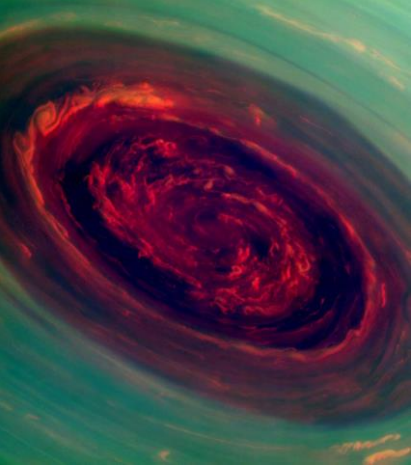

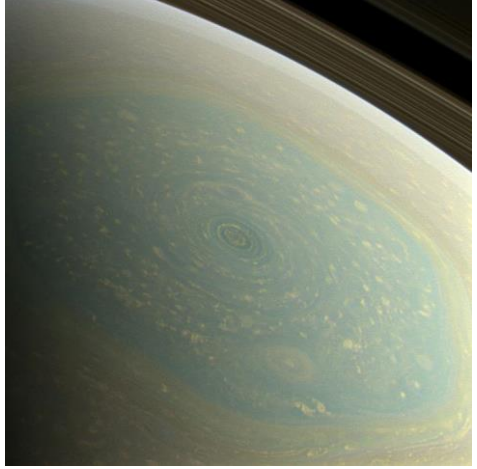
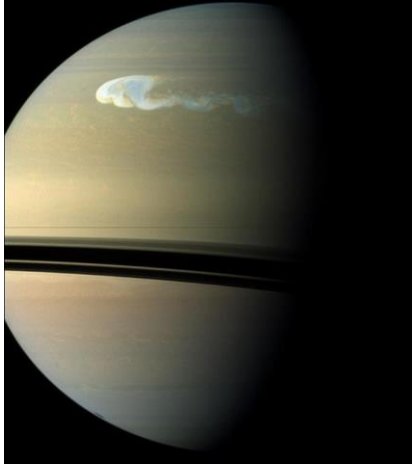

Science Planning & Sequence Team
CASSINI

SATURN TARGET WORKING TEAM

Rev 72_73 Segment Legacy Package

Segment Boundary: June 15, 2008 – June 22, 2008
2008-167T03:40:00 – 2008-174T03:09:00 (SCET)

Integration Began 11/03/2003
Segment Delivered to S41 Sequence 11/08/2004
Lead Integrator was Scott Edgington
Segment Updated/Revised by Chris Roumeliotis
Legacy Package Assembled by Keven Uchida

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

Segment Overview and Final Products

Segment Summary

- This was a ~7 day long Prime Mission segment encompassing both periapse and apoapse – it covered a broad range of sub-S/C latitudes and Saturn phase angles. Periapse was at a notably close range of 2.7 R_S.
- VIMS and ISS took the lead on a number of atmospheric studies: VIMS produced atmospheric mosaics of Saturn's North Pole and took a number (7) of dynamical movies, spread across the segment. ISS also led an atmospheric dynamical mapping observation. CIRS and VIMS performed several stellar occultation observations (Gamma Cru and Alpha Cen).
- There was also a generous amount of out-of-discipline studies in this segment: CIRS and ISS performed a number of icy satellite observations (Mimas, Rhea). ISS targeted a number of newly discovered small satellites to determine their orbits. CIRS performed ring scans. RSS conducted an ingress occultation (see page 11) at the time of periapse. There were four OPNAV satellite observations distributed throughout this segment.
- Initial science proposal oversubscribed the SSR by an enormous ~5 Gb, with VIMS being the greatest contributer. No info was given on how the cuts were specifically made, but oversubscription was eliminated by the time of the segment submission for sequencing.
- There were no ORS boresight constraints/issues in this segment.

Final Sequenced SPASS (1 of 2)

