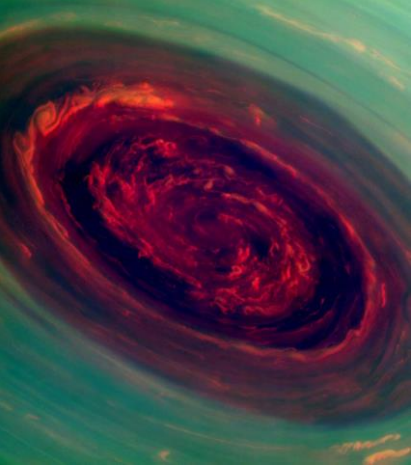

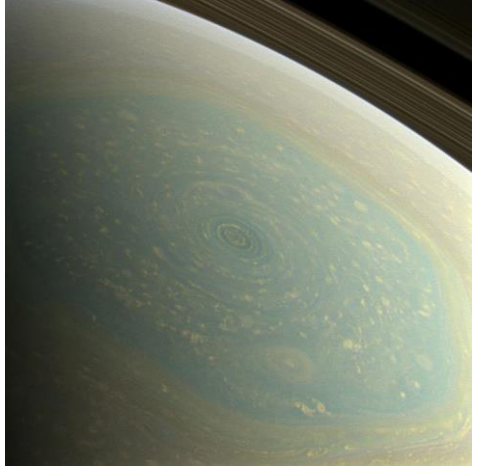
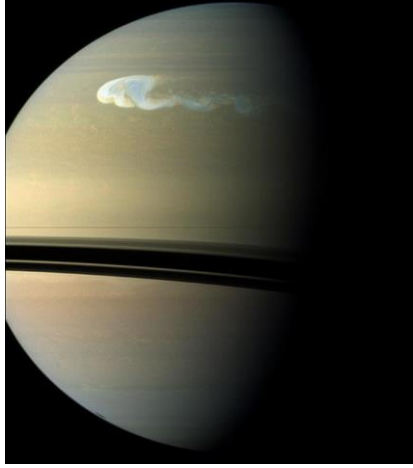

Science Planning & Sequence Team
CASSINI

SATURN TARGET WORKING TEAM

Rev 176 Segment Legacy Package

Segment Boundary: December 7, 2012 – December 12, Year 2012-342T20:02:00 – 2012-347T02:03:00 (SCET)

Integration Began 02/13/2012
Segment Delivered to S76 Sequence 05/11/2012
Lead Integrator was Nimisha Mittal

Legacy Package Assembled by Shawn Boll

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

Segment Overview and Final Products

Segment Summary

- This was a four day long periapse (7.43 Rs) segment in the first inclined phase (IN-1) of the Solstice Mission.

- The majority of the segment viewed Saturn at relatively high phase angles. Inbound to periapse, Cassini viewed Saturn's southern hemisphere and pole, crossing the ring plane before periapse. Outbound, Saturn presented a nearly fully-lit face, with unobstructed views of the northern hemisphere.

- Inbound Saturn science included VIMS south polar mapping, UVIS southern auroral stares and slews, CIRS south pole regional mapping, a VIMS southern storm latitude mosaic, and an ISS limb scan. VIMS also conducted a solar port calibration and ISS executed an Enceladus plume PIE (Pre-Integrated Event) observation.

- At periapse, CIRS conducted a compositional sit and stare observation of Saturn, and VIMS imaged north polar dynamics.

- Outbound, VIMS looked at Saturn's northern hemisphere storm latitudes and ISS performed an emission angle scan. CIRS executed a pair of PIE ring observations.

- Constraint Management was required for the Enceladus plume observation, where solar-boresight constraints were waived while the Sun was occulted by Saturn from Cassini's perspective.

