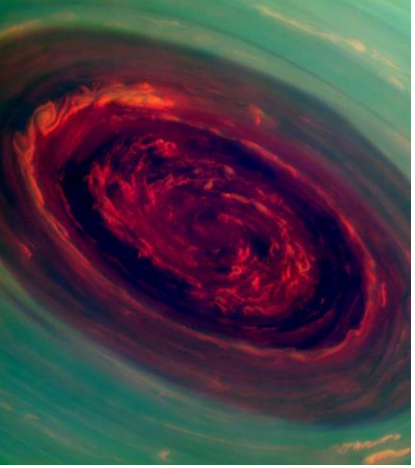
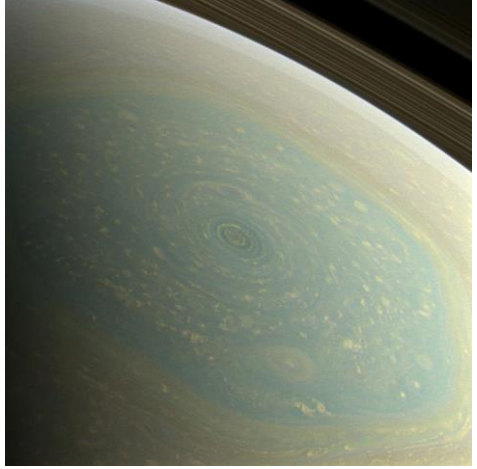
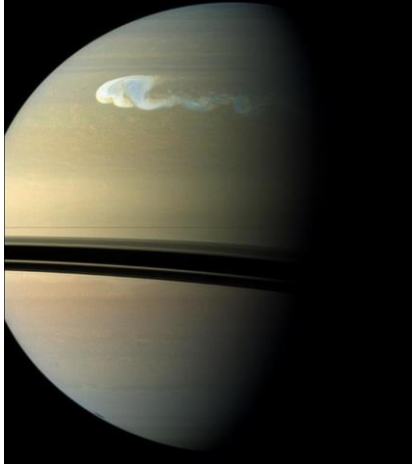


Science Planning & Sequence Team
CASSINI

SATURN TARGET WORKING TEAM

Rev 59 Segment Legacy Package

Segment Boundary: February 18, 2008 – February 22, 2008
2008-049T11:36:00 – 2008-053T03:51:00 (SCET)

Integration Began 08/04/2003
Segment Delivered to S38 Sequence 08/17/2004
Lead Integrator was Shawn Boll

Legacy Package Assembled by Shawn Boll

Table of Contents

Segment Overview and Final Products

Segment Summary

- This was an over 3.5 day long segment in the Prime Mission, mostly inbound to and including periapse, during an inclined orbit. The spacecraft approached Saturn with a view of the northern hemisphere on the lit-side. At periapse, the view was of the southern hemisphere on the dark side of the planet. By the time the segment had ended, the spacecraft again faced the lit-side, with an unobstructed view of the southern hemisphere.

- Inbound, Saturn science included ISS-led ORS polar movies, VIMS regional and polar mapping, and RADAR polar scans.

- Near periapse, VIMS observed solar occultations of both the rings and Saturn's atmosphere. They also looked at the rings at high phase while the sun was occulted by the planet. This geometry required managing the CMT solar viewing constraint limits.

- Outbound, Saturn science included VIMS polar mapping, a VIMS atmospheric stellar occultation, and UVIS limb studies. Observations of Janus and Titan were also performed.

- Because of the timing sensitivity of the VIMS solar occultations and hi-phase ring observation, the integration team made use of a Ground Movable Block. This allowed the flight team to update the timing during sequence development, utilizing the last trajectory update prior to uplink.

