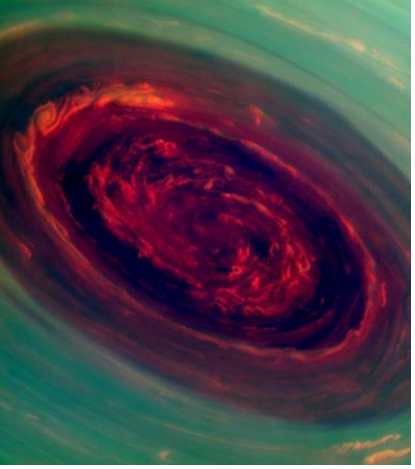
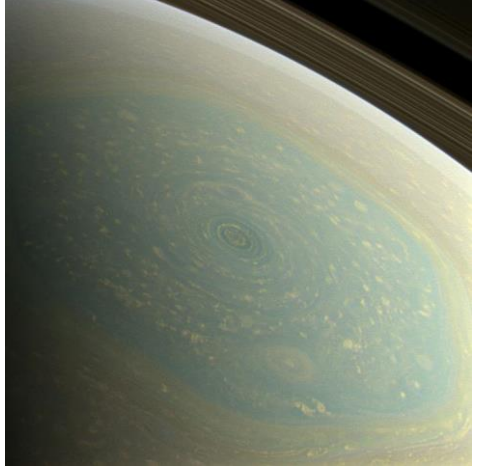
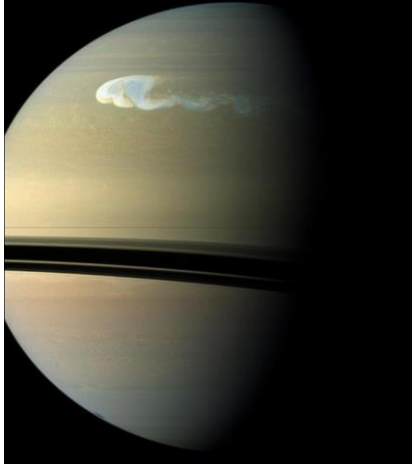


Science Planning & Sequence Team
CASSINI

SATURN TARGET WORKING TEAM

Rev 242 Segment Legacy Package

Segment Boundary: Sept 08, 2016 – Sept 16, 2016
252T10:36:00 – 260T10:05:00 (SCET)

Integration Began 10/05/2015
Segment Delivered to S96 Sequence 03/18/2016
Lead Integrator was Keven Uchida

Legacy Package Assembled by Keven Uchida

Table of Contents

*** N.A. = Slide present but content not available.**

Segment Overview and Final Products

Segment Summary

- This is an ~8 day long periapsis segment, with periapse occurring at approximately mid-segment. This segment is a direct continuation of the Saturn_241_241 apoapse segment.
- The orbit covered a large range of sub-S/C latitudes, viewing both the northern and southern hemispheres.
- VIMS had pre-integrated a high-value zero-phase ring occultation PIE. See Science Highlights, DOY 255
- At one point (257T11:28 to end of the observation period), the Sun to Saturn-center angle goes to < 15 deg. ORS needed to take care and limit their observations to those portions of Saturn's disk furthest from the Sun, thus avoiding any ORS boresight to Sun minimum angle violations.
- The Sun was too close to Saturn, from 257T14:45 to the end of the observation period, for ORS to observe any part of Saturn. The time was therefore allocated to an Earth pointed MAG_CAL roll, eliminating all ORS boresight to Sun issues/concerns. See slide 9: "Solar Geometry, ORS Boresight Concerns"

Final Sequenced SPASS (1 of 2)