Final Sequenced SPASS

	Request	Riders	Start (SCET)	Start (Epoch)	Duration	End (SCET)	Primary	Secondary	Comments
	Sequence S76, length = 72 days		2012-307T14:30:00		072T03:21:00	2013-013T17:51:00			
	SATURN_176 Segment		2012-342T20:02:00		004T06:01:00	2012-347T02:03:00			
	SP_176EA_WAYPTTURN342_PRIME		2012-342T20:02:00		000T00:40:00	2012-342T20:42:00	ISS_NAC to Saturn	NEG_Z to 136.7/38.0	
	NEW WAYPOINT		**2012-342T20:42:00**		**000T17:35:00**	**2012-343T14:17:00**	**ISS_NAC to Saturn**	**NEG_Z to 136.7/38.0**	
GAP 1	VIMS_176SA_SPOLMAP001_PRIME		2012-342T20:42:00		000T01:00:00	2012-342T21:42:00	ISS_NAC to Saturn	NEG_Z to 136.7/38.0	
GAP 1	UVIS_176SA_AURSTARE001_PRIME	C, I, V	2012-342T21:42:00		000T03:00:00	2012-343T00:42:00	UVIS_FUV to Saturn	NEG_Z to 136.7/38.0	Collaborative Rider(s): VIMS
GAP 1	VIMS_176SA_SPOLMAP002_PRIME		2012-343T00:42:00		000T01:00:00	2012-343T01:42:00	ISS_NAC to Saturn	NEG_Z to 136.7/38.0	
GAP 1	UVIS_176SA_AURSTARE002_PRIME	C, I, V	2012-343T01:42:00		000T03:00:00	2012-343T04:42:00	UVIS_FUV to Saturn	NEG_Z to 136.7/38.0	Collaborative Rider(s): VIMS
GAP 1	VIMS_176SA_SPOLMAP003_PRIME		2012-343T04:42:00		000T01:00:00	2012-343T05:42:00	ISS_NAC to Saturn	NEG_Z to 136.7/38.0	
GAP 1	UVIS_176SA_AURSLEW003_PRIME	V	2012-343T05:42:00		000T03:00:00	2012-343T08:42:00	UVIS_FUV to Saturn	NEG_Z to 136.7/38.0	Collaborative Rider(s): VIMS
GAP 1	VIMS_176SA_SPOLMAP004_PRIME		2012-343T08:42:00		000T01:00:00	2012-343T09:42:00	ISS_NAC to Saturn	NEG_Z to 136.7/38.0	
GAP 1	CIRS_176SA_REGMAP001_PRIME	R	2012-343T09:42:00		000T03:55:00	2012-343T13:37:00	CIRS_FPB to Saturn	NEG_Z to 136.7/38.0	slow scans 70S to 90S
GAP 1	SP_176EA_DLTURN343_PRIME	R	2012-343T13:37:00		000T00:40:00	2012-343T14:17:00	XBAND to Earth	NEG_X to NEP	
GAP 1	**NEW WAYPOINT**		**2012-343T14:17:00**		**000T12:40:00**	**2012-344T02:57:00**	**XBAND to Earth**	**NEG_X to NEP**	
	ISS_176TI_M90R2CLD343_PRIME	C, R, V	2012-343T14:17:00	E176_M90R2CLD343+000T00:00:00	000T01:30:00	2012-343T15:47:00	ISS_NAC to Titan	NEG_X to NEP	No Preference to secondary pointing
	ENGR_176SC_KPTYBIAS343_PRIME	R	2012-343T15:47:00		000T01:30:00	2012-343T17:17:00	POS_Z to DELTA_H (0.0,0.0,54.998 deg. offset)	NEG_X to Sun	
	SP_176EA_C34BWGNON343_PRIME	C, R	2012-343T17:17:00		000T09:00:00	2012-344T02:17:00	XBAND to Earth	3_Hr_Delayed_Rolling	CAPS. NEG_X to NEP or NSP.
	SP_176EA_WAYPTTURN344_PRIME		2012-344T02:17:00		000T00:40:00	2012-344T02:57:00	UVIS_SOL_OFF to Sun	POS_Z to NEP	
	NEW WAYPOINT		**2012-344T02:57:00**		**000T09:13:00**	**2012-344T12:10:00**	**UVIS_SOL_OFF to Sun**	**POS_Z to NEP**	
GAP 2	ISS_176SA_LIMBSCAN001_PRIME	C, V	2012-344T02:57:00		000T01:40:00	2012-344T04:37:00	ISS_NAC to Saturn	POS_Z to NEP	
GAP 2	VIMS_176SA_STRMLAT001_PRIME	C	2012-344T04:37:00		000T01:42:00	2012-344T06:19:00	ISS_NAC to Saturn	POS_X to NEP	
GAP 2	VIMS_176SU_SOLARPORT001_PRIME		2012-344T06:19:00		000T03:11:00	2012-344T09:30:00	VIMS_IR_SOL to Sun	POS_Z to NEP	
	ISS_176EN_PLMHPMR001_PIE	U, V	2012-344T09:30:00		000T02:00:00	2012-344T11:30:00	ISS_NAC to Enceladus	NEG_X to NSP	SOST PIE
	SP_176EA_DLTURN344_PRIME		2012-344T11:30:00		000T00:40:00	2012-344T12:10:00	XBAND to Earth	NEG_Y to NEP	CAPS preferred attitude causing FR violations
	NEW WAYPOINT		**2012-344T12:10:00**		**000T11:10:00**	**2012-344T23:20:00**	**XBAND to Earth**	**NEG_Y to NEP**	
	SP_176EA_G70METNON344_PRIME	C, M	2012-344T12:40:00		000T07:30:00	2012-344T20:10:00	XBAND to Earth	Rolling	CAPS. POS_X to NEP or NSP.
	SP_176EA_C34HEFNON344_PRIME	C	2012-344T20:10:00		000T01:00:00	2012-344T21:10:00	XBAND to Earth	Rolling	CAPS. POS_X to NEP or NSP.
	ENGR_176SC_KPTYBIAS344_PRIME		2012-344T21:10:00		000T01:30:00	2012-344T22:40:00	POS_Z to DELTA_H (0.0,0.0,-10.997 deg. offset)	NEG_X to Sun	
	SP_176EA_WAYPTTURN444_PRIME		2012-344T22:40:00		000T00:40:00	2012-344T23:20:00	ISS_NAC to Saturn	POS_Z to NSP	
GAP 3	**NEW WAYPOINT**		**2012-344T23:20:00**		**001T10:23:00**	**2012-346T09:43:00**	**ISS_NAC to Saturn**	**POS_Z to NSP**	
GAP 3	CIRS_176SA_COMPSIT003_PRIME	V	2012-344T23:20:00		000T03:37:00	2012-345T02:57:00	CIRS_FP3 to Saturn	POS_Z to NSP	
	Periapse R = 7.427 Rs, lat ...		2012-345T02:15:42		000T00:00:01	2012-345T02:15:43			
GAP 4	VIMS_176SA_NPOLEDYN001_PIE	C, E, I	2012-345T02:57:00		000T12:33:00	2012-345T15:30:00	ISS_NAC to Saturn	POS_Z to NSP	Collaborative Rider(s): ISS. PIE
GAP 4	CIRS_176RI_NP50L70004_PIE	C, E	2012-345T15:30:00		000T04:00:00	2012-345T19:30:00	CIRS_FP1 to Rings	POS_Z to NSP	No Preference to secondary pointing
GAP 5	VIMS_176SA_NORSTRM001_PRIME	C, I	2012-345T19:30:00		000T07:00:00	2012-346T02:30:00	ISS_NAC to Saturn	POS_Z to NSP	Collaborative Rider(s): ISS
GAP 5	CIRS_176RI_NP20L70001_PIE	C	2012-346T02:30:00		000T04:00:00	2012-346T06:30:00	CIRS_FP1 to Rings	POS_Z to NSP	No Preference to secondary pointing
GAP 6	ISS_176SA_EMASCAN002_PRIME	V	2012-346T06:30:00		000T02:33:00	2012-346T09:03:00	ISS_NAC to Saturn	POS_Z to NSP	
GAP 6	SP_176EA_DLTURN346_PRIME		2012-346T09:03:00		000T00:40:00	2012-346T09:43:00	XBAND to Earth	NEG_Y to 113.2/-46.5	
GAP 6	**NEW WAYPOINT**		**2012-346T09:43:00**		**000T17:07:00**	**2012-347T02:50:00**	**XBAND to Earth**	**NEG_Y to 113.2/-46.5**	
GAP 6	ENGR_176SC_KPTYBIAS346_PRIME		2012-346T09:43:00		000T01:30:00	2012-346T11:13:00	NEG_Z to DELTA_H (0.0,0.0,6.998 deg. offset)	NEG_X to Sun	
GAP 6	SP_176EA_G70METNON346_PRIME	C	2012-346T11:13:00		000T08:50:00	2012-346T20:03:00	XBAND to Earth	Rolling	MIMI. NEG_Y to Saturn (0,0,-9.5)

