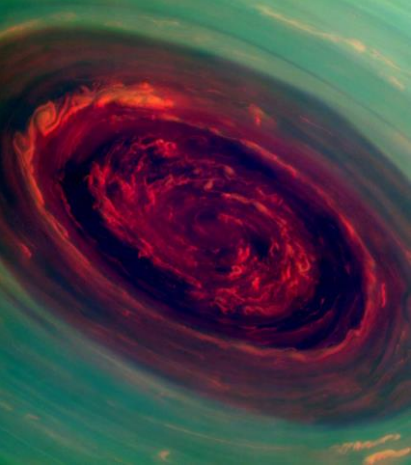
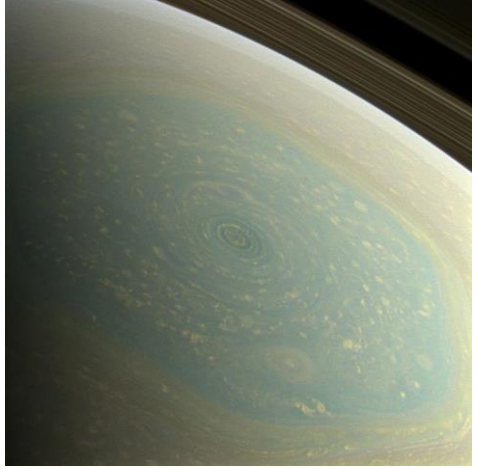
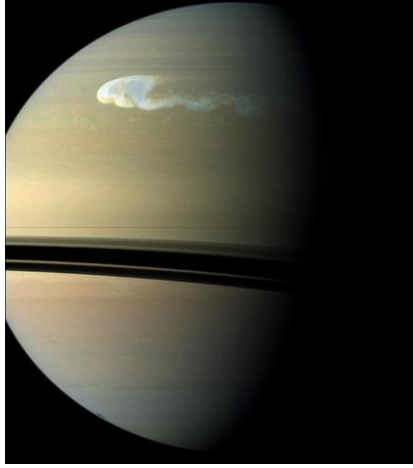


Science Planning & Sequence Team
CASSINI

SATURN TARGET WORKING TEAM

Rev 97 Segment Legacy Package

Segment Boundary: December 13, 2008 – December 20, 2008
2008-348T23:13 – 2008-355T16:29 (SCET)

Integration Began 11/19/2007
Segment Delivered to S46 Sequence 06/02/2008
Lead Integrator was Barbara Larsen

Legacy Package Assembled by Kyle Cloutier

Table of Contents

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

Segment Overview and Final Products

Segment Summary

- Saturn 97 is a periapse segment in the Equinox extended mission. The orbit geometry of this rev is highly inclined, and covers a large range of latitudes, including great views of both poles.

- Just before Periapse, RADAR maps the North Pole. Just after Periapse, RADAR maps the South Pole. There are multiple VIMS hi-res pole mosaics and polar dynamic studies (both poles). CIRS records data on composition and performs regional mapping and Far-IR mapping. UVIS observes a couple stellar occultations.

- Noteworthy out-of-discipline activities include a VIMS Ring-stellar occultation, ISS-led ORS imaging of Rhea and optical navigation.

- Data volume carryover from the previous Rings TWT segment is accepted.

Final Sequenced SPASS (1 of 2)

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End	Primary	Secondary	Comments
SATURN_97 Segment		2008-348T23:13:00		006T17:16:00	2008-355T16:29:00			
SP_097SA_WAYPTTURN348_PRIME		2008-348T23:13:00		000T00:40:00	2008-348T23:53:00	ISS_NAC to Saturn	POS_Z to NSP	SP Turn to Waypoint
NEW WAYPOINT		**2008-348T23:53:00**		**002T09:35:00**	**2008-351T09:28:00**	**ISS_NAC to Saturn**	**POS_Z to NSP**	
CIRS_097SA_COMPSIT001_PRIME	V	2008-348T23:53:00		000T07:25:00	2008-349T07:18:00	CIRS_FP1 to Saturn	POS_Z to NSP	
SP_097EA_DLTURN349_PRIME		2008-349T07:18:00		000T00:40:00	2008-349T07:58:00	XBAND to Earth	NEG_X to 271.4/58.4	
SP_097EA_G34BWGOTB349_PRIME	C, N	2008-349T07:58:00		000T09:00:00	2008-349T16:58:00	XBAND to Earth	6_Hr_Rolling	NEG_X to 271.4/58.4 for CDA
SP_097SA_WAYPTTURN349_PRIME		2008-349T16:58:00		000T00:40:00	2008-349T17:38:00	ISS_NAC to Saturn	POS_Z to NSP	SP Turn to Waypoint
ISS_097OT_SATELLORB003_PRIME		2008-349T17:38:00		000T00:50:00	2008-349T18:28:00	ISS_NAC to Rocks	POS_Z to NSP	
CIRS_097SA_COMPSIT002_PRIME	V	2008-349T18:28:00		000T12:35:00	2008-350T07:03:00	CIRS_FP1 to Saturn	POS_Z to NSP	
SP_097EA_DLTURN350_PRIME		2008-350T07:03:00		000T00:40:00	2008-350T07:43:00	XBAND to Earth	POS_X to NEP	
SP_097EA_G34BWGNON350_PRIME	C	2008-350T07:43:00		000T09:00:00	2008-350T16:43:00	XBAND to Earth	6_Hr_Rolling	POS_X to NEP; 6 hr roll, 3 hr dscal
SP_097SA_WAYPTTURN350_PRIME		2008-350T16:43:00		000T00:40:00	2008-350T17:23:00	ISS_NAC to Saturn	POS_Z to NSP	SP Turn to Waypoint
ISS_097TI_MR3CLD350_PRIME	C, U	2008-350T17:23:00	E097_MR3CLD350+ 000T00:00:00	000T01:15:00	2008-350T18:38:00	ISS_NAC to Titan	NEG_X to Sun	
CAPS_097SA_SURVEYPTG002_PRIME		2008-350T18:38:00		000T02:00:00	2008-350T20:38:00	POS_Y to COROT (20.0,0.0,0.0 deg. offset)	POS_X to NSP	
CIRS_097SA_REGMAP001_PRIME		2008-350T20:38:00		000T02:30:00	2008-350T23:08:00	CIRS_FPB to Saturn	POS_Z to NSP	
SP_097EA_DLTURN450_PRIME		2008-350T23:08:00		000T00:40:00	2008-350T23:48:00	XBAND to Earth	POS_X to NEP	
SP_097EA_M34BWGNON351_PRIME	C, E	2008-350T23:48:00		000T09:00:00	2008-351T08:48:00	XBAND to Earth	POS_X to NEP	POS_X to NEP
SP_097SA_WAYPTTURN351_PRIME		2008-351T08:48:00		000T00:40:00	2008-351T09:28:00	ISS_NAC to Saturn	NEG_X to Sun	SP Turn to Waypoint
NEW WAYPOINT		**2008-351T09:28:00**		**003T00:10:00**	**2008-354T09:38:00**	**ISS_NAC to Saturn**	**NEG_X to Sun**	
VIMS_097RI_GAMCRUOCC012_PRIME		2008-351T09:28:00		000T04:27:00	2008-351T13:55:00	VIMS_IR to 187.791/-57.113	NEG_X to Sun	
VIMS_097SA_NPOLEDYN001_PRIME	I, U	2008-351T13:55:00		000T04:42:00	2008-351T18:37:00	ISS_NAC to Saturn	NEG_X to Sun	
UVIS_097ST_ALPCRUSA002_PRIME	I	2008-351T18:37:00		000T01:32:00	2008-351T20:09:00	UVIS_FUV to 186.65/-63.099 (0.082,0.0,0.0 deg. offset)	NEG_Z to 214.556/24.224	
VIMS_097SA_NPOLEDYN002_PRIME	I, U	2008-351T20:09:00		000T02:09:00	2008-351T22:18:00	ISS_NAC to Saturn	NEG_X to Sun	
UVIS_097ST_BETCENSA001_PRIME	I	2008-351T22:18:00		000T01:30:00	2008-351T23:48:00	UVIS_FUV to 210.956/-60.373 (0.082,0.0,0.0 deg. offset)	NEG_Z to NSP	
VIMS_097SA_NPOLEDYN003_PRIME	I, R, U	2008-351T23:48:00		000T02:42:00	2008-352T02:30:00	ISS_NAC to Saturn	NEG_X to Sun	
RADAR_097SA_NORTHPOL001_PRIME	M	2008-352T02:30:00		000T07:00:00	2008-352T09:30:00	NEG_Z to Saturn	POS_Y to NSP	

