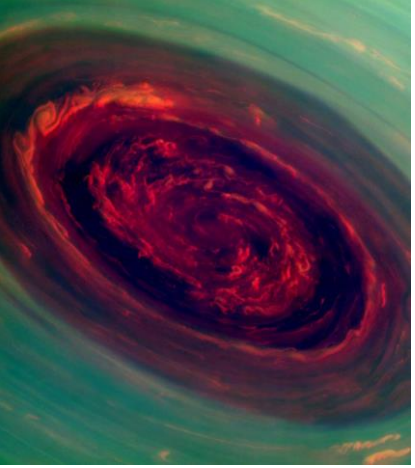
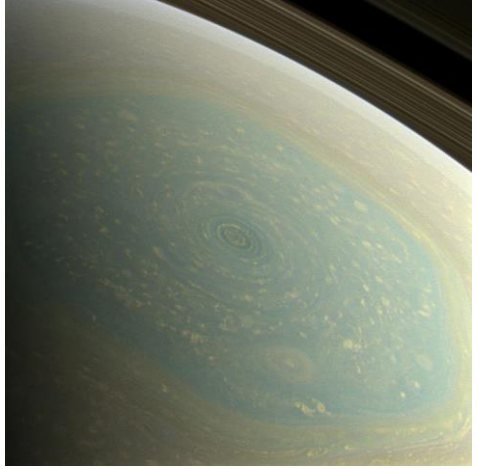
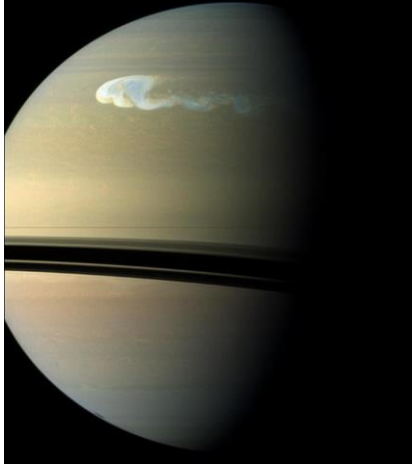


Science Planning & Sequence Team
CASSINI

SATURN TARGET WORKING TEAM

Rev 220_221 Segment Legacy Package

Segment Boundary: August 19, 2004 – September 8, 2015
2015-231T04:53:00 – 2015-251T09:50:00 (SCET)

Integration Began 11/03/2014
Segment Delivered to S90 Sequence 01/23/2015
Lead Integrators were Shawn Boll & Keven Uchida

Legacy Package Assembled by Shawn Boll

Table of Contents

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

Segment Overview and Final Products

Segment Summary

- 20 day “CAKE” (Cassini Apoapse for Kronian Exploration) segment.
- Majority of time filled with templated activities, including ORS mapping and composition, Aurora, and UVIS EUV/FUVs.
- Additional Saturn observations include VIMS global & equatorial mapping, ISS limb integration and feature-track.
- Noteworthy out-of-discipline observations included a very important CDA dust-stream campaign that was added somewhat late in the integration process with the backing of the Project, and an observation of “Hati”, an irregular moon of Saturn.
- Gaps in the timeline were more-or-less filled in with the observations suggested by the TWT leads.
- Several DSN stations needed to be altered from the strawman to accommodate the data volume requested.
- Waypoints were chosen to accommodate science in each observation period by minimizing turn time between observations as much as possible.

Final Sequenced SPASS (1 of 3)

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End	Primary	Secondary	Comments
SATURN_220_221 Segment		2015-231T04:53:00		020T04:57:00	2015-251T09:50:00			
SP_220SA_WAYPTTURN231_PRIME		2015-231T04:53:00		000T00:40:00	2015-231T05:33:00	ISS_NAC to Saturn	NEG_X to NSP	
NEW WAYPOINT		2015-231T05:33:00		000T12:50:00	2015-231T18:23:00	ISS_NAC to Saturn	NEG_X to NSP	
VIMS_220SA_GLOBALMAP001_PRIME	C	2015-231T05:33:00		000T10:40:00	2015-231T16:13:00	ISS_NAC to Saturn	NEG_X to NSP	
ISS_220TI_M120R2HZ232_PRIME	C, V	2015-231T16:13:00	E220_M120R2HZ232+000T00:00:00	000T01:30:00	2015-231T17:43:00	ISS_NAC to Titan	NEG_X to 28.963/71.731	No Preference to secondary pointing
SP_220EA_DLTURN231_PRIME		2015-231T17:43:00		000T00:40:00	2015-231T18:23:00	XBAND to Earth	NEG_Y to 125.7/-47.72	
NEW WAYPOINT		2015-231T18:23:00		000T11:10:00	2015-232T05:33:00	XBAND to Earth	NEG_Y to 125.7/-47.72	
SP_220EA_G70METNON232_PRIME	C	2015-231T19:53:00		000T05:20:00	2015-232T01:13:00	XBAND to Earth	NEG_Y to 125.7/-47.72	MIMI.NEG_Y to Saturn (0,0,-9.5).CIRS heating.
SP_220EA_G34B26NON232_PRIME	C	2015-232T01:13:00		000T03:40:00	2015-232T04:53:00	XBAND to Earth	NEG_Y to 125.7/-47.72	MIMI.NEG_Y to Saturn (0,0,-9.5).CIRS heating.
SP_220SA_WAYPTTURN232_PRIME		2015-232T04:53:00		000T00:40:00	2015-232T05:33:00	ISS_NAC to Saturn	NEG_X to Sun	
NEW WAYPOINT		2015-232T05:33:00		000T20:34:00	2015-233T02:07:00	ISS_NAC to Saturn	NEG_X to Sun	
ISS_220SA_LIMBINT001_PRIME	C, V	2015-232T05:33:00		000T07:45:00	2015-232T13:18:00	ISS_NAC to Saturn	NEG_X to Sun	
UVIS_220SA_EUVFUV001_PRIME	I	2015-232T13:18:00		000T12:09:00	2015-233T01:27:00	ISS_NAC to Saturn	NEG_X to Sun	
SP_220EA_DLTURN233_PRIME		2015-233T01:27:00		000T00:40:00	2015-233T02:07:00	XBAND to Earth	NEG_X to NEP	
NEW WAYPOINT		2015-233T02:07:00		000T09:40:00	2015-233T11:47:00	XBAND to Earth	NEG_X to NEP	
SP_220EA_C34BWGOTP233_PRIME	C, N	2015-233T02:07:00		000T09:00:00	2015-233T11:07:00	XBAND to Earth	NEG_X to NEP	OTP.
SP_220SA_WAYPTTURN233_PRIME		2015-233T11:07:00		000T00:40:00	2015-233T11:47:00	ISS_NAC to Saturn	POS_Z to NSP	
NEW WAYPOINT		2015-233T11:47:00		000T14:05:00	2015-234T01:52:00	ISS_NAC to Saturn	POS_Z to NSP	
ISS_220TI_M120R2HZ233_PRIME	V	2015-233T11:47:00	E220_M120R2HZ233+000T00:00:00	000T01:30:00	2015-233T13:17:00	ISS_NAC to Titan	POS_Z to 217.953/84.455	No Preference to secondary pointing
MAG_220SU_CALROLL001_PRIME	U	2015-233T13:17:00		000T08:00:00	2015-233T21:17:00	NEG_X to Earth (0.0,0.0,-30.0 deg. offset)	Rolling	
ISS_220SA_AURSTARE001_PRIME	U, V	2015-233T21:17:00		000T03:55:00	2015-234T01:12:00	ISS_NAC to Saturn	POS_Z to NSP	
SP_220EA_DLTURN234_PRIME		2015-234T01:12:00		000T00:40:00	2015-234T01:52:00	XBAND to Earth	NEG_X to NEP	
NEW WAYPOINT		2015-234T01:52:00		000T09:40:00	2015-234T11:32:00	XBAND to Earth	NEG_X to NEP	
SP_220EA_C34BWGOTB234_PRIME	C, E, N	2015-234T01:52:00		000T09:00:00	2015-234T10:52:00	XBAND to Earth	NEG_X to NEP	Same secondary as OTP pass.OTB.
SP_220SA_WAYPTTURN234_PRIME		2015-234T10:52:00		000T00:40:00	2015-234T11:32:00	ISS_NAC to Saturn	POS_Z to NSP	
NEW WAYPOINT		2015-234T11:32:00		001T12:50:00	2015-236T00:22:00	ISS_NAC to Saturn	POS_Z to NSP	
ISS_220TI_M120R2HZ234_PRIME	V	2015-234T11:32:00	E220_M120R2HZ234+000T00:00:00	000T01:30:00	2015-234T13:02:00	ISS_NAC to Titan	POS_Z to NSP	No Preference to secondary pointing
CIRS_220SA_MIRMAP001_PRIME	V	2015-234T13:02:00		000T22:00:00	2015-235T11:02:00	CIRS_FP3 to Saturn	POS_Z to NSP	
VIMS_220SA_AURSTARE001_PRIME	C, I, U	2015-235T11:02:00		000T06:20:00	2015-235T17:22:00	ISS_NAC to Saturn	POS_Z to NSP	
UVIS_220SA_AURSLEW002_PRIME	C, V	2015-235T17:22:00		000T06:20:00	2015-235T23:42:00	UVIS_FUV to Saturn	POS_Z to NSP	
SP_220EA_DLTURN235_PRIME		2015-235T23:42:00		000T00:40:00	2015-236T00:22:00	XBAND to Earth	NEG_X to NEP	
NEW WAYPOINT		2015-236T00:22:00		000T11:10:00	2015-236T11:32:00	XBAND to Earth	NEG_X to NEP	
SP_220EA_C34HEFNON236_PRIME	C	2015-236T01:52:00		000T05:30:00	2015-236T07:22:00	XBAND to Earth	NEG_X to NEP	
SP_220SA_WAYPTTURN236_PRIME		2015-236T10:52:00		000T00:40:00	2015-236T11:32:00	ISS_NAC to Saturn	POS_Z to NSP	
NEW WAYPOINT		2015-236T11:32:00		001T06:35:00	2015-237T18:07:00	ISS_NAC to Saturn	POS_Z to NSP	