Final Sequenced SPASS

	Request	Riders	Start (SCET)	Start (Epoch)	Duration	End (SCET)	Primary	Secondary	Comments
	Sequence S038, length = 36 ...		2008-047T11:51:00	E059_SEQUENCE_038+000T00:00:00	035T13:59:00	2008-083T01:50:00			
	SATURN rev 59 Segment		2008-049T11:36:00		003T16:15:00	2008-053T03:51:00			
	SP_059SA_WAYPTTURN049_PRIME		2008-049T11:36:00		000T00:30:00	2008-049T12:06:00	ISS_NAC to Saturn	NEG_Z to NSP	
	NEW WAYPOINT		**2008-049T12:06:00**		**001T13:30:00**	**2008-051T01:36:00**	**ISS_NAC to Saturn**	**NEG_Z to NSP**	
Gap 1	ISS_059SA_POLRMOV03001_PRIME	C, M, U, V	2008-049T12:06:00		000T14:00:00	2008-050T02:06:00	ISS_NAC to Saturn	NEG_Z to NSP	
	SP_059EA_DLTURN050_PRIME	M	2008-050T02:06:00		000T00:30:00	2008-050T02:36:00	XBAND to Earth	POS_X to NEP	21 min. turn
	SP_059EA_G34BWGOTP050_PRIME	C, M, N	2008-050T02:36:00		000T09:00:00	2008-050T11:36:00	XBAND to Earth	POS_X to NEP	
	SP_059SA_WAYPTTURN050_PRIME	M	2008-050T11:36:00		000T00:30:00	2008-050T12:06:00	ISS_NAC to Saturn	NEG_Z to NSP	21 min. turn
Gap 2	ISS_059SA_POLRMOV04001_PRIME	C, M, R, U, V	2008-050T12:06:00		000T08:30:00	2008-050T20:36:00	ISS_NAC to Saturn	NEG_Z to NSP	
	SP_059EA_DLTURN450_PRIME	M, R	2008-050T20:36:00		000T00:30:00	2008-050T21:06:00	XBAND to Earth	POS_X to NEP	19 min. turn
	SP_059EA_M70METNON050_PRIME	C, M, R	2008-050T21:06:00		000T03:59:57	2008-051T01:05:57	XBAND to Earth	POS_X to NEP	Shortened duration by 3 seconds for Telecom because of overlapping commands
	SP_059SA_WAYPTTURN051_PRIME	M, R	2008-051T01:05:57		000T00:30:03	2008-051T01:36:00	ISS_NAC to Saturn (0.0,-20.0,20.0 deg. offset)	POS_X to NSP	21 min. turn
	NEW WAYPOINT		**2008-051T01:36:00**		**000T18:24:00**	**2008-051T20:00:00**	**ISS_NAC to Saturn (0.0,-20.0,20.0 deg. offset)**	**POS_X to NSP**	
	VIMS_059SA_REGPOLMAP001_PRIME	M, R	2008-051T01:36:00		000T00:30:00	2008-051T02:06:00	ISS_NAC to Saturn	POS_X to NSP	
	RADAR_059SA_1POLAR001_PRIME	M	2008-051T02:06:00		000T14:20:00	2008-051T16:26:00	NEG_Z to Saturn	NEG_X to Sun	RADAR must control primary and secondary axes to obtain correct polarization. MAG will be accommodated as much as possible.
	SP_059NA_DEADTIME051_PRIME		**2008-051T16:26:00**		**000T00:05:00**	**2008-051T16:31:00**	**ISS_NAC to Saturn (0.0,-20.0,20.0 deg. offset)**	**POS_X to NSP**	
	VIMS_059RI_SOLAROCC001_PRIME	U	2008-051T16:31:02	GMB_E059_SATURN_SOLAR_OCC_1_ING-000T00:54:32	000T00:55:00	2008-051T17:26:02	ISS_NAC to Sun (-20.0,0.0,-0.109 deg. offset)	POS_X to NSP	UVIS to ride along. Secondary axis for MAG.
	VIMS_059RI_HIPHASE001_PRIME	C, I, M	2008-051T17:26:02	GMB_E059_SATURN_SOLAR_OCC_1_ING+000T00:00:28	000T00:35:00	2008-051T18:01:02	VIMS_IR to L_ANSA_D	POS_X to 53.3/50.8	Sun in occultation 1739 - 1838. Secondary axis for CDA & MAG.
	VIMS_059SA_SOLOCC001_PRIME	C, M, U	2008-051T18:01:02	GMB_E059_SATURN_SOLAR_OCC_1_ING+000T00:35:28	000T01:10:00	2008-051T19:11:02	ISS_NAC to Sun (-20.0,0.0,-0.109 deg. offset)	POS_X to NSP	Joint VIMS/UVIS observation. Secondary axis for MAG.
	SP_059NA_DEADTIME451_PRIME		**2008-051T19:12:00**		**000T00:28:00**	**2008-051T19:40:00**	**ISS_NAC to Saturn (0.0,-20.0,20.0 deg. offset)**	**POS_X to NSP**	
	Periapse R = 3.3 Rs, lat = ...		2008-051T19:22:48		000T00:00:01	2008-051T19:22:49			
	SP_059SA_WAYPTTURN451_PRIME		2008-051T19:40:00		000T00:20:00	2008-051T20:00:00	ISS_NAC to Saturn	POS_Z to NSP	18 min. turn
	NEW WAYPOINT		**2008-051T20:00:00**		**001T08:21:00**	**2008-053T04:21:00**	**ISS_NAC to Saturn**	**POS_Z to NSP**	
	VIMS_059SA_REGPOLMAP003_PRIME		2008-051T20:00:00		000T00:45:00	2008-051T20:45:00	ISS_NAC to Saturn	POS_Z to North_Pole_Dir	
	ISS_059JA_GEOLOG001_PRIME	C, U, V	2008-051T20:45:00		000T02:15:00	2008-051T23:00:00	CIRS_FP1 to Janus	POS_Z to NSP	ISS will accommodate CIRS
	VIMS_059SA_ALPAUROCC001_PRIME	V	2008-051T23:00:00		000T01:00:00	2008-052T00:00:00	VIMS_IR to 79.172/45.998	POS_Z to NSP	
	UVIS_059SA_LIMBSKIM001_PRIME		2008-052T00:00:00		000T02:06:00	2008-052T02:06:00	UVIS_EUV to Saturn	PIC	
	SP_059EA_DLTURN052_PRIME		2008-052T02:06:00		000T00:30:00	2008-052T02:36:00	XBAND to Earth	NEG_X to NEP	17 min. turn
	SP_059EA_G34BWGOTB052_PRIME	C, E, M, N	2008-052T02:36:00		000T09:00:00	2008-052T11:36:00	XBAND to Earth	NEG_X to NEP	
	SP_059SA_WAYPTTURN052_PRIME	M	2008-052T11:36:00		000T00:30:00	2008-052T12:06:00	ISS_NAC to Saturn	POS_Z to NSP	
Gap 3	CIRS_059TI_COMPMAP001_PRIME	M, V	2008-052T12:06:00		000T06:15:00	2008-052T18:21:00	CIRS_FPB to Titan	NEG_Z to NSP	
	SP_059EA_DLTURN452_PRIME		2008-052T18:21:00		000T00:30:00	2008-052T18:51:00	XBAND to Earth	NEG_X to NEP	18 min. turn
	SP_059EA_M70METCLS052_PRIME	C	2008-052T18:51:00		000T09:00:00	2008-053T03:51:00	XBAND to Earth	NEG_X to NEP	

