand off at ISS_NAC to Saturn (0.286,0.0,-1.719 deg. offset), NEG_Z to INSP.
VIMS_257SA_SHEMMAP001_PRIME	C, U	2017-017T00:00:00		000T01:35:00	2017-017T01:35:00	ISS_NAC to Saturn	NEG_Z to INSP	Pick up at ISS_NAC to Saturn (0.286,0.0,-1.719 deg. offset), NEG_Z to INSP; Hand off at ISS_NAC to Saturn (2.693,0.0,-5.157 deg. offset), NEG_Z to INSP.
VIMS_257SA_SEQREGMAP001_PRIME	C, U	2017-017T01:35:00		000T02:25:00	2017-017T04:00:00	ISS_NAC to Saturn	NEG_Z to INSP	Pick up at ISS_NAC to Saturn (2.693,0.0,-5.157 deg. offset), NEG_Z to INSP; Hand off at UVIS_SOL_OFF to Sun, NEG_Z to INSP.
VIMS_257RI_SOLAROCC001_PRIME	U	2017-017T04:00:00		000T01:32:00	2017-017T05:32:00	UVIS_SOL_OFF to Sun	NEG_Z to INSP	Pick up at UVIS_SOL_OFF to Sun, NEG_Z to INSP; Hand off at UVIS_SOL_OFF to Sun, NEG_Z to INSP.
UVIS_257SA_AURSTARE002_PRIME	C, R	2017-017T05:32:00		000T01:35:00	2017-017T07:07:00	UVIS_FUV to Saturn	NEG_Z to INSP	Pick up at UVIS_SOL_OFF to Sun, NEG_Z to INSP; Hand off at UVIS_FUV to Saturn_South_Pole, NEG_Z to INSP.
SP_257EA_DLTURN017_PRIME	R	2017-017T07:07:00		000T00:30:00	2017-017T07:37:00	XBAND to Earth	NEG_X to 224.0/63.0	Pick up at UVIS_FUV to Saturn_South_Pole, NEG_Z to INSP; Hand off at XBAND to Earth, NEG_X to 224.0/63.0.
NEW WAYPOINT		2017-017T07:37:00		000T16:24:00	2017-018T00:01:00	XBAND to Earth	NEG_X to 224.0/63.0	
End Custom Period		2017-017T07:37:00		000T00:00:01	2017-017T07:37:01	XBAND to Earth	NEG_X to 224.0/63.0	
SP_257EA_DEADTIME017_PRIME	R	2017-017T07:37:00		000T00:20:00	2017-017T07:57:00	XBAND to Earth	NEG_X to 224.0/63.0	
RSS_257SA_OCC001_PIE		2017-017T07:57:00	LMB_E257_Saturn_RSS_Occ_Egr-000T02:51:45	000T04:08:00	2017-017T12:05:00	XBAND to Earth	NEG_X to 224.0/63.0	
RSS_257RI_OCC001_PRIME		2017-017T12:05:00	LMB_E257_Saturn_RSS_Occ_Egr+000T01:16:15	000T01:59:03	2017-017T14:04:03	XBAND to Earth	NEG_X to 224.0/63.0	
SP_257EA_DEADTIME417_PRIME		2017-017T14:04:03	LMB_E257_Saturn_RSS_Occ_Egr+000T03:15:18	000T00:24:57	2017-017T14:29:00	XBAND to Earth	NEG_X to 224.0/63.0	

Final Sequenced SPASS (2 of 2)

E/FUV 2 Gap 3 E/FUV 3 Gap 4 E/FUV 4

ENGR_257SC_KPTYBIAS017_PRIME		2017-017T14:30:00		000T01:30:00	2017-017T16:00:00	NEG_Z to DELTA_H (0.0,0.0,62.0 deg. offset)	NEG_X to Sun	
SP_257EA_C34BWGNON017_PRIME	C	2017-017T16:00:00		000T04:21:00	2017-017T20:21:00	XBAND to Earth	NEG_X to 224.0/63.0	CDA: NEG_X to 224/63
257TI (int) ITAN Outbou...		2017-017T18:19:01		000T00:00:01	2017-017T18:19:02			
SP_257EA_C70METNON017_PRIME	C	2017-017T20:21:00		000T03:00:00	2017-017T23:21:00	XBAND to Earth	NEG_X to 224.0/63.0	CDA: NEG_X to 224/63
SP_257SA_WAYPTTURN017_PRIME		2017-017T23:21:00		000T00:40:00	2017-018T00:01:00	ISS_NAC to Saturn	POS_Z to 190.0/31.9	
NEW WAYPOINT		2017-018T00:01:00		000T15:38:00	2017-018T15:39:00	ISS_NAC to Saturn	POS_Z to 190.0/31.9	
UVIS_257SA_EUVFUV001_PRIME	C,E,V	2017-018T00:01:00		000T14:58:00	2017-018T14:59:00	UVIS_FUV to Saturn	POS_Z to 190.0/31.9	
SP_257EA_DLTURN018_PRIME		2017-018T14:59:00		000T00:40:00	2017-018T15:39:00	XBAND to Earth	NEG_Y to Saturn	
NEW WAYPOINT		2017-018T15:39:00		000T11:10:00	2017-019T02:49:00	XBAND to Earth	NEG_Y to Saturn	
SP_257EA_YGAP018_PRIME		2017-018T15:39:00		000T01:30:00	2017-018T17:09:00	XBAND to Earth	NEG_Y to Saturn	
SP_257EA_C70METNON018_PRIME	C	2017-018T21:14:00		000T03:55:00	2017-019T01:09:00	XBAND to Earth	Rolling	
SP_257SA_WAYPTTURN019_PRIME		2017-019T02:09:00		000T00:40:00	2017-019T02:49:00	ISS_NAC to Saturn	NEG_X to NSP	
NEW WAYPOINT		2017-019T02:49:00		000T13:18:00	2017-019T16:07:00	ISS_NAC to Saturn	NEG_X to NSP	
CIRS_257SA_FIRMAP001_PRIME	V	2017-019T02:49:00		000T12:38:00	2017-019T15:27:00	CIRS_FP1 to Saturn	NEG_X to NSP	
SP_257EA_DLTURN019_PRIME		2017-019T15:27:00		000T00:40:00	2017-019T16:07:00	XBAND to Earth	NEG_Y to Saturn	
NEW WAYPOINT		2017-019T16:07:00		000T11:10:00	2017-020T03:17:00	XBAND to Earth	NEG_Y to Saturn	
ENGR_257SC_KPTYBIAS019_PRIME		2017-019T16:07:00		000T01:30:00	2017-019T17:37:00	NEG_Z to DELTA_H (0.0,0.0,10.0 deg. offset)	NEG_X to Sun	
SP_257EA_C70METNON019_PRIME	C	2017-019T17:37:00		000T09:00:00	2017-020T02:37:00	XBAND to Earth	Rolling	
SP_257SA_WAYPTTURN020_PRIME		2017-020T02:37:00		000T00:40:00	2017-020T03:17:00	ISS_NAC to Saturn	POS_Z to 190.0/31.9	
NEW WAYPOINT		2017-020T03:17:00		000T12:51:00	2017-020T16:08:00	ISS_NAC to Saturn	POS_Z to 190.0/31.9	
MAG_257SU_LFCALROLL001_PRIME	U	2017-020T03:17:00		000T09:00:00	2017-020T12:17:00	NEG_X to Earth (0.0,0.0,-30.0 deg. offset)	Rolling	
Apoapse Per 7.2 Incl...		2017-020T03:29:30		000T00:00:01	2017-020T03:29:31			
ISS_258SA_LIMBINT003_PRIME	U,V	2017-020T12:17:00		000T03:11:00	2017-020T15:28:00	ISS_NAC to Saturn	PIC	
SP_258EA_DLTURN020_PRIME		2017-020T15:28:00		000T00:40:00	2017-020T16:08:00	XBAND to Earth	NEG_Y to 153.6/-39.1	
NEW WAYPOINT		2017-020T16:08:00		000T11:10:00	2017-021T03:18:00	XBAND to Earth	NEG_Y to 153.6/-39.1	
ENGR_258SC_KPTYBIAS020_PRIME		2017-020T16:08:00		000T01:30:00	2017-020T17:38:00	NEG_Z to DELTA_H (0.0,0.0,60.0 deg. offset)	NEG_X to Sun	
SP_258EA_C34BWGNON020_PRIME	C	2017-020T17:38:00		000T09:00:00	2017-021T02:38:00	XBAND to Earth	NEG_Y to 153.6/-39.1	MIMI: NEG_Y to Saturn (0,0,-9.5)
SP_258SA_WAYPTTURN021_PRIME		2017-021T02:38:00		000T00:40:00	2017-021T03:18:00	ISS_NAC to Saturn	POS_Z to 190.0/31.9	
NEW WAYPOINT		2017-021T03:18:00		000T12:42:00	2017-021T16:00:00	ISS_NAC to Saturn	POS_Z to 190.0/31.9	
ISS_258TI_M150R2HZ021_PRIME	V	2017-021T03:18:00		000T01:30:00	2017-021T04:48:00	ISS_NAC to Titan	POS_Z to 190.0/31.9	No Preference to Secondary Pointing
UVIS_258SA_EUVFUV001_PRIME	C,E,V	2017-021T04:48:00		000T10:32:00	2017-021T15:20:00	UVIS_FUV to Saturn	POS_Z to 190.0/31.9	
SP_258EA_DLTURN021_PRIME		2017-021T15:20:00		000T00:40:00	2017-021T16:00:00	XBAND to Earth	NEG_Y to 153.3/-39.7	
NEW WAYPOINT		2017-021T16:00:00		000T11:10:00	2017-022T03:10:00	XBAND to Earth	NEG_Y to 153.3/-39.7	
SP_258EA_YGAP021_PRIME		2017-021T16:00:00		000T01:30:00	2017-021T17:30:00	XBAND to Earth	NEG_Y to 153.3/-39.7	
SP_258EA_C70METNON021_PRIME	C	2017-021T20:45:00		000T05:45:00	2017-022T02:30:00	XBAND to Earth	NEG_Y to 153.3/-39.7	MIMI: NEG_Y to Saturn (0,0,-9.5)
SP_258SA_WAYPTTURN022_PRIME		2017-022T02:30:00		000T00:40:00	2017-022T03:10:00	ISS_NAC to Saturn	POS_Z to 190.0/31.9	
NEW WAYPOINT		2017-022T03:10:00		000T10:50:00	2017-022T14:00:00	ISS_NAC to Saturn	POS_Z to 190.0/31.9	
ISS_258TI_M150R2HZ022_PRIME	V	2017-022T03:10:00		000T01:30:00	2017-022T04:40:00	ISS_NAC to Titan	POS_Z to 190.0/31.9	No Preference to Secondary Pointing
UVIS_258SA_EUVFUV002_PRIME	C,E,V	2017-022T04:40:00		000T08:40:00	2017-022T13:20:00	UVIS_FUV to Saturn	POS_Z to 190.0/31.9	
SP_258EA_DLTURN022_PRIME		2017-022T13:20:00		000T00:40:00	2017-022T14:00:00	XBAND to Earth	NEG_Y to 152.8/-40.6	MIMI: NEG_Y to Saturn (0,0,-9.5)
NEW WAYPOINT		2017-022T14:00:00		000T14:55:00	2017-023T04:55:00	XBAND to Earth	NEG_Y to 152.8/-40.6	
ENGR_258SC_KPTYBIAS022_PRIME		2017-022T14:00:00		000T01:30:00	2017-022T15:30:00	POS_Z to DELTA_H (0.0,0.0,90.0 deg. offset)	NEG_X to Sun	
SP_258EA_C70METNON022_PRIME	C,M	2017-022T15:30:00		000T06:45:00	2017-022T22:15:00	XBAND to Earth	Rolling/SRU	SRU: MAG Range 21 Roll Requested

Final Sequenced SMT and Data Volume (1/2)