Final Sequenced SPASS (2 of 2)

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End	Primary	Secondary	Comments
ISS_097RH_020W151PH001_PRIME	C, M, U, V	2008-352T09:30:00		000T02:13:00	2008-352T11:43:00	UVIS_FUV to Rhea (0.0,30.0,0.0 deg. offset)	NEG_X to Sun	Do (0,0,-1.03 mrad) offset for CIRS FP3 within the first approx. 10 percent of the tracking period (but at least for 5 min.)
ISS_097SA_LIMBSCAN001_PRIME	M, V	2008-352T11:43:00		000T00:45:00	2008-352T12:28:00	ISS_NAC to Saturn (8.6,0.0,0.0 deg. offset)	NEG_X to Sun	Observe night limb for MAPS Titan vertical profile.
NAV_097SK_OPNAV521_PRIME	M	2008-352T12:28:00		000T01:29:00	2008-352T13:57:00	ISS_NAC to Satellites	NEG_X to Sun	Start at Waypoint, end at Earth point
NAV_097EA_DLTURN521_PRIME	M	2008-352T13:57:00		000T00:01:00	2008-352T13:58:00	XBAND to Earth	NEG_X to 261.5/-15.1	
SP_097EA_C70METOTP352_PRIME	C, E, M, N	2008-352T13:58:00		000T09:00:00	2008-352T22:58:00	XBAND to Earth	NEG_X to 261.5/-15.1	CDA vertical ring plane crossing
Periapse R = 5.765 Rs, lat ...		2008-352T17:25:26		000T00:00:01	2008-352T17:25:27			
SP_097SA_WAYPTTURN352_PRIME	M, R	2008-352T22:58:00		000T00:40:00	2008-352T23:38:00	ISS_NAC to Saturn	NEG_X to Sun	SP Turn to Waypoint
VIMS_097SA_SPOLEHIRE001_PRIME	M, R	2008-352T23:38:00		000T01:20:00	2008-353T00:58:00	ISS_NAC to Saturn (0.0,-20.0,0.0 deg. offset)	NEG_X to Sun	
RADAR_097SA_SOUTHPOL001_PRIME	M	2008-353T00:58:00		000T07:00:00	2008-353T07:58:00	NEG_Z to Saturn	POS_X to NSP	
VIMS_097SA_SPOLEDYN001_PRIME	I, U	2008-353T07:58:00		000T14:50:00	2008-353T22:48:00	ISS_NAC to Saturn	NEG_X to Sun	
ISS_097OT_SATELLORB008_PRIME		2008-353T22:48:00		000T00:30:00	2008-353T23:18:00	ISS_NAC to Rocks	NEG_X to Sun	
SP_097EA_DLTURN353_PRIME		2008-353T23:18:00		000T00:40:00	2008-353T23:58:00	XBAND to Earth	NEG_X to 261.5/-15.1	
SP_097EA_M70METOTB353_PRIME	C, E, N	2008-353T23:58:00		000T09:00:00	2008-354T08:58:00	XBAND to Earth	4_Hr_Rolling	
SP_097SA_WAYPTTURN354_PRIME		2008-354T08:58:00		000T00:40:00	2008-354T09:38:00	ISS_NAC to Saturn	NEG_X to NSP	SP Turn to Waypoint
NEW WAYPOINT		**2008-354T09:38:00**		**001T07:31:00**	**2008-355T17:09:00**	**ISS_NAC to Saturn**	**NEG_X to NSP**	
ISS_097TI_MR1CLDF354_PRIME	C, U	2008-354T09:38:00	E097_MR1CLDF354 +000T00:00:00	000T01:15:00	2008-354T10:53:00	ISS_NAC to Titan	NEG_Z to Sun	
CIRS_097SA_FIRMAP002_PRIME		2008-354T10:53:00		000T22:00:00	2008-355T08:53:00	CIRS_FP1 to Saturn	NEG_X to NSP	
SP_097EA_DLTURN355_PRIME		2008-355T08:53:00		000T00:40:00	2008-355T09:33:00	XBAND to Earth	NEG_X to NEP	
SP_097EA_G70METNON355_PRIME	C	2008-355T09:33:00		000T06:56:00	2008-355T16:29:00	XBAND to Earth	NEG_X to NEP	no rolling, CIRS pre-TOST