Final Sequenced SMT and Data Volume

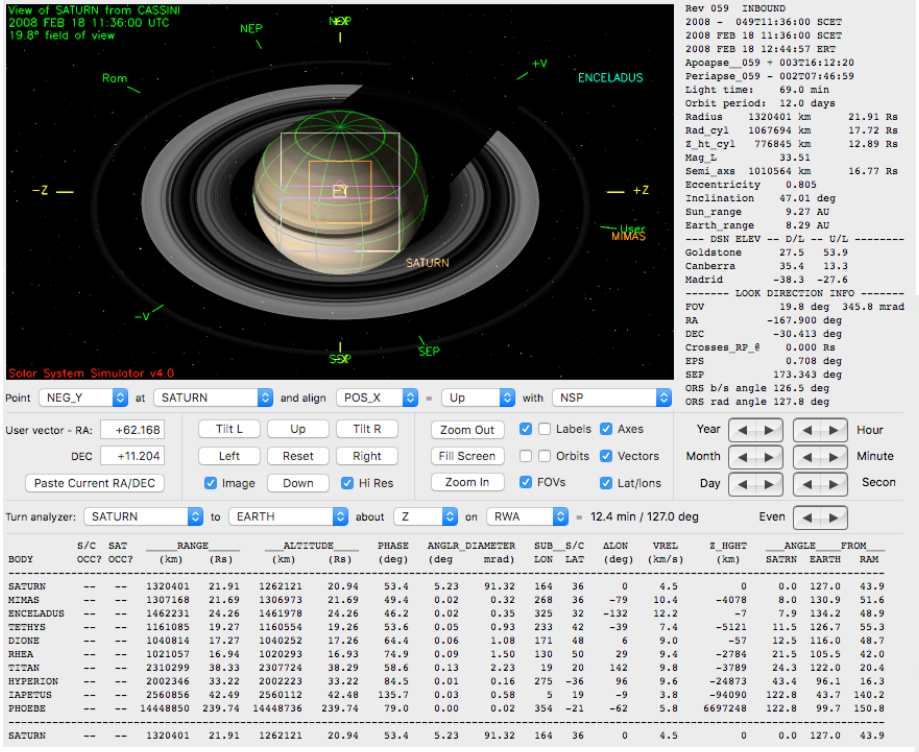
DATA VOLUME SUMMARY --- TRANSFER FRAME OVERHEAD INCLUDED (80 BITS PER 8800-BIT FRAME)

			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 (Mb)	(%)	CAROVR (Mb)
SP_059EA_G34BWGOTP050_PRIME	050 02:36	050 11:36	0	1529	63	1592	3492	1900	0	233	53	1878	837	-1042	30	0%	1041
SP_059EA_M70METNON050_PRIME	050 21:06	051 01:05	1041	963	40	2044	3492	1448	0	108	24	2176	2009	-167	30	0%	167
SP_059EA_G34BWGOTB052_PRIME	052 02:36	052 11:36	167	2258	109	2534	3492	958	0	1296	53	3883	981	-2903	30	0%	2902
SP_059EA_M70METCLS052_PRIME	052 18:51	053 03:51	2902	243	31	3176	3492	316	0	1058	53	4287	4400	112	30	0%	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	049 11:36	050 02:36	54.0	11.8	201.6	2.7	273.0	32.4	55.3	0.0	70.7	253.6	560.0	0.0	12.3	1527.4
SP_059EA_G34BWGOTP050_PRIME	050 02:36	050 11:36	32.4	7.1	86.4	1.6	0.0	19.4	38.9	0.0	42.4	2.5	0.0	0.0	0.0	230.7
DAILY TOTAL SCIENCE	049 11:36	050 11:36	86.4	18.8	288.0	4.3	273.0	51.8	94.2	0.0	113.2	256.1	560.0	0.0		
OBSERVATION_NOR	050 11:36	050 21:06	34.2	7.5	122.4	1.7	168.0	20.5	41.0	0.0	44.8	154.0	360.0	0.0	7.8	961.9
SP_059EA_M70METNON050_PRIME	050 21:06	051 01:05	14.4	4.1	43.2	0.7	0.0	8.6	17.3	0.0	18.9	0.0	0.0	0.0	0.0	107.2
DAILY TOTAL SCIENCE	050 11:36	051 01:05	48.6	11.6	165.6	2.4	168.0	29.2	58.3	0.0	63.7	154.0	360.0	0.0		
OBSERVATION_NOR	051 01:05	052 02:36	91.8	64.3	40.8	12.4	209.3	107.0	98.7	275.9	674.6	299.9	362.5	0.0	20.8	2258.0
OBSERVATION_SI	051 01:05	052 02:36	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.5
SP_059EA_G34BWGOTB052_PRIME	052 02:36	052 11:36	32.4	9.6	86.4	1.6	0.0	19.4	38.4	0.0	1093.6	2.5	0.0	0.0	0.0	1283.9
DAILY TOTAL SCIENCE	051 01:05	052 11:36	124.2	73.9	127.2	14.0	209.3	126.5	137.0	275.9	1768.2	302.3	363.0	0.0		
OBSERVATION_NOR	052 11:36	052 18:51	26.1	7.8	90.0	1.3	0.0	15.7	30.0	0.0	34.2	0.0	36.0	0.0	5.9	247.0
SP_059EA_M70METCLS052_PRIME	052 18:51	053 03:51	320.8	17.0	86.4	1.6	0.0	64.0	58.3	0.0	497.6	2.5	0.0	0.0	0.0	1048.2
DAILY TOTAL SCIENCE	052 11:36	053 03:51	346.9	24.8	176.4	2.9	0.0	79.7	88.3	0.0	531.8	2.5	36.0	0.0		