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_256EA_C34BWGNON012_PRIME	012 23:37	013 03:07	475	1350	118	1943	3322	1379	0	82	21	2045	214	-1832	-435	-3%	1832
SP_257EA_C70METNON013_PRIME	013 17:59	014 02:59	1832	932	63	2826	3322	496	0	199	53	3078	2970	-109	-435	-3%	109
SP_257EA_G70METNON015_PRIME	015 14:34	015 19:59	109	1783	150	2042	3322	1280	0	302	32	2376	1546	-831	-435	-3%	830
SP_257EA_C70METNON015_PRIME	015 23:04	016 01:04	830	150	13	993	3322	2329	0	107	12	1112	651	-462	-435	-3%	461
SP_257EA_C34BWGNON017_PRIME	017 16:00	017 20:26	461	3133	164	3758	3322	-435	0	93	26	3441	236	-3205	-53	0%	3205
SP_257EA_C70METNON017_PRIME	017 20:26	017 23:21	3205	0	0	3205	3322	117	0	68	17	3290	963	-2328	-53	0%	2327
SP_257EA_C70METNON018_PRIME	018 21:14	019 01:09	2327	956	92	3376	3322	-53	0	92	23	3437	1302	-2135	345	3%	2134
SP_257EA_C70METNON019_PRIME	019 17:37	020 02:37	2134	774	70	2977	3322	345	0	199	53	3230	2979	-252	714	6%	251
SP_258EA_C34BWGNON020_PRIME	020 17:38	021 02:38	251	587	63	902	3322	2421	0	199	53	1154	558	-597	714	7%	596
SP_258EA_C70METNON021_PRIME	021 20:45	022 02:30	596	871	77	1543	3322	1779	0	134	34	1712	1903	191	714	7%	0
SP_258EA_C70METNON022_PRIME	022 15:30	022 22:15	0	900	55	955	3322	2367	0	390	40	1385	2004	619	522	6%	0

* NOTE: Negative SSR (P4) Margins did not result in data loss due to compression/under-utilization.

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	011 19:45	012 23:37	0.0	52.6	199.2	10.0	88.5	49.0	85.3	0.0	130.5	318.0	405.0	0.0	116.5	1454.4
SP_256EA_C34BWGNON012_PRIME	012 23:37	013 03:07	0.0	6.6	37.8	1.3	0.0	6.2	10.7	0.0	16.5	1.9	0.0	0.0	0.0	81.1
DAILY TOTAL SCIENCE	011 19:45	013 03:07	0.0	59.2	237.0	11.3	88.5	55.2	96.0	0.0	147.0	319.9	405.0	0.0	116.5	
OBSERVATION_NOR	013 03:07	013 17:59	0.0	28.0	85.4	5.4	239.4	26.4	45.5	0.0	70.1	151.9	271.0	0.0	62.1	985.3
SP_257EA_C70METNON013_PRIME	013 17:59	014 02:59	0.0	17.0	86.4	3.2	0.0	16.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	197.5
DAILY TOTAL SCIENCE	013 03:07	014 02:59	0.0	45.0	171.8	8.6	239.4	42.4	73.0	0.0	112.6	156.8	271.0	0.0	62.1	
OBSERVATION_NOR	014 02:59	015 14:34	0.0	67.1	223.4	12.8	87.2	33.9	108.9	0.0	331.9	130.4	771.0	0.0	148.7	1915.5
SP_257EA_G70METNON015_PRIME	015 14:34	015 19:59	0.0	10.2	38.5	2.0	0.0	9.6	16.6	0.0	220.4	2.1	0.0	0.0	0.0	299.4
DAILY TOTAL SCIENCE	014 02:59	015 19:59	0.0	77.3	262.0	14.8	87.2	43.6	125.5	0.0	552.3	132.6	771.0	0.0	148.7	

Final Sequenced SMT and Data Volume (2/2)

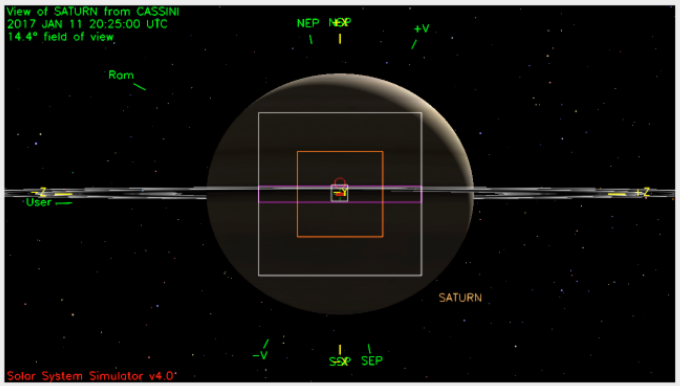
DATA VOLUME REPORT --- TRANSFER FRAME OVERHEAD NOT INCLUDED

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	015 19:59	015 23:04	0.0	5.8	0.0	1.1	0.0	5.5	9.4	0.0	125.4	1.7	0.0	0.0	12.9	161.9
SP_257EA_C70METNON015_PRIME	015 23:04	016 01:04	0.0	3.8	0.0	10.1	0.0	3.6	6.1	0.0	81.4	1.1	0.0	0.0	0.0	106.0
DAILY TOTAL SCIENCE	015 19:59	016 01:04	0.0	9.6	0.0	11.2	0.0	9.0	15.6	0.0	206.8	2.8	0.0	0.0	12.9	
OBSERVATION_NOR	016 01:04	017 16:00	0.0	88.9	291.7	24.8	584.0	91.9	119.1	0.0	432.7	594.4	877.0	0.0	162.7	3267.2
SP_257EA_C34BWGNON017_PRIME	017 16:00	017 20:26	0.0	8.4	37.1	1.6	0.0	7.9	13.6	0.0	20.7	2.4	0.0	0.0	0.0	91.7
SP_257EA_C70METNON017_PRIME	017 20:26	017 23:21	0.0	5.5	31.5	1.1	0.0	5.2	8.9	0.0	13.7	1.6	0.0	0.0	0.0	67.5
DAILY TOTAL SCIENCE	016 01:04	017 23:21	0.0	102.7	360.3	27.4	584.0	105.0	141.6	0.0	467.1	598.5	877.0	0.0	162.7	
OBSERVATION_NOR	017 23:21	018 21:14	0.0	41.3	141.1	7.9	50.0	38.9	67.0	0.0	103.2	273.4	225.0	0.0	91.5	1039.1
SP_257EA_C70METNON018_PRIME	018 21:14	019 01:09	0.0	7.4	42.3	1.4	0.0	7.0	12.0	0.0	18.5	2.1	0.0	0.0	0.0	90.7
DAILY TOTAL SCIENCE	017 23:21	019 01:09	0.0	48.7	183.4	9.3	50.0	45.9	78.9	0.0	121.7	275.5	225.0	0.0	91.5	
OBSERVATION_NOR	019 01:09	019 17:37	0.0	31.1	192.7	5.9	0.0	29.3	50.4	0.0	77.7	0.5	379.0	0.0	68.8	835.4
SP_257EA_C70METNON019_PRIME	019 17:37	020 02:37	0.0	17.0	86.4	3.2	0.0	16.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	197.5
DAILY TOTAL SCIENCE	019 01:09	020 02:37	0.0	48.0	279.1	9.2	0.0	45.3	77.9	0.0	120.1	5.5	379.0	0.0	68.8	
OBSERVATION_NOR	020 02:37	020 17:38	0.0	28.3	0.0	5.4	199.8	74.7	46.0	0.0	70.8	16.5	140.0	0.0	62.8	644.2
SP_258EA_C34BWGNON020_PRIME	020 17:38	021 02:38	0.0	17.0	86.4	3.2	0.0	16.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	197.5
DAILY TOTAL SCIENCE	020 02:37	021 02:38	0.0	45.3	86.4	8.6	199.8	90.7	73.5	0.0	113.3	21.4	140.0	0.0	62.8	
OBSERVATION_NOR	021 02:38	021 20:45	0.0	34.2	100.1	6.5	88.5	32.2	55.4	0.0	85.4	192.6	268.0	0.0	75.7	938.7
SP_258EA_C70METNON021_PRIME	021 20:45	022 02:30	0.0	10.8	62.1	2.1	0.0	10.2	17.6	0.0	27.1	3.2	0.0	0.0	0.0	133.1
DAILY TOTAL SCIENCE	021 02:38	022 02:30	0.0	45.0	162.2	8.6	88.5	42.4	73.0	0.0	112.6	195.8	268.0	0.0	75.7	
OBSERVATION_NOR	022 02:30	022 15:30	0.0	24.5	62.4	4.7	88.5	23.1	39.8	0.0	271.1	157.0	221.0	0.0	54.3	946.4
SP_258EA_C70METNON022_PRIME	022 15:30	022 22:15	0.0	12.7	62.1	2.4	0.0	12.0	20.7	0.0	274.6	1.6	0.0	0.0	0.0	386.2
DAILY TOTAL SCIENCE	022 02:30	022 22:15	0.0	37.3	124.5	7.1	88.5	35.1	60.4	0.0	545.7	158.6	221.0	0.0	54.3	

Segment Geometry (1/2)

Seg 257 Start (Left)

Apoapse-1 (below)




```
Rev 256 OUTBOUND
2017 -  011T20:25:00 SCET
2017 JAN 11 20:25:00 SCET
2017 JAN 11 21:55:40 ERT
Apoapse__256 + 006T00:40:26
Periapse_256 + 002T10:43:37
Light time:    90.7 min
Orbit period:  7.2 days
Radius     1195274 km      19.83 Rs
Rad_cyl    1195124 km      19.83 Rs
Z_ht_cyl    -18943 km      -0.31 Rs
Mag_L         19.84
Semi_axs    716515 km      11.89 Rs
Eccentricity    0.793
Inclination    63.70 deg
Sun_range      10.06 AU
Earth_range    10.90 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone       8.3   30.7
Canberra       58.6   21.9
Madrid        -70.9  -43.2
------- LOOK DIRECTION INFO -------
FOV            14.4 deg  251.9 mrad
RA            101.557 deg
DEC            -2.233 deg
Crosses_RP_@    0.000 Rs
EPS             2.739 deg
SEP            29.248 deg
ORS b/s angle  32.6 deg
ORS rad angle  64.2 deg  *
```