Final Sequenced SMT and Data Volume

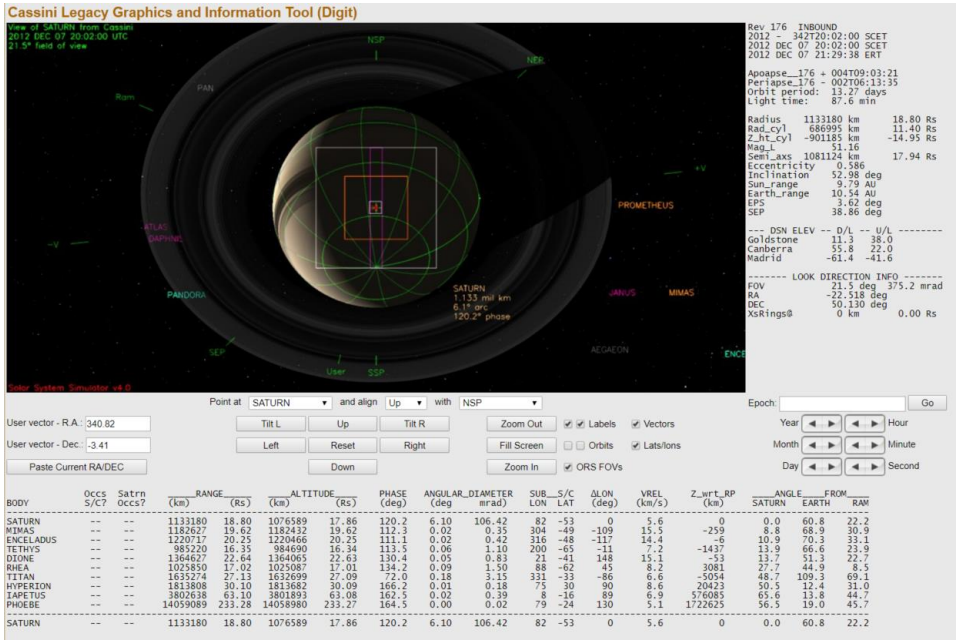
DATA VOLUME SUMMARY --- TRANSFER FRAME OVERHEAD INCLUDED (80 BITS PER 8800-BIT FRAME)

			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_176EA_C34BWGNON343_PRIME	343 17:17	344 02:17	0	1149	90	1239	3322	2083	0	219	53	1511	642	-869	0	0%	868
SP_176EA_G70METNON344_PRIME	344 12:40	344 20:10	868	994	44	1906	3322	1416	0	552	44	2502	2279	-224	0	0%	223
SP_176EA_C34HEFNON344_PRIME	344 20:10	344 21:10	223	0	0	223	3322	3099	0	32	6	261	79	-183	0	0%	182
SP_176EA_G70METNON346_PRIME	346 11:13	346 20:03	182	2359	161	2702	3322	620	0	191	52	2945	2540	-406	290	2%	406