Segment Geometry (1 of 2)



Rev 059 INBOUND
2008 - 049T11:36:00 SCET
2008 FEB 18 11:36:00 SCET
2008 FEB 18 12:44:57 ERT
Apoapse__059 + 003T16:12:20
Periapse_059 - 002T07:46:59
Light time: 69.0 min
Orbit period: 12.0 days

Radius	1320401 km	21.91 Rs
Rad_cyl	1067694 km	17.72 Rs
Z_ht_cyl	776845 km	12.89 Rs
Mag_L	33.51	
Semi_axs	1010564 km	16.77 Rs
Eccentricity	0.805	
Inclination	47.01 deg	
Sun_range	9.27 AU	
Earth_range	8.29 AU	

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

Goldstone	27.5	53.9
Canberra	35.4	13.3
Madrid	-38.3	-27.6

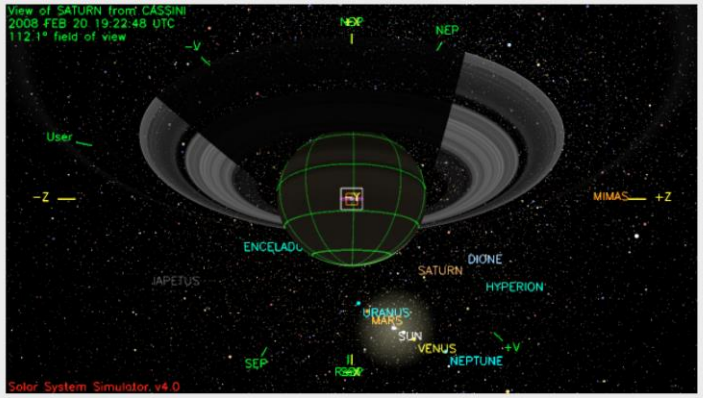
------- LOOK DIRECTION INFO -------

FOV	19.8 deg 345.8 mrad
RA	-167.900 deg
DEC	-30.413 deg
Crosses_RP_@	0.000 Rs
EPS	0.708 deg
SEP	173.343 deg
ORS b/s angle	126.5 deg
ORS rad angle	127.8 deg

BODY	S/C OCC?	SAT OCC?	RANGE (km)	RANGE (Rs)	ALTITUDE (km)	ALTITUDE (Rs)	PHASE (deg)	ANGLR_DIAMETER (deg	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	--	--	1320401	21.91	1262121	20.94	53.4	5.23	91.32	164	36	0	4.5	0	0.0	127.0	43.9
MIMAS	--	--	1307168	21.69	1306973	21.69	49.4	0.02	0.32	268	36	-79	10.4	-4078	8.0	130.9	51.6
ENCELADUS	--	--	1462231	24.26	1461978	24.26	46.2	0.02	0.35	325	32	-132	12.2	-7	7.9	134.2	48.9
TETHYS	--	--	1161085	19.27	1160554	19.26	53.6	0.05	0.93	233	42	-39	7.4	-5121	11.5	126.7	55.3
DIONE	--	--	1040814	17.27	1040252	17.26	64.4	0.06	1.08	171	48	6	9.0	-57	12.5	116.0	48.7
RHEA	--	--	1021057	16.94	1020293	16.93	74.9	0.09	1.50	130	50	29	9.4	-2784	21.5	105.5	42.0
TITAN	--	--	2310299	38.33	2307724	38.29	58.6	0.13	2.23	19	20	142	9.8	-3789	24.3	122.0	20.4
HYPERION	--	--	2002346	33.22	2002223	33.22	84.5	0.01	0.16	275	-36	96	9.6	-24873	43.4	96.1	16.3
IAPETUS	--	--	2560856	42.49	2560112	42.48	135.7	0.03	0.58	5	19	-9	3.8	-94090	122.8	43.7	140.2
PHOEBE	--	--	14448850	239.74	14448736	239.74	79.0	0.00	0.02	354	-21	-62	5.8	6697248	122.8	99.7	150.8
SATURN	--	--	1320401	21.91	1262121	20.94	53.4	5.23	91.32	164	36	0	4.5	0	0.0	127.0	43.9

← Seg Start (Left)

↓ Periapse (below)



Rev 059 INBOUND
2008 - 051T19:22:48 SCET
2008 FEB 20 19:22:48 SCET
2008 FEB 20 20:31:47 ERT
Apoapse__059 + 005T23:59:08
Periapse_059 - 00:00:11
Light time: 69.0 min
Orbit period: 12.1 days

Radius	197194 km	3.27 Rs
Rad_cyl	184575 km	3.06 Rs
Z_ht_cyl	-69408 km	-1.15 Rs
Mag_L	3.73	
Semi_axs	1015522 km	16.85 Rs
Eccentricity	0.806	
Inclination	47.02 deg	
Sun_range	9.28 AU	
Earth_range	8.29 AU	