Point NEG_Y at SATURN and align POS_X = Up with NSP

User vector - RA: +127.816 DEC: -0.334 Paste Current RA/DEC

Tilt L Up Tilt R Left Reset Right Image Down Hi Res

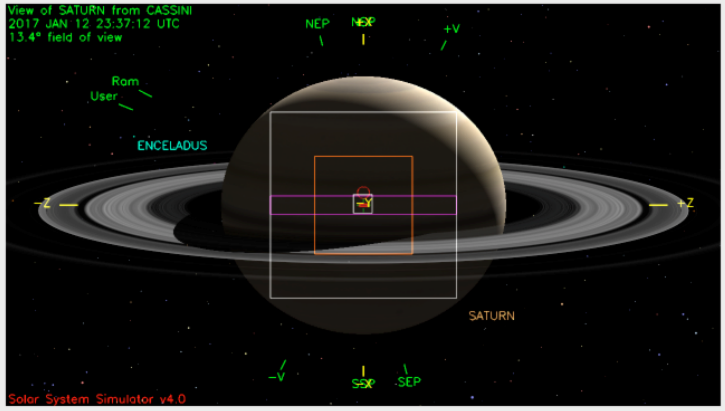
Zoom Out Fill Screen Zoom In

Labels Axes Orbits Vectors FOVs Lat/lons

Year Month Day Hour Minute Second

Turn analyzer: SATURN to EARTH about Z on RWA = 5.2 min / 30.9 deg Event

BODY	S/C OCC?	SAT OCC?	RANGE (km)	RANGE (Rs)	ALTITUDE (km)	ALTITUDE (Rs)	PHASE (deg)	ANGLR_DIAMETER (deg	mrad)	SUB_S/C LON	SUB_S/C LAT	ALON (deg)	VREL (km/s)	Z_HGHT (km)	ANGLE FROM SATRN	ANGLE FROM EARTH	ANGLE FROM RAH
SATURN	--	--	1195274	19.83	1135007	18.83	147.4	5.78	100.89	71	-1	0	3.2	0	0.0	30.9	110.2
MIMAS	--	--	1290446	21.41	1290246	21.41	151.0	0.02	0.32	304	-2	-118	17.0	-1105	7.2	27.9	116.5
ENCELADUS	--	--	1195518	19.84	1195266	19.83	139.7	0.02	0.43	89	-1	84	11.0	0	11.4	38.1	100.1
TETHYS	--	--	1018003	16.89	1017470	16.88	153.4	0.06	1.06	240	-1	-47	12.4	5604	12.3	25.9	120.6
DIONE	--	--	1060076	17.59	1059515	17.58	134.7	0.06	1.06	102	-1	60	8.1	-144	18.0	42.9	94.1
RHEA	--	--	1520254	25.22	1519489	25.21	134.7	0.06	1.01	46	-1	119	8.0	-1486	17.7	42.9	94.5
TITAN	--	--	1974119	32.76	1971544	32.71	118.3	0.15	2.61	34	-1	107	4.9	3749	37.4	59.0	76.8
HYPERION	--	--	1988346	32.99	1988197	32.99	103.0	0.01	0.16	36	-18	88	3.8	-5764	54.7	74.2	61.6
IAPETUS	--	--	3598504	59.71	3597757	59.70	120.4	0.02	0.42	345	5	-87	5.4	-261797	73.8	62.0	157.0
PHOEBE	--	--	15832394	262.70	15832279	262.70	162.8	0.00	0.01	181	-16	-178	3.0	6862199	24.9	14.3	98.7
SATURN	--	--	1195274	19.83	1135007	18.83	147.4	5.78	100.89	71	-1	0	3.2	0	0.0	30.9	110.2




```
Rev 256 OUTBOUND
2017 -  012T23:37:12 SCET
2017 JAN 12 23:37:12 SCET
2017 JAN 13 01:07:47 ERT
Apoapse__256 + 007T03:52:38
Periapse_256 + 003T13:55:49
Light time:    90.6 min
Orbit period:  7.2 days
Radius     1284481 km      21.31 Rs
Rad_cyl    1267793 km      21.04 Rs
Z_ht_cyl    206382 km       3.42 Rs
Mag_L         21.88
Semi_axs    716520 km      11.89 Rs
Eccentricity    0.793
Inclination    63.69 deg
Sun_range      10.06 AU
Earth_range    10.89 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone      -28.8    5.8
Canberra        70.3   61.4
Madrid         -49.2  -71.4
------- LOOK DIRECTION INFO -------
FOV            13.4 deg  234.4 mrad
RA            107.660 deg
DEC           -11.822 deg
Crosses_RP_@    0.000 Rs
EPS             2.827 deg
SEP            30.275 deg
ORS b/s angle  43.8 deg
ORS rad angle  55.1 deg  *
```

Point NEG_Y at SATURN and align POS_X = Up with NSP

User vector - RA: +127.816 DEC: -0.334 Paste Current RA/DEC

Tilt L Up Tilt R Left Reset Right Image Down Hi Res

Zoom Out Fill Screen Zoom In

Labels Axes Orbits Vectors FOVs Lat/lons

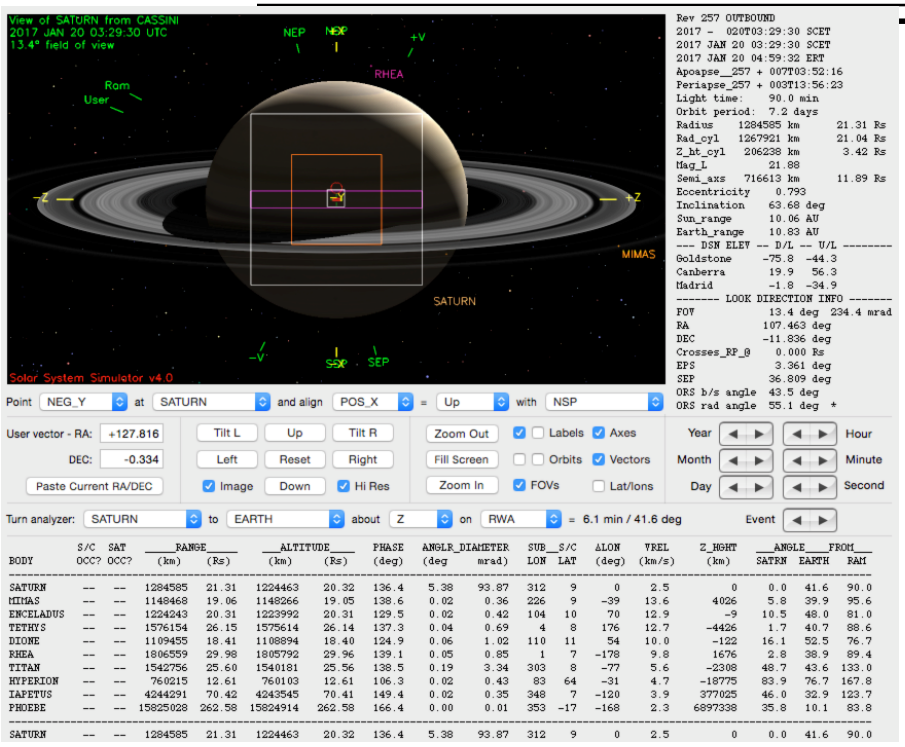
Year Month Day Hour Minute Second

Turn analyzer: SATURN to EARTH about Z on RWA = 6.1 min / 42.2 deg Event

BODY	S/C OCC?	SAT OCC?	RANGE (km)	RANGE (Rs)	ALTITUDE (km)	ALTITUDE (Rs)	PHASE (deg)	ANGLR_DIAMETER (deg	mrad)	SUB_S/C LON	SUB_S/C LAT	ALON (deg)	VREL (km/s)	Z_HGHT (km)	ANGLE FROM SATRN	ANGLE FROM EARTH	ANGLE FROM RAH
SATURN	--	--	1284481	21.31	1224359	20.32	136.2	5.38	93.87	265	9	0	2.5	0	0.0	42.2	90.0
MIMAS	--	--	1467245	24.35	1467038	24.34	136.4	0.02	0.28	4	7	173	15.6	-5075	1.3	41.8	88.7
ENCELADUS	--	--	1496389	24.83	1496134	24.82	134.6	0.02	0.34	29	8	152	13.9	19	4.5	43.4	85.6
TETHYS	--	--	1375449	22.82	1374916	22.81	128.7	0.05	0.79	66	9	102	12.1	-4586	12.1	49.1	79.1
DIONE	--	--	1297061	21.52	1296500	21.51	143.2	0.05	0.87	281	9	-83	9.8	172	16.8	36.3	105.1
RHEA	--	--	902233	14.97	901469	14.96	120.6	0.10	1.70	130	13	33	8.1	-2856	19.4	57.2	75.5
TITAN	--	--	1761492	29.23	1758917	29.18	103.2	0.17	2.92	46	7	88	6.3	84	45.2	74.0	51.0
HYPERION	--	--	1859839	30.86	1859710	30.86	90.5	0.01	0.18	105	-23	78	5.3	-13725	59.5	86.7	41.5
IAPETUS	--	--	3640100	60.40	3639353	60.39	124.2	0.02	0.41	344	9	-87	3.3	-175013	71.8	58.2	150.4
PHOEBE	--	--	15799248	262.15	15799135	262.15	162.8	0.00	0.01	157	-16	-172	2.2	6869437	34.9	14.2	81.0
SATURN	--	--	1284481	21.31	1224359	20.32	136.2	5.38	93.87	265	9	0	2.5	0	0.0	42.2	90.0

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	19.83	147.4	-1
Apoapse-1	21.31	136.2	+9
Periapse	2.47	43.7	-9
Apoapse-2	21.31	136.4	+9
Segment End	8.73	85.2	+52

Segment Geometry (2/2)

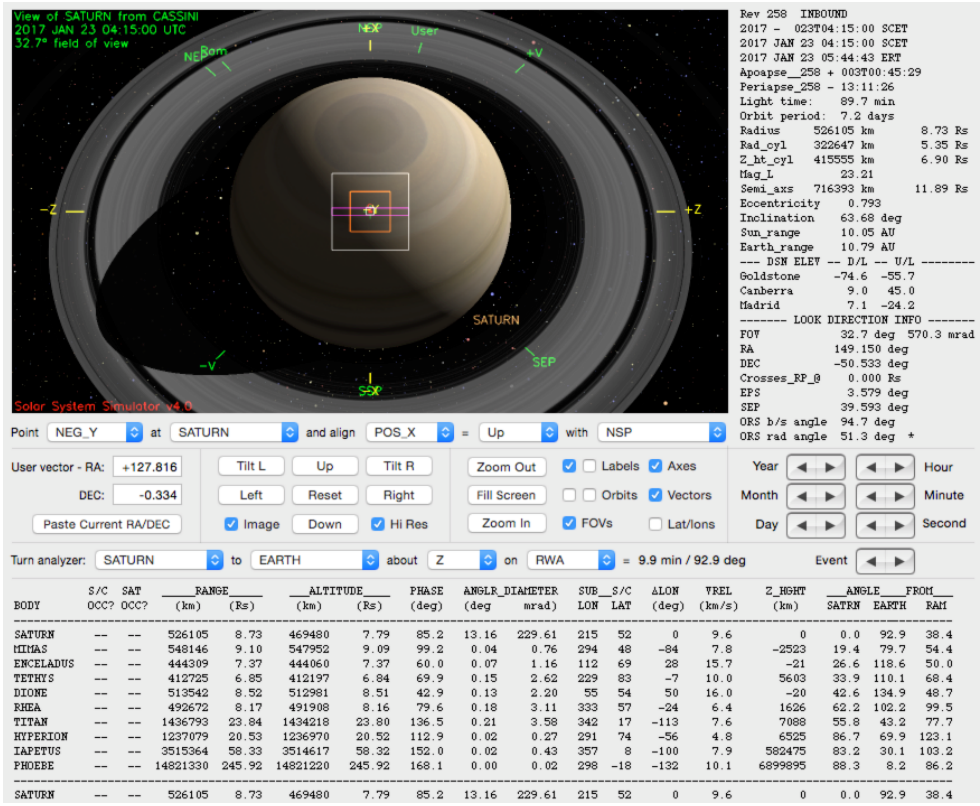


BODY	S/C OCC?	SAT OCC?	RANGE (km)	RANGE (Rs)	ALTITUDE (km)	ALTITUDE (Rs)	PHASE (deg)	ANGLR_DIAMETER (deg)	ANGLR_DIAMETER (mrad)	SUB_S/C LON	SUB_S/C LAT	ALON (deg)	VREL (km/s)	Z_HGHT (km)	ANGLE FROM SATRN	ANGLE FROM EARTH	ANGLE FROM RAM
SATURN	--	--	1284585	21.31	1224463	20.32	136.4	5.38	93.87	312	9	0	2.5	0	0.0	41.6	90.0
MIMAS	--	--	1148468	19.06	1148266	19.05	138.6	0.02	0.36	226	9	-39	13.6	4026	5.8	39.9	95.6
ENCELADUS	--	--	1224243	20.31	1223992	20.31	129.5	0.02	0.42	104	10	70	12.9	-9	10.5	48.0	81.0
TETHYS	--	--	1576154	26.15	1575614	26.14	137.3	0.04	0.69	4	8	176	12.7	-4426	1.7	40.7	88.6
DIONE	--	--	1109455	18.41	1108894	18.40	124.9	0.06	1.02	110	11	54	10.0	-122	16.1	52.5	76.7
RHEA	--	--	1806559	29.98	1805792	29.96	139.1	0.05	0.85	1	7	-178	9.8	1676	2.8	38.9	89.4
TITAN	--	--	1542756	25.60	1540181	25.56	138.5	0.19	3.34	303	8	-77	5.6	-2308	48.7	43.6	133.0
HYPERION	--	--	760215	12.61	760103	12.61	106.3	0.02	0.43	83	64	-31	4.7	-18775	83.9	76.7	167.8
IAPETUS	--	--	4244291	70.42	4243545	70.41	149.4	0.02	0.35	348	7	-120	3.9	377025	46.0	32.9	123.7
PHOEBE	--	--	15825028	262.58	15824914	262.58	166.4	0.00	0.01	353	-17	-168	2.3	6897338	35.8	10.1	83.8
SATURN	--	--	1284585	21.31	1224463	20.32	136.4	5.38	93.87	312	9	0	2.5	0	0.0	41.6	90.0