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End (SCET)	Primary	Secondary	Comments
SATURN revs 72/73 Segment		2008-167T03:40:00		006T23:29:00	2008-174T03:09:00			
NAV_072SK_OPNAV671_PRIME		2008-167T03:40:00		000T01:29:00	2008-167T05:09:00	ISS_NAC to Satellites	POS_X to NSP	Starts at Earth point, ends at NEW waypoint
NAV_072SA_WAYPTTURN671_PRIME		2008-167T05:09:00		000T00:01:00	2008-167T05:10:00	ISS_NAC to Saturn	NEG_Z to NSP	
NEW WAYPOINT		**2008-167T05:10:00**		**000T22:09:29**	**2008-168T03:19:29**	**ISS_NAC to Saturn**	**NEG_Z to NSP**	
CIRS_072RI_VERTULMP001_PRIME	C	2008-167T05:10:00		000T01:20:00	2008-167T06:30:00	CIRS_FP1 to Rings	NEG_Z to 183.5/51.0	
VIMS_072SA_DYNMOVIE001_PRIME		2008-167T06:30:00		000T04:35:00	2008-167T11:05:00	ISS_NAC to Saturn	NEG_Z to NSP	
VIMS_072ST_GAMCRUOCC001_PRIME		2008-167T11:05:00		000T01:55:00	2008-167T13:00:00	VIMS_IR to 187.791/-57.113	NEG_Z to NSP	
CIRS_072SA_NADIROCC008_PRIME		2008-167T13:00:00		000T03:00:00	2008-167T16:00:00	CIRS_FP3 to Saturn	NEG_Z to NSP	
VIMS_072SA_DYNMOVIE002_PRIME	M	2008-167T16:00:00		000T03:30:00	2008-167T19:30:00	ISS_NAC to Saturn	NEG_Z to NSP	
VIMS_072SA_ALPCENOCC001_PRIME	M	2008-167T19:30:00		000T01:00:00	2008-167T20:30:00	VIMS_IR to 219.901/-60.835	NEG_Z to NSP	
VIMS_072SA_DYNMOVIE003_PRIME	M, R	2008-167T20:30:00		000T05:42:00	2008-168T02:12:00	ISS_NAC to Saturn	NEG_Z to NSP	
SP_072EA_WAYPTTURN168_PRIME	E, R	2008-168T02:12:00		000T01:07:29	2008-168T03:19:29	XBAND to Earth	POS_X to 83.4/-55.2	SP Turn to Waypoint
NEW WAYPOINT		**2008-168T03:19:29**		**000T02:50:31**	**2008-168T06:10:00**	**XBAND to Earth**	**POS_X to 83.4/-55.2**	
SP_072EA_DEADTIME168_PRIME	**R**	**2008-168T03:19:29**		**000T00:15:00**	**2008-168T03:34:29**	**XBAND to Earth**	**POS_X to 83.4/-55.2**	**SP Turn to Waypoint**
RSS_072SA_OCCIN001_PRIME	M	2008-168T03:34:29	LMB_E072_SATURN_RSS_OCC_1_ING-000T00:24:01	000T02:02:00	2008-168T05:36:29	XBAND to Earth	POS_X to 83.4/-55.2	per Amand Hendrix Feb 01, 2005
Periapse R = 2.693 Rs, lat ...		2008-168T05:13:18		000T00:00:01	2008-168T05:13:19			
SP_072SA_DEADTIME168_PRIME	**M**	**2008-168T05:36:29**	**LMB_E072_SATURN_RSS_OCC_1_ING+000T0**	**000T00:14:31**	**2008-168T05:51:00**	**XBAND to Earth**	**POS_X to 83.4/-55.2**	**SP Turn to Waypoint**
SP_072SA_WAYPTTURN168_PRIME	M	2008-168T05:51:00		000T00:19:00	2008-168T06:10:00	ISS_NAC to Saturn (0.0,0.0,20.0 deg. offset)	POS_Z to NSP	SP Turn to Waypoint. Added a 20 deg offset about the z-axis in order to eliminate CIRS radiator heating.
NEW WAYPOINT		**2008-168T06:10:00**		**000T23:20:00**	**2008-169T05:30:00**	**ISS_NAC to Saturn (0.0,0.0,20.0 deg. offset)**	**POS_Z to NSP**	
CIRS_072SA_OCCLIMB006_PRIME	M	2008-168T06:10:00		000T00:40:00	2008-168T06:50:00	CIRS_FP4 to Saturn	NEG_X to 270.0/-40.0	MAG chosen 2nd axis.
ISS_072MI_MIDIECLN001_PRIME	C, M, U	2008-168T06:50:00		000T02:25:00	2008-168T09:15:00	CIRS_FP3 to Mimas (0.0,0.0,-0.143 deg. offset)	POS_X to 142.0/-27.0	FP3 to Mimas, POS_X to RA/Dec 142/-27. CIRS_FP1 to Dione at ~07:40
VIMS_072SA_DYNMOVIE004_PRIME	M	2008-168T09:15:00		000T02:30:00	2008-168T11:45:00	ISS_NAC to Saturn	POS_Z to NSP	
CIRS_072RI_TEMPL53MP001_PRIME	C, M	2008-168T11:45:00		000T03:00:00	2008-168T14:45:00	CIRS_FP1 to Rings	POS_Z to NEP	
VIMS_072SA_DYNMOVIE005_PRIME		2008-168T14:45:00		000T04:45:00	2008-168T19:30:00	ISS_NAC to Saturn	POS_Z to NSP	
CIRS_072SA_NADIROCC009_PRIME	R	2008-168T19:30:00		000T03:00:00	2008-168T22:30:00	CIRS_FP3 to Saturn	POS_Z to NSP	
SP_072EA_DLTURN168_PRIME	R	2008-168T22:30:00		000T00:30:00	2008-168T23:00:00	XBAND to Earth	NEG_X to NSP	SP Turn to Earth
SP_072EA_G70METNON168_PRIME	C, E, R	2008-168T23:00:00		000T06:00:00	2008-169T05:00:00	XBAND to Earth	NEG_X to NSP	Removed roll for RBOT (SCR-107881).
SP_072RH_WAYPTTURN169_PRIME	C	2008-169T05:00:00		000T00:30:00	2008-169T05:30:00	CIRS_FP3 to Rhea	NEG_X to NSP	SP Turn to Waypoint
NEW WAYPOINT		**2008-169T05:30:00**		**000T03:00:00**	**2008-169T08:30:00**	**CIRS_FP3 to Rhea**	**NEG_X to NSP**	
CIRS_072RH_RHEAORS001_PRIME	I, U	2008-169T05:30:00		000T02:30:00	2008-169T08:00:00	CIRS_FP3 to Rhea	NEG_X to North_Pole_Dir	
SP_072SA_WAYPTTURN169_PRIME	C	2008-169T08:00:00		000T00:30:00	2008-169T08:30:00	ISS_NAC to Saturn	POS_Z to NSP	SP Turn to Waypoint
NEW WAYPOINT		**2008-169T08:30:00**		**003T19:09:00**	**2008-173T03:39:00**	**ISS_NAC to Saturn**	**POS_Z to NSP**	
VIMS_072SA_DYNMOVIE006_PRIME		2008-169T08:30:00		000T03:30:00	2008-169T12:00:00	ISS_NAC to Saturn	POS_Z to NSP	
CIRS_072RI_VERTLLP001_PRIME	C	2008-169T12:00:00		000T03:55:00	2008-169T15:55:00	CIRS_FP1 to Rings	POS_Z to NSP	
ISS_072OT_RETMDRESA010_PRIME	C	2008-169T15:55:00		000T01:30:00	2008-169T17:25:00	ISS_NAC to Retargetable	PIC	
NAV_072SK_OPNAV691_PRIME	C, N	2008-169T17:25:00		000T00:59:00	2008-169T18:24:00	ISS_NAC to Satellites	POS_Z to NSP	Starts at waypoint, ends at Earth point
NAV_072EA_DLTURN691_PRIME	C	2008-169T18:24:00		000T00:01:00	2008-169T18:25:00	XBAND to Earth	NEG_X to NSP	

Final Sequenced SPASS (2 of 2)