Final Sequenced SMT and Data Volume

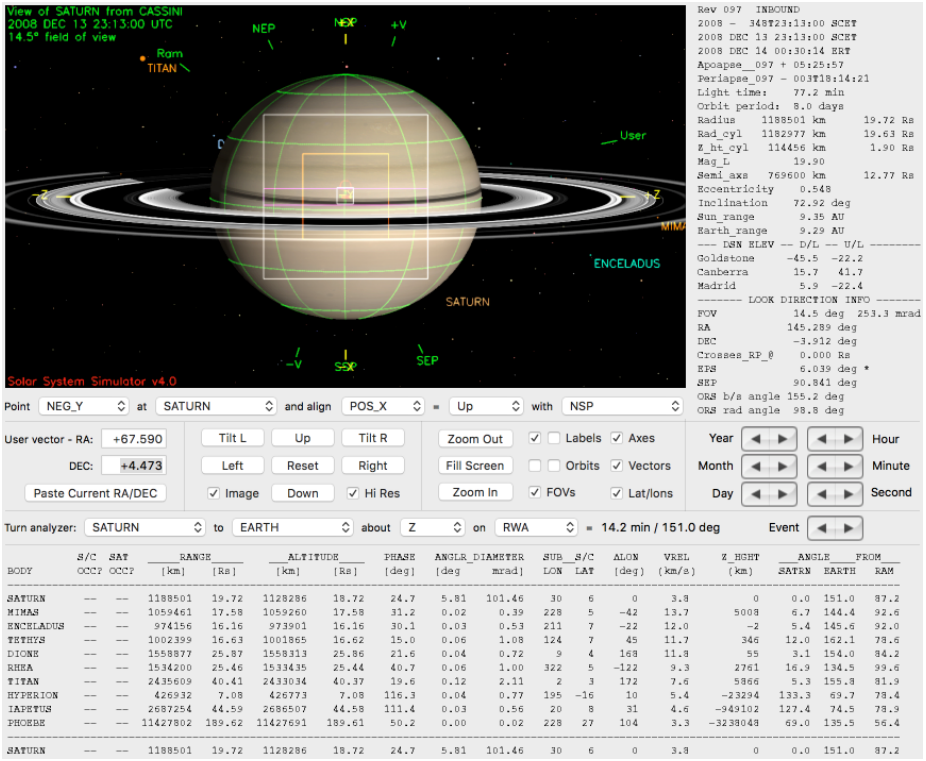
DATA VOLUME SUMMARY --- TRANSFER FRAME OVERHEAD INCLUDED (80 BITS PER 8800-BIT FRAME)

	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_097EA_G34BWGOTB349_PRIME	349 07:58	349 16:58	888	451	37	1375	3501	2126	0	237	53	1666	788	-879	231	1%	878
SP_097EA_G34BWGNON350_PRIME	350 07:43	350 16:43	878	766	62	1706	3501	1795	0	239	53	1998	788	-1211	231	1%	1211
SP_097EA_M34BWGNON351_PRIME	350 23:48	351 08:48	1211	224	30	1464	3501	2037	0	240	53	1758	742	-1017	231	1%	1016
SP_097EA_C70METOTP352_PRIME	352 13:58	352 22:58	1016	2130	124	3270	3501	231	21	900	53	4245	2771	-1474	264	1%	1474
SP_097EA_M70METOTB353_PRIME	353 23:58	354 08:58	1474	1657	106	3237	3501	264	0	247	53	3536	3737	200	306	1%	0
SP_097EA_G70METNON355_PRIME	355 09:33	355 16:29	0	2446	104	2550	3501	951	0	183	41	2774	2971	197	106	1%	0

DATA VOLUME REPORT --- TRANSFER FRAME OVERHEAD NOT INCLUDED

Event	Start doy hh:mm	End doy hh:mm	CAPS (Mb)	CDA (Mb)	CIRS (Mb)	INMS (Mb)	ISS (Mb)	MAG (Mb)	MIMI (Mb)	RADAR (Mb)	RPWS (Mb)	UVIS (Mb)	VIMS (Mb)	PROBE (Mb)	ENGR (Mb)	TOTAL (Mb)
OBSERVATION_NOR	348 23:13	349 07:58	31.5	16.5	106.8	3.2	0.0	18.9	28.3	0.0	41.3	0.0	200.0	0.0	7.2	453.6
SP_097EA_G34BWGOTB349_PRIME	349 07:58	349 16:58	32.4	17.0	86.4	3.2	0.0	19.4	29.2	0.0	42.4	4.9	0.0	0.0	0.0	235.0
DAILY TOTAL SCIENCE	348 23:13	349 16:58	63.9	33.5	193.2	6.4	0.0	38.3	57.5	0.0	83.7	4.9	200.0	0.0		
OBSERVATION_NOR	349 16:58	350 07:43	53.1	27.8	181.2	15.4	32.0	31.9	47.8	0.0	69.6	0.0	300.0	0.0	12.1	770.8
SP_097EA_G34BWGNON350_PRIME	350 07:43	350 16:43	32.4	17.0	86.4	3.2	0.0	19.4	31.4	0.0	42.4	4.9	0.0	0.0	0.0	237.2
DAILY TOTAL SCIENCE	349 16:58	350 16:43	85.5	44.8	267.6	18.6	32.0	51.3	79.2	0.0	112.0	4.9	300.0	0.0		
OBSERVATION_NOR	350 16:43	350 23:48	47.1	13.4	45.0	2.6	35.0	15.3	25.5	0.0	33.4	4.5	0.0	0.0	5.8	227.5
SP_097EA_M34BWGNON351_PRIME	350 23:48	351 08:48	32.4	17.0	86.4	3.2	0.0	19.4	32.4	0.0	42.1	4.9	0.0	0.0	0.0	237.9
DAILY TOTAL SCIENCE	350 16:43	351 08:48	79.5	30.3	131.4	5.8	35.0	34.7	57.9	0.0	75.5	9.5	0.0	0.0		
OBSERVATION_NOR	351 08:48	352 13:58	293.2	55.0	31.9	10.5	521.2	73.4	110.1	130.6	257.4	250.2	377.4	0.0	23.8	2134.8
OBSERVATION_OPN	351 08:48	352 13:58	0.0	0.0	0.0	0.0	21.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.0
SP_097EA_C70METOTP352_PRIME	352 13:58	352 22:58	259.2	15.3	86.4	3.2	0.0	32.0	29.2	0.0	466.9	0.0	0.0	0.0	0.0	892.2
DAILY TOTAL SCIENCE	351 08:48	352 22:58	552.4	70.3	118.3	13.7	521.2	105.4	139.3	130.6	724.3	250.2	377.4	0.0		
OBSERVATION_NOR	352 22:58	353 23:58	227.3	47.2	0.0	19.1	172.0	61.6	95.1	126.4	188.0	89.9	615.0	0.0	20.4	1662.0
SP_097EA_M70METOTB353_PRIME	353 23:58	354 08:58	32.4	17.0	86.4	3.2	0.0	19.4	38.9	0.0	42.1	4.9	0.0	0.0	0.0	244.4
DAILY TOTAL SCIENCE	352 22:58	354 08:58	259.7	64.1	86.4	22.3	172.0	81.1	134.0	126.4	230.1	94.9	615.0	0.0		
OBSERVATION_NOR	354 08:58	355 09:33	88.5	46.4	334.8	8.9	35.0	53.1	91.6	0.0	1760.9	5.1	0.0	0.0	20.1	2444.3
SP_097EA_G70METNON355_PRIME	355 09:33	355 16:29	25.0	13.1	66.8	2.5	0.0	15.0	22.5	0.0	32.7	3.8	0.0	0.0	0.0	181.3
DAILY TOTAL SCIENCE	354 08:58	355 16:29	113.5	59.5	401.6	11.3	35.0	68.1	114.0	0.0	1793.6	8.9	0.0	0.0		