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	19.83	147.4	-1
Apoapse-1	21.31	136.2	+9
Periapse	2.47	43.7	-9
Apoapse-2	21.31	136.4	+9
Segment End	8.73	85.2	+52

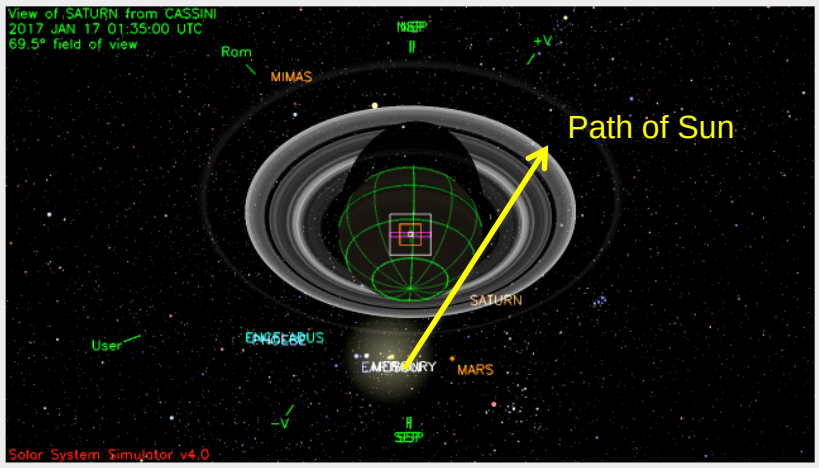
← Apoapse-2 (Left)

↓ Seg 257 End (below)



BODY	S/C OCC?	SAT OCC?	RANGE (km)	RANGE (Rs)	ALTITUDE (km)	ALTITUDE (Rs)	PHASE (deg)	ANGLR_DIAMETER (deg)	ANGLR_DIAMETER mrad)	SUB_S/C LON	SUB_S/C LAT	ALON (deg)	VREL (km/s)	Z_HGHT (km)	ANGLE FROM SATRN	ANGLE FROM EARTH	ANGLE FROM RAM
SATURN	--	--	526105	8.73	469480	7.79	85.2	13.16	229.61	215	52	0	9.6	0	0.0	92.9	38.4
MIMAS	--	--	548146	9.10	547952	9.09	99.2	0.04	0.76	294	48	-84	7.8	-2523	19.4	79.7	54.4
ENCELADUS	--	--	444309	7.37	444060	7.37	60.0	0.07	1.16	112	69	28	15.7	-21	26.6	118.6	50.0
TETHYS	--	--	412725	6.85	412197	6.84	69.9	0.15	2.62	229	83	-7	10.0	5603	33.9	110.1	68.4
DIONE	--	--	513542	8.52	512981	8.51	42.9	0.13	2.20	55	54	50	16.0	-20	42.6	134.9	48.7
RHEA	--	--	492672	8.17	491908	8.16	79.6	0.18	3.11	333	57	-24	6.4	1626	62.2	102.2	99.5
TITAN	--	--	1436793	23.84	1434218	23.80	136.5	0.21	3.58	342	17	-113	7.6	7088	55.8	43.2	77.7
HYPERION	--	--	1237079	20.53	1236970	20.52	112.9	0.02	0.27	291	74	-56	4.8	6525	86.7	69.9	123.1
IAPETUS	--	--	3515364	58.33	3514617	58.32	152.0	0.02	0.43	357	8	-100	7.9	582475	83.2	30.1	103.2
PHOEBE	--	--	14821330	245.92	14821220	245.92	168.1	0.00	0.02	298	-18	-132	10.1	6899895	88.3	8.2	86.2
SATURN	--	--	526105	8.73	469480	7.79	85.2	13.16	229.61	215	52	0	9.6	0	0.0	92.9	38.4

CMT Violation Geometry




```
Rev 257 OUTBOUND
2017 -  017T01:35:00 SCET
2017 JAN 17 01:35:00 SCET
2017 JAN 17 03:05:15 ERT
Apoapse_257 + 004T01:57:46
Periapse_257 + 12:01:53
Light time:     90.3 min
Orbit period:   7.2 days
Radius      494711 km       8.21 Rs
Rad_cyl     386844 km       6.42 Rs
Z_ht_cyl   -308368 km      -5.12 Rs
Mag_L          13.42
Semi_axs    716563 km      11.89 Rs
Eccentricity    0.793
Inclination    63.68 deg
Sun_range      10.05 AU
Earth_range    10.85 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone     -55.5  -19.0
Canberra       45.2   76.1
Madrid        -24.3  -58.0
------- LOOK DIRECTION INFO -------
FOV            69.5 deg 1212.3 mrad
RA             75.725 deg
DEC            33.364 deg
Crosses_RP_@    0.000 Rs
EPS             3.138 deg
SEP            34.013 deg
ORS b/s angle  12.0 deg  *
ORS rad angle 101.9 deg
```

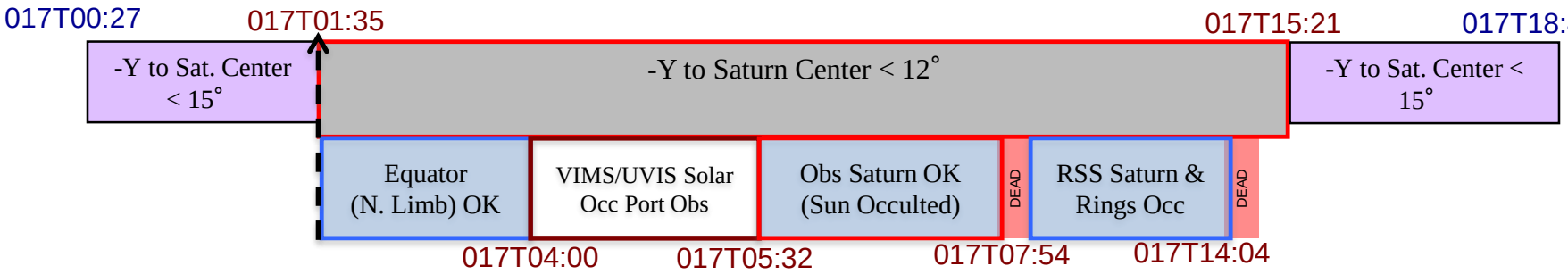
Point NEG_Y at SATURN and align POS_X = Up with NSP

User vector - RA: +139.923 DEC: -0.910 | Paste Current RA/DEC | Tilt L | Up | Tilt R | Left | Reset | Right | Image | Down | Hi Res | Zoom Out | Fill Screen | Zoom In | Labels | Axes | Orbits | Vectors | FOVs | Lat/lons | Year | Month | Day | Hour | Minute | Second

Turn analyzer: SATURN to EARTH about Z on RWA = 3.4 min / 12.8 deg Event

BODY	S/C OCC?	SAT OCC?	RANGE (km)	RANGE (Rs)	ALTITUDE (km)	ALTITUDE (Rs)	PHASE (deg)	ANGLR_DIAMETER (deg	mrad)	SUB_S/C LON	LAT	ALON (deg)	VREL (km/s)	Z_HGHT (km)	ANGLE FROM SATRN	EARTH	RAM
SATURN	--	--	494711	8.21	436699	7.25	168.0	13.99	244.26	3	-39	0	10.0	0	0.0	12.8	136.3
MIMAS	--	--	391926	6.50	391732	6.50	150.2	0.06	1.06	130	-54	29	9.2	2475	20.7	28.5	115.6
ENCELADUS	--	--	650689	10.80	650436	10.79	165.8	0.05	0.79	35	-28	131	11.9	20	18.3	11.1	128.9
TETHYS	--	--	334730	5.55	334202	5.55	134.2	0.19	3.23	130	-68	15	9.7	419	35.4	44.9	102.3
DIONE	--	--	541734	8.99	541172	8.98	135.9	0.12	2.08	55	-35	71	0.8	-171	42.3	41.2	98.6
RHEA	--	--	457104	7.58	456340	7.57	107.1	0.19	3.36	50	-42	40	4.8	-3203	67.2	70.4	69.7
TITAN	--	--	942607	15.64	940032	15.60	61.0	0.31	5.46	347	-19	-32	12.5	-8526	109.3	121.1	75.4
HYPERION	--	--	1215696	20.17	1215576	20.17	40.7	0.02	0.27	253	-47	-8	10.5	-29075	127.3	139.8	42.2
IAPETUS	--	--	3769048	62.54	3768300	62.53	133.6	0.02	0.40	357	-3	-134	13.1	144654	49.2	49.3	166.6
PHOEBE	--	--	15256119	253.14	15256005	253.14	166.3	0.00	0.02	2	-20	162	10.1	6889109	17.9	10.5	129.6
SATURN	--	--	494711	8.21	436699	7.25	168.0	13.99	244.26	3	-39	0	10.0	0	0.0	12.8	136.3

- Pointing to NEG_Y to Saturn (center) would lead to a CMT (<12˚) violation between ~2017-017T01:36:05 and ~2017-017T15:20:38.
- Minimum NEG_Y to Sun angle is ~5.0˚ at 2017-017T06:43:00.
- Between 017T01:36 – 04:00 observing at the Equator (northern limb) brings one out of the 12˚ cone, but not the 15˚ cone *A waiver will be required.*
- Cannot observe Saturn from 017T04:00 – 05:32, therefore observe Rings Solar Occ with VIMS/UVIS Solar ports
- Between 017T05:32:20 – 07:54:06 Sun is behind Saturn, CMT management allows NEG_Y to Saturn to observe southern aurora. *A waiver will be required.*
- *POS_X to Sun < 83˚ between 017T07:14:05 – 07:26:35 (min angle of 75.31˚). A waiver will be required.*
- Cannot observe Saturn from 017T07:54 – 10:30, therefore observe Saturn & Ring RSS Occ (2017-017T07:57:00 – 14:04:03)



Daily Science Highlights (1/3)

DOY 011 (11 January 2017): Saturn_257/258 was a long segment spanning about 1.5 orbits (starting before apoapse of Rev 257 and ending after apoapse of Rev 258). The segment began with a 1.5hr ISS haze observation of Titan's atmosphere as part of the Titan Monitoring Campaign with CIRS and VIMS riders.

DOY 012 (12 January 2017): UVIS performed the first of a series of EUV/FUV Saturn mapping observations to study the distribution of hazes and organic compounds high in Saturn's Northern hemisphere atmosphere for over 17hr; CIRS, ISS, and VIMS rode along.

DOY 013 (13 January 2017): After the first downlink of the segment and passing apoapse, ISS completed another haze observation of Titan's atmosphere for the Titan Monitoring Campaign with CIRS and VIMS riding along. Next UVIS and ISS performed instrument calibrations using an occultation of Alpha Virginis. The observation period ended with a 9hr CIRS observation studying the composition of the Northern Saturnian atmosphere.

DOY 014 (14 January 2017): A third installment of the Titan Monitoring Campaign had ISS studying Titans atmosphere with a VIMS rider. VIMS then took the lead for a 6hr mosaic mapping of Saturn's northern hemisphere, with CIRS riding. UVIS followed this with a collaborative observation with VIMS; by first staring at the northern aurora for 6hr, then conducting repeated slews across the illuminated northern polar aurora for 6hr (CIRS, ISS, and VIMS riders). UVIS then handed off to VIMS again for a Saturn North Pole movie for a full rotation of the planet (11hrs) with CIRS riding.