Saturn_72_73 SPASS Continued

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End (SCET)	Primary	Secondary	Comments
SP_072EA_G34HEFNON169_PRIME	C	2008-169T18:25:00		000T09:00:00	2008-170T03:25:00	XBAND to Earth	3_Hr_Rolling	
NAV_072SK_OPNAV701_PRIME	N	2008-170T03:25:00		000T00:59:00	2008-170T04:24:00	ISS_NAC to Satellites	POS_Z to NSP	Starts at Earth point, ends at NEW waypoint
NAV_072SA_WAYPTTURN701_PRIME		2008-170T04:24:00		000T00:01:00	2008-170T04:25:00	ISS_NAC to Saturn	POS_Z to NSP	
ISS_072SA_ATMOPHASE001_PRIME	M	2008-170T04:25:00		000T09:00:00	2008-170T13:25:00	ISS_NAC to Saturn	POS_Z to NSP	Coordinate with VIMS?
VIMS_072SA_DYNMOVIE007_PRIME	M	2008-170T13:25:00		000T03:30:00	2008-170T16:55:00	ISS_NAC to Saturn	POS_Z to NSP	
ISS_072RH_RHEARPXLP001_PRIME	M, U, V	2008-170T16:55:00		000T01:00:00	2008-170T17:55:00	ISS_NAC to Rhea (0.246,-60.0,0.115 deg. offset)	POS_Z to North_Pole_Dir	ISS_NAC to Rhea (0.2464,-60, 0.1146) POS_Z to *RHEA* North_Pole_Dir
SP_072EA_DLTURN170_PRIME	M	2008-170T17:55:00		000T00:30:00	2008-170T18:25:00	XBAND to Earth	NEG_X to NSP	SP Turn to Earth
SP_072EA_G70METNON170_PRIME	C, E, M	2008-170T18:25:00		000T09:00:00	2008-171T03:25:00	XBAND to Earth	3_Hr_Rolling	Friction Test
SP_072SA_WAYPTTURN171_PRIME	M	2008-171T03:25:00		000T00:30:00	2008-171T03:55:00	ISS_NAC to Saturn	POS_Z to NSP	SP Turn to Waypoint
ISS_072ST_CALSTAR3001_PRIME	C, M	2008-171T03:55:00		000T12:00:00	2008-171T15:55:00	ISS_NAC to 49.84/3.37	POS_X to NSP	
ISS_072SA_ATMDYNA001_PRIME	M	2008-171T15:55:00		000T04:44:00	2008-171T20:39:00	ISS_WAC to Saturn	POS_Z to NSP	Coordinate with VIMS
Apoapse Per = 7.1 d, inc =...		2008-171T18:45:16		000T00:00:01	2008-171T18:45:17			
SP_073EA_DLTURN171_PRIME	M	2008-171T20:39:00		000T00:30:00	2008-171T21:09:00	XBAND to Earth	NEG_X to NSP	SP Turn to Earth
SP_073EA_G34BWGNON171_PRIME	C, M	2008-171T21:09:00		000T06:00:00	2008-172T03:09:00	XBAND to Earth	3_Hr_Rolling	
SP_073SA_WAYPTTURN172_PRIME	C, M	2008-172T03:09:00		000T00:30:00	2008-172T03:39:00	ISS_NAC to Saturn	POS_Z to NSP	SP Turn to Waypoint
ISS_073SA_ATMDYNA002_PRIME	M	2008-172T03:39:00		000T06:30:00	2008-172T10:09:00	ISS_NAC to Saturn	POS_Z to NSP	Coordinate with VIMS
CIRS_073RI_SUBMU17LP001_PRIME	C, M	2008-172T10:09:00		000T07:00:00	2008-172T17:09:00	CIRS_FP1 to Rings	POS_Z to NSP	
NAV_073SK_OPNAV721_PRIME	C, M	2008-172T17:09:00		000T00:59:00	2008-172T18:08:00	ISS_NAC to Satellites	POS_X to NEP	Starts at waypoint, ends at Earth point
NAV_073EA_DLTURN721_PRIME	C, M	2008-172T18:08:00		000T00:01:00	2008-172T18:09:00	XBAND to Earth	POS_X to NEP	
SP_073EA_G34HEFNON172_PRIME	C, M	2008-172T18:09:00		000T09:00:00	2008-173T03:09:00	XBAND to Earth	POS_X to NEP	
SP_073SA_WAYPTTURN173_PRIME	M	2008-173T03:09:00		000T00:30:00	2008-173T03:39:00	ISS_NAC to Saturn	POS_Z to Sun	SP Turn to Waypoint
NEW WAYPOINT		**2008-173T03:39:00**		**001T01:00:00**	**2008-174T04:39:00**	**ISS_NAC to Saturn**	**POS_Z to Sun**	
VIMS_073SA_ATMOS001_PRIME	C, M	2008-173T03:39:00		000T01:40:00	2008-173T05:19:00	VIMS_IR to Saturn	POS_Z to North_Pole_Dir	
CIRS_073RI_SUBMU25LP001_PRIME	M	2008-173T05:19:00		000T02:30:00	2008-173T07:49:00	CIRS_FP1 to Rings	POS_Z to Sun	
VIMS_073SA_ATMOS002_PRIME	C, M	2008-173T07:49:00		000T01:40:00	2008-173T09:29:00	VIMS_IR to Saturn	POS_Z to North_Pole_Dir	
CIRS_073RI_SUBMU25LP002_PRIME	M	2008-173T09:29:00		000T02:30:00	2008-173T11:59:00	CIRS_FP1 to Rings	POS_Z to Sun	
VIMS_073SA_ATMOS003_PRIME	C, M	2008-173T11:59:00		000T01:40:00	2008-173T13:39:00	VIMS_IR to Saturn	POS_Z to North_Pole_Dir	
CIRS_073RH_FP13STARE001_PRIME	M, U	2008-173T13:39:00		000T02:00:00	2008-173T15:39:00	CIRS_FP1 to Rhea	POS_Z to Sun	
CIRS_073TE_FP13STARE001_PRIME	I, M, R, U	2008-173T15:39:00		000T01:30:00	2008-173T17:09:00	CIRS_FP1 to Tethys	POS_Z to Sun	
NAV_073SK_OPNAV731_PRIME	M, R	2008-173T17:09:00		000T00:59:00	2008-173T18:08:00	ISS_NAC to Satellites	POS_Z to NSP	Starts at waypoint, ends at Earth point
NAV_073EA_DLTURN731_PRIME	M, R	2008-173T18:08:00		000T00:01:00	2008-173T18:09:00	XBAND to Earth (0.0,0.0,-37.0 deg. offset)	NEG_X to NEP	
SP_073EA_G70METNON173_PRIME	C, E, M, R	2008-173T18:09:00		000T09:00:00	2008-174T03:09:00	XBAND to Earth (0.0,0.0,-37.0 deg. offset)	NEG_X to NEP	

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 (%)	CAROVR (Mb)
SP_072EA_G70METNON168_PRIME	168 23:00	169 05:00	0	3320	183	3503	3498	-4	13	153	35	3700	2222	-1478	461	3% 1477
SP_072EA_G34HEFNON169_PRIME	169 18:25	170 03:25	1477	909	57	2443	3498	1054	9	236	53	2741	894	-1848	461	3% 1847
SP_072EA_G70METNON170_PRIME	170 18:25	171 03:25	1847	1127	63	3037	3498	461	18	271	53	3379	3709	330	570	4% 0
SP_073EA_G34BWGNON171_PRIME	171 21:09	172 03:09	0	1347	75	1422	3498	2075	0	174	35	1631	473	-1159	240	2% 1158
SP_073EA_G34HEFNON172_PRIME	172 18:09	173 03:09	1158	779	63	2000	3498	1497	9	380	53	2443	894	-1549	240	2% 1549
SP_073EA_G70METNON173_PRIME	173 18:09	174 03:09	1549	981	63	2593	3498	904	9	961	53	3616	3765	148	240	2% 0