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End	Primary	Secondary	Comments
Sequence S96, length = 76 days		2016-252T10:36:00		075T19:07:00	2016-328T05:43:00			
SATURN_242 Segment		2016-252T10:36:00		007T23:29:00	2016-260T10:05:00			
SP_242EA_S96IVP252_PRIME		2016-252T10:36:00		000T00:06:00	2016-252T10:42:00	XBAND to Earth	NEG_Y to 147.0/-28.0	S96 IVP Gap
ENGR_242SC_KPTYBIAS252_PRIME		2016-252T10:42:00		000T01:30:00	2016-252T12:12:00	NEG_Z to DELTA_H (0.0,0.0,60.0 deg. offset)	NEG_X to Sun	
SP_242SA_WAYPTTURN252_PRIME		2016-252T12:12:00		000T00:40:00	2016-252T12:52:00	ISS_NAC to Saturn	POS_Z to NSP	
NEW WAYPOINT		2016-252T12:52:00		001T10:59:00	2016-253T23:51:00	ISS_NAC to Saturn	POS_Z to NSP	
CIRS_242SA_COMPSIT002_PRIME	U, V	2016-252T12:52:00		000T11:00:00	2016-252T23:52:00	CIRS_FP1 to Saturn	POS_Z to NSP	
UVIS_242SA_EUVFUV001_PRIME	C, I	2016-252T23:52:00		000T12:19:00	2016-253T12:11:00	UVIS_FUV to Saturn	POS_Z to NSP	
VIMS_242SA_NPOLMOV001_PRIME	C, I, U	2016-253T12:11:00		000T11:00:00	2016-253T23:11:00	ISS_NAC to Saturn	POS_Z to NSP	
SP_242EA_DLTURN253_PRIME		2016-253T23:11:00		000T00:40:00	2016-253T23:51:00	XBAND to Earth	NEG_Y to 147.0/-28.0	
NEW WAYPOINT		2016-253T23:51:00		000T11:10:00	2016-254T11:01:00	XBAND to Earth	NEG_Y to 147.0/-28.0	
SP_242EA_YGAP253_PRIME		2016-253T23:51:00		000T01:30:00	2016-254T01:21:00	XBAND to Earth	NEG_Y to 147.0/-28.0	
SP_242EA_C34BWGNON254_PRIME	C, R	2016-254T01:21:00		000T09:00:00	2016-254T10:21:00	XBAND to Earth	NEG_Y to 147.0/-28.0	Neg_Y to 147/-28 and no rolling per MIMI req 10-5-15
SP_242SA_WAYPTTURN254_PRIME		2016-254T10:21:00		000T00:40:00	2016-254T11:01:00	ISS_NAC to Saturn	POS_Z to NSP	
NEW WAYPOINT		2016-254T11:01:00		000T12:50:00	2016-254T23:51:00	ISS_NAC to Saturn	POS_Z to NSP	
ISS_242TI_M30R2CLD254_PRIME	C, V	2016-254T11:01:00	E242_M30R2CLD254+000T 00:00:00	000T01:30:00	2016-254T12:31:00	ISS_NAC to Titan	POS_Z to NSP	No Preference to secondary pointing
VIMS_242SA_NHEMMAP001_PRIME	C, I	2016-254T12:31:00		000T10:40:00	2016-254T23:11:00	ISS_NAC to Saturn	POS_Z to NSP	
SP_242EA_DLTURN254_PRIME		2016-254T23:11:00		000T00:40:00	2016-254T23:51:00	XBAND to Earth	POS_X to NEP	
NEW WAYPOINT		2016-254T23:51:00		000T11:10:00	2016-255T11:01:00	XBAND to Earth	POS_X to NEP	
ENGR_242SC_KPTYBIAS254_PRIME		2016-254T23:51:00		000T01:30:00	2016-255T01:21:00	POS_Z to DELTA_H (0.0,0.0,84.0 deg. offset)	NEG_X to Sun	
SP_242EA_C70METNON255_PRIME	C	2016-255T01:21:00		000T04:45:00	2016-255T06:06:00	XBAND to Earth	6_Hr_Rolling	CAPS.POS_X to 40.6/83.5 (NSP) or NEP.CIRS heating.
SP_242SA_WAYPTTURN255_PRIME		2016-255T10:21:00		000T00:40:00	2016-255T11:01:00	ISS_NAC to Saturn	NEG_X to Sun	
NEW WAYPOINT		2016-255T11:01:00		000T12:50:00	2016-255T23:51:00	ISS_NAC to Saturn	NEG_X to Sun	
UVIS_242SA_EUVFUV002_PRIME	C, I, V	2016-255T11:01:00		000T06:13:00	2016-255T17:14:00	UVIS_FUV to Saturn	POS_Z to NSP	
VIMS_242RI_0PHASEC001_PIE	C, U	2016-255T17:14:00		000T03:08:00	2016-255T20:22:00	POS_Y to Sun (0.011,0.0,-0.291 deg. offset)	NEG_X to 355.0/-12.0	Offset to point CIRS_FP1 to the 0 phase point
ISS_242SA_NHEMOSAIC001_PRIME	C, U, V	2016-255T20:22:00		000T02:49:00	2016-255T23:11:00	ISS_NAC to Saturn	NEG_X to Sun	
SP_242EA_DLTURN255_PRIME		2016-255T23:11:00		000T00:08:00	2016-255T23:19:00	ISS_NAC to Saturn (0.0,0.0,-20.0 deg. offset)	NEG_X to Sun	
SP_242EA_DLTURN455_PRIME		2016-255T23:19:00		000T00:32:00	2016-255T23:51:00	XBAND to Earth	NEG_X to NEP	
NEW WAYPOINT		2016-255T23:51:00		000T11:10:00	2016-256T11:01:00	XBAND to Earth	NEG_X to NEP	
ENGR_242SC_KPTYBIAS255_PRIME		2016-255T23:51:00		000T01:30:00	2016-256T01:21:00	NEG_Z to DELTA_H (0.0,0.0,74.0 deg. offset)	NEG_X to Sun	
SP_242EA_C70METNON256_PRIME	C, M	2016-256T01:21:00		000T08:10:00	2016-256T09:31:00	XBAND to Earth	NEG_X to NEP	NEG_X to 40.6/83.5 (NSP) or NEP.SRU.CIRS heating.
SP_242SA_WAYPTTURN256_PRIME		2016-256T10:21:00		000T00:40:00	2016-256T11:01:00	ISS_NAC to Saturn (0.0,0.0,14.0 deg. offset)	NEG_X to Sun	
NEW WAYPOINT		2016-256T11:01:00		001T12:34:00	2016-257T23:35:00	ISS_NAC to Saturn (0.0,0.0,14.0 deg. offset)	NEG_X to Sun	
VIMS_242SA_SPOLMOV001_PRIME	C	2016-256T11:01:00		000T08:00:00	2016-256T19:01:00	ISS_NAC to Saturn	NEG_Z to NSP	
Periapse R = 7.644 Rs, lat ...		2016-256T11:48:39		000T00:00:01	2016-256T11:48:40			
UVIS_242SA_AURSTARE001_PRIME	C, I, V	2016-256T19:01:00		000T06:00:00	2016-257T01:01:00	ISS_NAC to Saturn	NEG_Z to NSP	Collaborative Rider(s): VIMS
CIRS_242SA_REGMAP001_PRIME	V	2016-257T01:01:00		000T08:00:00	2016-257T09:01:00	CIRS_FPB to Saturn	NEG_X to Sun	Targeting SCART position is 89.99S with a CML offset of -90d (similar to setup for a water COMPSIT). Continue with mosaic with focal planes running left through the pole to 30 degrees on the other side. See iDigit Screen shot saved on Gordy's computer.
VIMS_242SA_SPOLMOV002_PRIME	C	2016-257T09:01:00		000T04:00:00	2016-257T13:01:00	ISS_NAC to Saturn	NEG_Z to NSP	
UVIS_242SA_HIGHPHASE001_PRIME	C, E, I, V	2016-257T13:01:00		000T01:44:00	2016-257T14:45:00	UVIS_FUV to Rings	POS_Z to Saturn	

Gap 1

Gap 2

Gap 3a

Gap 3b

Gap 4

Final Sequenced SPASS (2 of 2)