Segment Geometry



Rev 097 INBOUND
2008 - 348T23:13:00 SCET
2008 DEC 13 23:13:00 SCET
2008 DEC 14 00:30:14 ERT
Apoapse__097 + 05:25:57
Periapse_097 - 003T18:14:21
Light time: 77.2 min
Orbit period: 8.0 days

Radius	1188501 km	19.72 Rs
Rad_cyl	1182977 km	19.63 Rs
Z_ht_cyl	114456 km	1.90 Rs
Mag_L	19.90	
Semi_axs	769600 km	12.77 Rs
Eccentricity	0.548	
Inclination	72.92 deg	
Sun_range	9.35 AU	
Earth_range	9.29 AU	

--- DSN ELEV -- D/L -- U/L --------

Goldstone	-45.5	-22.2
Canberra	15.7	41.7
Madrid	5.9	-22.4

------- LOOK DIRECTION INFO -------

FOV	14.5 deg	253.3 mrad
RA	145.289 deg	
DEC	-3.912 deg	
Crosses_RP_@	0.000 Rs	
EPS	6.039 deg *	
SEP	90.841 deg	
ORB b/s angle	155.2 deg	
ORB rad angle	98.8 deg	

Point NEG_Y at SATURN and align POS_X = Up with NSP

User vector - RA: +67.590 DEC: +4.473 Paste Current RA/DEC

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

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

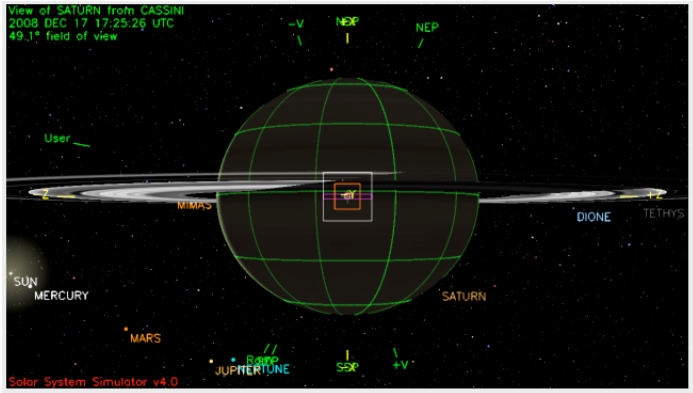
Year Month Day Hour Minute Second

Turn analyzer: SATURN to EARTH about Z on RWA = 14.2 min / 151.0 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	ALON [deg]	VREL [km/s]	Z_HGHT [km]	ANGLE_FROM SATRN	ANGLE_FROM EARTH	ANGLE_FROM RAM
SATURN	--	--	1188501	19.72	1128286	18.72	24.7	5.81	101.46	30	6	0	3.8	0	0.0	151.0	87.2
MIMAS	--	--	1059461	17.58	1059260	17.58	31.2	0.02	0.39	228	5	-42	13.7	5008	6.7	144.4	92.6
ENCELADUS	--	--	974156	16.16	973901	16.16	30.1	0.03	0.53	211	7	-22	12.0	-2	5.4	145.6	92.0
TETHYS	--	--	1002399	16.63	1001865	16.62	15.0	0.06	1.08	124	7	45	11.7	346	12.0	162.1	78.6
DIONE	--	--	1558877	25.87	1558313	25.86	21.6	0.04	0.72	9	4	168	11.8	55	3.1	154.0	84.2
RHEA	--	--	1534200	25.46	1533635	25.44	40.7	0.06	1.00	322	5	-122	9.3	2761	16.9	134.5	99.6
TITAN	--	--	2435609	40.41	2433034	40.37	19.6	0.12	2.11	2	3	172	7.6	5866	5.3	155.8	81.9
HYPERION	--	--	426932	7.08	426773	7.08	116.3	0.04	0.77	195	-16	10	5.4	-23294	133.3	69.7	78.4
IAPETUS	--	--	2687254	44.59	2686507	44.58	111.4	0.03	0.56	20	8	31	4.6	-949102	127.4	74.5	78.9
PHOEBE	--	--	11427802	189.62	11427691	189.61	50.2	0.00	0.02	228	27	104	3.3	-3238048	69.0	135.5	56.4
SATURN	--	--	1188501	19.72	1128286	18.72	24.7	5.81	101.46	30	6	0	3.8	0	0.0	151.0	87.2