DATA VOLUME REPORT --- TRANSFER FRAME OVERHEAD NOT INCLUDED

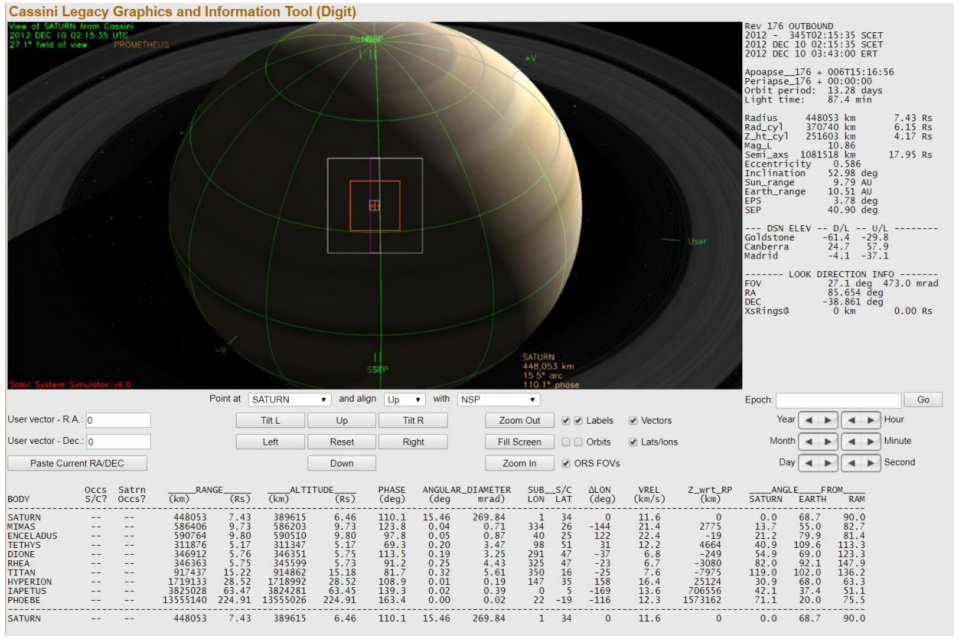
Event	Start doy hh:mm	End doy hh:mm	CAPS (Mb)	CDA (Mb)	CIRS (Mb)	INMS (Mb)	ISS (Mb)	MAG (Mb)	MIMI (Mb)	RADAR (Mb)	RPWS (Mb)	UVIS (Mb)	VIMS (Mb)	PROBE (Mb)	ENGR (Mb)	TOTAL (Mb)
OBSERVATION_NOR	342 20:02	343 17:17	76.5	40.1	121.2	7.7	158.5	37.8	65.0	0.0	68.8	163.0	400.0	0.0	88.8	1227.5
SP_176EA_C34BWGNON343_PRIME	343 17:17	344 02:17	32.4	17.0	86.4	3.2	0.0	16.0	27.5	0.0	29.2	4.9	0.0	0.0	0.0	216.7
DAILY TOTAL SCIENCE	342 20:02	344 02:17	108.9	57.1	207.6	10.9	158.5	53.8	92.6	0.0	98.0	168.0	400.0	0.0	88.8	
OBSERVATION_NOR	344 02:17	344 12:40	37.4	19.6	53.0	13.8	450.4	18.5	31.8	0.0	33.6	30.8	296.0	0.0	43.4	1028.3
SP_176EA_G70METNON344_PRIME	344 12:40	344 20:10	27.0	49.8	72.9	2.7	0.0	13.3	23.0	0.0	354.2	4.1	0.0	0.0	0.0	547.0
SP_176EA_C34HEFNON344_PRIME	344 20:10	344 21:10	3.6	1.9	10.8	0.4	0.0	1.8	3.1	0.0	9.8	0.5	0.0	0.0	0.0	31.9
DAILY TOTAL SCIENCE	344 02:17	344 21:10	68.0	71.3	136.7	16.9	450.4	33.6	57.8	0.0	397.7	35.5	296.0	0.0	43.4	
OBSERVATION_NOR	344 21:10	346 11:13	165.5	71.8	282.0	13.7	392.2	67.7	116.4	0.0	299.9	0.0	900.0	0.0	159.0	2468.2
OBSERVATION_SI	344 21:10	346 11:13	0.0	0.0	28.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.0
SP_176EA_G70METNON346_PRIME	346 11:13	346 20:03	31.8	16.7	64.8	3.2	0.0	15.7	27.0	0.0	28.6	1.6	0.0	0.0	0.0	189.4
DAILY TOTAL SCIENCE	344 21:10	346 20:03	197.3	88.4	374.8	16.9	392.2	83.4	143.5	0.0	328.5	1.6	900.0	0.0	159.0	

Segment Geometry



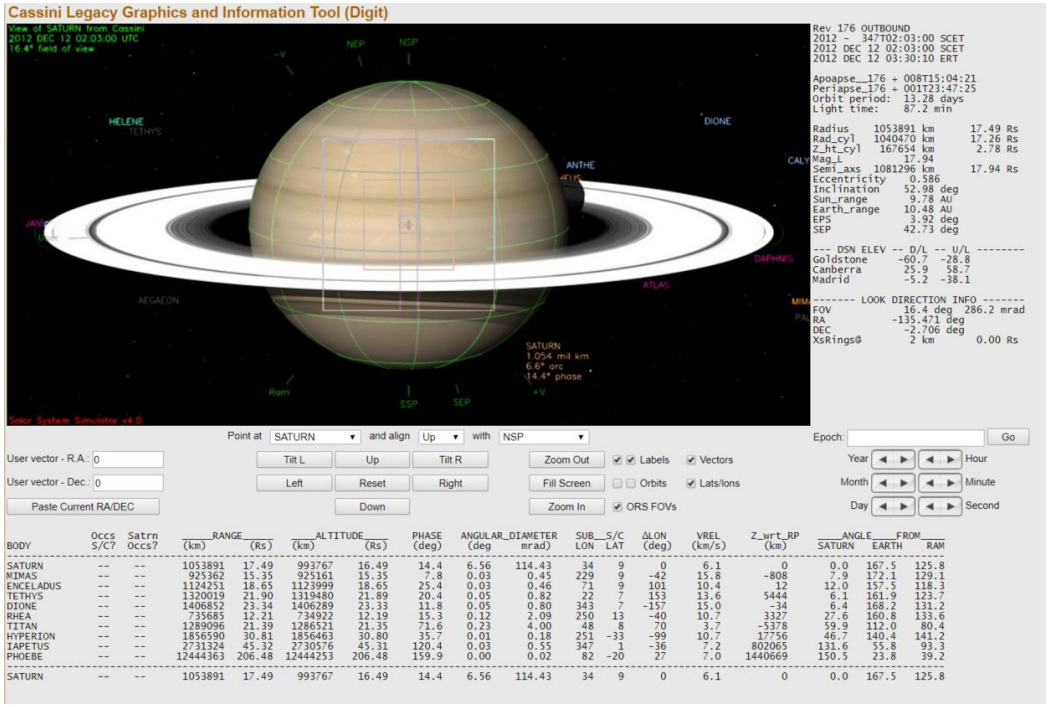
← Seg Start (Left)