Gap 1

Gap 2

Gap 3

Final Sequenced SPASS (2 of 3)

ISS_220TI_M120R2HZ236_PRIME	V	2015-236T11:32:00	E220_M120R2HZ236+000T00:00:00	000T01:30:00	2015-236T13:02:00	ISS_NAC to Titan	POS_Z to NSP	No Preference to secondary pointing
ISS_220SA_AURSTARE002_PRIME	U, V	2015-236T13:02:00		000T16:00:00	2015-237T05:02:00	ISS_NAC to Saturn	POS_Z to NSP	
CIRS_220SA_COMPSIT009_PRIME	U, V	2015-237T05:02:00		000T12:20:00	2015-237T17:22:00	CIRS_FP3 to Saturn	POS_Z to NSP	
SP_220EA_DLTURN237_PRIME		2015-237T17:22:00		000T00:40:00	2015-237T18:02:00	XBAND to Earth (0.0,0.0,-20.0 deg. offset)	NEG_X to 116.0/-58.0	Part 1 of 2-part Turn
SP_220SA_DLTURN437_PRIME		2015-237T18:02:00		000T00:05:00	2015-237T18:07:00	XBAND to Earth	NEG_X to 116.0/-58.0	Part 2 of 2-part Turn
NEW WAYPOINT		2015-237T18:07:00		007T02:39:00	2015-244T20:46:00	XBAND to Earth	NEG_X to 116.0/-58.0	
ENGR_220SC_KPTYBIAS237_PRIME		2015-237T18:07:00		000T01:30:00	2015-237T19:37:00	NEG_Z to DELTA_H (0.0,0.0,48.0 deg. offset)	NEG_X to Sun	
SP_220EA_G70METNON237_PRIME	C, M	2015-237T21:37:00		000T04:05:00	2015-238T01:42:00	XBAND to Earth	NEG_X to 116.0/-58.0	CDA.NEG_X to 116/-58
ISS_220TI_M150R2HZ238_PRIME	M, V	2015-238T04:22:00	E220_M150R2HZ238+000T00:00:00	000T01:30:00	2015-238T05:52:00	ISS_NAC to Titan	NEG_X to Sun	No Preference to secondary pointing
ISS_220OT_HATPOL073_PRIME	M	2015-238T05:52:00		000T06:15:00	2015-238T12:07:00	UVIS_FUV to Rocks	NEG_Z to Earth	
CDA_220DR_SATURNSTR001_PRIME	I, M	2015-238T12:07:00		001T11:59:00	2015-240T00:06:00	XBAND to Earth	NEG_X to 116.0/-58.0	
SP_220EA_C34HEFNON240_PRIME	C, M	2015-240T00:11:00		000T09:00:00	2015-240T09:11:00	XBAND to Earth	NEG_X to 116.0/-58.0	CDA.NEG_X to 116/-58
CDA_220DR_SATURNSTR002_PRIME	I, M	2015-240T10:36:00		001T13:15:00	2015-241T23:51:00	XBAND to Earth	NEG_X to 116.0/-58.0	
Apoapse Per = 21.9 d, inc ...		2015-240T23:28:48		000T00:00:01	2015-240T23:28:49			
SP_221EA_C34HEFNON241_PRIME	C, M	2015-242T00:31:00		000T06:40:00	2015-242T07:11:00	XBAND to Earth	NEG_X to 116.0/-58.0	CDA.NEG_X to 116/-58.
CDA_221DR_SATURNSTR003_PRIME	M	2015-242T10:21:00		002T00:00:00	2015-244T10:21:00	XBAND to Earth	NEG_X to 116.0/-58.0	
SP_221EA_M70METNON244_PRIME	C, E	2015-244T12:31:00		000T05:20:00	2015-244T17:51:00	XBAND to Earth	NEG_X to 116.0/-58.0	CDA. NEG_X to 116/-58
SP_221SA_WAYPTTURN244_PRIME		2015-244T20:06:00		000T00:40:00	2015-244T20:46:00	ISS_NAC to Saturn	NEG_X to Sun	
NEW WAYPOINT		2015-244T20:46:00		001T13:35:00	2015-246T10:21:00	ISS_NAC to Saturn	NEG_X to Sun	
UVIS_221SA_EUVFUV001_PRIME	I	2015-244T20:46:00		000T14:55:00	2015-245T11:41:00	ISS_NAC to Saturn	NEG_X to 40.271/14.821	
CIRS_221SA_MIRMAP002_PRIME	V	2015-245T11:41:00		000T22:00:00	2015-246T09:41:00	CIRS_FP3 to Saturn	POS_Z to NSP	
SP_221EA_DLTURN246_PRIME		2015-246T09:41:00		000T00:40:00	2015-246T10:21:00	XBAND to Earth	NEG_X to 116.0/-58.0	
NEW WAYPOINT		2015-246T10:21:00		000T10:10:00	2015-246T20:31:00	XBAND to Earth	NEG_X to 116.0/-58.0	
SP_221EA_M34HEFNON246_PRIME	C	2015-246T12:01:00		000T05:50:00	2015-246T17:51:00	XBAND to Earth	5_Hr_Rolling	CDA.NEG_X to 116/-58
SP_221SA_WAYPTTURN246_PRIME	C	2015-246T19:51:00		000T00:40:00	2015-246T20:31:00	ISS_NAC to Saturn	POS_Z to NSP	
NEW WAYPOINT		2015-246T20:31:00		001T01:42:00	2015-247T22:13:00	ISS_NAC to Saturn	POS_Z to NSP	
CIRS_221SA_COMPSIT003_PRIME	U, V	2015-246T20:31:00		000T07:32:00	2015-247T04:03:00	CIRS_FP1 to Saturn	POS_Z to NSP	Part 1
NAV_221SK_OPNAV471_PRIME		2015-247T04:03:00		000T01:30:00	2015-247T05:33:00	ISS_NAC to Satellites	POS_Z to NSP	No Preference to secondary pointing. Starts at waypoint, ends at same waypoint
ISS_221SA_WINDS001_PRIME	U, V	2015-247T05:33:00		000T05:00:00	2015-247T10:33:00	ISS_NAC to Saturn	POS_Z to NSP	
CIRS_221SA_COMPSIT004_PRIME	U	2015-247T10:33:00		000T06:00:00	2015-247T16:33:00	CIRS_FP1 to Saturn	POS_Z to NSP	Part 2
ISS_221SA_WINDS002_PRIME	U, V	2015-247T16:33:00		000T05:00:00	2015-247T21:33:00	ISS_NAC to Saturn	POS_Z to NSP	
SP_221EA_DLTURN247_PRIME		2015-247T21:33:00		000T00:40:00	2015-247T22:13:00	XBAND to Earth	NEG_X to 116.0/-58.0	
NEW WAYPOINT		2015-247T22:13:00		000T12:32:00	2015-248T10:45:00	XBAND to Earth	NEG_X to 116.0/-58.0	
SP_221EA_C70METNON247_PRIME	C	2015-247T23:50:00		000T08:00:00	2015-248T07:50:00	XBAND to Earth	Rolling/SRU	CDA.NEG_X to 116/-58

Gap 4

Gap 5

Final Sequenced SPASS (3 of 3)

SP_221SA_WAYPTTURN248_PRIME		2015-248T10:05:00		000T00:40:00	2015-248T10:45:00	ISS_NAC to Saturn	NEG_X to Sun	
NEW WAYPOINT		2015-248T10:45:00		000T12:35:00	2015-248T23:20:00	ISS_NAC to Saturn	NEG_X to Sun	
ISS_221TI_M90R3CLD248_PRIME	C, V	2015-248T10:45:00	E221_M90R3CLD248+000T00:00:00	000T01:30:00	2015-248T12:15:00	ISS_NAC to Titan	NEG_X to Sun	No Preference to secondary pointing
UVIS_221SA_EUVFUV002_PRIME	C, I	2015-248T12:15:00		000T10:25:00	2015-248T22:40:00	ISS_NAC to Saturn	NEG_X to Sun	
SP_221EA_DLTURN248_PRIME		2015-248T22:40:00		000T00:40:00	2015-248T23:20:00	XBAND to Earth	NEG_Y to 151.23/11.85	
NEW WAYPOINT		2015-248T23:20:00		000T11:10:00	2015-249T10:30:00	XBAND to Earth	NEG_Y to 151.23/11.85	
SP_221EA_C34HEFSEQ248_PRIME	C	2015-249T00:50:00		000T08:45:00	2015-249T09:35:00	XBAND to Earth	5_Hr_Rolling	MIMI.NEG_Y to Saturn (0,0,-9.5).SRU.CIRS heating.
SP_221SA_WAYPTTURN249_PRIME		2015-249T09:50:00		000T00:40:00	2015-249T10:30:00	ISS_NAC to Saturn	POS_Z to NSP	
NEW WAYPOINT		2015-249T10:30:00		000T12:50:00	2015-249T23:20:00	ISS_NAC to Saturn	POS_Z to NSP	
ISS_221TI_M90R3CLD249_PRIME	C, V	2015-249T10:30:00	E221_M90R3CLD249+000T00:00:00	000T01:30:00	2015-249T12:00:00	ISS_NAC to Titan	POS_Z to NSP	No Preference to secondary pointing
ISS_221SA_FEATRAK001_PRIME	C, U, V	2015-249T12:00:00		000T10:40:00	2015-249T22:40:00	ISS_NAC to Saturn	POS_Z to NSP	
SP_221EA_DLTURN249_PRIME		2015-249T22:40:00		000T00:40:00	2015-249T23:20:00	XBAND to Earth	NEG_Y to 152.77/16.11	
NEW WAYPOINT		2015-249T23:20:00		000T11:10:00	2015-250T10:30:00	XBAND to Earth	NEG_Y to 152.77/16.11	
SP_221EA_C70METSEQ249_PRIME	C	2015-250T00:50:00		000T04:15:00	2015-250T05:05:00	XBAND to Earth	Rolling/SRU	MIMI.NEG_Y to Saturn (0,0,-9.5).SRU.CIRS heating.
SP_221SA_WAYPTTURN250_PRIME		2015-250T09:50:00		000T00:40:00	2015-250T10:30:00	ISS_NAC to Saturn	POS_Z to NSP	
NEW WAYPOINT		2015-250T10:30:00		000T14:20:00	2015-251T00:50:00	ISS_NAC to Saturn	POS_Z to NSP	
VIMS_221SA_EQUAMAP001_PRIME	C, I	2015-250T10:30:00		000T13:40:00	2015-251T00:10:00	ISS_NAC to Saturn	POS_Z to NSP	
SP_221EA_DLTURN251_PRIME		2015-251T00:10:00		000T00:40:00	2015-251T00:50:00	XBAND to Earth	NEG_X to 274.0/72.0	
NEW WAYPOINT		2015-251T00:50:00		000T09:40:00	2015-251T10:30:00	XBAND to Earth	NEG_X to 274.0/72.0	
SP_221EA_C34HEFOTP250_PRIME	C, N	2015-251T00:50:00		000T03:55:00	2015-251T04:45:00	XBAND to Earth	NEG_X to 274.0/72.0	
SP_221EA_C70METOTP250_PRIME	C, M, N	2015-251T04:45:00		000T05:05:00	2015-251T09:50:00	XBAND to Earth	NEG_X to 274.0/72.0	