Saturn_242 SPASS Continued

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End	Primary	Secondary	Comments
MAG_242SU_CALROLL001_PRIME	E, U	2016-257T14:45:00		000T08:10:00	2016-257T22:55:00	NEG_X to Earth (0.0,0.0,-30.0 deg. offset)	Rolling	
SP_242EA_DLTURN257_PRIME		2016-257T22:55:00		000T00:40:00	2016-257T23:35:00	XBAND to Earth	NEG_X to NEP	
NEW WAYPOINT		2016-257T23:35:00		000T11:10:00	2016-258T10:45:00	XBAND to Earth	NEG_X to NEP	
ENGR_242SC_KPTYBIAS257_PRIME		2016-257T23:35:00		000T01:30:00	2016-258T01:05:00	POS_Z to DELTA_H (0.0,0.0,-90.0 deg. offset)	NEG_X to Sun	
SP_242EA_C70METNON258_PRIME	C	2016-258T01:05:00		000T08:20:00	2016-258T09:25:00	XBAND to Earth	Rolling	CAPS.NEG_X to 40.6/83.5 (NSP) or NEP.CIRS heating.
SP_242SA_WAYPTTURN258_PRIME		2016-258T10:05:00		000T00:40:00	2016-258T10:45:00	ISS_NAC to Saturn	NEG_X to NSP	
NEW WAYPOINT		2016-258T10:45:00		001T12:50:00	2016-259T23:35:00	ISS_NAC to Saturn	NEG_X to NSP	
ISS_242TI_M150R2HZ258_PRIME	C, V	2016-258T10:45:00	E242_M150R2HZ258+000T 00:00:00	000T01:30:00	2016-258T12:15:00	ISS_NAC to Titan	NEG_X to NSP	
ISS_242SA_LIMBINT001_PRIME	U, V	2016-258T12:15:00		000T05:00:00	2016-258T17:15:00	ISS_NAC to Saturn	NEG_X to NSP	
ISS_242SA_AURSTARE001_PRIME	C, U, V	2016-258T17:15:00		000T04:00:00	2016-258T21:15:00	ISS_NAC to Saturn	NEG_X to NSP	
CIRS_242SA_FIRMAP001_PRIME	V	2016-258T21:15:00		000T12:00:00	2016-259T09:15:00	CIRS_FP1 to Saturn	NEG_X to NSP	Southern Hemisphere
VIMS_242SA_GLOBALMAP001_PRIME	C	2016-259T09:15:00		000T13:40:00	2016-259T22:55:00	ISS_NAC to Saturn	NEG_X to NSP	
SP_242EA_DLTURN259_PRIME		2016-259T22:55:00		000T00:40:00	2016-259T23:35:00	XBAND to Earth	POS_X to 17.77/-59.1	
NEW WAYPOINT		2016-259T23:35:00		000T14:55:00	2016-260T14:30:00	XBAND to Earth	POS_X to 17.77/-59.1	
ENGR_242SC_KPTYBIAS259_PRIME		2016-259T23:35:00		000T01:30:00	2016-260T01:05:00	NEG_Z to DELTA_H	NEG_X to Sun	
SP_242EA_C70METNON260_PRIME	C	2016-260T01:05:00		000T07:25:00	2016-260T08:30:00	XBAND to Earth	Rolling/SRU	MIMI: Inertial for NEG_Y to Saturn (0,0,-9.5). SRU. CIRS heating.

Gap 5

Final Sequenced SMT and Data Volume

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

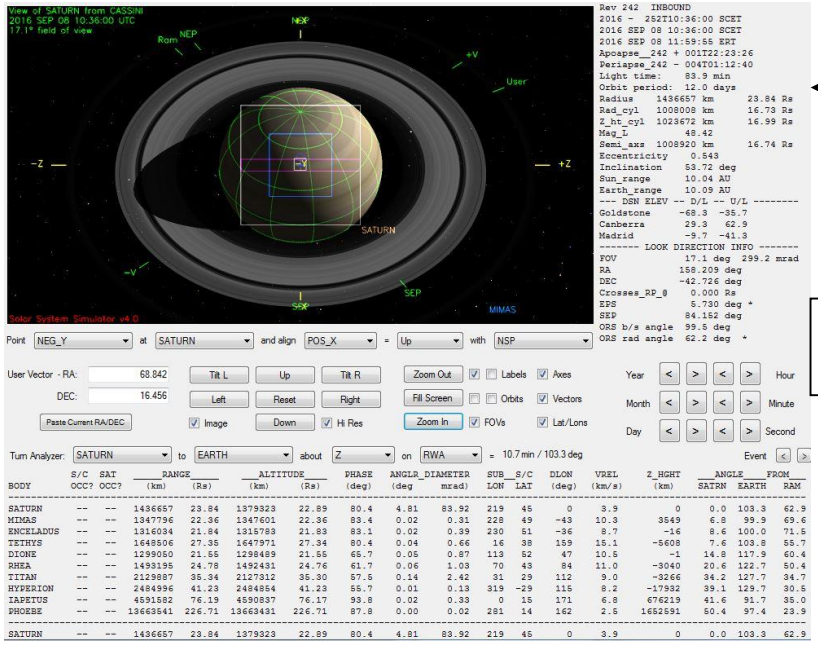
			OBSERVATION_PERIOD							DOWNLINK_PASS							
			P4					P5		RECORDED		PLAYBACK					
DOWNLINK PASS NAME	Start doy hh:mm	End doy hh:mm	START (Mb)	SCI (Mb)	HK+E (Mb)	TOTAL (Mb)	CPACTY (Mb)	MRGN (Mb)	OPNAV (Mb)	SCI (Mb)	ENGR (Mb)	TOTAL (Mb)	CPACTY (Mb)	MARGN (Mb)	NET_MARGN (Mb)	(%)	CAROVR (Mb)
SP_242EA_C34BWGNON254_PRIME	254 01:21	254 10:21	0	1844	164	2008	3322	1314	0	161	53	2222	699	-1524	-266	-1%	1524
SP_242EA_C70METNON255_PRIME	255 01:21	255 06:06	1524	921	63	2508	3322	814	0	96	28	2631	1731	-901	-266	-1%	900
SP_242EA_C70METNON256_PRIME	256 01:21	256 09:31	900	1829	81	2811	3322	511	0	795	48	3654	3023	-631	-266	-1%	631
SP_242EA_C70METNON258_PRIME	258 01:05	258 09:25	631	2791	167	3589	3322	-266	0	176	49	3547	3061	-487	536	4%	486
SP_242EA_C70METNON260_PRIME	260 01:05	260 08:30	486	2132	168	2786	3322	536	0	156	44	2986	2774	-212	1637	13%	211