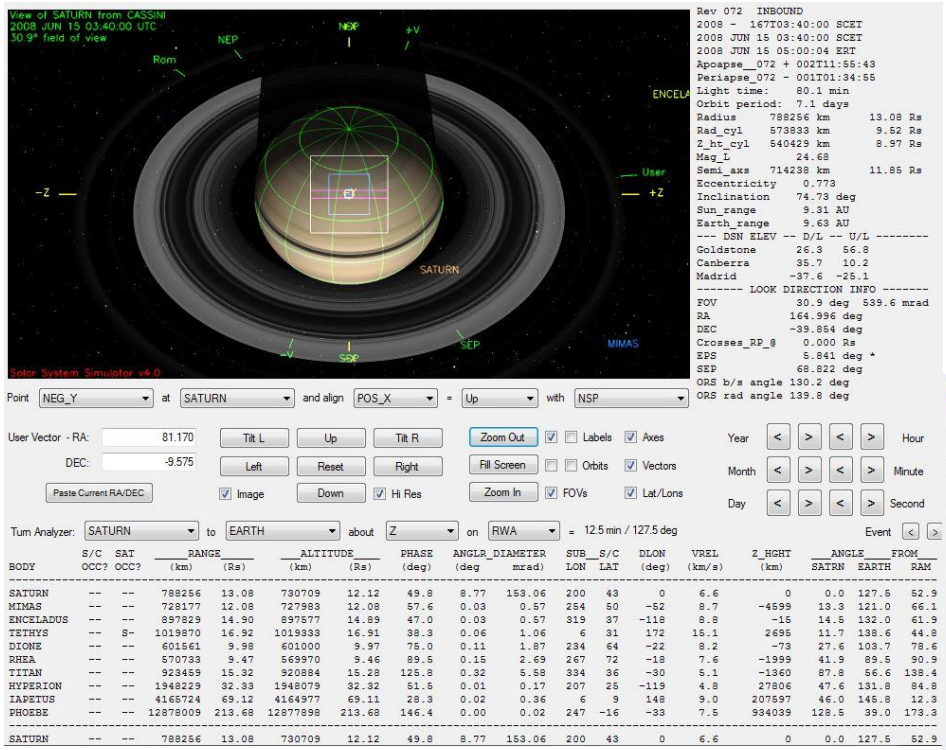
See Note 1

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	167 03:40	168 23:00	375.8	71.1	193.2	15.9	100.0	198.9	166.2	0.0	1600.9	37.2	520.9	0.0	35.4	3315.5
OBSERVATION_OPN	167 03:40	168 23:00	0.0	0.0	0.0	0.0	13.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.1
OBSERVATION_SI	167 03:40	168 23:00	0.0	0.0	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5
SP_072EA_G70METNON168_PRIME	168 23:00	169 05:00	21.6	6.5	54.0	1.1	0.0	13.0	25.9	0.0	28.3	1.6	0.0	0.0	0.0	152.0
DAILY TOTAL SCIENCE	167 03:40	169 05:00	397.4	77.6	256.7	17.0	100.0	211.8	192.1	0.0	1629.2	38.9	520.9	0.0		
OBSERVATION_NOR	169 05:00	169 18:25	48.3	14.5	103.9	2.4	325.7	29.0	58.0	0.0	63.3	38.5	210.0	0.0	11.0	904.5
OBSERVATION_OPN	169 05:00	169 18:25	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
OBSERVATION_SI	169 05:00	169 18:25	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5
SP_072EA_G34HEFNON169_PRIME	169 18:25	170 03:25	32.4	9.7	86.4	1.6	0.0	19.4	38.9	0.0	42.4	2.5	0.0	0.0	0.0	233.4
DAILY TOTAL SCIENCE	169 05:00	170 03:25	80.7	24.2	197.8	4.0	325.7	48.4	96.8	0.0	105.7	41.0	210.0	0.0		
OBSERVATION_NOR	170 03:25	170 18:25	84.7	20.7	0.0	2.7	600.0	32.4	64.8	0.0	70.7	15.4	225.0	0.0	12.3	1128.7
OBSERVATION_OPN	170 03:25	170 18:25	0.0	0.0	0.0	0.0	17.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.4
SP_072EA_G70METNON170_PRIME	170 18:25	171 03:25	32.4	15.4	115.2	1.6	0.0	19.4	39.6	0.0	42.4	2.5	0.0	0.0	0.0	268.6
DAILY TOTAL SCIENCE	170 03:25	171 03:25	117.1	36.1	115.2	4.3	600.0	51.8	104.4	0.0	113.2	17.9	225.0	0.0		
OBSERVATION_NOR	171 03:25	171 21:09	186.7	33.5	146.9	3.2	740.0	63.1	78.2	0.0	83.6	0.0	0.0	0.0	14.5	1349.7
SP_073EA_G34BWGNON171_PRIME	171 21:09	172 03:09	21.6	11.3	60.3	1.1	0.0	21.3	26.5	0.0	28.3	1.6	0.0	0.0	0.0	172.0
DAILY TOTAL SCIENCE	171 03:25	172 03:09	208.3	44.8	207.2	4.3	740.0	84.4	104.7	0.0	111.9	1.6	0.0	0.0		
OBSERVATION_NOR	172 03:09	172 18:09	54.0	28.3	122.4	2.7	360.0	53.4	66.2	0.0	70.7	0.0	0.0	0.0	12.3	770.0
OBSERVATION_OPN	172 03:09	172 18:09	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
OBSERVATION_SI	172 03:09	172 18:09	0.0	0.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0
SP_073EA_G34HEFNON172_PRIME	172 18:09	173 03:09	155.3	17.0	86.4	1.6	0.0	32.0	39.7	0.0	42.4	2.5	0.0	0.0	0.0	376.9
DAILY TOTAL SCIENCE	172 03:09	173 03:09	209.3	45.3	222.8	4.3	360.0	85.4	105.9	0.0	113.2	2.5	0.0	0.0		

NOTE 1: Negative SSR (P4) Margins did not result in data loss due to compression/under-utilization

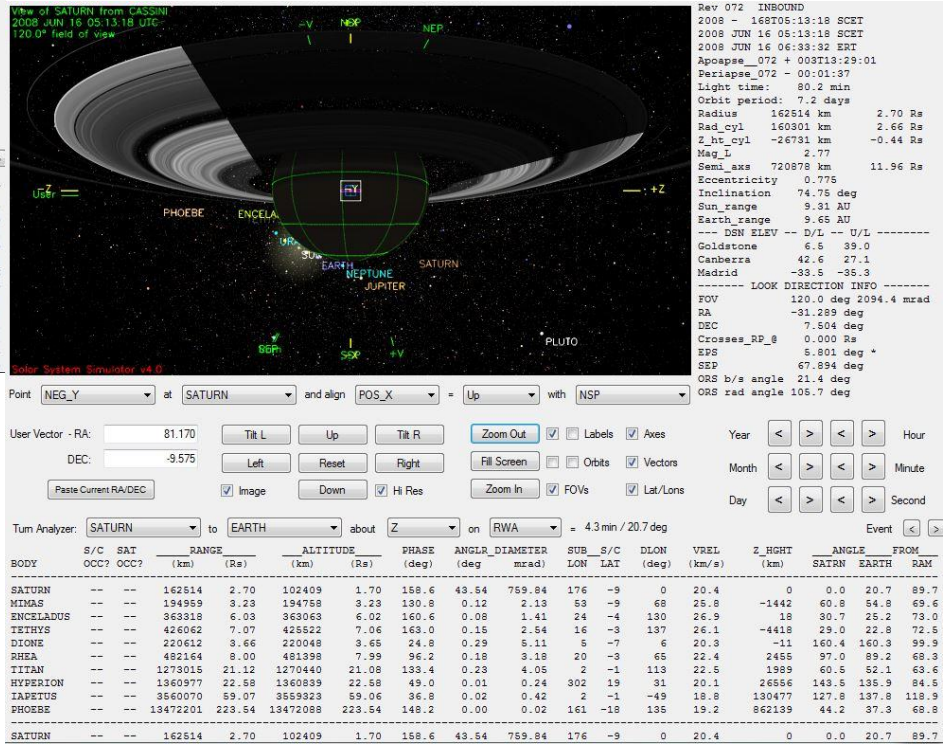
Segment Geometry



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	--	--	788256	13.08	730709	12.12	49.8	8.77	153.06	200	43	0	6.6	0	0.0	127.5	52.9
MIMAS	--	--	728177	12.08	727983	12.08	57.6	0.03	0.57	254	50	-52	8.7	-4599	13.3	121.0	66.1
ENCELADUS	--	--	897829	14.90	897577	14.89	47.0	0.03	0.57	319	37	-118	8.8	-15	14.5	132.0	61.9
TETHYS	--	S-	1019870	16.92	1019333	16.91	38.3	0.06	1.06	6	31	172	15.1	2695	11.7	138.6	44.8
DIONE	--	--	601561	9.98	601000	9.97	75.0	0.11	1.87	234	64	-22	8.2	-73	27.6	103.7	78.6
RHEA	--	--	570733	9.47	569970	9.46	89.5	0.15	2.69	267	72	-18	7.6	-1999	41.9	89.5	90.9
TITAN	--	--	923459	15.32	920884	15.28	125.8	0.32	5.58	334	36	-30	5.1	-1360	87.8	56.6	138.4
HYPERION	--	--	1948229	32.33	1948079	32.32	51.5	0.01	0.17	207	25	-119	4.8	27806	47.6	131.8	84.8
IAPETUS	--	--	4165724	69.12	4164977	69.11	28.3	0.02	0.36	6	9	148	9.0	207597	46.0	145.8	12.3
PHOEBE	--	--	12878009	213.68	12877898	213.68	146.4	0.00	0.02	247	-16	-33	7.5	934039	128.5	39.0	173.3
SATURN	--	--	788256	13.08	730709	12.12	49.8	8.77	153.06	200	43	0	6.6	0	0.0	127.5	52.9