DOY 016 (16 January 2017): After the SSR was cleared off during an important 70M Downlink pass, the densely packed periapse observation period began with a VIMS North Pole mosaic map for 4hr (CIRS, ISS, and UVIS riding). CIRS then completed 6 hours of Saturn limb mid-IR sounding to obtain the stratospheric thermal structure at a variety of locations (UVIS and ISS rode).

The 2.5hr ISS collaborative observation with CIRS of the ring-moon Daphnis was of the highest priority for this orbit as Cassini passed through periapse close to the edge of Saturn's rings. A UVIS rider collected ultra violet albedo measurements, while the VIMS rider studied Daphnis composition. This unique and relatively close flyby provided nearly 4X better resolution of the moon to explore its body/equatorial ridge morphology and greatly narrows the mean density dispersion by obtaining better volume estimates. Such information improves the origin story of Daphnis, the rings, and other small moons. During the ring plane crossing CDA, RPWS, and INMS studied the F-Ring particles, dust, and atmosphere.

Exiting periapse, VIMS collected high resolution images of Saturn's southern hemisphere as mosaics at 25, 45, and 60° S. Latitude with CIRS, ISS and UVIS riders.

Daily Science Highlights (2/3)

DOY 016 (16 January 2017) continued: Only 4hr after periapse CIRS began the segment's second PIE, which was of the highest priority for the orbit. A 4hr high resolution Saturn-illuminated limb integration was performed with mid-IR sounding to obtain stratospheric thermal structure. UVIS and VIMS rode along. This unique configuration and proximity to Saturn (between 4 and 6 Rs) provides vertical profiles of temperature and hydrocarbon abundances throughout Saturn's stratosphere. The latitude selected, 5° S., exhibits a dynamical effect known as the quasi-quadrennial oscillation. Layers of hot and cold air move vertically near Saturn's equator on a time scale of several Earth years. Limb measurements from CIRS are the only way to study this phenomenon on Saturn. This effect is also operative in the Earth's stratosphere with a 28-month period.

VIMS finished out the day by obtaining Saturn's South Polar region mosaic maps for 2.5hr, while CIRS and UVIS rode.

DOY 017 (17 January 2017): VIMS continued its block of various observations with a 1.5hr South hemisphere mosaic centered at the 30° S. latitude. Then VIMS switched its focus to mapping Saturn's equatorial region centered at 5° S. latitude. Next VIMS and the collaborative UVIS rider used their solar ports to observe a Solar Ring occultation as the Sun crossed through the rings and behind Saturn. UVIS then took advantage of the dark south polar region during the solar occultation behind Saturn in order to observe the southern auroral oval between 55° – 90° latitude over several slews.

The last PIE of the segment was the high-priority Radio Science (RSS) Saturn egress-only atmospheric occultation. The RSS Ka, X, and S-band signals peer through Saturn's atmosphere to profile its thermal structure and possible seasonal variation in mid-northern latitudes (~15° through 30° N.). RSS then followed Earth's occultation through Saturn's rings in order to detect detailed ring structure and composition.

Daily Science Highlights (3/3)

DOY 018 (18 January 2017): Heading out towards apoapse after the periapse observation period, UVIS performed another of its EUV/FUV observations spectrally mapping the planet in the ultraviolet to study the distribution of hazes and organic compounds high in Saturn's Northern hemisphere atmosphere for over 15hr; CIRS, ISS, and VIMS rode along.

DOY 019 (19 January 2017): CIRS completed a 12.6hr Far-IR mapping of the northern hemisphere to determine upper troposphere and tropopause temperature structure with spatial resolution of about 2 deg of Latitude and Longitude (VIMS rode). This observation occurred with Saturn's rings mostly edge-on, providing little ring obscuration of Saturn.

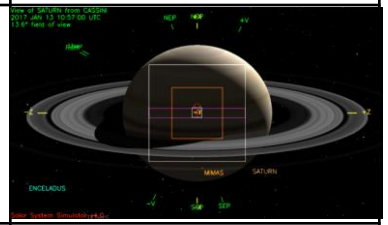
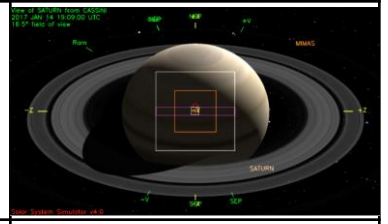
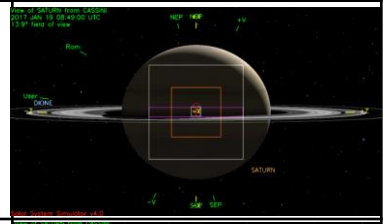
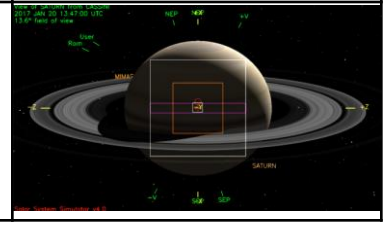
DOY 020 (20 January 2017): During apoapse, MAG performed 9hr of low field calibration rolls by rolling about an axis other than Z for determining sensor offsets. Next, ISS imaged along the Saturn bright limb for 3hr with UVIS and VIMS riding.

DOY 021 (21 January 2017): ISS performed another haze observation of Titan's atmosphere as part of the Titan Monitoring Campaign with CIRS and VIMS riders. UVIS then completed an EUV/FUV observation spectrally mapping the planet for a full rotation in the ultraviolet to study the distribution of hazes and organic compounds high in Saturn's Northern hemisphere atmosphere; CIRS, ISS, and VIMS rode along.

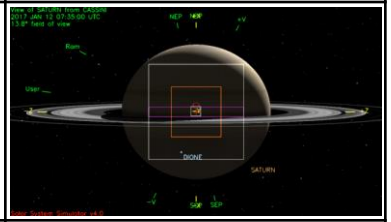
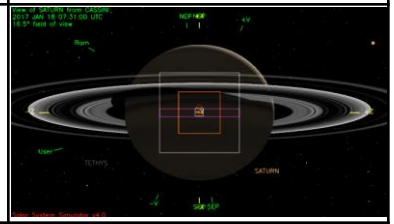
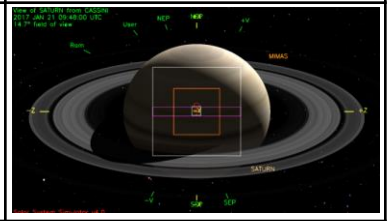
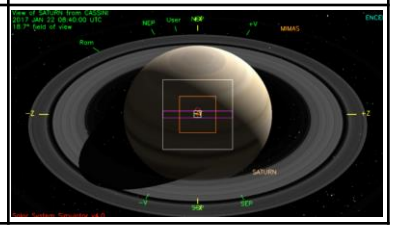
DOY 022 (22 January 2017): ISS performed its last Titan Monitoring Campaign haze observation of Titan's atmosphere for this segment with CIRS and VIMS riders. UVIS also completed its last EUV/FUV observation of the Saturn 257/258 segment, mapping the planet in the ultraviolet spectrum to study the distribution of hazes and organic compounds high in Saturn's Northern hemisphere atmosphere for over 8.6hr; CIRS, ISS, and VIMS rode along.

Segment Integration Planning

Timeline Gaps and Suggested Observations (1/2)

Gap	Start	End	Duration	Phase angle (range)	Rs range	Sub-S/C Lat.	Snapshot (mid-gap)
1	2017-013T06:57:00	2017-013T15:49:00	000T8:52:00	133.3 to 129.7	21.21 to 20.80	+12 to +15	
2	2017-014T05:09:00	2017-015T09:50:00	001T04:41:00	123.9 to 105.8	19.56 to 13.91	+20 to +36	
3	2017-019T02:49:00	2017-019T15:27:00	000T12:38:00	146.5 to 141.2	20.10 to 21.03	0 to +5	
4	2017-020T12:17:00	2017-020T15:28:00	000T03:11:00	132.9 to 131.7	21.16 to 21.03	+12 to +14	

Timeline Gaps and Suggested Observations (2/2)

Obs. Period	Start	End	Duration	Phase angle (range)	Rs range	Sub-S/C Lat.	Snapshot (mid-gap)
UVIS EUV/FUV 1	2017-011T22:35:00	2017-012T15:57:00	000T17:22:00	146.4 to 139.2	20.06 to 21.20	-0 to +7	
UVIS EUV/FUV 2	2017-018T00:01:00	2017-018T14:59:00	000T14:58:00	161.0 to 152.1	15.69 to 18.60	-13 to -5	
UVIS EUV/FUV 3	2017-021T04:48:00	2017-021T15:20:00	000T10:32:00	126.0 to 121.0	20.04 to 18.70	+19 to +23	
UVIS EUV/FUV 4	2017-022T04:40:00	2017-022T13:20:00	000T08:40:00	113.2 to 106.4	16.22 to 14.03	+30 to +36	

Initial SMT and Data Volume (1/2)

Beginning of Integration:

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)	NET_MARGN (%)	CAROVR (Mb)
SP_256EA_C34BWGNON012_PRIME	012 18:07	013 03:07	0	1256	92	1348	3322	1974	0	320	53	1721	558	-1164	-928	-9%	1163
SP_257EA_C34BWGNON013_PRIME	013 17:59	014 02:59	1163	608	63	1834	3322	1488	0	199	53	2087	558	-1529	-928	-9%	1529
SP_257EA_G70METNON015_PRIME	015 12:00	015 18:08	1529	683	139	2351	3322	971	0	355	36	2742	1717	-1025	-928	-7%	1025
SP_257EA_C70METNON015_PRIME	015 18:08	016 00:54	1025	0	0	1025	3322	2297	0	339	40	1403	2276	872	-928	-8%	0
SP_257EA_C70METNON017_PRIME	017 16:00	017 23:21	0	4958	165	5123	3322	-1800	0	354	43	3720	2191	-1530	-647	-7%	1529
SP_257EA_C34BWGNON018_PRIME	018 17:09	019 02:09	1529	1022	75	2627	3322	695	0	199	53	2879	553	-2327	-647	-10%	2326
SP_257EA_C34BWGNON019_PRIME	019 17:37	020 02:37	2326	780	65	3172	3322	150	0	199	53	3424	558	-2867	-647	-11%	2866
SP_258EA_C34BWGNON020_PRIME	020 17:38	021 02:38	2866	293	63	3223	3322	99	0	199	53	3475	558	-2918	-647	-13%	2917
SP_258EA_C34BWGNON021_PRIME	021 17:30	022 02:30	2917	828	63	3808	3322	-485	0	199	53	3574	582	-2993	-647	-14%	2993
SP_258EA_C70METNON022_PRIME	022 15:30	023 04:15	2993	923	55	3971	3322	-647	0	750	75	4147	3648	-499	0	0%	499

Science data allocation > SSR Capacity

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	011 20:25	012 18:07	0.0	40.9	21.6	7.8	962.3	38.6	66.4	0.0	102.3	0.0	5.0	0.0	90.7	1335.7
SP_256EA_C34BWGNON012_PRIME	012 18:07	013 03:07	0.0	17.0	86.4	3.2	0.0	16.0	27.5	0.0	42.4	124.7	0.0	0.0	0.0	317.4
DAILY TOTAL SCIENCE	011 20:25	013 03:07	0.0	57.9	108.0	11.1	962.3	54.6	93.9	0.0	144.8	124.7	5.0	0.0	90.7	
OBSERVATION_NOR	013 03:07	013 17:59	0.0	28.0	21.6	5.4	400.5	26.4	45.5	0.0	70.1	0.0	5.0	0.0	62.1	664.6
SP_257EA_C34BWGNON013_PRIME	013 17:59	014 02:59	0.0	17.0	86.4	3.2	0.0	16.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	197.5
DAILY TOTAL SCIENCE	013 03:07	014 02:59	0.0	45.0	108.0	8.6	400.5	42.4	73.0	0.0	112.6	4.9	5.0	0.0	62.1	
OBSERVATION_NOR	014 02:59	015 12:00	0.0	62.3	21.6	11.9	38.5	58.7	101.0	0.0	377.5	0.0	5.0	0.0	138.0	814.5
SP_257EA_G70METNON015_PRIME	015 12:00	015 18:08	0.0	11.6	55.4	2.2	0.0	10.9	18.8	0.0	249.5	3.4	0.0	0.0	0.0	351.8
SP_257EA_C70METNON015_PRIME	015 18:08	016 00:54	0.0	12.8	0.0	11.0	0.0	12.0	20.7	0.0	275.3	3.7	0.0	0.0	0.0	335.5
DAILY TOTAL SCIENCE	014 02:59	016 00:54	0.0	86.6	77.0	25.1	38.5	81.7	140.5	0.0	902.3	7.1	5.0	0.0	138.0	