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	252 10:36	254 01:21	0.0	36.5	247.1	18.3	149.2	34.5	83.7	0.0	125.5	302.8	830.0	0.0	162.0	1989.6
SP_242EA_C34BWGNON254_PRIME	254 01:21	254 10:21	0.0	8.5	86.4	3.2	0.0	8.0	19.4	0.0	29.2	4.9	0.0	0.0	0.0	159.7
DAILY TOTAL SCIENCE	252 10:36	254 10:21	0.0	45.0	333.5	21.5	149.2	42.5	103.1	0.0	154.7	307.8	830.0	0.0	162.0	
OBSERVATION_NOR	254 10:21	255 01:21	0.0	28.3	98.4	7.3	138.5	13.3	45.9	0.0	70.6	0.0	510.0	0.0	62.7	975.1
SP_242EA_C70METNON255_PRIME	255 01:21	255 06:06	0.0	9.0	40.5	1.7	0.0	4.2	14.5	0.0	22.2	2.6	0.0	0.0	0.0	94.8
DAILY TOTAL SCIENCE	254 10:21	255 06:06	0.0	37.3	138.9	9.0	138.5	17.6	60.4	0.0	92.9	2.6	510.0	0.0	62.7	
OBSERVATION_NOR	255 06:06	256 01:21	0.0	36.3	156.1	6.9	350.0	17.1	58.9	0.0	426.7	170.7	590.0	0.0	80.5	1893.1
SP_242EA_C70METNON256_PRIME	256 01:21	256 09:31	0.0	50.6	77.4	2.9	0.0	7.3	25.0	0.0	619.9	4.5	0.0	0.0	0.0	787.6
DAILY TOTAL SCIENCE	255 06:06	256 09:31	0.0	86.9	233.5	9.9	350.0	24.4	83.9	0.0	1046.6	175.2	590.0	0.0	80.5	
OBSERVATION_NOR	256 09:31	258 01:05	0.0	74.6	256.3	24.3	149.9	86.0	121.1	0.0	994.6	138.8	920.0	0.0	165.4	2931.0
SP_242EA_C70METNON258_PRIME	258 01:05	258 09:25	0.0	15.7	79.2	3.0	0.0	7.4	25.5	0.0	39.2	4.6	0.0	0.0	0.0	174.6
DAILY TOTAL SCIENCE	256 09:31	258 09:25	0.0	90.4	335.5	27.3	149.9	93.4	146.6	0.0	1033.8	143.4	920.0	0.0	165.4	
OBSERVATION_NOR	258 09:25	260 01:05	0.0	74.8	328.8	24.3	188.4	35.3	121.4	0.0	187.1	33.0	1120.0	0.0	165.8	2278.9
SP_242EA_C70METNON260_PRIME	260 01:05	260 08:30	0.0	14.0	69.3	2.7	0.0	6.6	22.7	0.0	35.0	4.1	0.0	0.0	0.0	154.3
DAILY TOTAL SCIENCE	258 09:25	260 08:30	0.0	88.8	398.1	27.0	188.4	41.9	144.1	0.0	222.0	37.0	1120.0	0.0	165.8	