← Seg Start (Left)
2008-167T03:40:00

↓ Periapse (below)
2008-168T05:13:18

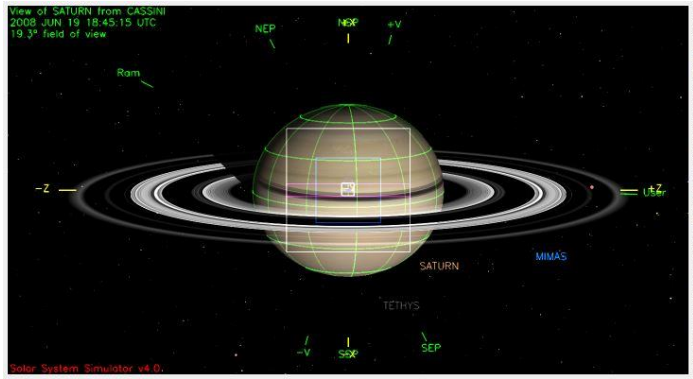


BODY	S/C OCC?	SAT OCC?	RANGE (km)	RANGE (Rs)	ALTITUDE (km)	ALTITUDE (Rs)	PHASE (deg)	ANGLR_DIAMETER (deg)	ANGLR_DIAMETER mrad	SUB_S/C LON	SUB_S/C LAT	DLON (deg)	VREL (km/s)	Z_HGHT (km)	ANGLE_FROM SATRN	ANGLE_FROM EARTH	ANGLE_FROM RAM
SATURN	--	--	162514	2.70	102409	1.70	158.6	43.54	759.84	176	-9	0	20.4	0	0.0	20.7	89.7
MIMAS	--	--	194959	3.23	194758	3.23	130.8	0.12	2.13	53	-9	68	25.8	-1442	60.8	54.8	69.6
ENCELADUS	--	--	363318	6.03	363063	6.02	160.6	0.08	1.41	24	-4	130	26.9	18	30.7	25.2	73.0
TETHYS	--	--	426062	7.07	425522	7.06	163.0	0.15	2.54	16	-3	137	26.1	-4418	29.0	22.8	72.5
DIONE	--	--	220612	3.66	220048	3.65	24.8	0.29	5.11	5	-7	6	20.3	-11	160.4	160.3	99.9
RHEA	--	--	482164	8.00	481398	7.99	96.2	0.18	3.18	20	-3	65	22.4	2455	97.0	89.2	68.3
TITAN	--	--	1273015	21.12	1270440	21.08	133.4	0.23	4.05	2	-1	113	22.5	1989	60.5	52.1	63.6
HYPERION	--	--	1360977	22.58	1360839	22.58	49.0	0.01	0.24	302	19	31	20.1	26556	143.5	135.9	84.5
IAPETUS	--	--	3560070	59.07	3559323	59.06	36.8	0.02	0.42	2	-1	-49	18.8	130477	127.8	137.8	118.9
PHOEBE	--	--	13472201	223.54	13472088	223.54	148.2	0.00	0.02	161	-18	135	19.2	862139	44.2	37.3	68.8
SATURN	--	--	162514	2.70	102409	1.70	158.6	43.54	759.84	176	-9	0	20.4	0	0.0	20.7	89.7

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	13.08	49.8	+43
Periapse	2.70	158.6	–9
Apoapse	21.01	21.8	+10
Segment End	14.11	46.3	+40

Segment Geometry

Apoapse
2008-171T18:45:15




```
Rev 072 OUTBOUND
2008 - 171T18:45:15 SCET
2008 JUN 19 18:45:15 SCET
2008 JUN 19 20:05:52 ERT
Apoapse__072 + 007T03:00:58
Periapse_072 + 003T13:30:20
Light time:    80.6 min
Orbit period:  7.1 days
Radius     1266238 km      21.01 Rs
Rad_cyl    1246879 km      20.69 Rs
Z_ht_cyl    220569 km       3.66 Rs
Mag_L          21.67
Semi_axs    714289 km      11.85 Rs
Eccentricity    0.773
Inclination    74.75 deg
Sun_range       9.30 AU
Earth_range     9.69 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone      28.6   -4.0
Canberra      -58.7   -61.4
Madrid         38.1    60.3
------- LOOK DIRECTION INFO -------
FOV            19.3 deg  336.3 mrad
RA            148.872 deg
DEC            -8.054 deg
Crosses_RP_@    0.000 Rs
EPS             5.669 deg *
SEP            64.757 deg
ORS b/s angle 158.2 deg
ORS rad angle 106.2 deg
```

Point NEG_Y at SATURN and align POS_X = Up with NSP

User Vector - RA: 81.170 DEC: -9.575 Paste Current RA/DEC

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

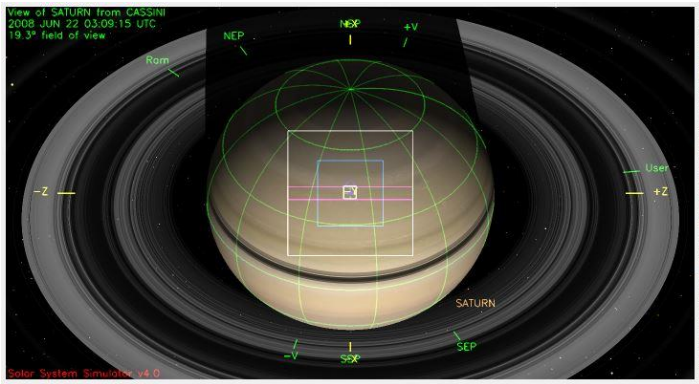
Zoom Out | Fill Screen | Zoom In | Labels | Orbits | FOVs | Axes | Vectors | Lat/Lons

Year / Month / Day — Hour / Minute / Second

Turn Analyzer: SATURN to EARTH about Z on RWA = 14.8 min / 158.9 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 SATURN	ANGLE FROM EARTH	ANGLE FROM RAM
SATURN	--	--	1266238	21.01	1206142	20.01	21.8	5.46	95.23	5	10	0	2.6	0	0.0	158.9	90.0
MIMAS	--	--	1117224	18.54	1117022	18.53	26.6	0.02	0.37	221	13	-33	13.5	-5123	5.5	154.8	95.4
ENCELADUS	--	--	1304795	21.65	1304544	21.65	16.6	0.02	0.39	80	10	94	13.4	-3	10.4	161.2	80.7
TETHYS	--	--	978268	16.23	977729	16.22	24.7	0.06	1.10	185	12	-3	11.0	-1199	3.2	155.7	92.3
DIONE	--	--	1240186	20.58	1239625	20.57	17.0	0.05	0.91	85	10	77	10.6	121	17.2	159.1	75.1
RHEA	--	--	928000	15.40	927237	15.39	41.0	0.09	1.65	243	14	-39	8.1	-1562	21.5	141.8	110.7
TITAN	--	--	2400028	39.82	2397453	39.78	32.8	0.12	2.15	339	5	-147	6.3	8005	17.1	150.8	102.4
HYPERION	--	--	2523547	41.87	2523392	41.87	11.7	0.01	0.13	165	-23	147	6.8	5606	18.0	163.9	72.5
IAPETUS	--	--	4365726	72.44	4364979	72.43	36.1	0.02	0.34	18	6	116	5.0	-130938	48.7	138.2	47.1
PHOEBE	--	--	12367863	205.21	12367752	205.21	146.5	0.00	0.02	239	-16	-43	4.0	620681	133.1	38.7	133.0
SATURN	--	--	1266238	21.01	1206142	20.01	21.8	5.46	95.23	5	10	0	2.6	0	0.0	158.9	90.0