Initial SMT and Data Volume (2/2)

Beginning of Integration:

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	016 00:54	017 16:00	0.0	89.2	291.7	25.7	584.0	137.6	144.8	0.0	1933.4	594.4	1112.0	0.0	163.4	5076.2
SP_257EA_C70METNON017_PRIME	017 16:00	017 23:21	0.0	13.9	68.6	2.6	0.0	13.1	22.5	0.0	226.5	4.0	0.0	0.0	0.0	351.2
DAILY TOTAL SCIENCE	016 00:54	017 23:21	0.0	103.0	360.3	28.3	584.0	150.6	167.3	0.0	2159.9	598.5	1112.0	0.0	163.4	
OBSERVATION_NOR	017 23:21	018 17:09	0.0	33.6	0.0	6.4	803.0	31.7	54.5	0.0	83.9	0.0	0.0	0.0	74.4	1087.5
SP_257EA_C34BWGNON018_PRIME	018 17:09	019 02:09	0.0	17.0	86.4	3.2	0.0	16.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	197.5
DAILY TOTAL SCIENCE	017 23:21	019 02:09	0.0	50.6	86.4	9.6	803.0	47.7	82.0	0.0	126.4	4.9	0.0	0.0	74.4	
OBSERVATION_NOR	019 02:09	019 17:37	0.0	29.2	0.0	5.6	590.6	27.5	47.3	0.0	72.9	0.0	0.0	0.0	64.6	837.8
SP_257EA_C34BWGNON019_PRIME	019 17:37	020 02:37	0.0	17.0	86.4	3.2	0.0	16.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	197.5
DAILY TOTAL SCIENCE	019 02:09	020 02:37	0.0	46.2	86.4	8.8	590.6	43.5	74.9	0.0	115.4	4.9	0.0	0.0	64.6	
OBSERVATION_NOR	020 02:37	020 17:38	0.0	28.3	21.6	5.4	38.5	74.7	46.0	0.0	70.8	0.0	5.0	0.0	62.8	353.1
SP_258EA_C34BWGNON020_PRIME	020 17:38	021 02:38	0.0	17.0	86.4	3.2	0.0	16.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	197.5
DAILY TOTAL SCIENCE	020 02:37	021 02:38	0.0	45.3	108.0	8.6	38.5	90.7	73.5	0.0	113.3	4.9	5.0	0.0	62.8	
OBSERVATION_NOR	021 02:38	021 17:30	0.0	28.0	21.6	5.4	618.5	26.4	45.5	0.0	70.1	0.0	5.0	0.0	62.1	882.7
SP_258EA_C34BWGNON021_PRIME	021 17:30	022 02:30	0.0	17.0	86.4	3.2	0.0	16.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	197.5
DAILY TOTAL SCIENCE	021 02:38	022 02:30	0.0	45.0	108.0	8.6	618.5	42.4	73.0	0.0	112.6	4.9	5.0	0.0	62.1	
OBSERVATION_NOR	022 02:30	022 15:30	0.0	24.5	21.6	4.7	524.6	23.1	39.8	0.0	271.1	0.0	5.0	0.0	54.3	968.7
SP_258EA_C70METNON022_PRIME	022 15:30	023 04:15	0.0	24.1	126.9	4.6	0.0	22.7	39.0	0.0	518.7	7.0	0.0	0.0	0.0	742.9
DAILY TOTAL SCIENCE	022 02:30	023 04:15	0.0	48.6	148.5	9.3	524.6	45.8	78.8	0.0	789.8	7.0	5.0	0.0	54.3	

Waypoint Selection

Good Waypoints

OBS_NAME	START	END	POS_X_2_NSP	POS_X_2_NEP	NEG_X_2_NSP	NEG_X_2_NEP	POS_Z_2_NSP	POS_Z_2_NEP	NEG_Z_2_NSP	NEG_Z_2_NEP	NEG_X_2_SUN	NEG_Z_2_EARTH
SP_256NA_OBSERV011_NA	2017-011T20:25:00	2017-012T18:07:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	**BAD**
SP_257NA_OBSERV013_NA	2017-013T03:07:00	2017-013T17:59:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	**BAD**
SP_257NA_OBSERV014_NA	2017-014T02:59:00	2017-015T12:00:00	**BAD**	**BAD**	OK	OK	OK	**BAD**	**BAD**	**BAD**	OK	**BAD**
SP_257NA_OBSERV016_NA	2017-016T00:54:00	2017-017T16:00:00	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**
SP_257NA_OBSERV017_NA	2017-017T23:21:00	2017-018T17:09:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	**BAD**
SP_257NA_OBSERV019_NA	2017-019T02:09:00	2017-019T17:37:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	**BAD**
SP_257NA_OBSERV020_NA	2017-020T02:37:00	2017-020T17:38:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	**BAD**
SP_258NA_OBSERV021_NA	2017-021T02:38:00	2017-021T17:30:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	**BAD**
SP_258NA_OBSERV022_NA	2017-022T02:30:00	2017-022T15:30:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	**BAD**

RBOT Friendly Waypoints

	OBSERVATION PERIOD	START	END	POS_X	NEG_X	POS_Z	NEG_Z
UVIS EUV/FUV 1	SP_256NA_OBSERV011_NA	2017-011T20:25:00	2017-012T18:07:00	190.2/31.9	------	190.2/31.9	------
Gap 1 (CIRS)	SP_257NA_OBSERV013_NA	2017-013T03:07:00	2017-013T17:59:00	190.2/31.9	------	190.2/31.9	------
Gap 2 (VIMS/UVIS)	SP_257NA_OBSERV014_NA	2017-014T02:59:00	2017-015T12:00:00	190.2/31.9	------	190.2/31.9	------
Periapse Jump Start	SP_257NA_OBSERV016_NA	2017-016T00:54:00	2017-017T16:00:00	------	------	------	------
UVIS EUV/FUV 2	SP_257NA_OBSERV017_NA	2017-017T23:21:00	2017-018T17:09:00	190.0/31.9	------	190.0/31.9	------
Gap 3 (CIRS)	SP_257NA_OBSERV019_NA	2017-019T02:09:00	2017-019T17:37:00	190.0/31.9	------	190.0/31.9	------
Gap 4 (MAG/ISS)	SP_257NA_OBSERV020_NA	2017-020T02:37:00	2017-020T17:38:00	190.0/31.9	------	190.0/31.9	------
UVIS EUV/FUV 3	SP_258NA_OBSERV021_NA	2017-021T02:38:00	2017-021T17:30:00	190.0/31.9	------	190.0/31.9	------
UVIS EUV/FUV 4	SP_258NA_OBSERV022_NA	2017-022T02:30:00	2017-022T15:30:00	190.0/31.9	------	190.0/31.9	------

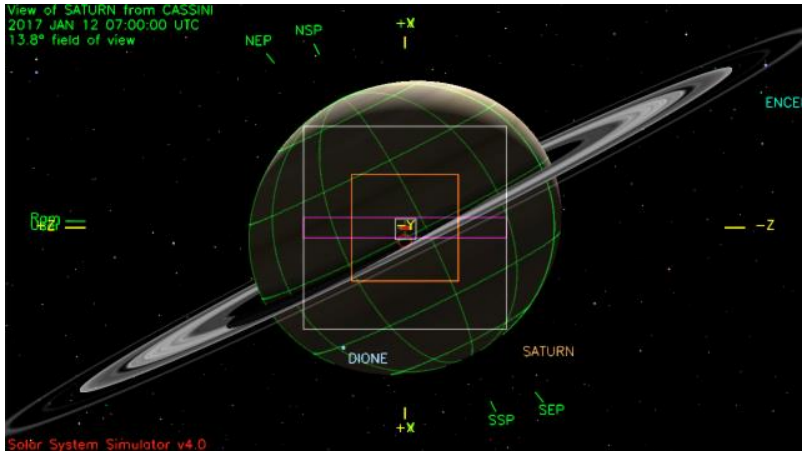
Good Downlinks

DOWNLINK	START	END	POS_X_2_NSP	POS_X_2_NEP	NEG_X_2_NSP	NEG_X_2_NEP	POS_Y_2_NSP	POS_Y_2_NEP	NEG_Y_2_NSP	NEG_Y_2_NEP	ROLL_FLAG
SP_256EA_C34BWGNON012_PRIME	2017-012T18:07:00	2017-013T03:07:00	OK	OK	OK	OK	OK	OK	OK	OK	OK
SP_257EA_C34BWGNON013_PRIME	2017-013T17:59:00	2017-014T02:59:00	OK	OK	OK	OK	OK	OK	OK	OK	94
SP_257EA_G70METNON015_PRIME	2017-015T12:00:00	2017-015T18:08:00	OK	OK	**BAD**	**BAD**	OK	OK	OK	OK	0
SP_257EA_C70METNON015_PRIME	2017-015T18:08:00	2017-016T00:54:00	OK	OK	**BAD**	**BAD**	OK	OK	OK	OK	0
SP_257EA_C34HEFNON017_PRIME	2017-017T16:00:00	2017-017T23:21:00	OK	OK	OK	OK	OK	OK	OK	OK	OK
SP_257EA_C70METNON018_PRIME	2017-018T17:09:00	2017-019T02:09:00	OK	OK	OK	OK	OK	OK	OK	OK	OK
SP_257EA_C34BWGNON019_PRIME	2017-019T17:37:00	2017-020T02:37:00	OK	OK	OK	OK	OK	OK	OK	OK	OK
SP_258EA_C34BWGNON020_PRIME	2017-020T17:38:00	2017-021T02:38:00	OK	OK	OK	OK	OK	OK	OK	OK	OK
SP_258EA_C34BWGNON021_PRIME	2017-021T17:30:00	2017-022T02:30:00	OK	OK	OK	OK	OK	OK	OK	OK	0
SP_258EA_C70METNON022_PRIME	2017-022T15:30:00	2017-023T04:15:00	OK	OK	**BAD**	**BAD**	OK	OK	OK	OK	0

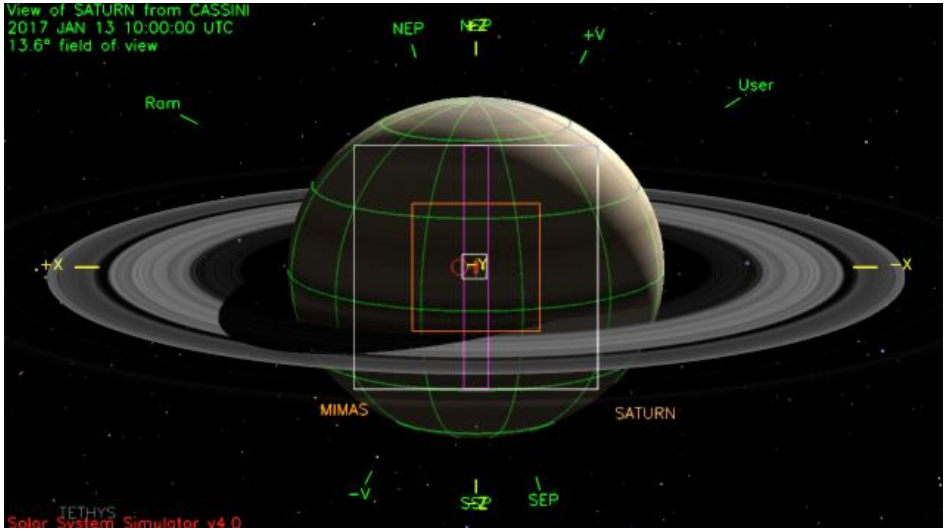
- **NEG_Y to Saturn not safe from ~2017-017T00:27 to 18:48 (ORS to Sun < 15 deg.)**
  - **ORS to SUN < 12 deg from ~2017-017T01:35 to 15:21**
  - **Minimum ORS to SUN angle is ~5.0 deg**