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

Goldstone	-43.3	-34.7
Canberra	-5.7	20.6
Madrid	26.9	0.7

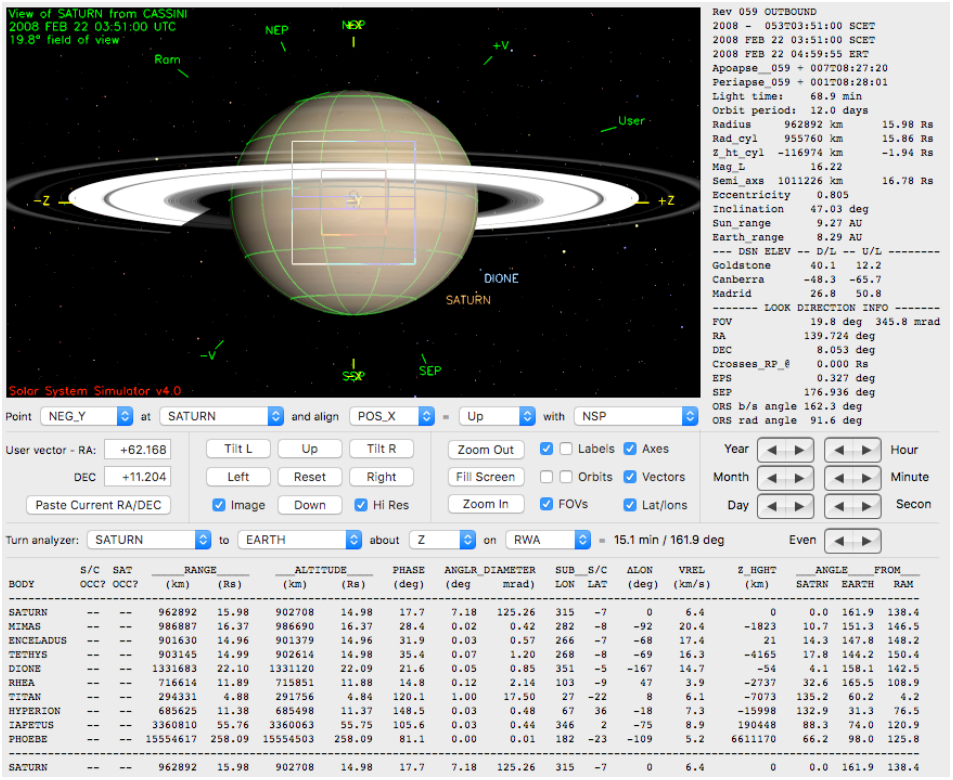
------- LOOK DIRECTION INFO -------

FOV	112.1 deg 1955.9 mrad
RA	-10.537 deg
DEC	16.624 deg
Crosses_RP_@	0.000 Rs
EPS	0.460 deg
SEP	175.683 deg
ORS b/s angle	30.3 deg
ORS rad angle	118.6 deg

BODY	S/C OCC?	SAT OCC?	RANGE (km)	RANGE (Rs)	ALTITUDE (km)	ALTITUDE (Rs)	PHASE (deg)	ANGLR_DIAMETER (deg	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	--	--	197194	3.27	137663	2.28	149.7	35.59	621.20	91	-21	0	18.6	0	0.0	30.2	90.0
MIMAS	--	--	261086	4.33	260884	4.33	134.6	0.09	1.59	316	-15	-85	20.0	3272	45.6	45.8	92.9
ENCELADUS	--	--	397727	6.60	397472	6.60	140.5	0.07	1.29	24	-10	135	28.7	21	26.9	39.0	80.8
TETHYS	--	--	192345	3.19	191810	3.18	61.8	0.32	5.62	37	-21	36	17.0	-2822	98.3	117.7	113.8
DIONE	--	--	539810	8.96	539246	8.95	157.6	0.12	2.09	348	-7	-142	24.7	50	28.0	22.7	79.3
RHEA	--	--	350582	5.82	349815	5.80	7.7	0.25	4.38	4	-12	2	13.8	2612	147.4	172.7	122.4
TITAN	--	--	1288251	21.38	1285676	21.33	129.2	0.23	4.00	353	-3	-113	19.9	-7679	60.2	51.2	83.3
HYPERION	--	--	1625272	26.97	1625108	26.96	159.0	0.01	0.20	3	3	-149	21.4	-22648	33.2	21.4	74.1
IAPETUS	--	--	3606160	59.84	3605412	59.82	129.8	0.02	0.41	4	-1	138	21.6	86413	42.7	49.7	75.8
PHOEBE	--	--	15248843	253.02	15248730	253.02	84.4	0.00	0.02	4	-25	97	18.1	6643687	74.3	94.6	110.4
SATURN	--	--	197194	3.27	137663	2.28	149.7	35.59	621.20	91	-21	0	18.6	0	0.0	30.2	90.0

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	21.91	53.4	36
Periapse	3.27	149.7	-21
Segment End	15.98	17.7	-7

Segment Geometry (2 of 2)