Gap 6

Gap 7

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)	NET_MARGN (%)	CAROVR (Mb)
SP_220EA_G70METNON232_PRIME	231 19:53	232 01:13	705	919	78	1702	3322	1620	0	95	31	1829	1742	-87	56	1%	86
SP_220EA_G34B26NON232_PRIME	232 01:13	232 04:53	86	0	0	86	3322	3236	0	73	22	181	237	56	56	1%	0
SP_220EA_C34BWGOTP233_PRIME	233 02:07	233 11:07	0	540	90	630	3322	2693	0	167	53	850	598	-253	0	0%	252
SP_220EA_C34BWGOTB234_PRIME	234 01:52	234 10:52	252	313	62	627	3322	2695	0	168	53	848	708	-140	-303	-2%	139
SP_220EA_C34HEFNON236_PRIME	236 01:52	236 07:22	139	1377	165	1680	3322	1642	0	98	32	1811	501	-1311	-303	-2%	1310
SP_220EA_G70METNON237_PRIME	237 21:37	238 01:42	1310	1007	162	2479	3322	843	0	81	24	2584	1519	-1066	-303	-2%	1065
SP_220EA_C34HEFNON240_PRIME	240 00:11	240 09:11	1065	800	196	2062	3322	1260	0	152	53	2267	767	-1500	-303	-2%	1500
SP_221EA_C34HEFNON241_PRIME	242 00:31	242 07:11	1500	619	166	2284	3322	1038	0	112	39	2436	567	-1869	-303	-2%	1868
SP_221EA_M70METNON244_PRIME	244 12:31	244 17:51	1868	497	225	2591	3322	731	0	102	31	2724	1665	-1060	-303	-2%	1059
SP_221EA_M34HEFNON246_PRIME	246 12:01	246 17:51	1059	1262	178	2500	3322	822	0	63	34	2597	405	-2193	-303	-2%	2192
SP_221EA_C70METNON247_PRIME	247 23:50	248 07:50	2192	1307	127	3626	3322	-303	0	134	47	3503	2845	-659	-185	-1%	658
SP_221EA_C34HEFSEQ248_PRIME	249 00:50	249 09:35	658	560	72	1289	3322	2033	0	163	52	1504	688	-816	-185	-1%	815
SP_221EA_C70METSEQ249_PRIME	250 00:50	250 05:05	815	2147	64	3026	3322	296	0	84	25	3135	1550	-1585	-185	-1%	1584
SP_221EA_C34HEFOTP250_PRIME	251 00:50	251 04:45	1584	1002	83	2670	3322	652	0	119	23	2812	302	-2510	-185	-1%	2510
SP_221EA_C70METOTP250_PRIME	251 04:45	251 09:50	2510	0	0	2510	3322	812	0	441	30	2981	1333	-1648	-185	-1%	1647

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

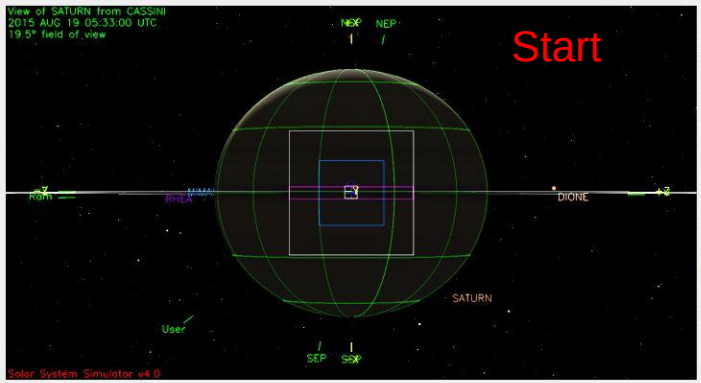
DATA VOLUME REPORT --- TRANSFER FRAME OVERHEAD NOT INCLUDED

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	231 01:23	231 19:53	0.0	34.9	136.2	6.7	35.0	19.6	43.1	0.0	123.1	1.9	510.0	0.0	77.3	987.8
SP_220EA_G70METNON232_PRIME	231 19:53	232 01:13	0.0	10.1	46.8	1.9	0.0	4.7	11.5	0.0	17.5	1.5	0.0	0.0	0.0	94.0
SP_220EA_G34B26NON232_PRIME	232 01:13	232 04:53	0.0	6.9	39.6	1.3	0.0	3.3	7.9	0.0	12.0	1.0	0.0	0.0	0.0	72.0
DAILY TOTAL SCIENCE	231 01:23	232 04:53	0.0	51.9	222.6	9.9	35.0	27.6	62.5	0.0	152.6	4.4	510.0	0.0	77.3	
OBSERVATION_NOR	232 04:53	233 02:07	0.0	40.1	55.8	7.6	89.9	18.9	45.9	0.0	69.6	177.2	30.0	0.0	88.7	623.7
SP_220EA_C34BWGOTP233_PRIME	233 02:07	233 11:07	0.0	17.0	86.4	3.2	0.0	8.0	19.4	0.0	29.5	2.4	0.0	0.0	0.0	165.9
DAILY TOTAL SCIENCE	232 04:53	233 11:07	0.0	57.0	142.2	10.9	89.9	26.9	65.3	0.0	99.0	179.6	30.0	0.0	88.7	