Segment Start: 2008-348T23:13

Periapse: 2008-352T17:25:26



Rev 097 INBOUND
2008 - 352T17:25:26 SCET
2008 DEC 17 17:25:26 SCET
2008 DEC 17 18:42:14 ERT
Apoapse__097 + 003T23:38:23
Periapse_097 - 00:01:55
Light time: 76.8 min
Orbit period: 8.0 days

Radius	347913 km	5.77 Rs
Rad_cyl	347726 km	5.77 Rs
Z_ht_cyl	-11403 km	-0.19 Rs
Mag_L	5.78	
Semi_axs	770355 km	12.78 Rs
Eccentricity	0.548	
Inclination	72.92 deg	
Sun_range	9.37 AU	
Earth_range	9.24 AU	

--- DSN ELEV -- D/L -- U/L --------

Goldstone	13.3	43.2
Canberra	46.5	24.2
Madrid	-43.5	-37.4

------- LOOK DIRECTION INFO -------

FOV	49.1 deg	857.6 mrad
RA	-36.250 deg	
DEC	0.411 deg	
Crosses_RP_@	0.000 Rs	
EPS	6.012 deg *	
SEP	94.577 deg	
ORB b/s angle	24.8 deg	
ORB rad angle	95.4 deg	

Point NEG_Y at SATURN and align POS_X = Up with NSP

User vector - RA: +67.590 DEC: +4.473 Paste Current RA/DEC

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

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

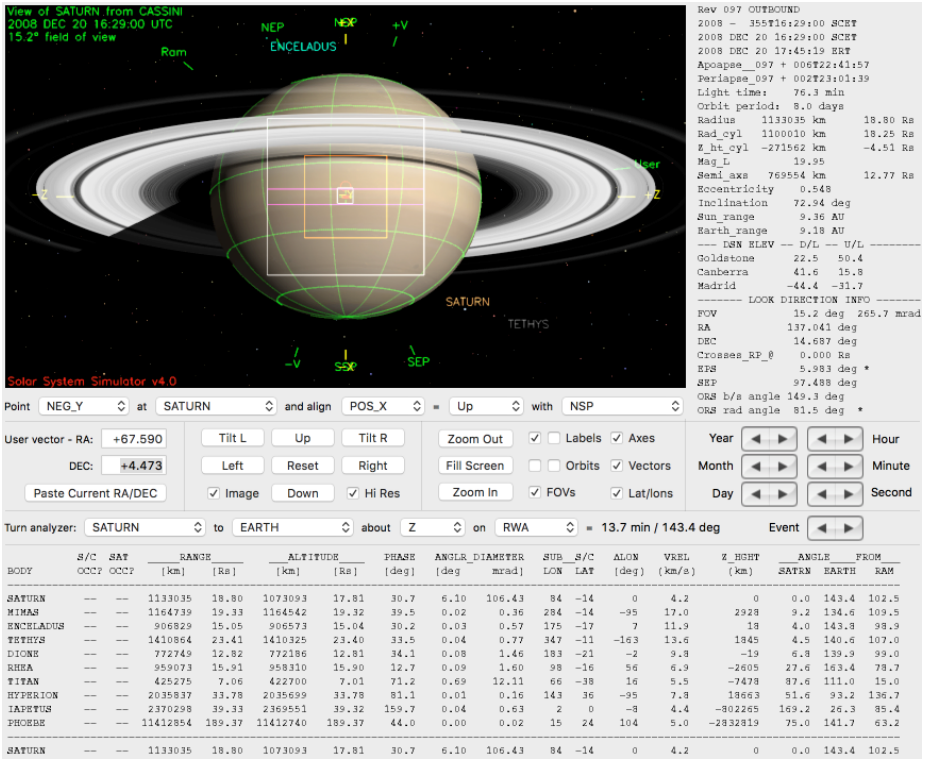
Year Month Day Hour Minute Second

Turn analyzer: SATURN to EARTH about Z on RWA = 5.1 min / 29.7 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	ALON [deg]	VREL [km/s]	Z_HGHT [km]	ANGLE_FROM SATRN	ANGLE_FROM EARTH	ANGLE_FROM RAM
SATURN	--	--	347913	5.77	287651	4.77	155.1	19.95	348.21	18	-2	0	13.0	0	0.0	29.7	89.9
MIMAS	--	--	504093	8.36	503887	8.36	167.6	0.05	0.82	25	-1	141	21.8	4997	13.1	16.6	83.8
ENCELADUS	--	--	483757	8.03	483502	8.02	128.0	0.06	1.06	322	-1	-110	18.8	38	27.5	57.1	102.2
TETHYS	--	--	589838	9.79	589299	9.78	134.1	0.10	1.83	335	-1	-133	18.6	589	21.4	51.0	99.3
DIONE	--	--	695799	11.55	695235	11.54	138.7	0.09	1.62	345	-1	-148	18.2	52	16.9	46.4	97.0
RHEA	--	--	752242	12.48	751475	12.47	165.0	0.12	2.04	27	-1	117	16.7	-232	38.5	9.1	72.3
TITAN	--	--	1283214	21.29	1280639	21.25	82.3	0.23	4.01	345	-0	-91	14.0	-4506	73.4	103.0	116.6
HYPERION	--	--	1862278	30.90	1862146	30.90	164.0	0.01	0.18	45	40	132	14.8	-990	39.7	10.2	71.4
IAPETUS	--	--	3836913	63.66	3836166	63.65	144.2	0.02	0.39	5	-1	-168	14.5	-899749	18.5	41.7	81.4
PHOEBE	--	--	11028569	182.99	11028458	182.99	53.9	0.00	0.02	125	24	-74	13.9	-3014863	104.5	131.7	101.9
SATURN	--	--	347913	5.77	287651	4.77	155.1	19.95	348.21	18	-2	0	13.0	0	0.0	29.7	89.9

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	19.72 Rs	24.7 deg	6
Periapse	5.77 Rs	155.1 deg	-2
Segment End	18.8 Rs	30.7 deg	-14