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

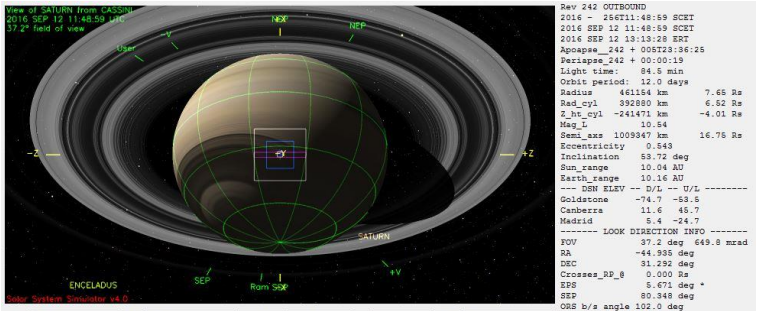
Segment Geometry

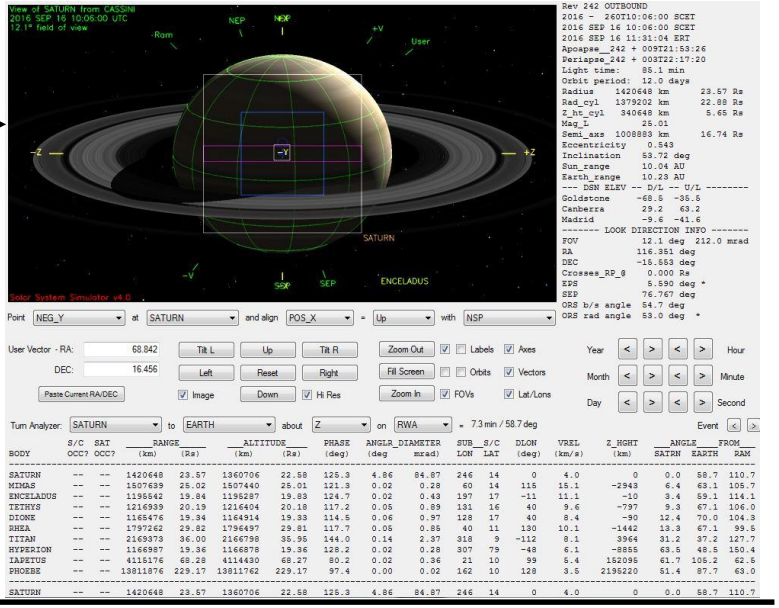


Start
252T10:36:00

Periapse
256T11:48:59

End
260T10:05:00

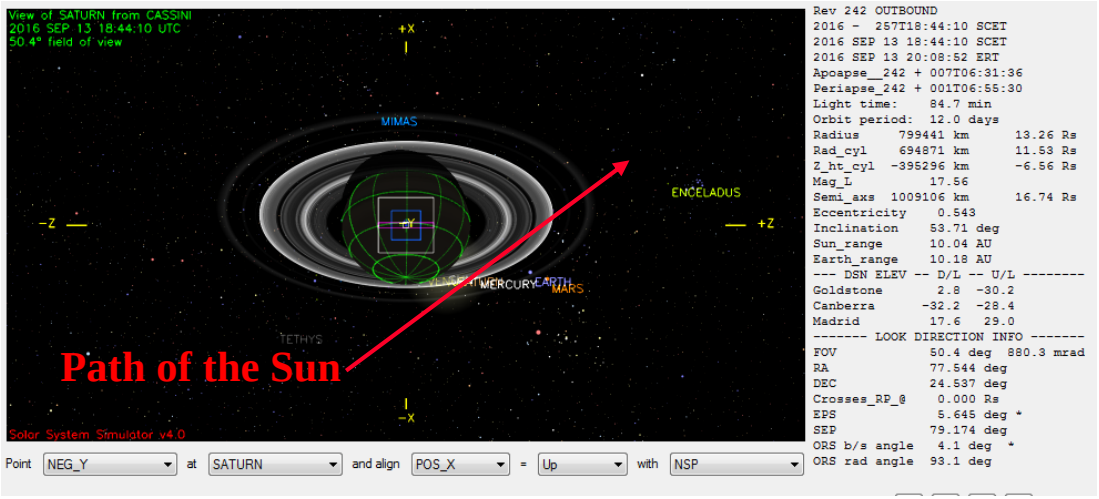




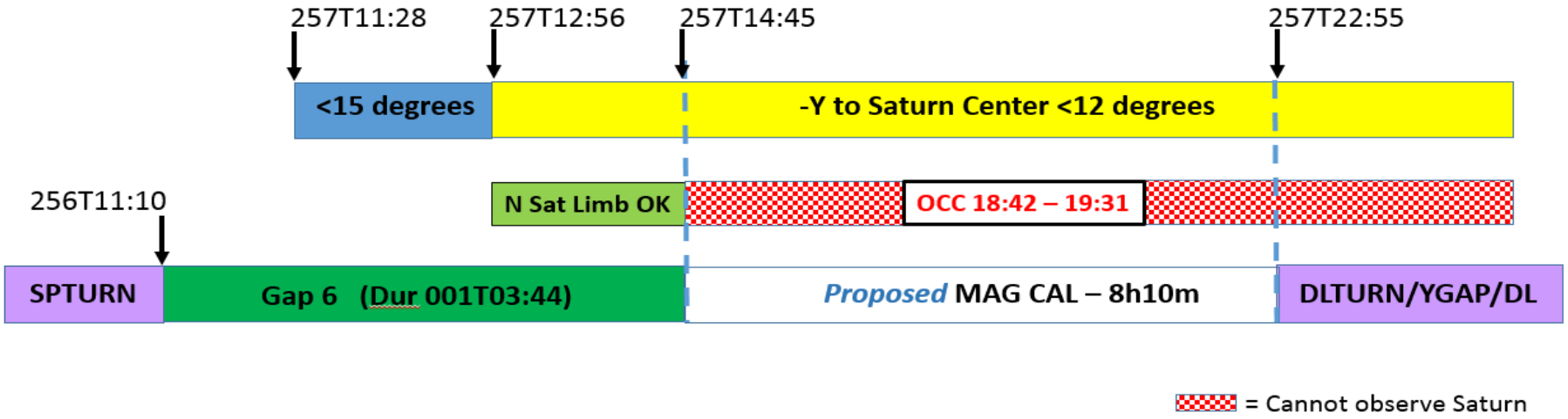
	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	23.84	80.4	45
Periapse	7.65	77.9	-32
Segment End	23.57	125.3	14

Solar Geometry – ORS Boresight Concerns

Sun closest approach to Saturn Center (4.1 deg) 257T18:44



- ORS to Sun < 15 deg from 257T11:28 until Gap 6 end (257T14:45)
- ORS to Sun < 12 deg from 257T12:45 until Gap 6 end (257T14:45). **North Saturn Limb OK during this time.**
- **CANNOT** observe Saturn from 257T14:45 until end of observing period.



Daily Science Highlights (1 of 2)

08 Sept 2016 (DOY 252) : The Saturn_242 segment began with the last of three CAKE observation periods (Rs > 20) initiated in the previous segment/sequence. CIRS performed its second "compositional sit and stare" (COMPSIT) of this CAKE segment, for one rotation period (11 hrs), – UVIS and VIMS were riders. This COMPSIT was taken at higher S/C latitude and is at lower phase angle than the preceding COMPSIT performed a few days earlier. Following the COMPSIT, UVIS took the lead with ~12.5 hours of EUV/FUV imaging (C and I riders) of Saturn to obtain spectral images of the northern hemisphere.

09 Sept 2016 (DOY 253): The CAKE period concluded with a VIMS led north polar daytime movie (NPOLMOV), with CIRS, ISS and UVIS riding along. Mosaics were taken 50 degrees north to the pole and off the polar limb. The NPOLMOV had 11 hr duration, followed by a turn to downlink at the approximate start of DOY 254.

10 Sept 2016 (DOY 254): Immediately following the downlink, ISS performed a Titan Monitoring campaign observation, with CIRS and VIMS as riders. VIMS then maps (for ~11 hours) the day-lit northern hemisphere of Saturn (C, I, U riders) from high sub-S/C latitude (53 deg).

11 Sept 2016 (DOY 255): Following downlink to Canberra, UVIS performed the last of its three EUV/FUV observations, spread out over ten days to sample a range of illumination and latitudes. VIMS then began a ~3 hour long zero-phase occultation PIE. In this `0PHASE' observation the ORS instruments (CIRS & UVIS) observed the opposition effect in the rings: the brightening in reflected light which occurred within 1-2 degrees of zero phase angle when the sun was directly opposite the rings as seen by Cassini. As the spacecraft moved along its orbit, the zero-phase point moved across the rings, providing an opportunity to observe the opposition effect in different parts of the rings. The strength and angular width of the brightening is diagnostic of the texture on the surfaces of the ring particles (i.e., how rough they are and what the typical grain sizes are), as well as the packing density of the particles within the rings. This particular observation provided a complete scan across the main rings, from the innermost D ring to the F ring, at a solar elevation angle higher than we have seen previously in the mission.

At the end of the day, ISS performed a northern hemisphere mosaic (NHEMAP) of Saturn's disk at low phase angle (C, U, and V riders).

Continued on next page

Daily Science Highlights (1 of 2)

12 Sept 2016 (DOY 256): Following ring plane crossing (256T03:20) and shortly before periapse (256T11:50) VIMS (with CIRS rider) took movies/mosaics (about 50 degrees south to the pole and off the polar limb) of Saturn's now almost completely dark southern hemisphere. UVIS then took the lead with an auroral observation (AURSTARE) toward Saturn's south polar region, supporting UVIS, ISS and VIMS as riders.

13 Sept 2016 (DOY 257): CIRS started the day with a regional map (REGMAP) of Saturn's south polar region, mapping the temperature of southern vortex (VIMS rider). VIMS then conducted the second of its south pole movies (SPOLMOV) within two days, this time while the S/C was at the highest southern sub-S/C latitude in this segment (CIRS rider). The REGMAP was followed by ISS performing a short (~2 hr) high phase scan (HIGHPHASE), mapping the very thin illuminated limb crescent away from rings or shadow so as to for avoid the Sun as it neared Saturn in projection. UVIS and VIMS rode along. MAG then performed an 8 hr rolling calibration observation (CALROLL) at a particularly good time, when the Sun wa1s otherwise within 12 degrees of Saturn center. The CALROLL was followed by downlink to Canberra.