Segment End
2008-174T03:09:00




```
Rev 073  INBOUND
2008 - 174T03:09:15 SCET
2008 JUN 22 03:09:15 SCET
2008 JUN 22 04:30:11 ERT
Apoapse__073 + 002T08:22:03
Periapse_073 - 001T05:10:33
Light time:    80.9 min
Orbit period:  7.1 days
Radius     850541 km      14.11 Rs
Rad_cyl    653914 km      10.85 Rs
Z_ht_cyl   543890 km       9.02 Rs
Mag_L          23.88
Semi_axs   714188 km      11.85 Rs
Eccentricity    0.773
Inclination    74.75 deg
Sun_range       9.31 AU
Earth_range     9.73 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone      27.0    57.6
Canberra       35.4     9.2
Madrid        -37.8   -24.5
------- LOOK DIRECTION INFO -------
FOV            19.3 deg  336.3 mrad
RA            162.642 deg
DEC           -36.529 deg
Crosses_RP_@    0.000 Rs
EPS             5.567 deg *
SEP            62.687 deg
ORS b/s angle 133.7 deg
ORS rad angle 136.0 deg
```

Point NEG_Y at SATURN and align POS_X = Up with NSP

User Vector - RA: 81.170 DEC: -9.575 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

Turn Analyzer: SATURN to EARTH about Z on RWA = 12.8 min / 131.3 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 SATURN	ANGLE FROM EARTH	ANGLE FROM RAM
SATURN	--	--	850541	14.11	792634	13.15	46.3	8.13	141.84	100	40	0	6.0	0	0.0	131.3	54.7
MIMAS	--	--	985265	16.35	985064	16.34	39.6	0.02	0.42	18	35	156	18.7	4995	7.8	137.5	47.6
ENCELADUS	--	--	1028809	17.07	1028555	17.07	39.8	0.03	0.50	345	32	-153	12.6	-25	9.7	138.7	56.0
TETHYS	--	--	868793	14.42	868263	14.41	53.2	0.07	1.24	287	38	-81	5.4	-5502	19.7	126.7	72.5
DIONE	--	--	1111581	18.44	1111019	18.43	37.2	0.06	1.01	27	29	139	15.3	101	16.1	138.8	38.7
RHEA	--	--	1248791	20.72	1248025	20.71	34.2	0.07	1.23	23	26	144	13.6	1183	19.3	141.6	35.6
TITAN	--	--	1982295	32.89	1979720	32.85	22.2	0.15	2.60	1	16	173	9.4	4607	24.3	154.7	40.1
HYPERION	--	--	1784630	29.61	1784506	29.61	50.2	0.01	0.18	288	-40	110	11.5	-13811	46.9	124.1	18.3
IAPETUS	--	--	4062509	67.41	4061762	67.40	53.5	0.02	0.37	11	9	117	9.1	-299241	55.5	120.8	16.5
PHOEBE	--	--	12640536	209.74	12640427	209.74	150.7	0.00	0.02	273	-15	-31	7.0	460906	130.1	34.4	170.0
SATURN	--	--	850541	14.11	792634	13.15	46.3	8.13	141.84	100	40	0	6.0	0	0.0	131.3	54.7

Solar Geometry – ORS Boresight Concerns

No ORS Boresight Solar Constraints on Science Pointing Noted

Monday, June 16 (DOY 168):
The Cassini Radio Science (RSS) orbit 72 Saturn atmospheric occultation observation was completed in the early hours of the morning today. The purpose of the activity was to observe the ingress to Saturn's ionosphere and atmosphere to measure vertical profiles of electron density in the ionosphere, and density, pressure, and temperature in the neutral atmosphere. Antennas at the Goldstone, Canberra and Narrabri complexes supported the experiment. Goldstone's DSS-14, 25 and 26 and Narrabri's DSS-47 provided partial support, while Canberra's DSS-43 and DSS-34 covered the entire experiment. This was the first time ever that four antennas tracked Ka-band simultaneously: DSS-25, 26, 34 and 47. Previously, three was the most to support this type of activity. RSS has one more science observation in the Cassini prime mission, the orbit 73 atmospheric occultation on DOY 175 (June 23) over Canberra and Narrabri.

Thursday, June 19 (DOY 171)
ISS began observations on DOY 171 by conducting a photometric stellar calibration. As the spacecraft approached apoapse, ISS imaged Saturn atmospheric dynamics using the narrow- and wide-angle cameras. Meanwhile, Magnetospheric and Plasma Science (MAPS) teams added more data to their ongoing campaign to image the dynamics of Saturn's inner magnetosphere.

Segment Integration Planning

Timeline Gaps and Suggested Observations

Rev 72 Strawman v0.5

Request	Start Time	Epoch Relative Start Time	Duration	EndTime	Effective Rate	Data Volume	SPASS Type	Primary Pointing	Secondary Pointing	Agreement
SP_072NA_SATURNSEG167_NA	2008-167T03:40:00		007T18:20:00	2008-174T22:00:00	0	0	SPASS Note			
CIRS_072SA_NADAROCCxxx_PRIME	2008-167T11:30:00		000T03:00:00	2008-167T14:30:00	4000	79.2	Prime			
Deadtime			000T00:15:00							
RSS_072SA_OCCIN001_PRIME	2008-168T01:51:00		000T02:02:00	2008-168T03:53:00	0	0	Prime			
Deadtime			000T00:15:00							
CIRS_072SA_OCCLIMB006_PRIME	2008-168T04:30:00		000T00:30:00	2008-168T05:00:00	4000	7.2	Prime			
Mimas	2008-168T05:00:00		000T02:00:00	2008-168T07:00:00						
Dione	2008-168T07:00:00		000T02:15:00	2008-168T09:15:00						
CIRS_072SA_NADAROCCxxx_PRIME	2008-168T19:30:00		000T03:00:00	2008-168T22:30:00	4000	79.2	Prime			
SP_Turn	2008-168T22:30:00		000T00:30:00	2008-168T23:00:00						
SP_072EA_G70METNON168_PRIME	2008-168T23:00:00		000T06:00:00	2008-169T05:00:00?	0	0	Prime	XBAND to Earth		
SP_072EA_G34HEFNON169_PRIME	2008-169T18:25:00		000T09:00:00	2008-170T03:25:00	0	0	Prime	XBAND to Earth		
SP_072EA_G34HEFNON170_PRIME	2008-170T18:25:00		000T09:00:00	2008-171T03:25:00	0	0	Prime	XBAND to Earth		
SP_073EA_G34BWGNON171_PRIME	2008-171T18:09:00		000T09:00:00	2008-172T03:09:00	0	0	Prime	XBAND to Earth		
SP_073EA_G34HEFNON172_PRIME	2008-172T18:09:00		000T09:00:00	2008-173T03:09:00	0	0	Prime	XBAND to Earth		

Initial SMT and Data Volume

Beginning of Integration:

Rev 72 Data Volumes

DATA VOLUME SUMMARY

			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)	MARGIN (Mb)	MARGIN (%)	OPNAV (Mb)	SCI (Mb)	ENGR (Mb)	TOTAL (Mb)	CPACTY (Mb)	MARGIN (Mb)	MARGIN (%)	CAROVR (Mb)
SP_072EA_G70METNON168_PRIME	168 23:00	169 05:00	0	8504	151	8655	3516	-5139	-146%	26	153	35	3731	2076	-1655	-80%	1655
SP_072EA_G34HEFNON169_PRIME	169 18:25	170 03:25	1655	869	47	2571	3534	963	27%	17	230	53	2871	911	-1960	-215%	1960
SP_072EA_G70METNON170_PRIME	170 18:25	171 03:25	1960	1015	52	3028	3534	506	14%	17	231	53	3329	3495	166	5%	0
SP_073EA_G34BWGNON171_PRIME	171 21:09	172 03:09	0	1020	62	1081	3568	2487	70%	0	168	35	1285	473	-812	-172%	812
SP_073EA_G70METNON172_PRIME	172 18:09	173 03:09	812	750	52	1614	3531	1917	54%	17	214	53	1899	3434	1535	45%	0

Legacy Note: Initial data volume requests oversubscribed the SSR by 5.1 Gb. Cuts were subsequently made and the negative margin was eliminated before delivery for sequencing.