Final Sequenced SMT and Data Volume

OBSERVATION_NOR	233 11:07	234 01:52	0.0	27.8	0.0	5.3	75.0	62.9	31.9	0.0	48.3	18.6	40.0	0.0	61.6	371.5
SP_220EA_C34BWGOTB234_PRIME	234 01:52	234 10:52	0.0	17.0	86.4	3.2	0.0	8.0	19.4	0.0	29.5	2.5	0.0	0.0	0.0	166.0
DAILY TOTAL SCIENCE	233 11:07	234 10:52	0.0	44.8	86.4	8.6	75.0	70.9	51.3	0.0	77.8	21.0	40.0	0.0	61.6	
OBSERVATION_NOR	234 10:52	236 01:52	0.0	73.6	249.6	14.0	97.5	34.7	84.2	0.0	127.8	129.6	553.0	0.0	163.0	1527.0
SP_220EA_C34HEFNON236_PRIME	236 01:52	236 07:22	0.0	10.4	48.6	2.0	0.0	4.9	11.9	0.0	18.0	1.5	0.0	0.0	0.0	97.2
DAILY TOTAL SCIENCE	234 10:52	236 07:22	0.0	83.9	298.2	16.0	97.5	39.6	96.1	0.0	145.8	131.1	553.0	0.0	163.0	
OBSERVATION_NOR	236 07:22	237 21:37	0.0	72.2	140.1	13.8	115.0	34.0	82.6	0.0	125.3	81.8	333.0	0.0	159.9	1157.6
SP_220EA_G70METNON237_PRIME	237 21:37	238 01:42	0.0	7.7	44.1	1.5	0.0	3.6	8.8	0.0	13.4	1.1	0.0	0.0	0.0	80.2
DAILY TOTAL SCIENCE	236 07:22	238 01:42	0.0	79.9	184.2	15.2	115.0	37.6	91.4	0.0	138.7	82.9	333.0	0.0	159.9	
OBSERVATION_NOR	238 01:42	240 00:11	0.0	87.7	28.8	16.7	355.0	41.3	100.4	0.0	152.3	0.7	10.0	0.0	194.3	987.2
SP_220EA_C34HEFNON240_PRIME	240 00:11	240 09:11	0.0	17.0	71.1	3.2	0.0	8.0	19.4	0.0	29.5	2.1	0.0	0.0	0.0	150.3
DAILY TOTAL SCIENCE	238 01:42	240 09:11	0.0	104.7	99.9	20.0	355.0	49.3	119.8	0.0	181.8	2.8	10.0	0.0	194.3	
OBSERVATION_NOR	240 09:11	242 00:31	0.0	74.2	15.3	24.2	250.0	35.0	85.0	0.0	128.9	0.4	0.0	0.0	164.4	777.3
SP_221EA_C34HEFNON241_PRIME	242 00:31	242 07:11	0.0	12.6	52.2	2.4	0.0	5.9	14.4	0.0	21.8	1.6	0.0	0.0	0.0	110.9
DAILY TOTAL SCIENCE	240 09:11	242 07:11	0.0	86.8	67.5	26.6	250.0	40.9	99.4	0.0	150.7	2.0	0.0	0.0	164.4	
OBSERVATION_NOR	242 07:11	244 12:31	0.0	100.6	34.2	19.2	0.0	47.4	115.2	0.0	174.7	1.0	0.0	0.0	222.9	715.3
SP_221EA_M70METNON244_PRIME	244 12:31	244 17:51	0.0	10.1	54.0	1.9	0.0	4.7	11.5	0.0	17.5	1.5	0.0	0.0	0.0	101.2
DAILY TOTAL SCIENCE	242 07:11	244 17:51	0.0	110.7	88.2	21.1	0.0	52.2	126.7	0.0	192.2	2.5	0.0	0.0	222.9	
OBSERVATION_NOR	244 17:51	246 12:01	0.0	79.5	182.7	15.2	50.0	37.5	91.1	0.0	138.1	212.8	444.0	0.0	176.2	1427.1
SP_221EA_M34HEFNON246_PRIME	246 12:01	246 17:51	0.0	11.0	10.8	2.1	0.0	5.2	12.6	0.0	19.1	1.6	0.0	0.0	0.0	62.4
DAILY TOTAL SCIENCE	244 17:51	246 17:51	0.0	90.5	193.5	17.3	50.0	42.7	103.7	0.0	157.2	214.4	444.0	0.0	176.2	
OBSERVATION_NOR	246 17:51	247 23:50	0.0	56.6	121.7	10.8	450.0	26.7	64.8	0.0	98.2	57.9	400.0	0.0	125.3	1411.9
OBSERVATION_SI	246 17:51	247 23:50	0.0	0.0	0.0	0.0	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.7
SP_221EA_C70METNON247_PRIME	247 23:50	248 07:50	0.0	15.1	62.1	2.9	0.0	7.1	17.3	0.0	26.2	1.8	0.0	0.0	0.0	132.5
DAILY TOTAL SCIENCE	246 17:51	248 07:50	0.0	71.7	183.8	13.7	458.7	33.8	82.0	0.0	124.4	59.7	400.0	0.0	125.3	
OBSERVATION_NOR	248 07:50	249 00:50	0.0	32.1	120.9	6.1	88.5	15.1	36.7	0.0	55.7	189.3	10.0	0.0	71.0	625.5
SP_221EA_C34HEFSEQ248_PRIME	249 00:50	249 09:35	0.0	16.5	83.7	3.2	0.0	7.8	18.9	0.0	28.7	2.4	0.0	0.0	0.0	161.1
DAILY TOTAL SCIENCE	248 07:50	249 09:35	0.0	48.6	204.6	9.3	88.5	22.9	55.6	0.0	84.4	191.7	10.0	0.0	71.0	
OBSERVATION_NOR	249 09:35	250 00:50	0.0	28.8	101.1	5.5	1338.5	13.6	32.9	0.0	50.0	96.7	460.0	0.0	63.7	2190.8
SP_221EA_C70METSEQ249_PRIME	250 00:50	250 05:05	0.0	8.0	35.1	11.6	0.0	3.8	9.2	0.0	13.9	1.2	0.0	0.0	0.0	82.8
DAILY TOTAL SCIENCE	249 09:35	250 05:05	0.0	36.8	136.2	17.1	1338.5	17.3	42.1	0.0	63.9	97.8	460.0	0.0	63.7	
OBSERVATION_NOR	250 05:05	251 00:50	0.0	109.7	149.7	7.1	100.0	17.6	42.7	0.0	64.7	1.3	500.0	0.0	82.5	1075.3
SP_221EA_C34HEFOTP250_PRIME	251 00:50	251 04:45	0.0	59.1	31.5	1.4	0.0	3.5	8.5	0.0	12.8	1.1	0.0	0.0	0.0	117.9
SP_221EA_C70METOTP250_PRIME	251 04:45	251 09:50	0.0	76.7	54.9	1.8	0.0	4.5	11.0	0.0	286.7	1.4	0.0	0.0	0.0	437.0
DAILY TOTAL SCIENCE	250 05:05	251 09:50	0.0	245.5	236.1	10.4	100.0	25.6	62.1	0.0	364.2	3.8	500.0	0.0	82.5	

Segment Geometry




```
Rev 220 OUTBOUND
2015 -  231T05:33:00 SCET
2015 AUG 19 05:33:00 SCET
2015 AUG 19 06:55:21 ERT
Apoapse__220 + 012T01:51:59
Periapse_220 + 001T04:08:47
Light time:    82.4 min
Orbit period:  21.9 days
Radius      883009 km      14.65 Rs
Rad_cyl     883003 km      14.65 Rs
Z_ht_cyl     -3259 km      -0.05 Rs
Mag_L          14.65
Semi_axs   1508405 km      25.03 Rs
Eccentricity    0.812
Inclination     0.37 deg
Sun_range      10.00 AU
Earth_range     9.90 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone      -0.6   26.6
Canberra       67.1   36.2
Madrid        -65.9  -55.0
------- LOOK DIRECTION INFO -------
FOV            19.5 deg  340.7 mrad
RA             57.654 deg
DEC            -5.969 deg
Crosses_RP_0    0.000 Rs
EPS             5.805 deg *
SEP            92.563 deg
ORS b/s angle  25.5 deg
ORS rad angle  65.1 deg  *
```

Point NEG_Y at SATURN and align POS_X = Up with NSP

User Vector - RA: 100.874 DEC: -29.906 Paste Current RA/DEC

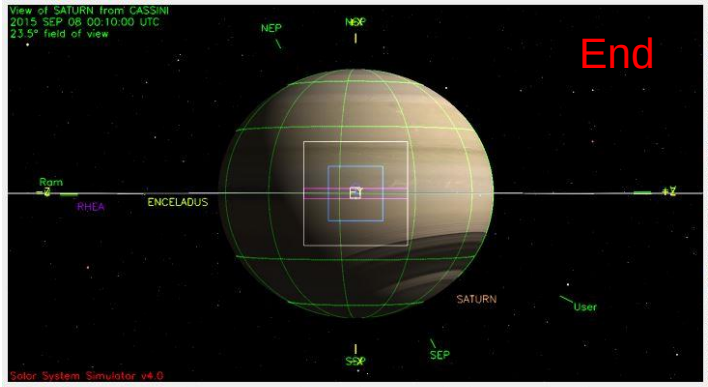
Tilt L | Up | Tilt R | Left | Reset | Right | Image | Down | Hi Res

Zoom Out | Fill Screen | Zoom In | Labels | Orbits | FOVs | Axes | Vectors | Lat/Lons

Year Month Day Hour Minute Second

Tum Analyzer: SATURN to EARTH about Z on RWA = 4.6 min / 23.9 deg Event

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	DLON (deg)	VREL (km/s)	Z_HGHT (km)	ANGLE_FROM SATRN	ANGLE_FROM EARTH	ANGLE_FROM RAM
SATURN	--	--	883009	14.65	822741	13.65	154.5	7.83	136.61	17	-0	0	7.8	0	0.0	23.9	165.4
MIMAS	--	--	1053592	17.48	1053387	17.48	155.3	0.02	0.39	24	1	152	17.4	5151	4.8	24.2	160.7
ENCELADUS	--	--	1119934	18.58	1119677	18.58	154.5	0.03	0.46	5	-0	179	18.6	29	0.2	23.9	165.3
TETHYS	--	--	911557	15.13	911025	15.12	145.4	0.07	1.19	285	0	-86	17.8	-1676	18.8	29.9	175.7
DIONE	--	--	510991	8.48	510427	8.47	152.8	0.13	2.21	194	-0	-8	8.8	-182	5.8	24.3	171.2
RHEA	--	--	1399678	23.22	1398911	23.21	155.2	0.06	1.10	12	0	166	13.8	3190	5.4	24.5	160.1
TITAN	--	--	1565760	25.98	1563185	25.94	128.1	0.19	3.29	31	-0	92	5.3	7007	53.2	57.0	112.2
HYPERION	--	--	1179071	19.56	1178942	19.56	88.2	0.02	0.28	280	-17	48	3.0	-2888	97.9	97.5	67.5
IAPETUS	--	--	2947052	48.90	2946304	48.89	51.4	0.03	0.51	13	3	32	5.1	-30921	139.0	134.1	26.5
PHOEBE	--	--	15628003	259.31	15627890	259.31	167.1	0.00	0.01	197	-22	159	7.5	6715509	31.8	18.6	138.3
SATURN	--	--	883009	14.65	822741	13.65	154.5	7.83	136.61	17	-0	0	7.8	0	0.0	23.9	165.4




```
Rev 221  INBOUND
2015 -  251T00:10:00 SCET
2015 SEP 08 00:10:00 SCET
2015 SEP 08 01:34:59 ERT
Apoapse__221 + 010T00:41:12
Periapse_221 - 21:31:22
Light time:    85.0 min
Orbit period:  21.8 days
Radius      734609 km      12.19 Rs
Rad_cyl     734608 km      12.19 Rs
Z_ht_cyl     -1439 km      -0.02 Rs
Mag_L          12.19
Semi_axs   1506884 km      25.00 Rs
Eccentricity    0.812
Inclination     0.37 deg
Sun_range       9.99 AU
Earth_range    10.22 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone      34.2   30.7
Canberra       19.9  -12.4
Madrid        -40.9   -8.8
------- LOOK DIRECTION INFO -------
FOV            23.5 deg  409.3 mrad
RA           -175.337 deg
DEC             5.355 deg
Crosses_RP_0    0.000 Rs
EPS             5.572 deg *
SEP            74.337 deg
ORS b/s angle 117.4 deg
ORS rad angle  64.8 deg  *
```

Point NEG_Y at SATURN and align POS_X = Up with NSP

User Vector - RA: 100.874 DEC: -29.906 Paste Current RA/DEC

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

Zoom Out | Fill Screen | Zoom In | Labels | Orbits | FOVs | Axes | Vectors | Lat/Lons