↓ Periapse (below)



	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	18.8 Rs	120.2	-53
Periapse	7.43 Rs	110.1	34
Segment End	17.49 Rs	14.4	9

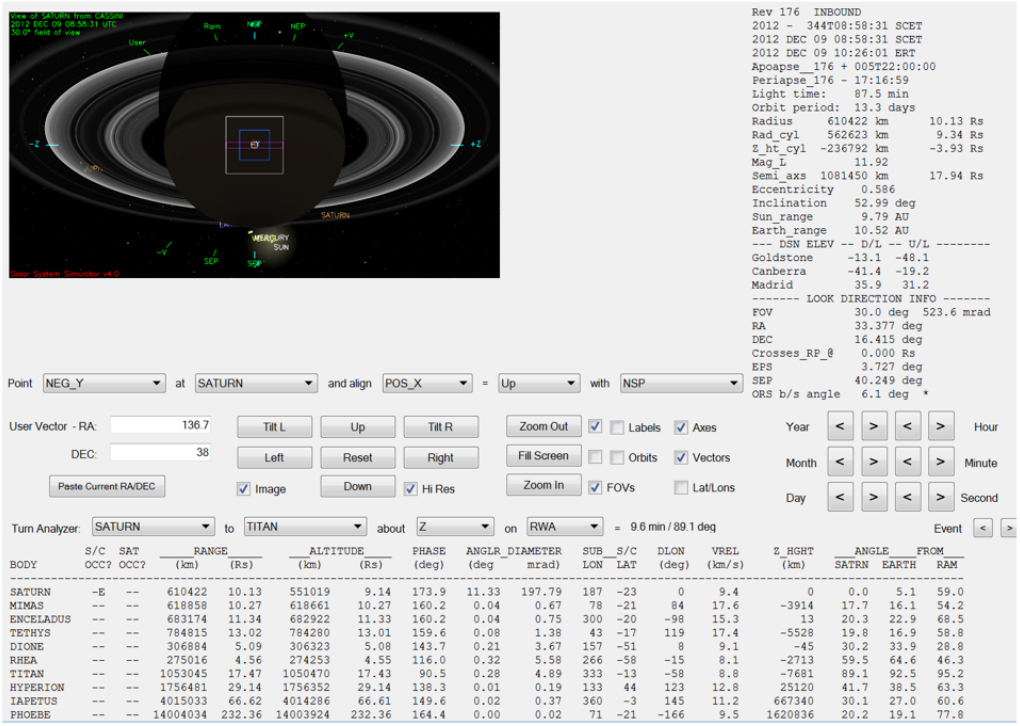
Segment Geometry



BODY	Occs S/C?	Satrn Occs?	RANGE (km)	RANGE (Rs)	ALTITUDE (km)	ALTITUDE (Rs)	PHASE (deg)	ANGULAR DIAMETER (deg	ANGULAR DIAMETER mrad)	SUB S/C LON	SUB S/C LAT	ΔLON (deg)	VREL (km/s)	Z_wrt_RP (km)	ANGLE FROM SATURN	ANGLE FROM EARTH	ANGLE FROM RAM
SATURN	--	--	1053891	17.49	993767	16.49	14.4	6.56	114.43	34	9	0	6.1	0	0.0	167.5	125.8
MIMAS	--	--	925362	15.35	925161	15.35	7.8	0.03	0.45	229	9	-42	15.8	-808	7.9	172.1	129.1
ENCELADUS	--	--	1124251	18.65	1123999	18.65	25.4	0.03	0.46	71	9	101	10.4	12	12.0	157.5	118.3
TETHYS	--	--	1320019	21.90	1319480	21.89	20.4	0.05	0.82	22	7	153	13.6	5444	6.1	161.9	123.7
DIONE	--	--	1406852	23.34	1406289	23.33	11.8	0.05	0.80	343	7	-157	15.0	-34	6.4	168.2	131.2
RHEA	--	--	735685	12.21	734922	12.19	15.3	0.12	2.09	250	13	-40	10.7	3327	27.6	160.8	133.6
TITAN	--	--	1289096	21.39	1286521	21.35	71.6	0.23	4.00	48	8	70	3.7	-5378	59.9	112.0	80.4
HYPERION	--	--	1856590	30.81	1856463	30.80	35.7	0.01	0.18	251	-33	-99	10.7	17756	46.7	140.4	141.2
IAPETUS	--	--	2731324	45.32	2730576	45.31	120.4	0.03	0.55	347	1	-36	7.2	802065	131.6	55.8	93.3
PHOEBE	--	--	12444363	206.48	12444253	206.48	159.9	0.00	0.02	82	-20	27	7.0	1440669	150.5	23.8	39.2
SATURN	--	--	1053891	17.49	993767	16.49	14.4	6.56	114.43	34	9	0	6.1	0	0.0	167.5	125.8