Segment Geometry



Rev 097 OUTBOUND
2008 - 355T16:29:00 SCET
2008 DEC 20 16:29:00 SCET
2008 DEC 20 17:45:19 ERT
Apoapse__097 + 006T22:41:57
Periapse_097 + 002T23:01:39
Light time: 76.3 min
Orbit period: 8.0 days
Radius 1133035 km 18.80 Rs
Rad_cyl 1100010 km 18.25 Rs
Z_ht_cyl -271562 km -4.51 Rs
Mag_L 19.95
Semi_axs 769554 km 12.77 Rs
Eccentricity 0.548
Inclination 72.94 deg
Sun_range 9.36 AU
Earth_range 9.18 AU
--- DSN KLEV -- D/L -- U/L ---
Goldstone 22.5 50.4
Canberra 41.6 15.8
Madrid -44.4 -31.7
------- LOOK DIRECTION INFO -------
FOV 15.2 deg 265.7 mrad
RA 137.041 deg
DEC 14.687 deg
Crosses_RP_@ 0.000 Rs
EPS 5.983 deg *
SEP 97.488 deg
ORB b/s angle 149.3 deg
ORB rad angle 81.5 deg *

Point NEG_Y at SATURN and align POS_X = Up with NSP

User vector - RA: +67.590 DEC: +4.473 Paste Current RA/DEC

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

Zoom Out Fill Screen Zoom In

Labels Axes Orbits Vectors FOVs Lat/lons

Year Month Day Hour Minute Second

Turn analyzer: SATURN to EARTH about Z on RWA = 13.7 min / 143.4 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	ALON [deg]	VREL [km/s]	Z_HGHT [km]	ANGLE FROM SATRN	ANGLE FROM EARTH	ANGLE FROM RAM
SATURN	--	--	1133035	18.80	1073093	17.81	30.7	6.10	106.43	84	-14	0	4.2	0	0.0	143.4	102.5
MIMAS	--	--	1164739	19.33	1164542	19.32	39.5	0.02	0.36	284	-14	-95	17.0	2928	9.2	134.6	109.5
ENCELADUS	--	--	906829	15.05	906573	15.04	30.2	0.03	0.57	175	-17	7	11.9	18	4.0	143.8	98.9
TETHYS	--	--	1410864	23.41	1410325	23.40	33.5	0.04	0.77	347	-11	-163	13.6	1845	4.5	140.6	107.0
DIONE	--	--	772749	12.82	772186	12.81	34.1	0.08	1.46	183	-21	-2	9.8	-19	6.8	139.9	99.0
RHEA	--	--	959073	15.91	958310	15.90	12.7	0.09	1.60	98	-16	56	6.9	-2605	27.6	163.4	78.7
TITAN	--	--	425275	7.06	422700	7.01	71.2	0.69	12.11	66	-38	16	5.5	-7478	87.6	111.0	15.0
HYPERION	--	--	2035837	33.78	2035699	33.78	81.1	0.01	0.16	143	36	-95	7.8	18663	51.6	93.2	136.7
IAPETUS	--	--	2370298	39.33	2369551	39.32	159.7	0.04	0.63	2	0	-8	4.4	-802265	169.2	26.3	85.4
PHOEBE	--	--	11412854	189.37	11412740	189.37	44.0	0.00	0.02	15	24	104	5.0	-2832819	75.0	141.7	63.2
SATURN	--	--	1133035	18.80	1073093	17.81	30.7	6.10	106.43	84	-14	0	4.2	0	0.0	143.4	102.5

← Segment End: 2008-355T16:29

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	19.72 Rs	24.7 deg	6
Periapse	5.77 Rs	155.1 deg	-2
Segment End	18.8 Rs	30.7 deg	-14

Solar Geometry – ORS Boresight Concerns

No ORS Boresight Solar Constraints on Science Pointing Noted.

Daily Science Highlights

Saturn_97:

Saturday, December 13 (DOY 348): Today, CIRS did a compositional study of Saturn to measure oxygen compounds (H_2O,CO_2) in the stratosphere as a function of latitude. The latitude of the sub-spacecraft point during this observation was 8 degrees North.

Sunday, December 14 (DOY 349): The CIRS study of oxygen compounds in Saturn's stratosphere continued today. Observations were in Saturn's northern hemisphere.

Monday, December 15 (DOY 350): Most of today's science observation was devoted to regional mapping of the Saturn atmospheric composition by CIRS. The region studied is typically about 15 degrees on a side and in this instance was centered around a latitude of 45 degrees North.

Tuesday, December 16 (DOY 351): Today's science was divided between stellar occultations and polar dynamics studies. The day began with VIMS observing a ring stellar occultation of the star Gamma Crux (one of the stars in the Southern Cross). The other occultations were of the stars Alp Cru and Beta Centauri by Saturn observed in the ultraviolet by UVIS. These occultations provide temperature of the high atmosphere and vertical profiles of H, H2 and hydrocarbons. From the dynamics studies, VIMS acquires 3-D imagery of the polar regions, in order to study the structure and dynamics of the polar vortices and their variability over time, including seasonal changes. In addition, images of the north pole -where sunlight is just beginning to illuminate features - will reveal the structure and microphysical nature of upper tropospheric clouds that help form the bizarre hexagonal feature there.

Wednesday, December 17 (DOY 352): All of the ORS instruments observed Rhea from a distance of 770,000 km at phase angles increasing to 165 degrees when the spacecraft began turning away to protect the boresights from sunlight. ISS scanned the rings behind Saturn's nightside limb. Two instruments turned their attention to Saturn. RADAR was in a passive detection mode to observe radiation originating from the atmosphere below the visible clouds and haze. This radiation is modulated by ammonia in the atmosphere. Mapping the polar regions will give us unsight into the behavior of the north polar hexagon. and south polar vortex at deeper pressure levels. Periapse occurred at 2008-352T17:25:15. Cassini's trajectory through this periapse was from the north polar region (yesterday) toward the south polar region.

Thursday, December 18 (DOY 353): Study of Saturn's polar regions continued. Yesterday, RADAR observed the north pole. Today similar measurements were taken over the south Saturn pole to give us insight into the south polar vortex at deeper pressure levels. VIMS also continued its polar dynamics study on the south pole. The poles are experiencing drastic changes in seasonal lighting, with the north polar region experiencing sunlight for the first time in over a decade and the south polar region about to enter over a decade of polar winter. VIMS studies of these regions over the next few years hope to reveal changes in Saturn's meteorology and circulation produced by such seasonal changes, including solar heat deposition.

Friday, December 19 (DOY 354): CIRS mapped the thermal structure of Saturn's upper troposphere in the far infra-red. These maps are made at different times during the mission to reveal seasonal and other temporal variations. In order to cover two full rotations of Saturn, 22 hours was devoted to this activity.