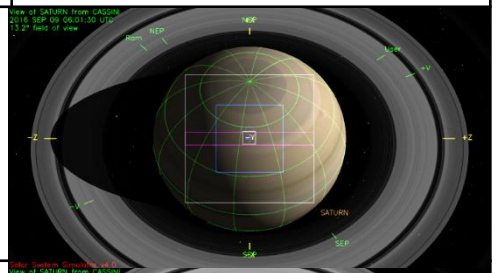
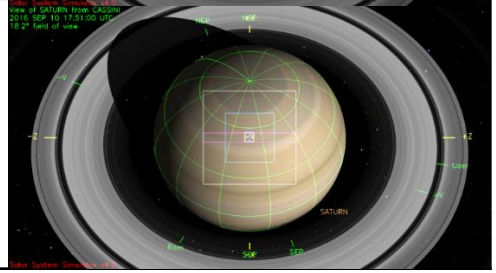
14 Sept 2016 (DOY 258): Immediately following downlink ISS performed1 its last of two Titan monitoring campaigns performed in this segment (CIRS, VIMS Riders). ISS then shifted gear to perform a limb integration (LIMINT), taking stare images along the thin bright limb of Saturn, with UVIS and VIMS as riders. It continued the lead with an Auroral stare observation southern hemisphere) (CIRS, UVIS, VIMS riders). Finally, CIRS performed a FIRMAP to determine upper troposphere and tropopause temperature (with spatial resolution of about two degrees of latitude and longitude).

15 Sept 2016 (DOY 259): On this day, VIMs performed a Saturn global map (GLOBALMAP00P), at high phase angle, low sub-S/C latitudes (2-9 degrees) – repeated 3*3 mosaics, each mosaic covering the planet or at least up to the polar regions (CIRS rider).

16 Sept 2016 (DOY 260): The segment ended with a downlink to Canberra, shortly after the start of DOY 260.

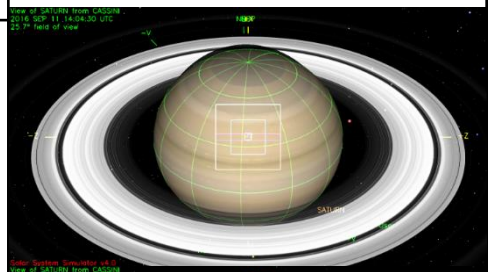
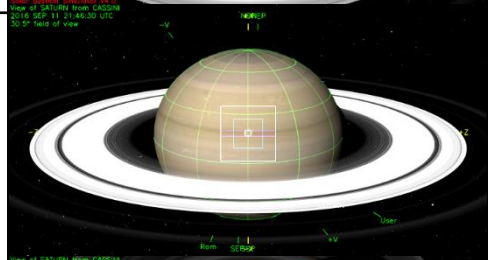
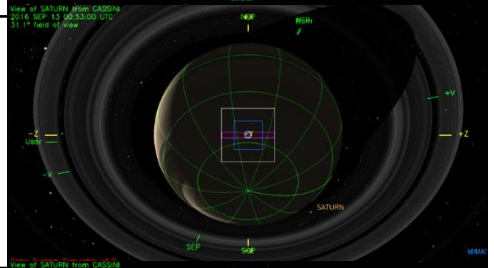
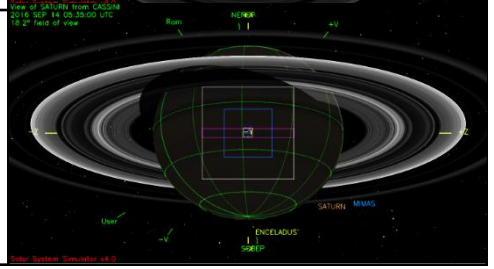
Segment Integration Planning

Timeline Gaps and Suggested Observations (1 of 2)

Gap	Start	End	Duration	Phase angle (range)	Rs range	Sub-S/C Lat.	Snapshot (mid-gap)
1	2016-252T12:52:00 Note 1:	2016-253T23:11:00	001T10:19:00	79.2 – 57.5	23.63 – 19.23	+46 to+ 53	
2	2016-254T12:31:00 *Suggested Activities:* *VIMS Northern Hemisphere Map 19h40m*	2016-254T23:11:00	000T10:40:00	45.4 – 32.7	16.80 – 14.56	+53 to +49	

Note 1: Gap 1 is still within the periapsis domain (R > 20 RS), and was therefore filled with “CAKE” template activities.

Timeline Gaps and Suggested Observations (2 of 2)

Gap	Start	End	Duration	Phase angle (range)	Rs range	Sub-S/C Lat.	Snapshot (mid-gap)
3a	2016-255T11:01:00 *Suggested Activities:* *ISS Low Phase Imaging, OR* *ISS Feature Track 10h40m*	2016-255T17:14:00	000T06:13:00	12.9 / 5.0	11.8 / 10.4	+38 to +27	
3b	2016-255T20:22:00 *Suggested Activities:* *VIMS Equatorial Imaging 02h49m*	2016-255T23:11:00	000T02:49:00	12.6 / 21.8	9.7 /9.1	+20 to +13	
4	2016-256T11:01:00 *Suggested Activities:* *VIMS South Pole Imaging 08h00m* *CIRS Regional Map 08h00m* *VIMS Imaging of mid Southern Lattitudes 03h44m*	2016-257T14:45:00	001T03:44:00	73.9 / 171.3	7.7 / 12.3	–29 to –35	
5	2016-258T12:15:00 *Suggested Activities:* *ISS Bright Shimmering Limb 11h00m* *CIRS Regional Map 11h00m* *VIMS N. Hemisphere Regional Map 12h40m)*	2016-259T22:55:00	001T10:40:00	157 / 132	17.0 / 22.4	–12 to +9	