Year Month Day Hour Minute Second

Tum Analyzer: SATURN to EARTH about Z on RWA = 12.1 min / 123.0 deg Event

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	DLON (deg)	VREL (km/s)	Z_HGHT (km)	ANGLE_FROM SATRN	ANGLE_FROM EARTH	ANGLE_FROM RAM
SATURN	--	--	734609	12.19	674341	11.19	62.5	9.41	164.27	84	-0	0	8.8	0	0.0	123.0	10.3
MIMAS	--	--	710886	11.80	710689	11.79	76.0	0.03	0.58	271	-1	-75	7.6	5059	14.9	109.6	25.2
ENCELADUS	--	--	949317	15.75	949062	15.75	56.3	0.03	0.54	27	-0	150	21.2	-34	7.2	129.1	3.1
TETHYS	--	--	951118	15.78	950581	15.77	74.8	0.07	1.14	324	0	-130	13.5	2128	13.7	110.8	24.0
DIONE	--	--	498622	8.27	498061	8.26	39.3	0.13	2.26	113	-0	39	12.8	70	28.2	145.5	17.9
RHEA	--	--	1237535	20.53	1236768	20.52	54.2	0.07	1.24	16	-0	157	16.9	-2837	9.5	131.2	0.9
TITAN	--	--	1844467	30.60	1841892	30.56	40.0	0.16	2.79	17	0	137	14.3	-4209	27.0	144.9	16.7
HYPERION	--	--	2230688	37.01	2230558	37.01	73.3	0.01	0.15	254	-32	-162	11.4	8221	12.2	112.2	22.5
IAPETUS	--	--	3395842	56.35	3395094	56.33	34.9	0.03	0.44	18	1	72	10.8	-960014	95.5	139.6	85.7
PHOEBE	--	--	14528286	241.06	14528176	241.06	173.6	0.00	0.02	266	-24	-63	10.2	6291899	111.2	11.9	120.0
SATURN	--	--	734609	12.19	674341	11.19	62.5	9.41	164.27	84	-0	0	8.8	0	0.0	123.0	10.3

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	14.65	154.5	0
Apoapse	45.31	123.3	0
Periapse	---	---	---
Segment End	12.19	62.5	0

Solar Geometry – ORS Boresight Concerns

No ORS Boresight Solar Constraints on Science Pointing Noted.

Daily Science Highlights (1 of 3)

DOY 231 (19 Aug 2015):
The Saturn 220_221 segment began on DOY 231, following the SOST_220_D5 segment. VIMs began with a global mapping of Saturn, with CIRS riding along. ISS performed the first of seven Titan monitoring campaigns in this segment, with CIRs and VIMs riding along. MAPS instruments continue their ongoing magnetosphere survey campaign.
d

DOY 232 (20 Aug 2015):
ISS performed "Saturn Limb" observations, with CIRS and VIMs riding, taking images along the bright limb of Saturn. This was followed by UVIS EUV/FUV observations (with ISS rider), where a slow scan was performed across Saturn's illuminated hemisphere to form spectral images.

DOY 233 (21 Aug 2015):
ISS performed the second of this segment's Titan monitoring campaigns (haze observations), with CIRS and VIMS riding along. This was followed by a Mag rolling calibration. ISS then resumed with NAC staring observations of the auroral oval (with UVIS,VIMS riders). MAPS instruments continued their ongoing magnetosphere survey campaign.

DOY 234 (22 Aug 2015):
ISS performed another of its Titan monitoring campaigns (haze observations), with CIRS and VIMS riders. CIRS conducted Saturn Mid-IR mapping, with VIMS riding along, to measure upper troposphere and tropopause temperatures. MAPS instruments continued their ongoing magnetosphere survey campaign.

DOY 235 (23 Aug 2015):
VIMS began with high resolution stare mapping of the aurorae (across the south polar region), with all remaining ORS instruments riding along. UVIS then continuesd the auroral observations, performing repeated slow slews across the auroral oval - with CIRS and VIMS riders.

DOY 236 (24 Aug 2015):
ISS performed another of its Titan monitoring campaigns (haze observations), with CIRS and VIMS riding along. ISS then conducted NAC auroral stare observations, with UVIS and VIMS riders.

DOY 237 (25 Aug 2015):
A CIRS COMPSIT sit-and-stare, with UVIS and VIMS riders, comprised the day's science activities.

Daily Science Highlights (2 of 3)

DOY 238 (26 Aug 2015):
ISS performed another of its Titan monitoring campaigns (haze observations), with CIRS and VIMS riding along. ISS then shifted to observe "Hati", an irregular moon of Saturn. CDA then began its 6 day special-request "Saturn dust stream' observation campaign. This activity stemmed from the identification of a new and important science opportunity. CDS had found periodicities in some earlier observation periods that correlated with the SKR signatures of RPWS! They also tentatively identified frequencies that correlated with moon orbital periods. If CDA were clearly able to identify the moon orbital periods (e.g. Enceladus) in the dust stream, they would have a direct indication of the source of the particles. The observations were continuous over the 6 day period, interrupted only by downlinks (two).

DOY 240 (28 Aug 2015):
CDA continued the Saturn dust stream observation.
MAPS instruments continued their ongoing magnetosphere survey campaign.

DOY 241 (29 Aug 2015):
CDA continued the Saturn dust stream observation.
MAPS instruments continued their ongoing magnetosphere survey campaign.

DOY 242 (30 Aug 2015):
CDA continued the Saturn dust stream observation.

DOY 243 (31 Aug 2015):
CDA continued the Saturn dust stream observation.

DOY 244 (01 Sep 2015):
CDA Saturn dust stream observation continued until 244T10:21. UVIS then performsed EUV/FUV observations (with CIRS and ISS riders), where a slow scan was performed across Saturn's illuminated hemisphere to form spectral images.

DOY 245 (02 Sep 2015):
On this day CIRS conducted mid-infrared mapping to determine upper troposphere and tropopause temperature (with spatial resolution of about two degrees). VIMS rode along.

Daily Science Highlights (3 of 3)

DOY 246 (03 Sep 2015):
CIRS studied/derived composition with a COMPSIT sit-and-stare. UVIS and VIMS are riders.

DOY 247 (04 Sep 2015):
The day started with ISS performing WINDs observations (UVIS VIMS Rider) tracking features with time. CIRS studied/derived composition with a COMPSIT sit-and-stare. UVIS rider. ISS performed the second of this day's WINDs observations (UVIS VIMS Rider) tracking features with time.

DOY 248 (05 Sep 2015):
ISS performed another of its Titan monitoring campaigns (haze observations), with CIRS and VIMS riding along. ISS then conducted auroral stare observations with its NAC (CIRS and VIMS riders). UVIS performed more EUV/FUV observations (with CIRS and ISS rider), where a slow scan was performed across Saturn's illuminated hemisphere to form spectral images.

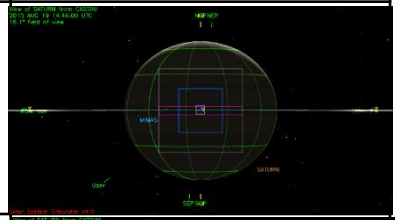
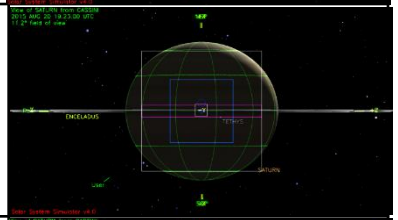
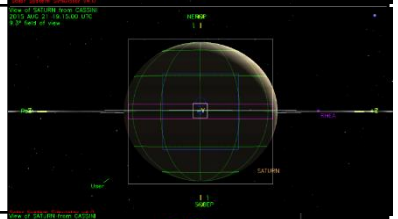
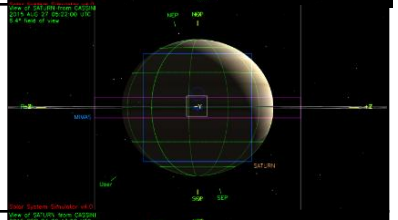
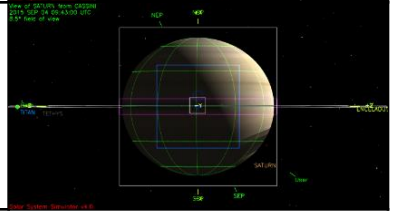
DOY 249 (05 Sep 2015):
ISS performed the last Titan monitoring campaign (haze observations) of this segment, with CIRS and VIMS riding along. ISS then conducted auroral stare observations with its NAC (CIRS and VIMS riders). ISS then performed "FEATRAK" imaging, which is imaging at selected latitudes at a range of emission angles as the planet rotates. All remaining ORS instruments rode along.

DOY 250 (07 Sep 2015):
INMS performed Titan torus observations. VIMS then conducted nearly 13 hours of equatorial daylit mapping through repeated 2x2 mosaics. CIRS and ISS rode along. MAPS instruments continued their ongoing magnetosphere survey campaign.

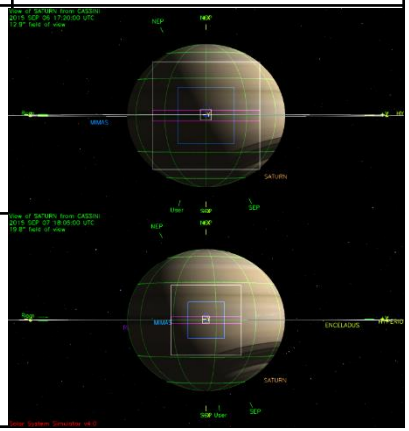
DOY 251 (08 Sep 2015):
INMS conducted its campaign to determine atmospheric and ionospheric thermal. RPWS then conducted ring plane crossing dust measurements to determine dust flux and scale height as a function of radial distance. MAPS instruments continued their ongoing magnetosphere survey campaign. Saturn segment 220_221 ended on this day, and SOST_221 started.