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Rev 059 OUTBOUND
2008 -  053T03:51:00 SCET
2008 FEB 22 03:51:00 SCET
2008 FEB 22 04:59:55 ERT
Apoapse__059 + 007T08:27:20
Periapse_059 + 001T08:28:01
Light time:    68.9 min
Orbit period:  12.0 days
Radius      962892 km       15.98 Rs
Rad_cyl     955760 km       15.86 Rs
Z_ht_cyl   -116974 km       -1.94 Rs
Mag_L          16.22
Semi_axs   1011226 km       16.78 Rs
Eccentricity    0.805
Inclination    47.03 deg
Sun_range       9.27 AU
Earth_range     8.29 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone      40.1   12.2
Canberra      -48.3  -65.7
Madrid         26.8   50.8
------- LOOK DIRECTION INFO -------
FOV            19.8 deg  345.8 mrad
RA            139.724 deg
DEC             8.053 deg
Crosses_RP_@    0.000 Rs
EPS             0.327 deg
SEP           176.936 deg
ORS b/s angle 162.3 deg
ORS rad angle  91.6 deg
```

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	--	--	962892	15.98	902708	14.98	17.7	7.18	125.26	315	-7	0	6.4	0	0.0	161.9	138.4
MIMAS	--	--	986887	16.37	986690	16.37	28.4	0.02	0.42	282	-8	-92	20.4	-1823	10.7	151.3	146.5
ENCELADUS	--	--	901630	14.96	901379	14.96	31.9	0.03	0.57	266	-7	-68	17.4	21	14.3	147.8	148.2
TETHYS	--	--	903145	14.99	902614	14.98	35.4	0.07	1.20	268	-8	-69	16.3	-4165	17.8	144.2	150.4
DIONE	--	--	1331683	22.10	1331120	22.09	21.6	0.05	0.85	351	-5	-167	14.7	-54	4.1	158.1	142.5
RHEA	--	--	716614	11.89	715851	11.88	14.8	0.12	2.14	103	-9	47	3.9	-2737	32.6	165.5	108.9
TITAN	--	--	294331	4.88	291756	4.84	120.1	1.00	17.50	27	-22	8	6.1	-7073	135.2	60.2	4.2
HYPERION	--	--	685625	11.38	685498	11.37	148.5	0.03	0.48	67	36	-18	7.3	-15998	132.9	31.3	76.5
IAPETUS	--	--	3360810	55.76	3360063	55.75	105.6	0.03	0.44	346	2	-75	8.9	190448	88.3	74.0	120.9
PHOEBE	--	--	15554617	258.09	15554503	258.09	81.1	0.00	0.01	182	-23	-109	5.2	6611170	66.2	98.0	125.8
SATURN	--	--	962892	15.98	902708	14.98	17.7	7.18	125.26	315	-7	0	6.4	0	0.0	161.9	138.4

Seg End

Solar Geometry – ORS Boresight Concerns

There were solar viewing conflicts on DOY 051 and constraint management was required during the occultation for the VIMS Hi-Phase Rings observation.

Please see final slide for more details.

Daily Science Highlights

DOY 049 – This day was spent looking at Saturn's North Pole. ISS led the joint ORS campaign. Meanwhile the MAPS teams conducted a campaign of their own to study the dynamics of Saturn's inner magnetosphere.

DOY 050 –The day saw a continuation of the previous day's activities with ISS again leading observations of Saturn's northern hemisphere while MAPS looked at the magnetosphere. Toward the end of the day RSS performed an Operations Readiness Test (ORT) to demonstrate DSN and RSSG preparedness to support the Rings Occultation experiment on DOY 062.

DOY 051 – As the spacecraft neared periapse, VIMS took a quick map of the north polar region, followed by RADAR imaging of the northern polar region and the rings at high inclination. At periapse, VIMS led ORS observations of the solar eclipses of Saturn and the rings. Meanwhile, MAG took measurements yielding unique observations of Saturn's internal magnetic field over a unique orbit track in latitude and longitude space. Outbound from periapse, VIMS continued polar viewing and also observed a Alp Aur Stellar Occultation by Saturn. ISS led a joint observation of the tiny moon Janus.