Segment Integration Planning

Timeline Gaps and Suggested Observations

Info on Suggested Observations was Not Available.

Initial SMT and Data Volume

Beginning of Integration:

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

			OBSERVATION_PERIOD							DOWNLINK_PASS						
			P4						P5	RECORDED		PLAYBACK				
DOWNLINK PASS NAME	Start doy hh:mm	End doy hh:mm	START (Mb)	SCI (Mb)	HK+E (Mb)	TOTAL (Mb)	CPACTY (Mb)	MRGN (Mb)	OPNAV (Mb)	SCI (Mb)	ENGR (Mb)	TOTAL (Mb)	CPACTY (Mb)	MARGN (Mb)	NET_MARGN (Mb)	CAROVR (%) (Mb)
SP_097EA_G34BWGOTB349_PRIME	349 07:58	349 16:58	0	616	37	653	3362	2709	0	237	53	943	788	-156	-3527	-35% 155
SP_097EA_G34BWGNON350_PRIME	350 07:43	350 16:43	155	1058	62	1276	3362	2086	0	244	53	1573	788	-786	-3527	-39% 785
SP_097EA_M34BWGNON351_PRIME	350 23:48	351 08:48	785	238	30	1053	3362	2309	0	247	53	1353	742	-612	-3527	-43% 611
SP_097EA_C34BWGOTP352_PRIME	352 13:58	352 22:58	611	2687	125	3422	3362	-60	21	1287	53	4723	649	-4074	-3527	-47% 4074
SP_097EA_M70METOTB353_PRIME	353 23:58	354 08:58	4074	2710	106	6890	3362	-3527	0	247	53	3662	3737	75	1921	29% 0
SP_097EA_G70METNON355_PRIME	355 09:33	355 16:29	0	786	104	890	3362	2472	0	195	41	1126	2971	1845	1845	62% 0

DATA VOLUME REPORT --- TRANSFER FRAME OVERHEAD NOT INCLUDED

Event	Start doy hh:mm	End doy hh:mm	CAPS (Mb)	CDA (Mb)	CIRS (Mb)	INMS (Mb)	ISS (Mb)	MAG (Mb)	MIMI (Mb)	RADAR (Mb)	RPWS (Mb)	UVIS (Mb)	VIMS (Mb)	PROBE (Mb)	ENGR (Mb)	TOTAL (Mb)
OBSERVATION_NOR	348 23:13	349 07:58	31.5	16.5	106.8	13.2	0.0	18.9	28.3	0.0	41.3	0.0	353.6	0.0	7.2	617.3
SP_097EA_G34BWGOTB349_PRIME	349 07:58	349 16:58	32.4	17.0	86.4	3.2	0.0	19.4	29.2	0.0	42.4	4.9	0.0	0.0	0.0	235.0
DAILY TOTAL SCIENCE	348 23:13	349 16:58	63.9	33.5	193.2	16.5	0.0	38.3	57.5	0.0	83.7	4.9	353.6	0.0		
OBSERVATION_NOR	349 16:58	350 07:43	53.1	27.8	181.2	5.3	32.0	31.9	47.8	0.0	69.6	0.0	600.0	0.0	12.1	1060.7
SP_097EA_G34BWGNON350_PRIME	350 07:43	350 16:43	32.4	17.0	86.4	3.2	0.0	19.4	35.9	0.0	42.4	4.9	0.0	0.0	0.0	241.7
DAILY TOTAL SCIENCE	349 16:58	350 16:43	85.5	44.8	267.6	8.6	32.0	51.3	83.7	0.0	112.0	4.9	600.0	0.0		
OBSERVATION_NOR	350 16:43	350 23:48	47.1	13.4	54.0	2.6	35.0	15.3	30.6	0.0	33.4	4.5	0.0	0.0	5.8	241.6
SP_097EA_M34BWGNON351_PRIME	350 23:48	351 08:48	32.4	17.0	86.4	3.2	0.0	19.4	38.9	0.0	42.1	4.9	0.0	0.0	0.0	244.4
DAILY TOTAL SCIENCE	350 16:43	351 08:48	79.5	30.3	140.4	5.8	35.0	34.7	69.5	0.0	75.5	9.5	0.0	0.0		
OBSERVATION_NOR	351 08:48	352 13:58	508.2	55.0	31.9	10.5	577.3	100.0	142.1	131.1	136.5	266.4	703.2	0.0	23.8	2686.1
OBSERVATION_OPN	351 08:48	352 13:58	0.0	0.0	0.0	0.0	21.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.0
SP_097EA_C34BWGOTP352_PRIME	352 13:58	352 22:58	518.4	27.2	86.4	3.2	0.0	64.0	58.3	0.0	512.5	4.9	0.0	0.0	0.0	1275.0
DAILY TOTAL SCIENCE	351 08:48	352 22:58	1026.6	82.2	118.3	13.7	577.3	164.0	200.4	131.1	649.0	271.4	703.2	0.0		
OBSERVATION_NOR	352 22:58	353 23:58	384.3	47.2	0.0	19.1	336.0	81.0	119.8	125.9	714.7	268.7	588.5	0.0	20.4	2705.6
SP_097EA_M70METOTB353_PRIME	353 23:58	354 08:58	32.4	17.0	86.4	3.2	0.0	19.4	38.9	0.0	42.1	4.9	0.0	0.0	0.0	244.4
DAILY TOTAL SCIENCE	352 22:58	354 08:58	416.7	64.1	86.4	22.3	336.0	100.4	158.7	125.9	756.8	273.6	588.5	0.0		
OBSERVATION_NOR	354 08:58	355 09:33	88.5	46.4	334.8	8.9	35.0	53.1	91.6	0.0	115.9	5.1	0.0	0.0	20.1	799.2
SP_097EA_G70METNON355_PRIME	355 09:33	355 16:29	25.0	13.1	74.9	2.5	0.0	15.0	26.2	0.0	32.7	3.8	0.0	0.0	0.0	193.1
DAILY TOTAL SCIENCE	354 08:58	355 16:29	113.5	59.5	409.7	11.3	35.0	68.1	117.8	0.0	148.5	8.9	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)	1785.7	314.4	1215.6	78.2	1015.3	456.9	687.5	257.0	1825.6	573.3	2245.4	0.0