Initial SMT and Data Volume

Beginning of Integration:

Rev 72 Data Volumes

DATA VOLUME REPORT

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	167 03:40	168 23:00	1047.0	30.7	286.1	18.6	176.2	198.9	217.7	0.0	1553.4	15.4	4951.9	0.0	0.0	8495.8
OBSERVATION_OPN	167 03:40	168 23:00	0.0	0.0	0.0	0.0	26.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.1
OBSERVATION_SI	167 03:40	168 23:00	0.0	0.0	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.5
SP_072EA_G70METNON168_PRIME	168 23:00	169 05:00	21.6	4.3	57.6	1.1	0.0	13.0	25.9	0.0	28.3	1.6	0.0	0.0	0.0	153.4
DAILY TOTAL SCIENCE	167 03:40	169 05:00	1068.6	35.0	352.2	19.7	176.2	211.8	243.6	0.0	1581.7	17.0	4951.9	0.0		
OBSERVATION_NOR	169 05:00	169 18:25	48.3	9.6	103.9	2.4	325.7	29.0	58.0	0.0	63.3	9.1	210.0	0.0	0.0	859.3
OBSERVATION_OPN	169 05:00	169 18:25	0.0	0.0	0.0	0.0	17.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.4
OBSERVATION_SI	169 05:00	169 18:25	0.0	0.0	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5
SP_072EA_G34HEFNON169_PRIME	169 18:25	170 03:25	32.4	6.5	86.4	1.6	0.0	19.4	38.9	0.0	42.4	2.5	0.0	0.0	0.0	230.1
DAILY TOTAL SCIENCE	169 05:00	170 03:25	80.7	16.1	199.8	4.0	325.7	48.4	96.8	0.0	105.7	11.5	210.0	0.0		
OBSERVATION_NOR	170 03:25	170 18:25	54.0	10.8	0.0	2.7	510.0	32.4	64.8	0.0	70.7	0.0	270.0	0.0	0.0	1015.4
OBSERVATION_OPN	170 03:25	170 18:25	0.0	0.0	0.0	0.0	17.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.4
SP_072EA_G70METNON170_PRIME	170 18:25	171 03:25	32.4	6.5	86.4	1.6	0.0	19.4	39.6	0.0	42.4	2.5	0.0	0.0	0.0	230.9
DAILY TOTAL SCIENCE	170 03:25	171 03:25	86.4	17.2	86.4	4.3	510.0	51.8	104.4	0.0	113.2	2.5	270.0	0.0		
OBSERVATION_NOR	171 03:25	171 21:09	63.8	12.4	0.0	3.2	740.0	38.3	78.2	0.0	83.6	0.0	0.0	0.0	0.0	1019.6
SP_073EA_G34BWGNON171_PRIME	171 21:09	172 03:09	21.6	4.3	72.0	1.1	0.0	13.0	26.5	0.0	28.3	1.6	0.0	0.0	0.0	168.4
DAILY TOTAL SCIENCE	171 03:25	172 03:09	85.4	16.7	72.0	4.3	740.0	51.3	104.7	0.0	111.9	1.6	0.0	0.0		
OBSERVATION_NOR	172 03:09	172 18:09	54.0	10.8	139.0	2.7	360.0	32.4	66.2	0.0	70.7	0.0	0.0	0.0	0.0	735.8
OBSERVATION_OPN	172 03:09	172 18:09	0.0	0.0	0.0	0.0	17.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.4
OBSERVATION_SI	172 03:09	172 18:09	0.0	0.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0
SP_073EA_G70METNON172_PRIME	172 18:09	173 03:09	32.4	6.5	69.8	1.6	0.0	19.4	39.7	0.0	42.4	2.5	0.0	0.0	0.0	214.4
DAILY TOTAL SCIENCE	172 03:09	173 03:09	86.4	17.2	222.8	4.3	360.0	51.8	105.9	0.0	113.2	2.5	0.0	0.0		

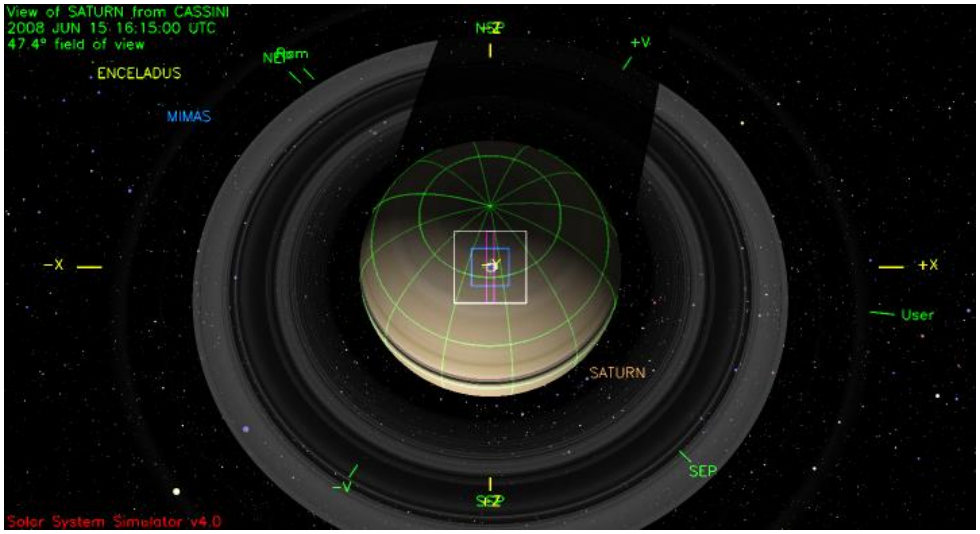
	CAPS (Mb)	CDA (Mb)	CIRS (Mb)	INMS (Mb)	ISS (Mb)	MAG (Mb)	MIMI (Mb)	RADAR (Mb)	RPWS (Mb)	UVIS (Mb)	VIMS (Mb)	PROBE (Mb)
TOTAL RECORDED (OPNAV data not included)	1407.5	102.3	933.2	36.6	2111.9	415.2	655.5	0.0	2025.7	35.1	5431.9	0.0

Waypoint Selection

No Waypoint Selection Info Available

Waypoints Chosen (1 of 3)