Seg End

Solar Geometry – ORS Boresight Concerns

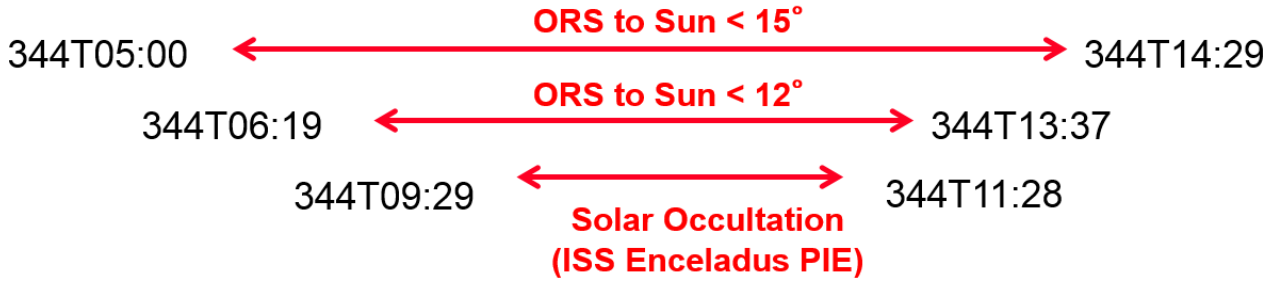


- Pointing to NEG_Y to Saturn (center) would have lead to a CMT violation between ~2012-344T06:19:00 and ~2012-344T13:37:00. (violation of the 12° cone rule), **but no observations have been planned at that attitude**.

- Minimum NEG_Y to Sun angle is ~7.29°

- *A waiver will be required for VIMS_176SA_STRMLAT001_PRIME as it is within the 15 degree NEG_Y to Sun cone (observation ends at DOY 344 06:19:00)*

•NO CMT management required.



Daily Science Highlights

DOY 342: Saturn_176 kicked off with VIMS mapping the south pole vortex winds in the continuous dark nighttime conditions of winter, and trying to determine if winds whirling around the vortex have changed with time or season. After this observation, UVIS made a 3 hour auroral observation at the south pole.

DOY 343: VIMS and UVIS alternated between mapping the south pole vortex winds and making auroral observations during the first 10 hours of the day. CIRS then made a regional map of the south polar region to obtain measurements on the temperature of the southern vortex. This was followed by an ISS Titan cloud monitor.

DOY 344: The day was filled with activities as Cassini approached periapse. ISS started this day with a limbscan of Saturn's nightside limb in order to view high haze layers in Saturn's stratosphere. VIMS then observed regions close to -35 degree south latitude (the "storm alley") to look for storms. A VIMS solar port calibration followed, where the instrument obtained spectra of the sun through its solar port in order to monitor instrument sensitivity over time as well as look for subtle changes in the solar spectrum. An ISS PIE observed the plumes on the icy moon Enceladus. Cassini then turned to Earth to downlink most of its data. After the spacecraft turned back to face Saturn, CIRS observed a latitude region to obtain atmospheric composition data of trace gases and isotopes at high emission angles.

DOY 345: Cassini approached Saturn periapse early in the morning, now with a good view of its north pole. VIMS started a high priority map of the hexagon and the north polar vortex to look for temporal/seasonal changes in the wind and cloud structures since its last detailed look in about 2007. This was followed by a CIRS PIE in which rings thermal measurements were made at a variety of phase angles and spacecraft elevations. Later, VIMS looked at the second "thunderstorm stomping grounds" of Saturn: at 35 degrees north latitude to see the latest developments there. One objective was to find out if a new String of Pearls had developed in this region (the previous one was evidently snuffed out during the Northern Storm in the previous year).

DOY 346: CIRS had another high priority measurement of the temperatures of the rings at another set of phase angles and elevation ranges for four hours. This was followed by an emission angle scan by ISS at an extremely low phase angle. After that observation, Cassini turned back to earth point to start its downlink and continued that until the end of the segment early on DOY 347.

Segment Integration Planning

Timeline Gaps and Suggested Observations

Gap	Start	End	Duration	Phase angle (range)	Rs range	Suggested observations/activities
1	2012-342T20:42:00	2012-343T15:07:00	000T18:25:00	120.8°-140.4°	18.7 – 14.6	CIRS Maps, VIMS – South Pole dynamics
2a	2012-344T02:57:00	2012-344T06:19:00	000T03:22:00	160.5° - 168.0°	11.6 - 10.8	VIMS or CIRS (Warning: ORS to Sun <15°)
2b	2012-344T06:19:00	2012-344T09:30:00	000T03:11:00	168.0° - 174.7°	10.8 - 10.0	(Warning: ORS to Sun <12°)
3	2012-344T23:20:00	2012-345T02:57:00	000T03:37:00	125.4° - 106.4°	7.5 – 7.4	-
4	2012-345T07:39:00	2012-345T15:30:00	000T07:51:00	82.2° - 49.4°	7.7 – 9.2	More VIMS North Pole dynamics
5	2012-345T19:30:00	2012-346T02:30:00	000T07:00:00	36.8° - 19.9°	10.1 – 11.9	ISS Winds
6	2012-346T06:30:00	2012-346T11:38:00	000T05:08:00	12.5° - 5.8°	12.9 – 14.1	ISS imaging w/ VIMS rider

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 (%)	CAROVR (Mb)
SP_176EA_C34HEFNON343_PRIME	343 17:17	344 02:17	0	275	90	364	3322	2958	0	232	53	649	677	27	1044	20%	0
SP_176EA_G70METNON344_PRIME	344 13:40	344 20:10	0	586	48	634	3322	2688	0	714	38	1386	1974	587	1016	23%	0
SP_176EA_C34HEFNON344_PRIME	344 20:10	344 22:40	0	0	0	0	3322	3322	0	95	15	110	193	83	428	17%	0
SP_176EA_G70METNON346_PRIME	346 13:48	346 20:00	0	1471	165	1637	3322	1685	0	119	37	1792	1873	81	345	15%	0
SP_176EA_C34HEFNON346_PRIME	346 20:00	347 02:03	0	0	0	0	3322	3322	0	163	36	199	463	263	264	57%	0