DOY 052 - The day began with a UVIS observation of Saturn's limb to measure airglow spectrum and brightness vs. altitude. Half-way through the day the spacecraft turned its attention to Titan as CIRS obtained equatorial measurements of nitriles, hydrocarbons, an oxygen compound and CO_2, as a function of latitude and emission angle. Meanwhile the MAPS teams continued their campaign to study the dynamics of Saturn's inner magnetosphere.

Segment Integration Planning

Timeline Gaps and Suggested Observations

Rev 59 - TOL

Activity	Start	Duration	Pointing	Notes	TLM
Segment Start	2008-049T11:36:00				
OPNAV and NAV Turn to New Waypoint	2008-049T11:36:00	01:00:00			
New Waypoint	**2008-049T12:36:00**				
OPEN **Gap 1**	2008-049T12:36:00	13:30:00			
SP Turn to Downlink	2008-050T02:06:00	00:30:00			
Downlink	2008-050T02:36:00	09:00:00	XBAND to Earth;	Goldstone 34 BWG	
SP Turn to Waypoint	2008-050T11:36:00	00:30:00			
OPEN **Gap 2**	2008-050T12:06:00	08:30:00			
SP Turn to Downlink	2008-050T20:36:00	00:30:00			
Downlink (OTM Prime)	2008-050T21:06:00	06:00:00	XBAND to Earth;	Madrid 34 HEF	
SP Turn to Waypoint	2008-051T03:06:00	00:30:00			
RADAR/Warm-up ?	2008-051T03:36:00	12:54:00			
SP Deadtime	2008-051T16:30:00	00:15:00			
VIMS Ring Occ.	2008-051T16:45:00	00:55:00			
VIMS High Phase or Janus?	2008-051T17:40:00	00:35:00			
VIMS Saturn Occ.	2008-051T18:15:00	01:10:00			
SP Deadtime	2008-051T19:25:00	00:15:00			
RADAR/Warm-up ?	2008-051T19:40:00	05:26:00			
SOST Janus /More RADAR time?	2008-052T01:06:00	01:00:00			
SP Turn to Downlink	2008-052T02:06:00	00:30:00	XBAND to Earth;		
Downlink (OTM Back-up)	2008-052T02:36:00	09:00:00	XBAND to Earth;	Goldstone 34 HEF	
OPNAV and NAV Turn to Waypoint	2008-052T11:36:00	01:00:00			
OPEN **Gap 3**	2008-052T12:36:00	05:45:00			
SP Turn to Downlink	2008-052T18:21:00	00:30:00			
Downlink	2008-052T18:51:00	09:00:00	XBAND to Earth;	Madrid 34 HEF	

Initial SMT and Data Volume

First Look During Integration:

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_059EA_G34HEFOTP050_PRIME	050 02:36	050 11:36	0	1388	52	1440	3534	2094	59%	17	142	53	1652	1220	-433	-35%	433	
SP_059EA_M34HEFNON050_PRIME	050 21:06	051 01:06	433	957	33	1423	3568	2146	60%	0	111	24	1557	308	-1249	-406%	1249	
SP_059EA_G34HEFOTB052_PRIME	052 02:36	052 11:36	1249	2175	89	3513	3568	55	2%	0	147	53	3713	1224	-2489	-203%	2489	
SP_059EA_M34HEFCLS052_PRIME	052 18:51	053 03:51	2489	195	25	2709	3534	824	23%	17	220	53	3000	1106	-1894	-171%	1894	

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	049 11:36	050 02:36	54.0	8.1	194.4	2.7	54.6	32.4	55.3	0.0	70.7	255.5	660.0	0.0	0.0	1387.6
OBSERVATION_OPN	049 11:36	050 02:36	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_059EA_G34HEFOTP050_PRIME	050 02:36	050 11:36	32.4	4.9	0.0	1.6	0.0	19.4	38.9	0.0	42.4	2.5	0.0	0.0	0.0	142.1
DAILY TOTAL SCIENCE	049 11:36	050 11:36	86.4	12.9	194.4	4.3	54.6	51.8	94.2	0.0	113.2	257.9	660.0	0.0		
OBSERVATION_NOR	050 11:36	050 21:06	34.2	5.1	122.4	1.7	22.6	20.5	41.0	0.0	44.8	154.5	510.0	0.0	0.0	956.9
SP_059EA_M34HEFNON050_PRIME	050 21:06	051 01:06	14.4	2.7	46.8	0.7	0.0	8.6	17.3	0.0	18.9	1.1	0.0	0.0	0.0	110.5
DAILY TOTAL SCIENCE	050 11:36	051 01:06	48.6	7.9	169.2	2.4	22.6	29.2	58.3	0.0	63.7	155.6	510.0	0.0		
OBSERVATION_NOR	051 01:06	052 02:36	91.8	19.7	8.4	12.4	201.3	107.4	98.7	277.1	674.6	260.0	423.9	0.0	0.0	2175.3
SP_059EA_G34HEFOTB052_PRIME	052 02:36	052 11:36	32.4	6.1	0.0	1.6	0.0	19.4	38.4	0.0	46.8	2.5	0.0	0.0	0.0	147.2
DAILY TOTAL SCIENCE	051 01:06	052 11:36	124.2	25.8	8.4	14.0	201.3	126.9	137.0	277.1	721.4	262.4	423.9	0.0		