Initial SMT and Data Volume

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)	(%)	CAROVR (Mb)
SP_242EA_C34BWGNON254_PRIME	254 01:21	254 10:21	0	1190	164	1353	3322	1969	0	161	53	1568	699	-869	1785	16%	869
SP_242EA_C34BWGNON255_PRIME	255 01:21	255 10:21	869	238	63	1170	3322	2152	0	191	53	1414	694	-720	1785	17%	720
SP_242EA_C70METNON256_PRIME	256 01:21	256 10:21	720	754	63	1537	3322	1785	0	953	53	2543	3310	767	2653	27%	0
SP_242EA_C70METNON258_PRIME	258 01:05	258 10:05	0	1272	164	1436	3322	1886	0	191	53	1680	3288	1607	4031	61%	0
SP_242EA_C70METNON260_PRIME	260 01:05	260 10:05	0	510	165	675	3322	2647	0	191	53	919	3343	2423	2423	72%	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	252 10:36	254 01:21	0.0	36.5	0.0	18.3	876.1	34.5	83.7	0.0	125.5	4.4	0.0	0.0	162.0	1340.9
SP_242EA_C34BWGNON254_PRIME	254 01:21	254 10:21	0.0	8.5	86.4	3.2	0.0	8.0	19.4	0.0	29.2	4.9	0.0	0.0	0.0	159.7
DAILY TOTAL SCIENCE	252 10:36	254 10:21	0.0	45.0	86.4	21.5	876.1	42.5	103.1	0.0	154.7	9.3	0.0	0.0	162.0	
OBSERVATION_NOR	254 10:21	255 01:21	0.0	28.3	21.6	7.3	38.5	13.3	45.9	0.0	70.6	0.0	10.0	0.0	62.7	298.3
SP_242EA_C34BWGNON255_PRIME	255 01:21	255 10:21	0.0	17.0	86.4	3.2	0.0	8.0	27.5	0.0	42.1	4.9	0.0	0.0	0.0	189.2
DAILY TOTAL SCIENCE	254 10:21	255 10:21	0.0	45.3	108.0	10.6	38.5	21.3	73.4	0.0	112.7	4.9	10.0	0.0	62.7	
OBSERVATION_NOR	255 10:21	256 01:21	0.0	28.3	0.0	5.4	0.0	13.3	45.9	0.0	406.8	45.5	201.8	0.0	62.7	809.8
SP_242EA_C70METNON256_PRIME	256 01:21	256 10:21	0.0	52.2	86.4	3.2	0.0	8.0	27.5	0.0	762.1	4.9	0.0	0.0	0.0	944.4
DAILY TOTAL SCIENCE	255 10:21	256 10:21	0.0	80.5	86.4	8.6	0.0	21.3	73.4	0.0	1168.9	50.5	201.8	0.0	62.7	
OBSERVATION_NOR	256 10:21	258 01:05	0.0	73.1	0.0	24.0	0.0	84.2	118.5	0.0	960.7	0.0	0.0	0.0	161.9	1422.4
SP_242EA_C70METNON258_PRIME	258 01:05	258 10:05	0.0	17.0	86.4	3.2	0.0	8.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	189.5
DAILY TOTAL SCIENCE	256 10:21	258 10:05	0.0	90.0	86.4	27.2	0.0	92.2	146.1	0.0	1003.1	4.9	0.0	0.0	161.9	
OBSERVATION_NOR	258 10:05	260 01:05	0.0	73.6	21.6	24.1	38.5	34.7	119.3	0.0	183.9	0.0	10.0	0.0	163.0	668.7
SP_242EA_C70METNON260_PRIME	260 01:05	260 10:05	0.0	17.0	86.4	3.2	0.0	8.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	189.5
DAILY TOTAL SCIENCE	258 10:05	260 10:05	0.0	90.5	108.0	27.3	38.5	42.7	146.9	0.0	226.4	4.9	10.0	0.0	163.0	

Waypoint Selection

Good Waypoints

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
2016-252T10:36:00	2016-254T01:21:00	**BAD**	OK	OK	**BAD**	OK	OK	**BAD**	**BAD**	OK	OK
2016-254T10:21:00	2016-255T01:21:00	OK	OK	**BAD**	**BAD**	OK	OK	**BAD**	**BAD**	OK	OK
2016-255T10:21:00	2016-256T01:21:00	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	OK	**BAD**
2016-256T10:21:00	2016-258T01:05:00	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**
2016-258T10:05:00	2016-260T01:05:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK
2016-260T10:05:00	2016-261T18:50:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK

RBOT Friendly

OBSERVATION PERIOD	START	END	POS_X	NEG_X	POS_Z	NEG_Z
SP_242NA_OBSERV252_NA	2016-252T10:36:00	2016-254T01:21:00	191.9/ 42.0	------	191.9/ 42.0	------
SP_242NA_OBSERV254_NA	2016-254T10:21:00	2016-255T01:21:00	191.9/ 42.0	------	191.9/ 42.0	------
SP_242NA_OBSERV255_NA	2016-255T10:21:00	2016-256T01:21:00	191.9/ 42.0	------	------	------
SP_242NA_OBSERV256_NA	2016-256T10:21:00	2016-258T01:05:00	------	------	------	------
SP_242NA_OBSERV258_NA	2016-258T10:05:00	2016-260T01:05:00	191.8/ 42.0	------	191.8/ 42.0	------
SP_242NA_OBSERV260_NA	2016-260T10:05:00	2016-261T18:50:00	191.8/ 42.0	------	191.8/ 42.0	------

① **Gap 3** (255T10:21 – 256T01:21): ORS radiator to Sun issues throughout period
Only safe waypoint is **NEG_Y_2_SATURN, NEG_X_2_SUN**

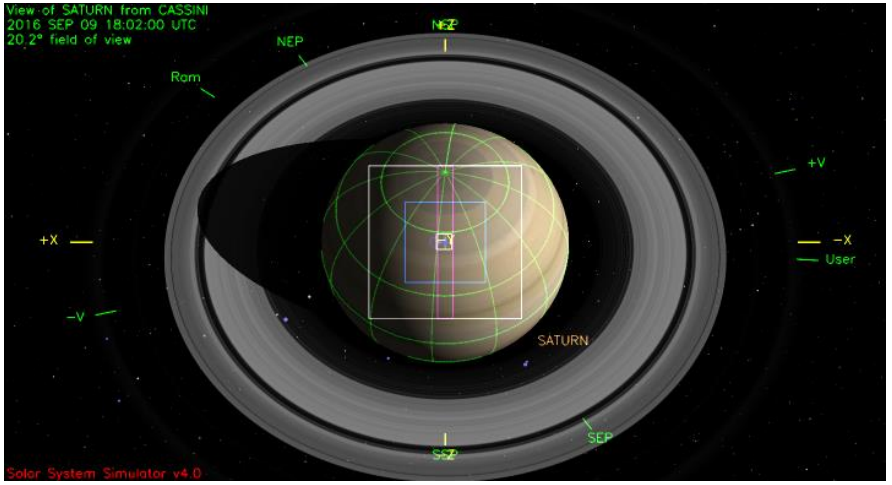
② **Gap 4** (256T10:21 – 258T01:05): ORS radiator to Sun issues AND ORS boresight to Sun issues (Note A)
Only safe waypoint is **NEG_Y_2_Saturn (0,0,14), NEG_X_2_SUN**

Note A: ORS to Sun < 15 deg from 257T11:28 until DL turn
ORS to Sun < 12 deg from 257T12:45 until DL turn
Minimum ORS to SUN angle is approx. 4.1 deg (257T18:45)