~650 Mb available to teams in the periods **above** the red line (until 2012-344T22:40:00)

A total of 2336 Mb can be collected in the period **below** the red line (GAPS 3-6)

- 15% currently being used by the VIMS and CIRS PIEs (VIMS=10%, CIRS=5%)
- 53% currently being used by MAPS teams
- 7% currently being used by engineering

340 Mb still available to ORS teams in the periods below the red line
[~700 Mb can be added by shrinking Gap 6 down to 2.5 hours and starting the G70 earlier]

Initial SMT and Data Volume

Beginning of Integration:

SMT Report (Team Summary)

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	342 20:02	343 17:17	54.0	40.1	0.0	5.4	0.0	26.7	45.9	0.0	100.1	0.0	0.0	0.0	88.8	361.0
SP_176EA_C34HEFNON343_PRIME	343 17:17	344 02:17	32.4	17.0	86.4	3.2	0.0	16.0	27.5	0.0	42.1	4.9	0.0	0.0	0.0	229.6
DAILY TOTAL SCIENCE	342 20:02	344 02:17	86.4	57.1	86.4	8.6	0.0	42.7	73.4	0.0	142.2	4.9	0.0	0.0	88.8	
OBSERVATION_NOR	344 02:17	344 13:40	41.0	21.5	28.8	14.2	300.0	20.2	34.8	0.0	53.3	30.8	36.0	0.0	47.6	628.1
SP_176EA_G70METNON344_PRIME	344 13:40	344 20:10	23.4	47.9	20.3	2.3	0.0	11.6	19.9	0.0	580.7	1.6	0.0	0.0	0.0	707.7
SP_176EA_C34HEFNON344_PRIME	344 20:10	344 22:40	9.0	4.7	27.0	0.9	0.0	4.4	7.7	0.0	39.1	1.4	0.0	0.0	0.0	94.2
DAILY TOTAL SCIENCE	344 02:17	344 22:40	73.4	74.1	76.1	17.4	300.0	36.2	62.4	0.0	673.0	33.8	36.0	0.0	47.6	
OBSERVATION_NOR	344 22:40	346 13:48	169.4	73.8	154.3	14.1	0.0	69.6	119.7	0.0	605.0	2.0	250.0	0.0	163.6	1621.5
SP_176EA_G70METNON346_PRIME	346 13:48	346 20:00	22.3	11.7	21.1	2.2	0.0	11.0	19.0	0.0	29.2	1.6	0.0	0.0	0.0	118.1
SP_176EA_C34HEFNON346_PRIME	346 20:00	347 02:03	21.8	11.4	65.3	2.2	0.0	10.8	18.5	0.0	28.5	3.3	0.0	0.0	0.0	161.8
DAILY TOTAL SCIENCE	344 22:40	347 02:03	213.5	96.9	240.7	18.5	0.0	91.4	157.2	0.0	662.7	6.9	250.0	0.0	163.6	

	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)	373.3	228.1	403.2	44.5	300.0	170.3	293.0	0.0	1478.0	45.6	286.0	0.0

Waypoint Selection

RBOT - Friendly

			POS_X	NEG_X	POS_Z	NEG_Z
SP_176NA_OBSERV343_NA	2012-342T20:02:00	2012-343T17:17:00	136.7/ 38.0	-----	-----	136.7/ 38.0
SP_176NA_OBSERV344_NA	2012-344T02:17:00	2012-344T13:40:00	-----	-----	-----	-----
SP_176NA_OBSERV345_NA	2012-344T22:40:00	2012-346T13:48:00	136.7/ 38.0	-----	136.7/ 38.0	-----

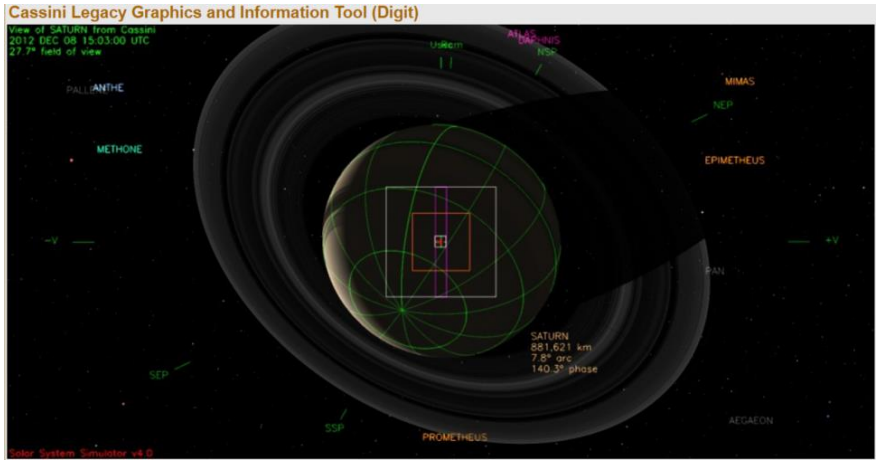
- Occ Port (NEG_Y (-20,0,0.109)) to Sun suggested for OBSERV344;
  For the rest of the time POS_X to 136.7/38.0 works well

- **NEG_Y to Saturn not safe from 2012-344T05:00:00 to 2012-344T09:30:00**
  - **GAPS 2a and 2b**
  - **ORS to Sun < 15° in Gap 2a (CIRS Operational FR Zone).**
  - **ORS to Sun < 12° in Gap 2b**