Waypoints Chosen

WAYPOINT 1 (2017-011T21:05:00 - 2017-012T16:37:00): ISS_NAC to Saturn, POS_Z to 190.2/31.9

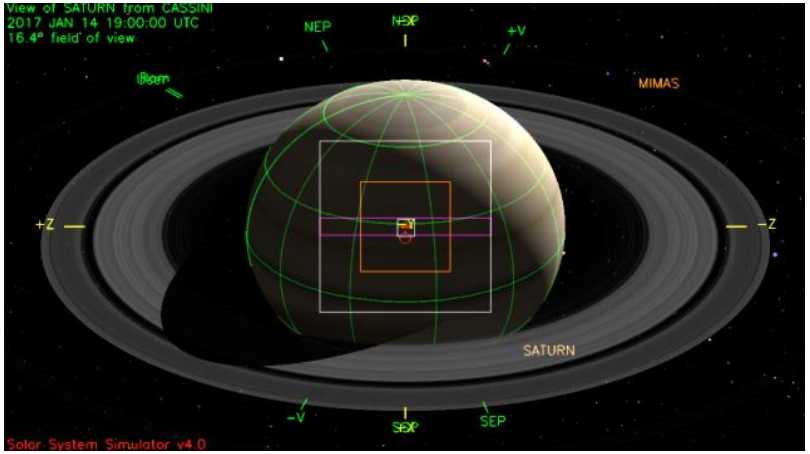


WAYPOINT 2 (2017-013T03:47:00 - 2017-013T16:29:00): ISS_NAC to Saturn, POS_Z to NSP

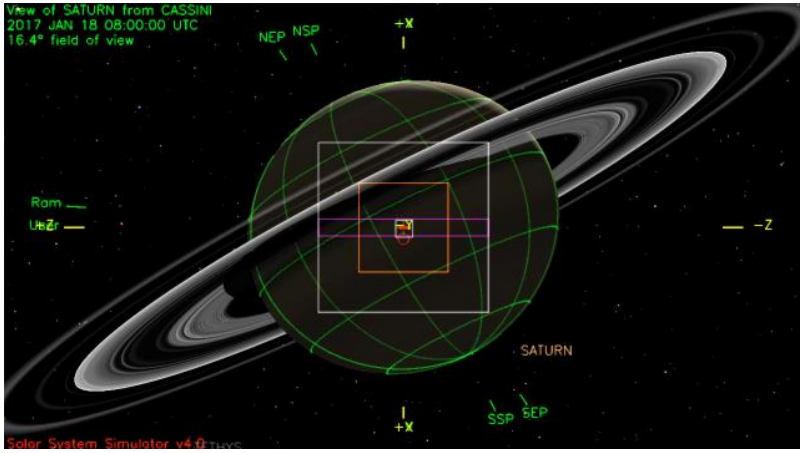


Waypoints Chosen

WAYPOINT 3 (2017-014T03:39:00 - 2017-015T10:30:00): ISS_NAC to Saturn, NEG_X to NSP

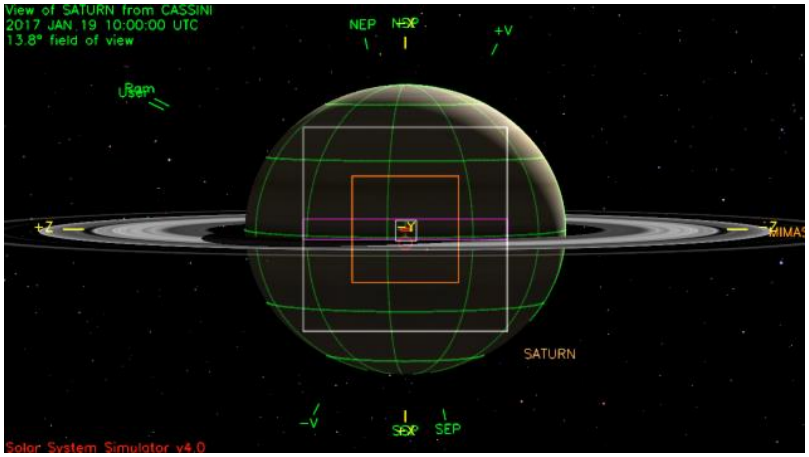


WAYPOINT 4 (2017-016T01:34:00 - 2017-017T07:37:00): No acceptable valid waypoint, custom period used
WAYPOINT 5 (2017-018T00:01:00 - 2017-018T15:39:00): ISS_NAC to Saturn, POS_Z to 190.0/31.9

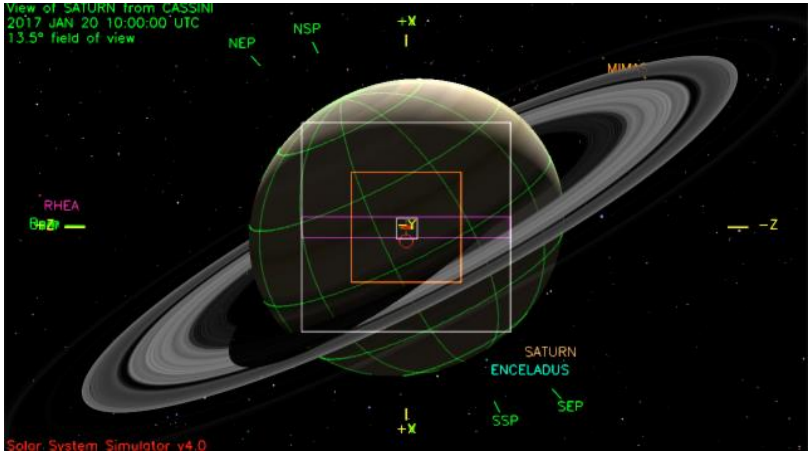


Waypoints Chosen

WAYPOINT 6 (2017-019T02:49:00 - 2017-019T16:07:00): ISS_NAC to Saturn, NEG_X to NSP

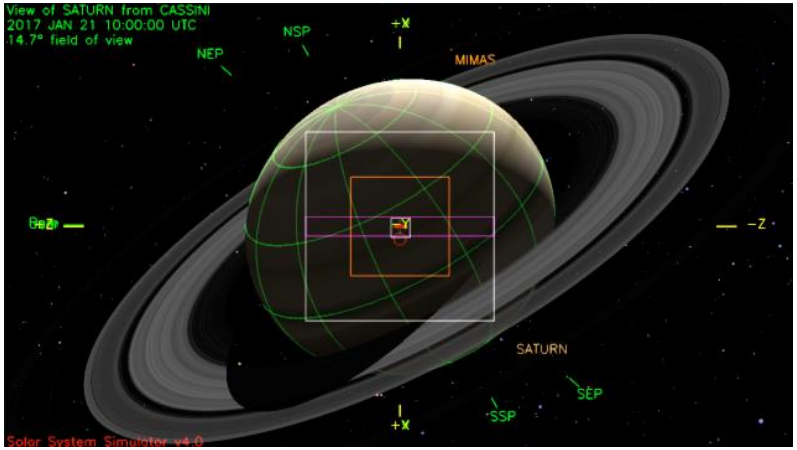


WAYPOINT 7 (2017-020T03:17:00 - 2017-020T16:08:00): ISS_NAC to Saturn, POS_Z to 190.0/31.9

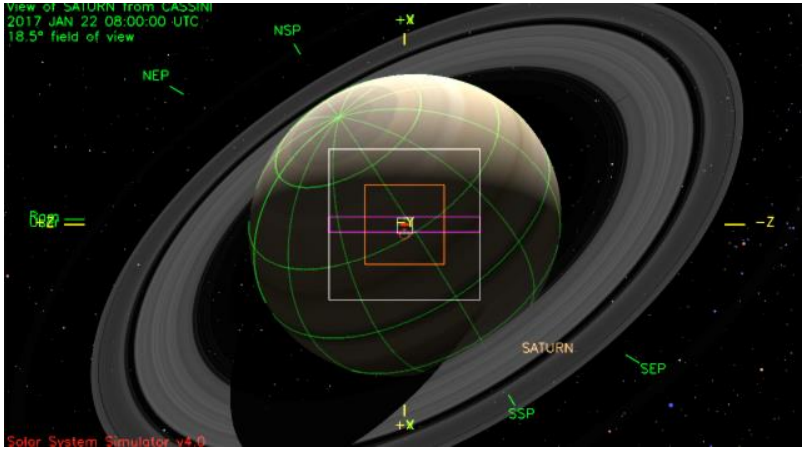


Waypoints Chosen

WAYPOINT 8 (2017-021T03:18:00 - 2017-021T16:00:00): ISS_NAC to Saturn, POS_Z to 190.0/31.9



WAYPOINT 9 (2017-022T03:10:00 - 2017-022T14:00:00): ISS_NAC to Saturn, POS_Z to 190.0/31.9



Notes (1/3)

- Pointing:
  - Waypoints:
    - RBOT friendly waypoints used when compatible with science
    - No Valid Waypoint for Periapse Period (2017-016T01:34 – 017T07:37 SCET, Duration 001T06:03): Use Custom Period
  - Custom Period (2017-016T11:33 – 017T07:37 SCET) – Used to minimize turn times among instruments and avoid Waypoint issues
  - Collaborative PRIME/RIDER activities:
    - UVIS_257SA_AURDSTARE001_PRIME - Collab w/ VIMS Rider
    - UVIS_257SA_AURSLEW001_PRIME ---- Collab w/ VIMS Rider
    - ISS_257DA_DAPHNIS001_PIE ---------- Collab w/ CIRS Rider
    - VIMS_257RI_SOLAROCC001_PRIME --- Collab w/ UVIS Rider
  - CIRS and VIMS temperature/boresite violations:
    - CIRS Max Temp = 77.05K (ΔT = 2.45K) at 2017-016T13:33 SCET (During ISS Daphnis PIE)
      - CIRS provided approval via email (Paul Romani and Gordy Bjoraker)
      - **Operational FR Wavier will be required (See SPLAT item)**
    - VIMS Max Temp = 62.03K (ΔT = 2.37K) at 2017-016T15:20 SCET (During VIMS SHEMHIRES001)
      - VIMS provided approval via email (Ed Audi and Bob Brown)
      - **Consumable FR waiver will be required (See SPLAT item)**
    - CIRS Boresite to Sun < 15° during DOY 016 – 017 (During VIMS SPOL / SHEM / SEQREG MAPs, UVIS AURSTARE002, & SP DLTURN017)
      - CIRS Boresite to Sun angle < 12° occur only during Solar Occultation behind Saturn
      - CIRS provided approval via email (Paul Romani)
      - **Operational FR Wavier will be required (See SPLAT item)**
  - **CMT Management required during the period 2017-017T05:39:20 – 07:47:06 SCET for the following violations (see SPLAT item):**
    - NEG_Y to SUN angle < 12° (Min NEG_Y to Sun angle = 1.74° at 2017-017T07:04)
      - CMT Management required during UVIS_257SA_AURSTARE002_PRIME (violation at 2017-017T05:39:25 – 07:10:40)
    - POS_X to SUN angle < 83° (Min POS_X to SUN angle = 72.62° at 2017-017T07:19)
      - CMT Management required during UVIS_257SA_AURSTARE002_PRIME (violation at 2017-017T06:29:40 – 06:33:30) & SP_257EA_DLTURN017_PRIME (violation at 2017-017T07:10:00 – 07:27:40)
    - Sun occulted behind Saturn between 2017-017T05:32:20 – 07:54:06 (from Tour Atlas)