Segment Integration Planning

Timeline Gaps and Suggested Observations

Obs. Per.	Start	End	Duration	Phase angle (range)	Rs range	Sub-S/C Lat.	Snapshot (mid-gap)
1	2015-231T05:33:00 VIMS	2015-231T17:43:00	000T12:10:00	154.5-154.7	14.65-18.69	0	
2	2015-232T05:33:00 ISS Limb or Lightning	2015-233T01:27:00	000T19:54:00	152.5- 148.3	22.13-27.04	0	
3	2015-233T11:47:00 ISS Limb or Lightning	2015-234T01:12:00	000T12:25:00	146.2-143.8	29.25-31.82	0	
4	2015-238T05:02:00 CIRS Compsit	2015-239T23:26:00	001T10:39:00	130.3-125.9	43.37-45.05	0	
5	2015-246T20:31:00 All filled w/CAKE templates except last 01:22 prior to K/O	2015-247T22:55:00	001T02:24:00	105.8-100.6	35.90-31.63	0	

Timeline Gaps and Suggested Observations

Obs. Per.	Start	End	Duration	Phase angle (range)	Rs range	Sub-S/C Lat.	Snapshot (mid-gap)
6	2015-249T10:30:00	2015-249T22:40:00	000T12:10:00	90.2-84.6	23.98-20.70	0	
7	2015-250T10:30:00	2015-251T00:10:00	000T13:40:00	77.1-62.5	17.06-12.19	0	

ISS Feature Track or VIMS Hemisphere Mapping

VIMS Hemisphere Mapping

Initial SMT and Data Volume (1 of 3)

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_220EA_G70METNON232_PRIME	231 19:53	232 04:53	0	180	63	243	3322	3079	0	98	53	394	2701	**2306**	2536	22%	0
SP_220EA_C34BWGOTP233_PRIME	233 02:07	233 11:07	0	682	90	772	3322	2550	0	167	53	992	598	-395	229	3%	394
SP_220EA_C34BWGOTB234_PRIME	234 01:52	234 10:52	394	195	62	651	3322	2671	0	168	53	872	708	-164	229	2%	163
SP_220EA_C34HEFNON236_PRIME	236 01:52	236 10:52	163	1999	165	2327	3322	995	0	168	53	2548	809	-1739	229	2%	1739
SP_220EA_G70METNON237_PRIME	237 19:37	238 04:22	1739	1216	138	3093	3322	229	0	96	52	3240	2737	-503	467	3%	503
SP_220EA_C34HEFNON240_PRIME	240 01:36	240 10:36	503	781	191	1474	3322	1848	0	168	53	1695	796	-899	467	4%	899
SP_221EA_C34HEFNON241_PRIME	242 01:21	242 10:21	899	598	164	1660	3322	1662	0	168	53	1881	792	-1089	467	4%	1089
SP_221EA_M70METNON244_PRIME	244 11:51	244 20:06	1089	428	209	1726	3322	1596	0	153	49	1927	2190	**262**	467	4%	0
SP_221EA_M34HEFNON246_PRIME	246 11:51	246 19:51	0	1814	168	1982	3322	1340	0	148	47	2177	517	-1660	204	2%	1660
SP_221EA_C70METNON247_PRIME	248 01:05	248 10:05	1660	1334	124	3118	3322	204	0	168	53	3338	3332	-7	2738	30%	6
SP_221EA_C34HEFSEQ248_PRIME	249 00:50	249 09:50	6	515	62	584	3322	2738	0	168	53	804	708	-96	2962	52%	96
SP_221EA_C70METSEQ249_PRIME	250 00:50	250 09:50	96	200	63	360	3322	2962	0	178	53	591	3332	**2741**	3401	69%	0
SP_221EA_C34HEFOTP250_PRIME	251 00:50	251 04:50	0	274	63	337	3322	2985	0	122	24	482	309	-174	660	41%	173
SP_221EA_C70METOTP250_PRIME	251 04:50	251 09:50	173	0	0	173	3322	3149	0	438	29	641	1301	**660**	660	51%	0

Initial SMT and Data Volume (2 of 3)

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	231 04:53	231 19:53	0.0	28.3	0.0	5.4	0.0	63.1	32.4	0.0	49.1	0.0	0.0	0.0	62.7	241.1
SP_220EA_G70METNON232_PRIME	231 19:53	232 04:53	0.0	17.0	18.9	3.2	0.0	8.0	19.4	0.0	29.5	0.8	0.0	0.0	0.0	96.8
DAILY TOTAL SCIENCE	231 04:53	232 04:53	0.0	45.3	18.9	8.6	0.0	71.1	51.8	0.0	78.6	0.8	0.0	0.0	62.7	
OBSERVATION_NOR	232 04:53	233 02:07	0.0	40.1	89.1	7.6	393.0	18.9	45.9	0.0	69.6	1.8	10.0	0.0	88.7	764.6
SP_220EA_C34BWGOTP233_PRIME	233 02:07	233 11:07	0.0	17.0	86.4	3.2	0.0	8.0	19.4	0.0	29.5	2.4	0.0	0.0	0.0	165.9
DAILY TOTAL SCIENCE	232 04:53	233 11:07	0.0	57.0	175.5	10.9	393.0	26.9	65.3	0.0	99.0	4.2	10.0	0.0	88.7	
OBSERVATION_NOR	233 11:07	234 01:52	0.0	27.8	21.6	5.3	35.0	13.1	31.9	0.0	48.3	0.0	10.0	0.0	61.6	254.7
SP_220EA_C34BWGOTB234_PRIME	234 01:52	234 10:52	0.0	17.0	86.4	3.2	0.0	8.0	19.4	0.0	29.5	2.5	0.0	0.0	0.0	166.0
DAILY TOTAL SCIENCE	233 11:07	234 10:52	0.0	44.8	108.0	8.6	35.0	21.1	51.3	0.0	77.8	2.5	10.0	0.0	61.6	
OBSERVATION_NOR	234 10:52	236 01:52	0.0	73.6	21.6	14.0	1615.0	34.7	84.2	0.0	127.8	0.0	10.0	0.0	163.0	2143.9
SP_220EA_C34HEFNON236_PRIME	236 01:52	236 10:52	0.0	17.0	86.4	3.2	0.0	8.0	19.4	0.0	29.5	2.5	0.0	0.0	0.0	166.0
DAILY TOTAL SCIENCE	234 10:52	236 10:52	0.0	90.5	108.0	17.3	1615.0	42.7	103.7	0.0	157.2	2.5	10.0	0.0	163.0	
OBSERVATION_NOR	236 10:52	237 19:37	0.0	61.8	21.6	11.8	892.5	29.1	70.7	0.0	107.3	0.0	10.0	0.0	136.9	1341.7
SP_220EA_G70METNON237_PRIME	237 19:37	238 04:22	0.0	16.5	18.9	3.2	0.0	7.8	18.9	0.0	28.7	0.8	0.0	0.0	0.0	94.7
DAILY TOTAL SCIENCE	236 10:52	238 04:22	0.0	78.3	40.5	14.9	892.5	36.9	89.6	0.0	135.9	0.8	10.0	0.0	136.9	
OBSERVATION_NOR	238 04:22	240 01:36	0.0	85.3	89.1	16.3	285.0	40.2	97.7	0.0	148.2	1.7	10.0	0.0	189.0	962.6
SP_220EA_C34HEFNON240_PRIME	240 01:36	240 10:36	0.0	17.0	86.4	3.2	0.0	8.0	19.4	0.0	29.5	2.5	0.0	0.0	0.0	166.0
DAILY TOTAL SCIENCE	238 04:22	240 10:36	0.0	102.3	175.5	19.5	285.0	48.2	117.1	0.0	177.7	4.2	10.0	0.0	189.0	
OBSERVATION_NOR	240 10:36	242 01:21	0.0	73.1	0.0	24.0	250.0	34.5	83.7	0.0	126.9	0.0	0.0	0.0	162.0	754.2
SP_221EA_C34HEFNON241_PRIME	242 01:21	242 10:21	0.0	17.0	86.4	3.2	0.0	8.0	19.4	0.0	29.5	2.5	0.0	0.0	0.0	166.0
DAILY TOTAL SCIENCE	240 10:36	242 10:21	0.0	90.1	86.4	27.3	250.0	42.5	103.1	0.0	156.4	2.5	0.0	0.0	162.0	
OBSERVATION_NOR	242 10:21	244 11:51	0.0	93.4	0.0	17.8	0.0	44.0	106.9	0.0	162.2	0.0	0.0	0.0	206.9	631.2
SP_221EA_M70METNON244_PRIME	244 11:51	244 20:06	0.0	15.6	78.3	3.0	0.0	7.3	17.8	0.0	27.0	2.3	0.0	0.0	0.0	151.3
DAILY TOTAL SCIENCE	242 10:21	244 20:06	0.0	108.9	78.3	20.8	0.0	51.4	124.7	0.0	189.2	2.3	0.0	0.0	206.9	
OBSERVATION_NOR	244 20:06	246 11:51	0.0	75.0	0.0	14.3	1457.0	35.3	85.9	0.0	130.2	0.0	0.0	0.0	166.1	1963.8
SP_221EA_M34HEFNON246_PRIME	246 11:51	246 19:51	0.0	15.1	75.6	2.9	0.0	7.1	17.3	0.0	26.2	2.2	0.0	0.0	0.0	146.4
DAILY TOTAL SCIENCE	244 20:06	246 19:51	0.0	90.1	75.6	17.2	1457.0	42.5	103.1	0.0	156.4	2.2	0.0	0.0	166.1	

NOTE: CAKE Templates Book-kept as "ISS"

Initial SMT and Data Volume (3 of 3)