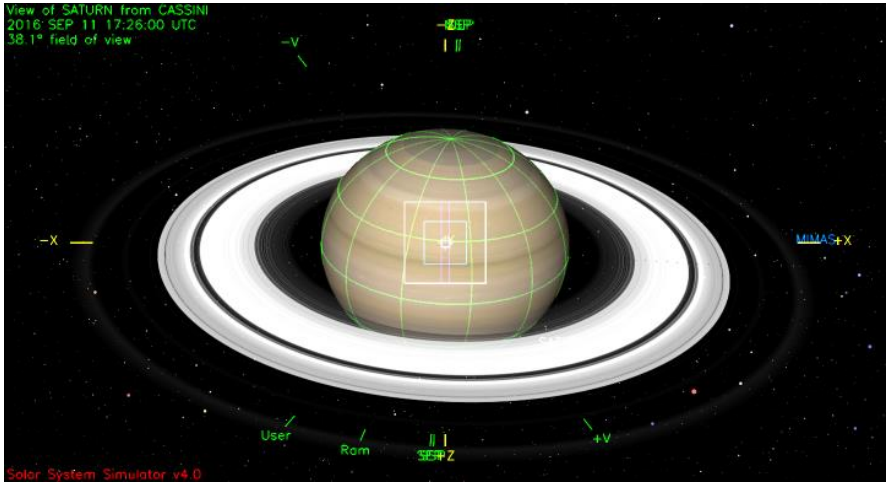
Gaps 5 and 6 observing note: Second most useful secondary (besides the waypoint secondary), to avoid heating while observing, is Neg_Z to NSP.

Waypoints Chosen (1 of 2)

Waypoint 1 (2016-252T12:52:00 – 254T23:51:00): NEG_Y to Saturn, POS_Z to NSP

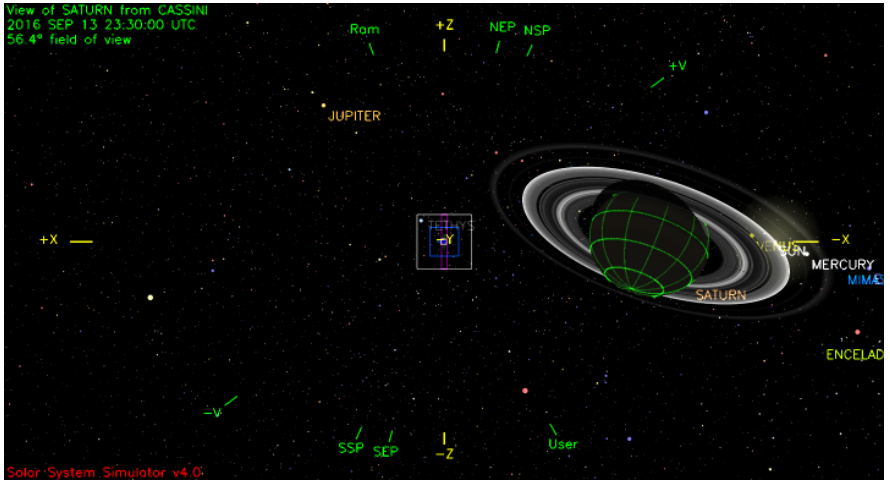


Waypoint 2 (2016-255T11:01:00 – 255T23:51:00): NEG_Y to Saturn, NEG_X to Sun

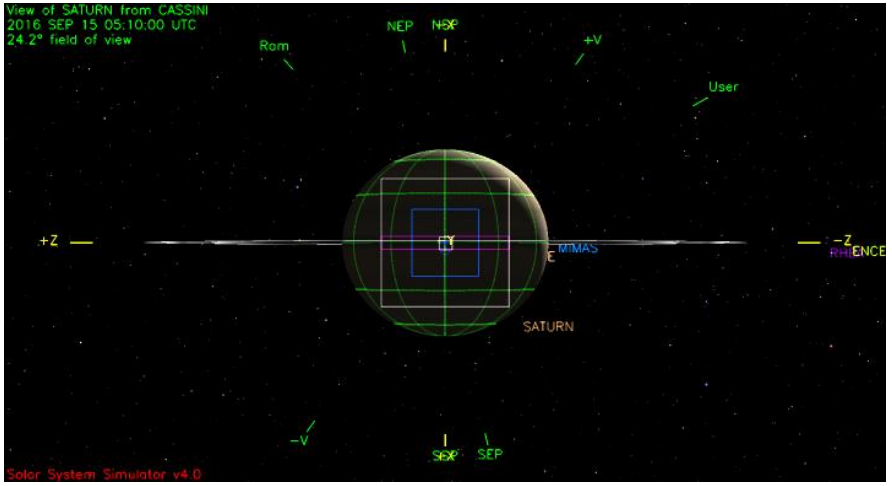


Waypoints Chosen (2 of 2)

Waypoint 3 (2016-256T11:01:00 – 257T23:35:00): NEG_Y to Saturn (0,0,14), NEG_X to SUN



Waypoint 4 (2016-258T10:45:00 – 259T23:35:00): NEG_Y to Saturn, NEG_X to NSP



Notes

- Pointing:
  - Zeta Ori PIE request pair (UVIS_222ST_ZETAORI001_PIE and UVIS_222ST_ZETAORI002_PIE) has been modified slightly (start/end times and durations) to maximize Zeta ORI ingress-egress observation timing. Approximately same total combined duration. Has been approved by SATURN_TWT.
  - RBOT friendly secondaries were used when compatible with science activities
- Data Volume:
  - No issues
- DSN:
  - Last downlink of segment (2015-274T23:17) upgraded to 70m (DSS 45 to DSS 42) for data volume purposes.
- Resource checker:
  - 2015-274T23:17:00 SP_222EA_C70METOTP274_PRIME --- Manually verify identical inertial pointing, the backup OTM may exist in the next segment/sequence.
    - This has been verified.
- Opmodes:
  - No RWA-slow and/or unique opmodes.
- Hydrazine:
  - N/A
- Special Activities:
  - None

Liens

Sequence Liens (should all be SPLAT items):

- SPLAT Item #S91000005: ISS_222DI_DIONE002_PIE. This and the observations immediately before and after have total target (Dione) motion of 122 degrees over 3h30m. Lien: Any observation >3 hours in which the target body travels > 60 degrees must include 20 minute quiescent periods every 3 hours. Action: Activity has been designed so that the last 20 minutes of this observation is at an inertial attitude to satisfy this guideline.