Notes (2/3)

- Pointing (continued):
  - **SIP SASF Hand Edits for SP_257EA_DLTURN017_PRIME (2017-017T07:07:00 – 37:00 SCET)**
    - **Hand Edit Max Accel (X,Y,Z) to be "0.005, 0.008, 0.012" mrad/s^2 (RWA-Slow)**
    - **Hand Edit UVIS_FUV to be "UVIS_FUV_LO"**
    - **Hand Edit secondary Saturn_South_Pole to be "SATURN",["LAT_LON_500","-89.9","0.0","0"]**
  - Periapse Jumpstart of Merged PDT & AACS analysis for teams early PDT deliveries during 2017-016T01:34 – 017T14:05 (see SPLAT item)
- Data Volume:
  - No SMT warnings.
  - SSR cleared by end of segment.
  - Have carryover for 6 straight days after periapse period, but likely to clear SSR again by accounting for Vcut.
- DSN:
  - No Level 3 requests
  - Disposition ap_downlink report check warnings (except %70M stations, ignore):
    - Warning: SP_257NA_DSS84MRSS017_SP DSS code is inconsistent with complex/antenna
      - DSS-84 and AP-Gen configuration for RSS is verified by Aseel via email 05/25/16
    - Ignore "Warning: 70m usage for sequence exceeds project commitment of <= 35%; is at 50%"
    - Ignore "Warning: number of sequence upload passes is 0; should be 5 or more"
  - ESA support: DSS-84 Malargue, SP_257NA_DSS84MRSS017_SP (2017-017T09:30 – 14:35 SCET, Duration: 5:05hr)
    - Maintenance status unknown: Contact Belinda Arroyo for update
  - Differences from DSN strawman:
    - C70METNON013 Upgraded to 70M (Part of Swap with following 70M pass deletion)
    - C70METNON015 Deleted First pass of Split 70M and adjusted second pass to 9hr (Note Earth-Pointed gap b/w YGAP and DL)
      - NAV approved Julie Bellerose via email 04/18/16
    - C70METNON017 Upgraded to 70M (Part of swap with following 70M downgrade)
    - C34BWGNON018 Downgraded to 34BWG
    - C70METNON019 Upgraded to 70M (Part of Swap with DOY022 70M 3:45hr reduction)
    - C70METNON022 Reduction of BOT by 3:45hr for 9hr pass duration (Note Earth-Pointed gap b/w YGAP and DL)
      - NAV approved Julie Bellerose via email 04/18/16

Notes (3/3)

- RSS DSN Support:
  - SP_257NA_M70METRSS017_SP (2017-017T04:30 – 12:30 SCET, Duration: 8:00hr) added for RSS
  - SP_257NA_M34BWGRSS017_SP (2017-017T07:10 – 12:25 SCET, Duration: 5:15hr) added for RSS
  - SP_257NA_DSS84MRSS017_SP (2017-017T09:30 – 14:35 SCET, Duration: 5:05hr) added for RSS
  - SP_257NA_G34BWGRSS017_SP (2017-017T11:45 – 14:55 SCET, Duration: 3:10hr) added for RSS
  - SP_257NA_G70METRSS017_SP (2017-017T11:45 – 14:55 SCET, Duration: 3:10hr) added for RSS
- Resource checker:
  - ENGR_257SC_DFPW017_PPS: Prior to the LMB S/C in RSS3BRWAS, After the LMB S/C in DFPW normal
    - RSS3BRWAS OpMode times OKAY: begins before LMB for RSS Thermal stabilization, ends just at end of LMB Deadtime.
  - Gap on 2017-015T12:00 – 16:04 (Duration of 000T04:04:00) is ≥ 60 seconds. – Gap is intentional (Note Earth-Pointed Attitude)
  - Gap on 2017-017T14:29 – 14:30 (Duration of 000T00:01:00) is ≥ 60 seconds. – Gap is intentional (Note Earth-Pointed Attitude)
  - Gap on 2017-022T15:30 – 19:15 (Duration of 000T03:45:00) is ≥ 60 seconds. – Gap is intentional (Note Earth-Pointed Attitude)
  - SP_257EA_DLTURN017_PRIME: Waypoint change cannot occur during a Custom Period
    - Waypoint change is OKAY, DLTURN used at end of Custom Period
- Opmodes:
  - RSS3B RWA-Slow (2017-017T05:32:00 – 14:29:00 SCET) : Verified by Aseel Anabtawi and Laura Burke via email 05/24/16
    - All instrument configurations are verified and OKAY (ISS & VIMS sleep, UVIS in No HDAC, CDA On)
    - RWA-Slow during UVIS Auroral Stare, SP DLTURN, and RSS Ring/Saturn OCC on DOY 017
- Hydrazine:
  - N/A
- Special Activities:
  - PIES:
    - ISS_257DA_DAPHNIS001_PIE ------ (2017-016T11:33:00 – 14:03:00 SCET)
    - CIRS_257SA_LIMBINT001_PIE ----- (2017-016T17:31:00 – 21:31:00 SCET)
    - RSS_257SA_OCC001_PIE ----------(2017-017T07:57:00 – 16:00:00 SCET)

Liens (1/2)

Sequence Liens (should all be SPLAT items):

- Target Motion: VIMS_257SA_SHEMHIRES001_PRIME (2017-016T14:03 – 17:31 SCET) has 67.2 deg angular motion over a 3:28hr activity period. Requires a a 20 min quiescent period for AACS within 3 hours of the violation per AACS rule. The required quiescent period is already implemented by team in Periapse Jumpstart analysis.
- UVIS will redeliver PDT design for UVIS_257SA_AURSTARE002_PRIME for S97 Port 1 Merge to account for using the required RWA-Slow accelerations (0.005, 0.008, 0.012) mrad/s2 due to the RSS3BRWAS opmode that is active during the entire UVIS observation.
- CMT Management waiver required for the period 2017-017T05:39:20 – 07:47:06 SCET due to the following CMT violations:
  - NEG_Y to Sun $< 12^\circ$ violation during UVIS_257SA_AURSTARE002_PRIME at 2017-017T05:39:25 – 07:10:40.
    Minimum NEG_Y to Sun angle = 1.74° at 2017-017T07:04.
  - POS_X to Sun $< 83^\circ$ violation during UVIS_257SA_AURSTARE002_PRIME at 2017-017T06:29:40 – 06:33:30 & SP_257EA_DLTURN017_PRIME at 2017-017T07:10:00 – 07:27:40.
    Minimum POS_X to SUN angle = 72.62° at 2017-017T07:19.
  - Sun is occulted behind Saturn between 2017-017T05:32:20 – 07:54:06 (from Tour Atlas)
- CIRS Boresite to Sun < 15° Operational FR waiver required during DOY 016 – 017 (During VIMS SPOLMAP001 / SHEMMAP001 / SEQREGMAP001, UVIS AURSTARE002, & SP DLTURN017)
  - CIRS Boresite to Sun angle < 12° occur only during Solar Occultation behind Saturn
  - Sun is occulted behind Saturn between 2017-017T05:32:20 – 07:54:06 (from Tour Atlas)
- CIRS heating violation Operational FR waiver required during ISS_257DA_DAPHNIS001_PIE
  - Max Temp = 77.05K (ΔT = 2.45K) at 2017-016T13:33 SCET
- VIMS heating violation Consumable FR waiver required during VIMS_257SA_SHEMHIRES001_PRIME
  - Max Temp = 62.03K (ΔT = 2.37K) at 2017-016T15:20 SCET

Liens (2/2)

Sequence Liens (should all be SPLAT items):

- The following science requests from 2017-016T01:34 to 017T14:05 in Saturn_257_258 have been designed in PDT during integration. Teams identified shall deliver these designs as part of the Port 1 delivery; SIP Leads to monitor.

  VIMS_257SA_NPOLMAP001_PRIME

  CIRS_257SA_LIMBMAP001_PRIME

  ISS_257DA_DAPHNIS001_PIE

  VIMS_257SA_SHEMHIRES001_PRIME

  CIRS_257SA_LIMBINT001_PIE

  VIMS_257SA_SPOLMAP001_PRIME

  VIMS_257SA_SHEMMAP001_PRIME

  VIMS_257SA_SEQREGMAP001_PRIME

  VIMS_257RI_SOLAROCC001_PRIME

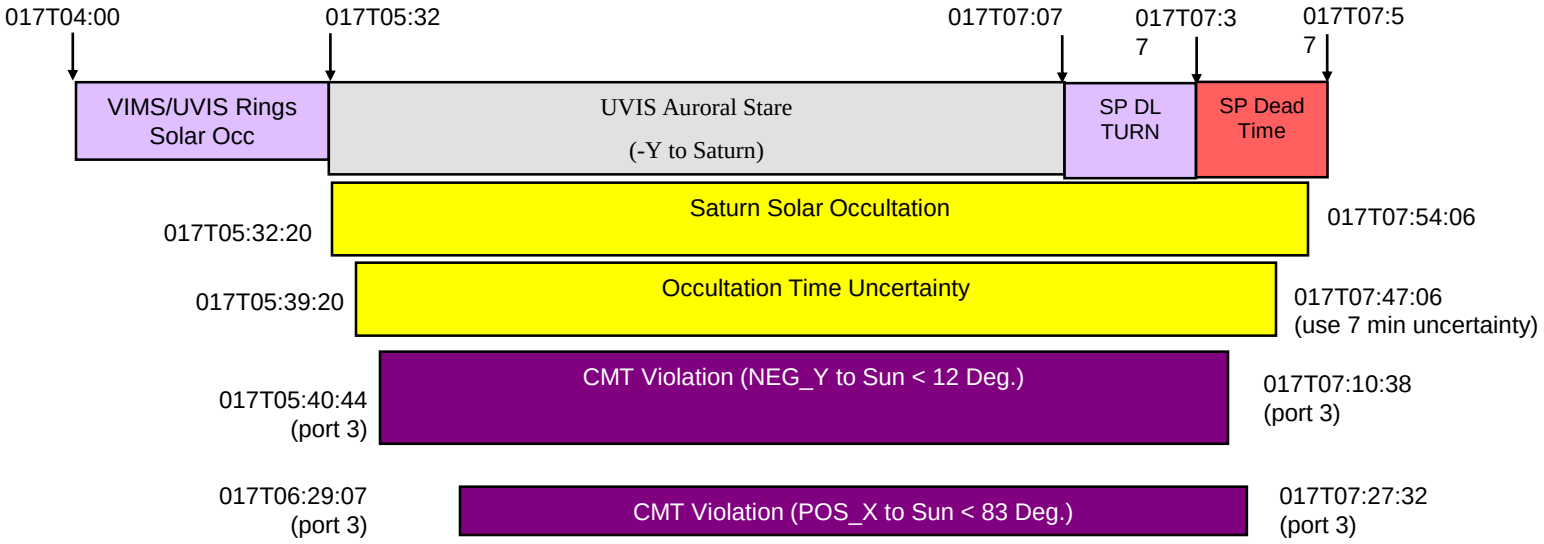
  UVIS_257SA_AURSTARE002_PRIME

  RSS_257SA_OCC001_PIE

  RSS_257RI_OCC001_PRIME

CMT Management: -Y to Sun and +X to Sun Violations

- -Y to Sun CMT Management and flight rule waivers will be needed for the UVIS Auroral Stare on DOY 017 during the solar occultation
- +X to Sun CMT Management and flight rule waivers will be needed for the SP Downlink Turn on DOY 017 during the solar occultation
  - Time of Saturn Solar Occultation is from the tour atlas.
  - Timing uncertainty is ± 7 minutes as determined using Brad Wallis' "ask_carnac.pro"



RBOT Summary

AACS Evaluation of Saturn 257/258 Jumpstart by David Bates (05/31/16)

- Solutions are clean if we are allowed to insert off Earth bias during VIMS_257SA_SHEMHIRES001_PRIME observation at 2017-016T14:20