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	246 19:51	248 01:05	0.0	55.1	2.7	10.5	1060.0	26.0	63.1	0.0	95.8	0.0	0.0	0.0	122.2	1435.4
OBSERVATION_SI	246 19:51	248 01:05	0.0	0.0	0.0	0.0	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.7
SP_221EA_C70METNON247_PRIME	248 01:05	248 10:05	0.0	17.0	86.4	3.2	0.0	8.0	19.4	0.0	29.5	2.5	0.0	0.0	0.0	166.0
DAILY TOTAL SCIENCE	246 19:51	248 10:05	0.0	72.1	89.1	13.8	1068.7	34.0	82.6	0.0	125.2	2.5	0.0	0.0	122.2	
OBSERVATION_NOR	248 10:05	249 00:50	0.0	27.8	21.6	5.3	352.5	13.1	31.9	0.0	48.3	0.0	10.0	0.0	61.6	572.2
SP_221EA_C34HEFSEQ248_PRIME	249 00:50	249 09:50	0.0	17.0	86.4	3.2	0.0	8.0	19.4	0.0	29.5	2.5	0.0	0.0	0.0	166.0
DAILY TOTAL SCIENCE	248 10:05	249 09:50	0.0	44.8	108.0	8.6	352.5	21.1	51.3	0.0	77.8	2.5	10.0	0.0	61.6	
OBSERVATION_NOR	249 09:50	250 00:50	0.0	28.3	21.6	5.4	38.5	13.3	32.4	0.0	49.1	0.0	10.0	0.0	62.7	261.4
SP_221EA_C70METSEQ249_PRIME	250 00:50	250 09:50	0.0	17.0	86.4	13.3	0.0	8.0	19.4	0.0	29.5	2.5	0.0	0.0	0.0	176.1
DAILY TOTAL SCIENCE	249 09:50	250 09:50	0.0	45.3	108.0	18.7	38.5	21.3	51.8	0.0	78.6	2.5	10.0	0.0	62.7	
OBSERVATION_NOR	250 09:50	251 00:50	0.0	100.7	21.6	5.4	38.5	13.3	32.4	0.0	49.1	0.0	10.0	0.0	62.7	333.8
SP_221EA_C34HEFOTP250_PRIME	251 00:50	251 04:50	0.0	60.4	32.4	1.4	0.0	3.6	8.6	0.0	13.1	1.1	0.0	0.0	0.0	120.6
SP_221EA_C70METOTP250_PRIME	251 04:50	251 09:50	0.0	75.5	54.0	1.8	0.0	4.4	10.8	0.0	286.4	1.4	0.0	0.0	0.0	434.2
DAILY TOTAL SCIENCE	250 09:50	251 09:50	0.0	236.6	108.0	8.6	38.5	21.3	51.8	0.0	348.6	2.5	10.0	0.0	62.7	

	CAPS (Mb)	CDA (Mb)	CIRS (Mb)	INMS (Mb)	ISS (Mb)	MAG (Mb)	MIMI (Mb)	RADAR (Mb)	RPWS (Mb)	UVIS (Mb)	VIMS (Mb)	PROBE (Mb)
TOTAL RECORDED (OPNAV data not included)	0.0	1106.1	1279.8	194.7	6425.7	481.0	1047.5	0.0	1858.6	31.5	80.0	0.0

NOTE: CAKE Templates Book-kept as "ISS"

Waypoint Selection

Waypoints (NEG_Y to Saturn)

RBOT - Friendly

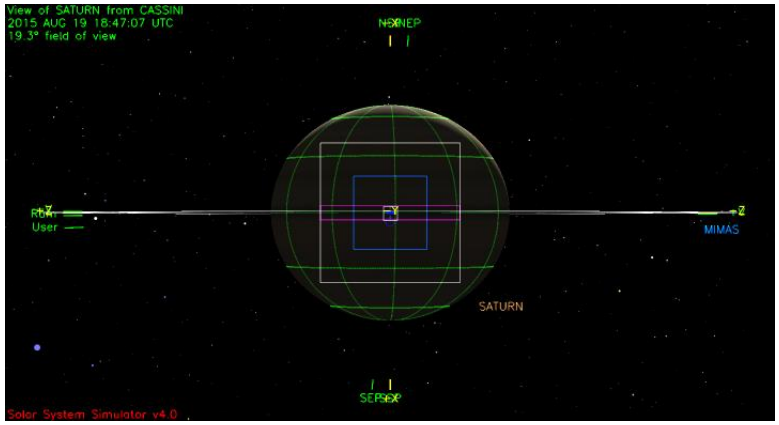
OBSERVATION PERIOD	START	END	POS_X	NEG_X	POS_Z	NEG_Z
SP_220NA_OBSERV231_NA	2015-231T04:53:00	2015-232T02:08:00	------	37.2/ 83.6	------	------
SP_220NA_OBSERV232_NA	2015-232T11:08:00	2015-233T02:07:00	------	37.1/ 83.6	37.1/ 83.6	------
SP_220NA_OBSERV233_NA	2015-233T11:07:00	2015-234T01:52:00	------	37.2/ 83.6	37.2/ 83.6	------
SP_220NA_OBSERV234_NA	2015-234T10:52:00	2015-236T01:52:00	------	37.2/ 83.6	37.2/ 83.6	------
SP_220NA_OBSERV236_NA	2015-236T10:52:00	2015-238T01:37:00	------	37.3/ 83.6	37.3/ 83.6	------
SP_220NA_OBSERV238_NA	2015-238T10:37:00	2015-240T01:36:00	------	37.3/ 83.6	37.3/ 83.6	------
SP_220NA_OBSERV240_NA	2015-240T10:36:00	2015-242T01:21:00	------	37.4/ 83.6	37.4/ 83.6	------
SP_221NA_OBSERV242_NA	2015-242T10:21:00	2015-244T11:51:00	------	37.4/ 83.6	37.4/ 83.6	------
SP_221NA_OBSERV244_NA	2015-244T20:06:00	2015-246T11:51:00	------	37.5/ 83.6	37.5/ 83.6	------
SP_221NA_OBSERV246_NA	2015-246T19:51:00	2015-248T01:05:00	------	37.5/ 83.6	37.5/ 83.6	------
SP_221NA_OBSERV248_NA	2015-248T10:05:00	2015-249T00:50:00	------	37.6/ 83.6	37.6/ 83.6	------
SP_221NA_OBSERV249_NA	2015-249T09:50:00	2015-250T00:50:00	------	37.6/ 83.6	37.6/ 83.6	------
SP_221NA_OBSERV250_NA	2015-250T09:50:00	2015-251T00:50:00	------	37.7/ 83.6	37.7/ 83.6	------

Standard Waypoints

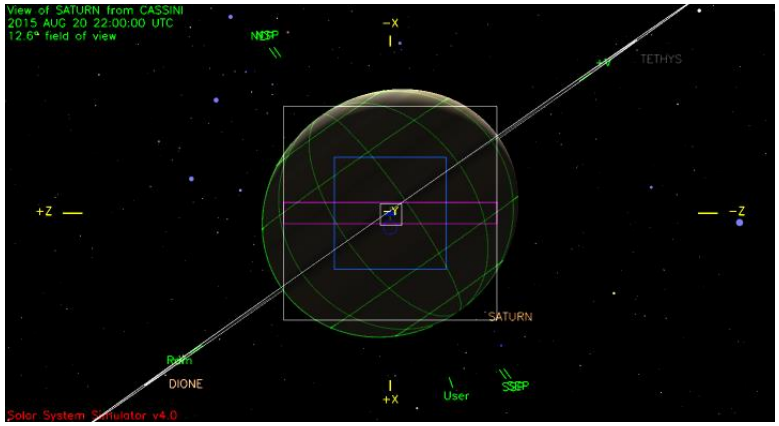
OBS_NAME	START	END	POS_X_2_NSP	POS_X_2_NEP	NEG_X_2_NSP	NEG_X_2_NEP	POS_Z_2_NSP	POS_Z_2_NEP	NEG_Z_2_NSP	NEG_Z_2_NEP	NEG_X_2_SUN	NEG_Z_2_EARTH
SP_220NA_OBSERV231_NA	2015-231T04:53:00	2015-232T02:08:00	**BAD**	**BAD**	OK	OK	**BAD**	**BAD**	**BAD**	**BAD**	OK	OK
SP_220NA_OBSERV232_NA	2015-232T11:08:00	2015-233T02:07:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK
SP_220NA_OBSERV233_NA	2015-233T11:07:00	2015-234T01:52:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK
SP_220NA_OBSERV234_NA	2015-234T10:52:00	2015-236T01:52:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK
SP_220NA_OBSERV236_NA	2015-236T10:52:00	2015-238T01:37:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK
SP_220NA_OBSERV238_NA	2015-238T10:37:00	2015-240T01:36:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK
SP_220NA_OBSERV240_NA	2015-240T10:36:00	2015-242T01:21:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK
SP_221NA_OBSERV242_NA	2015-242T10:21:00	2015-244T11:51:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK
SP_221NA_OBSERV244_NA	2015-244T20:06:00	2015-246T11:51:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK
SP_221NA_OBSERV246_NA	2015-246T19:51:00	2015-248T01:05:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK
SP_221NA_OBSERV248_NA	2015-248T10:05:00	2015-249T00:50:00	**BAD**	OK	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK
SP_221NA_OBSERV249_NA	2015-249T09:50:00	2015-250T00:50:00	**BAD**	OK	OK	**BAD**	OK	OK	**BAD**	**BAD**	OK	OK
SP_221NA_OBSERV250_NA	2015-250T09:50:00	2015-251T00:50:00	**BAD**	**BAD**	OK	**BAD**	OK	OK	**BAD**	**BAD**	OK	OK

Waypoints Chosen

Waypoint 1 (2015-231T05:33:00 – 2015-232T05:33:00): ISS_NAC to Saturn; NEG_X to NSP