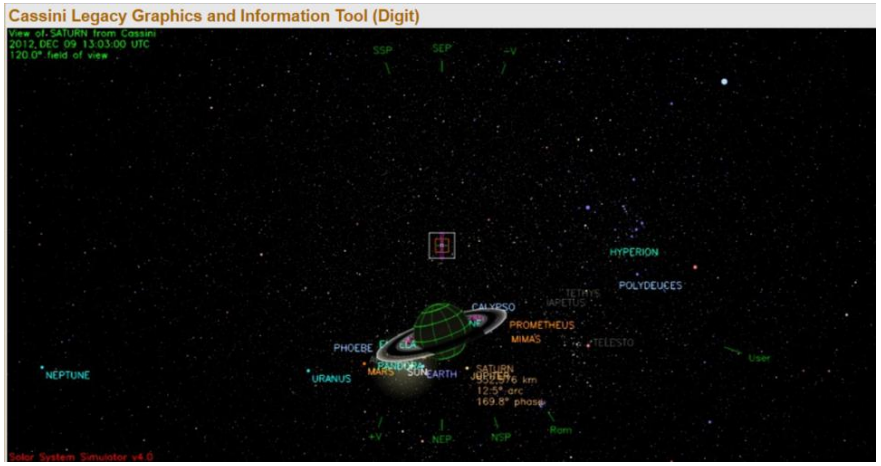
Minimum ORS to SUN angle is appx. 7.29°

Waypoints Chosen

Waypoint 1 (2012-342T20:42:00 – 2012-344T02:57:00): ISS_NAC to Saturn; NEG_Z to 136.7/38.0

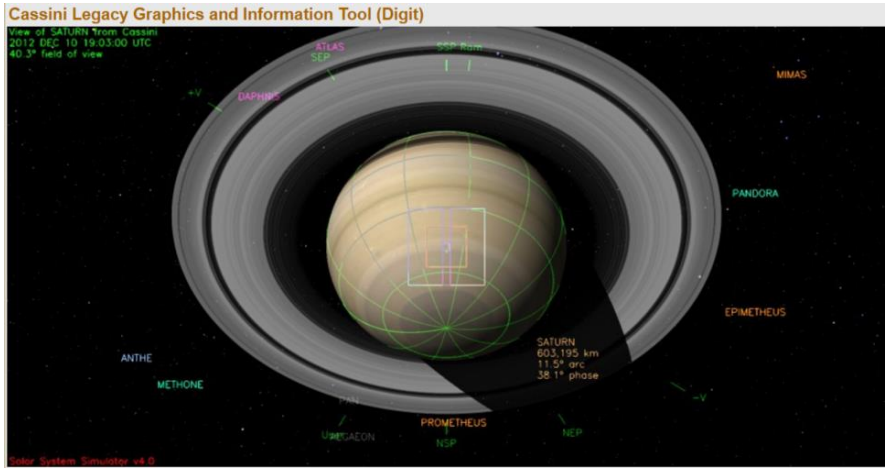


Waypoint 2 (2012-344T02:57:00 – 2012-344T23:20:00): UVIS_SOL_OFF to Sun; POS_Z to NEP



Waypoints Chosen

Waypoint 3 (2012-344T23:20:00 – 2012-346T09:43:00): ISS_NAC to Saturn; POS_Z to NSP



Notes & Liens

- Pointing
  - Waypturn444 has (fractionally) faster rates in PDT which will need to be modified in the spturn sasf.
  - RBOT friendly waypoints used wherever possible except:
    - Between 344T02:17:00 to 344T13:40:00 where no RBOT friendly waypoints existed.
    - The ISS_176EN_PLMHPMR001_PIE has a preferred secondary of NEG_X to NSP to align noise in the observation with the NAC- it simplifies data analysis; the waypoint secondary (and other preferred secondaries) were causing CIRS and VIMS radiator FR violations.
- DSN:
  - Due to the extended downtime of the Canberra 70m antenna (used in the original DSN plan), other stations in the nearest view period had to be substituted in the segment (hence the numerous handovers and strange pass durations).
  - Checked with NAV before moving the YGAP to occur after the downlink on DOY 344.
- Resource checker:
  - Gap in Prime SPASS requests between SP_176EA_DLTURN344_PRIME and SP_176EA_G70METNON344_PRIME. “Gap of 000T00:30:00 is greater than or equal to 60 seconds” – This gap is expected – it was unusable due to PIE and downlink timing and data volume restrictions. The Earth is obstructed from Cassini at this time by Saturn and its rings.
- Opmodes:
  - Unique opmodes: RSSP and RSSK used for the RSS USOPIM activity.
- Special Activities:
  - RSS has an activity (RSS_176EA_USOPIM001_RSS) on DOY 343, which currently requires a quiescent spacecraft (hence, there is no rolling during the first 3 hours of the downlink, with a slight preference for no-CDA articulation). However, since the USO is most likely gone, this activity maybe changed to an auxillary oscillator characterization. The Aus Osc has poor phase stability, so a quiescent spacecraft would not be required. If this change is made, it would be after the USO-DSTB test (expected to occur in early July).

    Due to these considerations, I have not opened a SPLAT item for CDA non-articulation during this period.
  - FSW uploads –AACS A8.9.0 flight software load activity is scheduled to happen starting ~DOY 342 (check with SCO).
  - A waiver will be required for VIMS_176SA_STRMLAT001_PRIME as it is within the 15 degree NEG_Y to Sun cone (see Pg5 of this package for details)

CMT Management: -Y to Sun violation

- -Y to Sun CMT Management and flight rule waivers will be needed for the ISS_PLMHPMR on DOY 344 during the solar occultation
  - Time of Saturn Solar Occultation is from the tour atlas.
  - Timing uncertainty is ± 1.1847 minutes as determined using Brad Wallis' "ask_carnac.pro" (using 7 minutes timing pad)