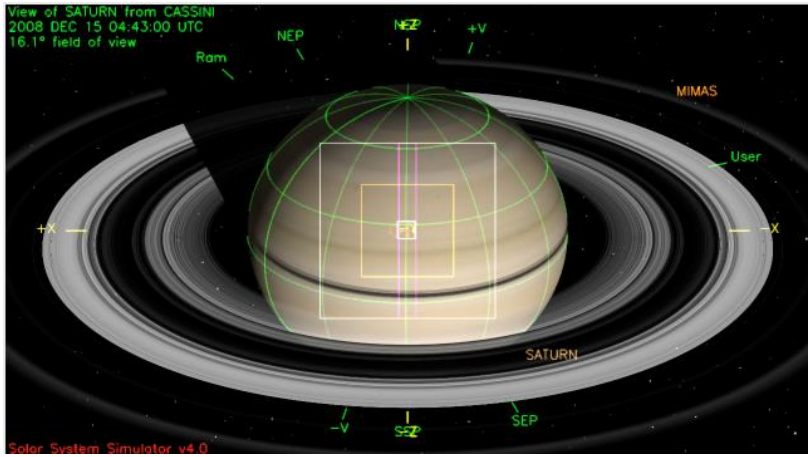
Waypoint Selection

Options considered:

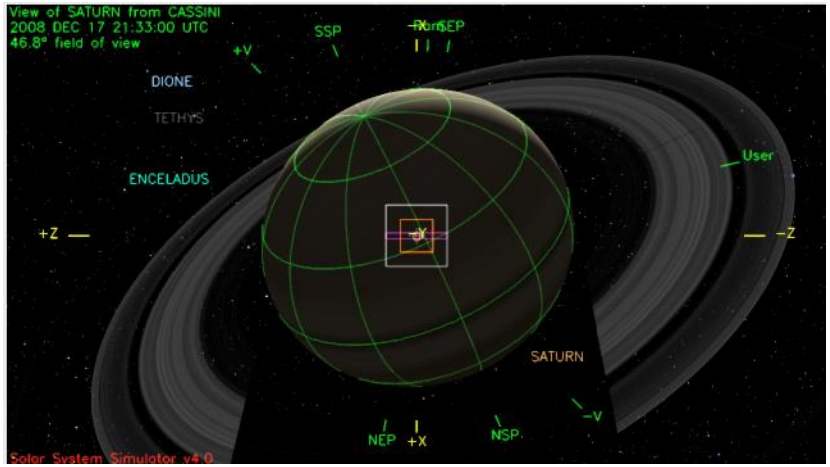
- ISS_NAC to Saturn, NEG_X to Sun
  - Good for the entire Period
- ISS_NAC to Saturn, POS_X to NSP
  - Good for 2008-348T23:13:00 to 2008-352T03:03:00
  - Good for 2008-352T16:43:00 to 2008-353T11:43:00
- ISS_NAC to Saturn, POS_X to NEP
  - Good for 2008-348T23:13:00 to 2008-352T02:33:00
  - Good for 2008-352T14:33:00 to 2008-353T11:13:00
  - Good for 2008-355T09:03:00 to 2008-355T17:03:00
- ISS_NAC to Saturn, NEG_X to NSP
  - Good for 2008-352T03:03:00 to 2008-352T16:33:00
  - Good for 2008-353T11:43:00 to 2008-355T17:03:00
- ISS_NAC to Saturn, NEG_X to NEP
  - Good for 2008-352T02:43:00 to 2008-352T14:23:00
  - Good for 2008-353T11:13:00 to 2008-355T09:23:00
- ISS_NAC to Saturn, POS_Z to NSP
  - Good for 2008-348T23:13:00 to 2008-351T09:33:00
  - Good for 2008-353T01:33:00 to 2008-355T17:03:00
- ISS_NAC to Saturn, POS_Z to NEP
  - Good for 2008-348T23:13:00 to 2008-350T04:13:00
  - Good for 2008-352T20:43:00 to 2008-355T17:03:00
- ISS_NAC to Saturn, NEG_Z to NSP
  - Good for 2008-351T09:23:00 to 2008-353T01:23:00
- ISS_NAC to Saturn, NEG_Z to NEP
  - Good for 2008-350T04:13:00 to 2008-352T20:33:00
- ISS_NAC to Saturn, POS_Z to NEP (0,0,15 degree offset)
  - Good for the entire period
- Other???

Waypoints Chosen

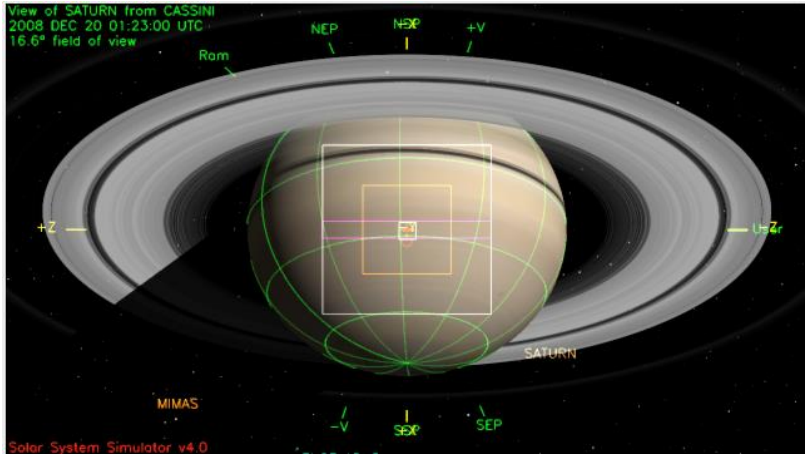
Waypoint 1 (2008-348T23:53 – 351T09:28):
NAC to Saturn, POS_Z to NSP



Waypoint 2 (2008-351T09:28 – 354T09:38):
NAC to Saturn, NEG_X to Sun



Waypoint 3 (2008-354T09:38 – 355T17:09):
NAC to Saturn, NEG_X to NSP



Notes & Liens

Notes:

- Pointing:
  - None
- Data Volume:
  - Accepted 700 Mb carryover from Rings 96_97
- DSN:
  - Stations in maintenance fluctuated during integration. None at time of this package.
- Opmodes:
  - Shorter than usual RADAR warm-up negotiated to avoid telemetry mode conflicts during UVIS occs
- Special Activities:
  - None

Sequence Liens:

- None