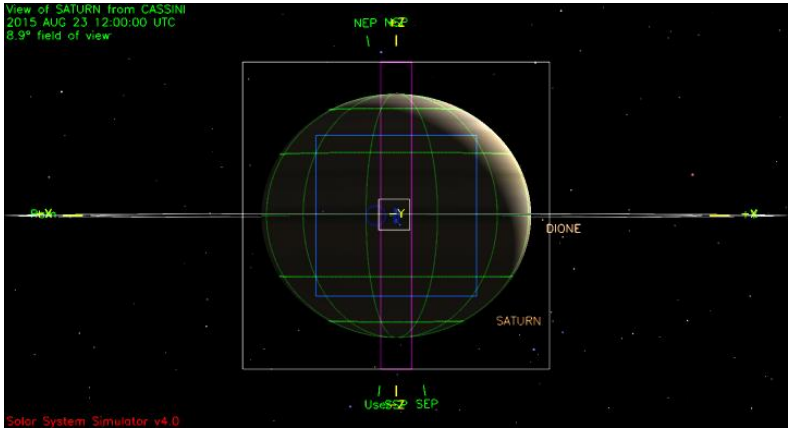


Waypoint 2 (2015-232T05:33:00– 2015-233T11:47:00): ISS_NAC to Saturn, NEG_X to Sun



Waypoints Chosen

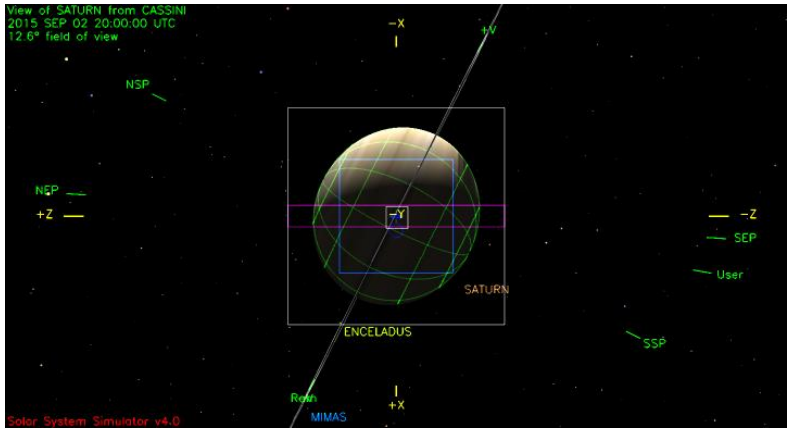
Waypoint 3 (2015-233T11:47:00 – 2015-237T18:07:00): ISS_NAC to Saturn; POS_Z to NSP



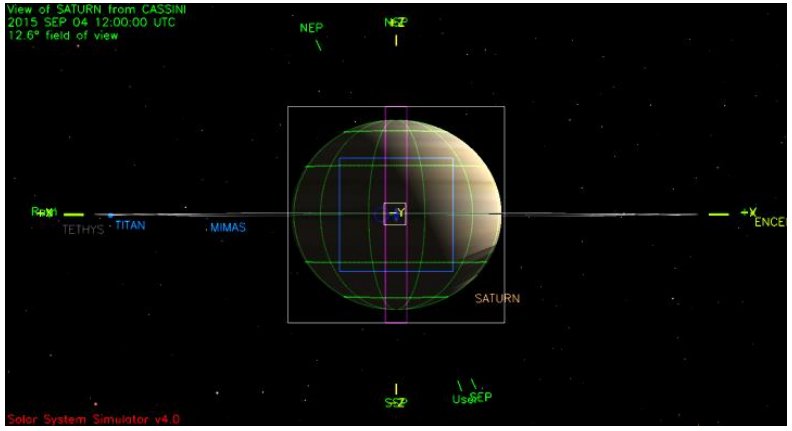
Waypoint 4 (2015-237T18:07:00 – 2015-244T20:46:00): XBAND to Earth, NEG_X to 116.0/-58.0

Waypoints Chosen

Waypoint 5 (2015-244T20:46:00 – 2015-246T20:31:00): ISS_NAC to Saturn; NEG_X to Sun

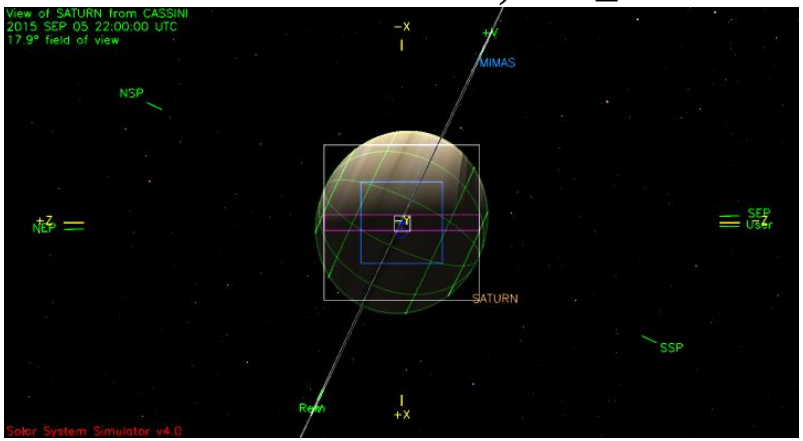


Waypoint 6 (2015-246T20:31:00 – 2015-248T10:45:00): ISS_NAC to Saturn, POS_Z to NSP

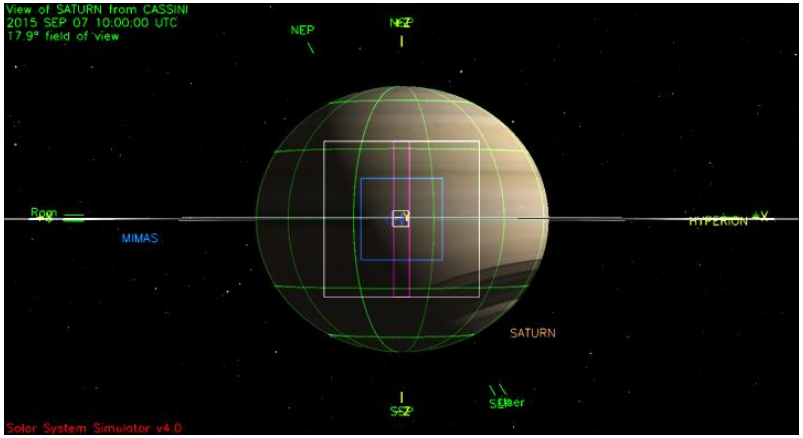


Waypoints Chosen

Waypoint 7 (2015-248T10:45:00 – 2015-249T10:30:00): ISS_NAC to Saturn; NEG_X to Sun



Waypoint 8 (2015-249T10:30:00 – 2015-251T09:50:00): ISS_NAC to Saturn, POS_Z to NSP



Notes (1 of 2)

- Pointing:
  - CIRS heating (> 1.6 deg) during waypoints
    - None
  - Any > 48 hour earth pointed quiescent periods
    - CDA_221DR_SATURNSTR00[1-3]_PRIME (~6 days)
- Data Volume:
  - No SMT warnings
- DSN:
  - The following comprise a split OTP pass.
    - 251T00:50:00 (SP_221EA_C34HEFOTP250_PRIME) (DSS-45) 4 hrs dur
    - 251T04:50:00 (SP_221EA_C70METOTP250_PRIME) (DSS-43) 5 hrs dur
  - Ap_downlink report check warnings
    - "Warning: SP_221NA_C70METOTP250_SP overlaps end of DSS-43 weekly maintenance by 65 minute(s)"

      This is intentional – will request the 65 minute overlap (due to weekly maintenance) be waived. Prior to this there was already two weeks of extended maintenance on this antenna.
  - Additional DSN changes
    - Change 1: Moved and upgraded
      - WAS: 232T02:08:00 SP_220EA_C34BWGNON232_PRIME
      - IS: 231T19:53:00 SP_220EA_G70METNON232_PRIME (DSS-14)
    - Change 2: Downgraded
      - WAS: 236T01:52:00 SP_220EA_C70METNON236_PRIME
      - IS: 236T01:52:00 SP_220EA_C34HEFNON236_PRIME (DSS-45)
    - Change 3: Moved, upgraded and shortened 15 min
      - WAS: 238T01:37:00 SP_220EA_C34HEFNON238_PRIME
      - IS: 237T19:37:00 SP_220EA_G70METNON237_PRIME (DSS-14)

Notes (2 of 2)

- Additional DSN changes (continued)
  - Change 4: Downgraded
    - WAS: 240T01:36:00 SP_220EA_C70METNON240_PRIME
    - IS: 240T01:36:00 SP_220EA_C34HEFNON240_PRIME (DSS-45)
  - Change 5: Extended pass 01:15 min on front end
    - WAS: 248T01:05:00 SP_221EA_C70METNON247_PRIME
    - IS: 247T23:50:00 SP_221EA_C70METNON247_PRIME
  - Change 6: Upgraded
    - WAS: 250T00:50:00 SP_221EA_C34HEFSEQ249_PRIME
    - IS: 250T00:50:00 SP_221EA_C70METSEQ249_PRIME (DSS-43)
- Resource checker Dispositions:
  - SP_221EA_C34HEFOTP250_PRIME: OTP Downlink Pass Playback gap is not 01:22:00.
    - Split Pass. Playback gap (1h22m) placed in following 70 m pass (SP_221EA_C70METOTP250_PRIME) as per procedure.
  - SP_221EA_YGAP247_PRIME: Gap in Prime SPASS requests
    - Seven minute gap starting at 2015-247T23:43:00 is intentional.
  - SP_221EA_C34HEFOTP250_PRIME: Manually verify identical inertial pointing with backup OTM.
    - This is verified.
- Opmodes:
  - N/A
- Hydrazine:
  - N/A
- Special Activities:
  - Six day special CDA Saturn dust stream observation campaign (See DOY 238 Science Highlights).
    - CDA_220DR_SATURNSTR001, CDA_220DR_SATURNSTR002 , CDA_221DR_SATURNSTR003
  - OpNavs
    - NAV_221SK_OPNAV471_PRIME (2015-247T04:03:00 to 2015-247T05:33:00)

Liens

Sequence Liens (should all be SPLAT items):

- Liens to be worked in SIP
  - SP_221NA_C70METOTP250_SP overlaps end of DSS-43 weekly maintenance by 65 minute(s)