OBSERVATION_NOR	052 11:36	052 18:51	26.1	5.2	82.8	1.3	0.0	15.7	30.0	0.0	34.2	0.0	0.0	0.0	0.0	195.3
OBSERVATION_OPN	052 11:36	052 18:51	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_059EA_M34HEFCLS052_PRIME	052 18:51	053 03:51	32.4	5.8	86.4	1.6	0.0	19.4	29.2	0.0	42.4	2.5	0.0	0.0	0.0	219.7
DAILY TOTAL SCIENCE	052 11:36	053 03:51	58.5	11.0	169.2	2.9	0.0	35.1	59.2	0.0	76.6	2.5	0.0	0.0		

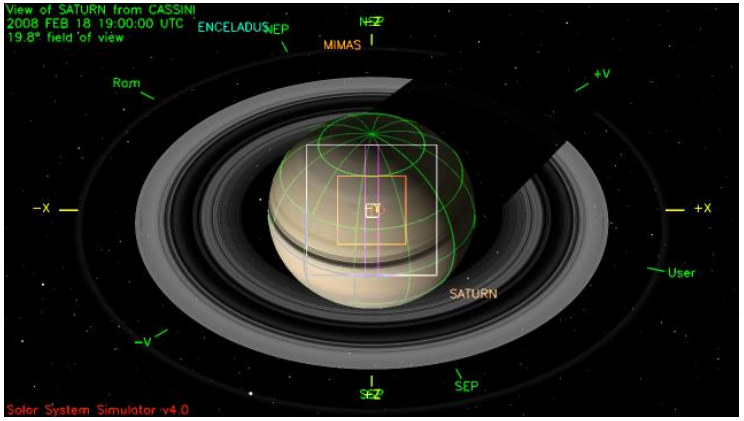
	CAPS (Mb)	CDA (Mb)	CIRS (Mb)	INMS (Mb)	ISS (Mb)	MAG (Mb)	MIMI (Mb)	RADAR (Mb)	RPWS (Mb)	UVIS (Mb)	VIMS (Mb)	PROBE (Mb)
TOTAL RECORDED (OPNAV data not included)	317.7	57.6	541.2	23.7	278.4	243.0	348.7	277.1	974.9	678.4	1594.0	0.0

Waypoint Selection

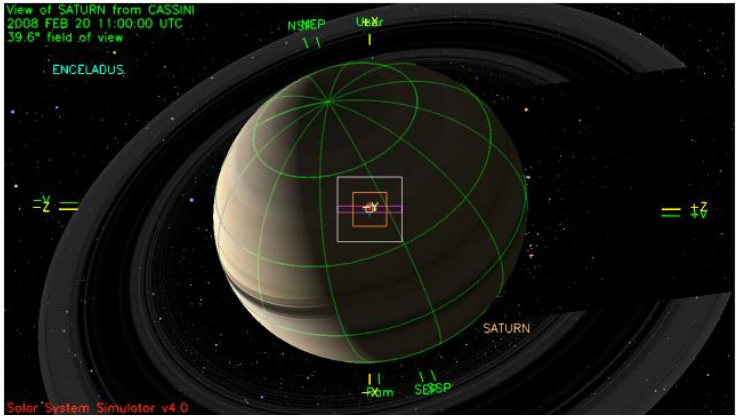
- Waypoint / Secondary Axis Pointing during Occultation Period
  - CDA suggested Occ_Port to Sun; -X to 233.3/-50.8 was NOT safe during the period with CIRS heating of 2.07 degrees (must be under 5 for waypoint), however there are SRU violations, so this cannot be used as a waypoint.
  - RADAR observation
  - Other suggestions?

Waypoints Chosen (1 of 2)

Waypoint 1 (2008-049T12:06:00 – 2008-051T01:36:00): ISS_NAC to Saturn; NEG_Z to NSP

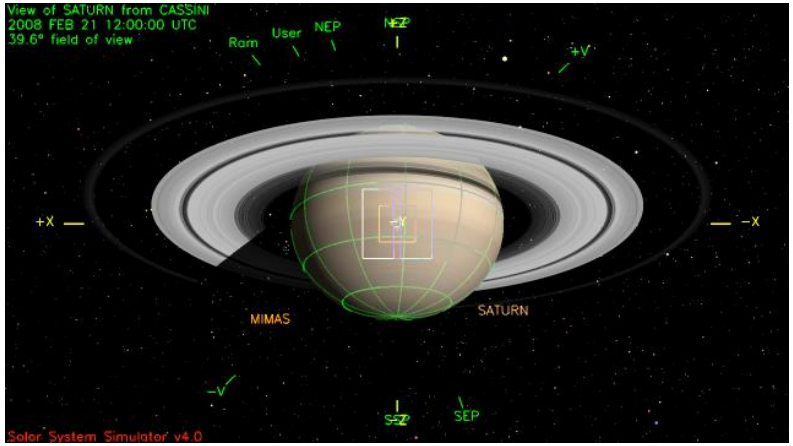


Waypoint 2 (2008-051T01:36:00 – 2008-051T20:00:00):
ISS_NAC to Saturn (0.0,-20.0,20.0 deg. offset); POS_X to NSP



Waypoints Chosen (2 of 2)

Waypoint 3 (2008-051T20:00:00 - 2008-053T03:51:00): ISS_NAC to Saturn; POS_Z to NSP



Notes & Liens

- **Pointing Issues**
  - None
- **Data Volume Issues**
  - None
- **Telemetry Mode Issues**
  - None
- **CIMS Issues**
  - None
- **Power/OPMODE Issues**
  - None
- **Flight Rule/Mission Planning Guideline and Constraint Issues**
  - The second downlink was shortened to 4 hrs. to accommodate a difficult time period of integration. The DSN station is requested early enough to get 2-way for the entire 4 hrs. This plan was approved by NAV during TWT meetings.
- **Other Issues**
  - The DSN Station request may be 5-10 minutes earlier than necessary.

CMT Management: -Y to Sun violation

Details from waiver – usual diagram unavailable:

VIMS requests to waive FR84B2 and FR89B21-2.0 and request CMT management during the Saturn Solar Occultation for observation VIMS_059RI_HIPHASE001_PRIME to cover the period between 2008-051T17:34:59.810 and 2008-051T17:52:36.510.

The Neg Y to Sun KPT Data from PSIV1 data indicates:

Violation of the 15 deg from Sun (CIRS Rule) starts between 2008-051T17:34:59.810 and 2008-051T17:35:05:810.

Violation of the 12 deg from Sun (UVIS Rule) starts between 2008-051T17:35:59.810 and 2008-051T17:36:05.810.

Violation of 12 degrees from Sun (UVIS Rule) ends between 2008-051T17:50:42.510 and 2008-051T17:50:48.510.

Violation of 15 degrees from Sun (CIRS Rule) ends between 2008-051T17:52:30.510 and 2008-051T17:52:36.510.

During this period, the NEG_Y to Sun angle reaches a minimum of 8.0957448 degrees at 2008-051T17:38:53.810.

Mission Planning indicates the occultation occurs between 2008-051T17:26:00 and 2008-051T18:22:00 with the main uncertainty due to the maneuver delivery uncertainty. Taking this into account the commanding of CMT to detect 16 minutes prior to and after the occultation is at a minimum of 3 times Ken Klaasen's uncertainty. The pointing design for this observation is within these guidelines.

* The absolute times given for CMT management are base on the current epoch GMB_E059_SATURN_OCC_1_ING of 2008-051T17:25:34. All CMT management times must be in epoch relative NOT absolute time.