Waypoint 1 (2008-167T05:10:00 – 168T03:19:29): NEG_Y to Saturn, Neg_Z to NSP

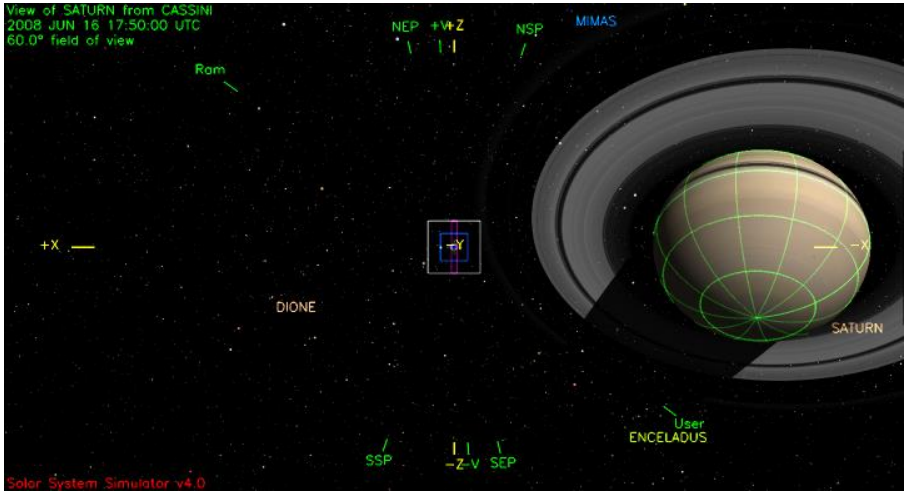


Waypoint 2 (2008-168T03:19:29 – 168T06:10:00): XBAND to Earth, POS_X to 83.4/55.2

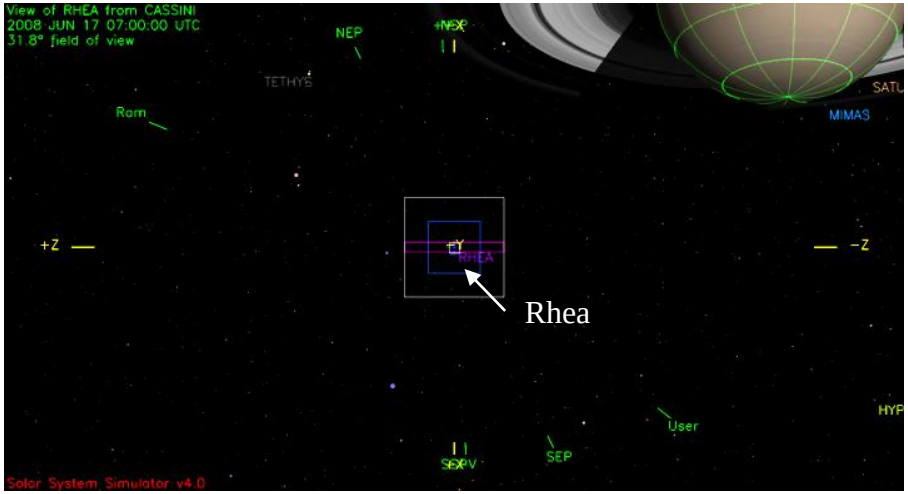
Not shown here since ORS is not pointed toward any body in this period.

Waypoints Chosen (2 of 3)

Waypoint 3 (2008-168T06:10:00 – 169T05:30:00): NEG_Y to Saturn (0,0,+20), POS_Z to NSP

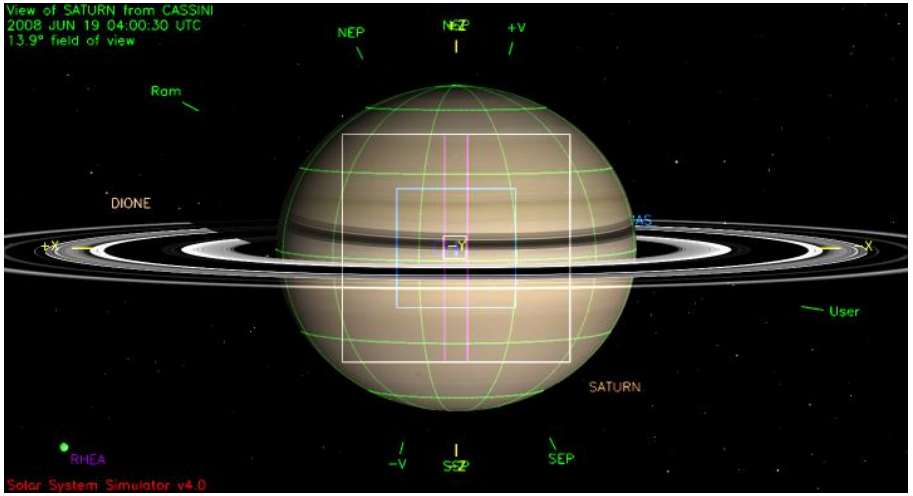


Waypoint 4 (2008-169T05:30:00 – 169T08:30:00): CIRS_FP3 to Rhea, NEG_X to NSP

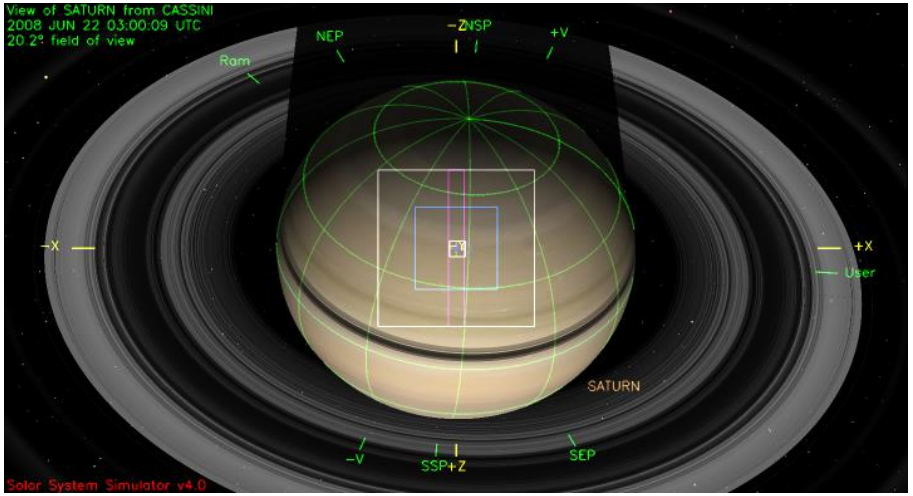


Waypoints Chosen

Waypoint 5 (2008-169T08:30:00 – 173T03:39:00): NEG_Y to Saturn, POS_Z to NSP



Waypoint 6 (2008-173T03:39:00 – 174T04:39:00): NEG_Y to Saturn, POS_Z to Sun



Saturn Rev 072/073 Open Issues and Liens

- **Pointing Issues**
  - None
- **Data Volume Issues**
  - The version of SMT used does not apply the latest margin policy. We'll deal when implemented.
- **Telemetry Mode Issues**
  - None
- **CIMS Issues**
  - None
- **Power/OPMODE Issues**
  - INMS will be asleep and ISS WAC will be off during the RSS Gravity Pass and Saturn Occ periods
- **Flight Rule/Mission Planning Guideline and Constraint Issues**
  - Not checked
- **Other Issues**
  - Special activities requiring special attention include the RSS occultation. This involves a ground movable block update.
  - RSS will need to update DSN Pass parameters for RSS occultation.

Saturn Rev 072/073 Open Issues and Liens Continued

- **Outstanding Issues**
  - MAPS teams have requested a waypoint for the last day (173) with pointing at ISS_NAC to Saturn, POS_Z to SUN to assist them with science collection. During this waypoint, CIRS and VIMS have prime observations with secondary pointing at POS_Z to NSP. We would like to change some of the secondary pointing to POS_Z to SUN to accommodate MAPS science.
  - ISS has requested to avoid eliminating ISS_073OT_RETMDRESA031_PRIME request on day 173 which was removed by the most recent CCR. If ISS still feels strongly about this, we would need a consensus from the TWT in order to salvage all or a portion of this request.