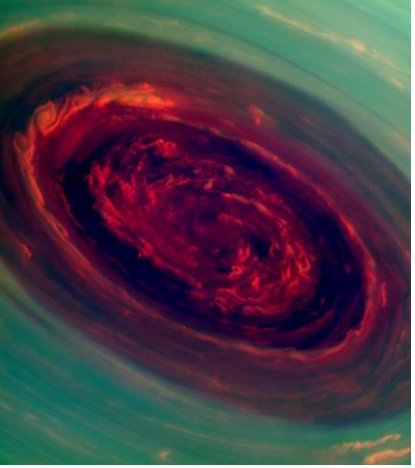

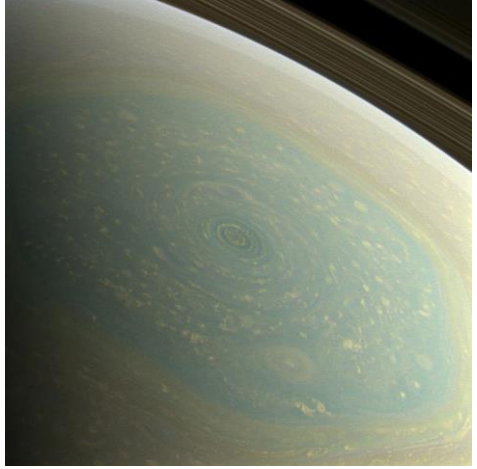
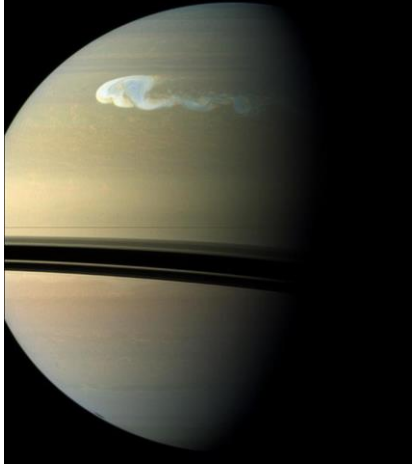

Science Planning & Sequence Team
CASSINI

SATURN TARGET WORKING TEAM

Rev 17 Segment Legacy Package

Segment Boundary: Oct 29, 2005 – Oct 31, 2005
2005-302T09:49:00– 2005-304T17:14:00 (SCET)

Integration Began 12/17/2001
Segment Delivered to S15 Sequence 04/12/2002
Lead Integrator was Jerod Gross

Legacy Package Assembled by Martin Brennan

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

Segment Overview and Final Products

Segment Summary

- Saturn Rev 17 is a periapse segment starting ~12 hours before perikrone and ending nearly 2 days after.
- Low inclination orbit nearly equatorial (edge-on to ring plane)
- The segment begins on day-side with ISS/CIRS observation and ends at high phase angle night side with CIRS/VIMS observations
- OTM-041 was planned for the second downlink pass on DOY 304
- Consideration early in integration for extending the segment into the following XD segment for potential CIRS FIR MAP and VIMS Cylindrical Map. The extension was later cancelled.

Final Sequenced SPASS

Request	Riders	Start (SCET)	Sta	Duration	End (SCET)	Primary	Secondary	Comments
Sequence S015, length = 35 ...		2005-281T12:30:00		035T04:31:00	2005-316T17:01:00			
SATURN rev 17 Segment		2005-302T09:49:00		002T07:25:00	2005-304T17:14:00			
SP_017SA_WAYPTTURN302_PRIME		2005-302T09:49:00		000T00:31:00	2005-302T10:20:00	ISS_NAC to Saturn	POS_Z to Sun	
NEW WAYPOINT		**2005-302T10:20:00**		**001T07:25:00**	**2005-303T17:45:00**	**ISS_NAC to Saturn**	**POS_Z to Sun**	
ISS_017OT_RETARG2X2001_PRIME	V	2005-302T10:20:00		000T02:00:00	2005-302T12:20:00	ISS_NAC to Satellites	POS_Z to Sun	
CIRS_017SA_FTRACK003_PRIME	I, M, U, V	2005-302T12:20:00		000T06:00:00	2005-302T18:20:00	CIRS_FPB to Saturn	POS_X to NSP	
ISS_017TI_1X1PT160001_PRIME	M	2005-302T18:20:00		000T00:50:00	2005-302T19:10:00	ISS_NAC to Titan	NEG_X to Sun	
UVIS_017SA_LIMBSKIM001_PRIME	M	2005-302T19:10:00		000T01:20:00	2005-302T20:30:00	UVIS_FUV to Saturn	POS_X to Saturn	
CDA_017TE_0500TEORX011_PRIME	M	2005-302T20:30:00		000T02:30:00	2005-302T23:00:00	NEG_Y to 254.0/-0.4	NEG_X to 162.8/-71.1	
Periapse per = 29.0 d, inc ...		2005-302T22:55:53		000T00:00:01	2005-302T22:55:54			
CIRS_017TE_FP1FAZ0P5366_PRIME	I, M, U, V	2005-302T23:00:00		000T01:30:00	2005-303T00:30:00	CIRS_FP1 to Tethys	POS_Z to Sun	
CIRS_017SA_LIMBINT002_PRIME	C, M	2005-303T00:30:00		000T02:30:00	2005-303T03:00:00	CIRS_FPB to Saturn	NEG_Z to NSP	
VIMS_017SA_FEATRACK003_PRIME	I, M, U	2005-303T03:00:00		000T01:00:00	2005-303T04:00:00	ISS_NAC to Saturn	NEG_Z to NSP	
CIRS_017SA_LIMBINT222_PRIME	C, M	2005-303T04:00:00		000T02:00:00	2005-303T06:00:00	CIRS_FPB to Saturn	NEG_Z to NSP	
VIMS_017SA_FEATRACK007_PRIME	I, M, U	2005-303T06:00:00		000T01:45:00	2005-303T07:45:00	ISS_NAC to Saturn	NEG_Z to NSP	
SP_017EA_DLTURN303_PRIME	M	2005-303T07:45:00		000T00:30:00	2005-303T08:15:00	XBAND to Earth	NEG_X to 205.0/-44.0	
SP_017EA_G70METNON303_PRIME	C, M	2005-303T08:15:00		000T09:00:00	2005-303T17:15:00	XBAND to Earth	NEG_X to 205.0/-44.0	Rocking
SP_017SA_WAYPTTURN303_PRIME		2005-303T17:15:00		000T00:30:00	2005-303T17:45:00	ISS_NAC to Saturn	POS_X to NSP	
NEW WAYPOINT		**2005-303T17:45:00**		**000T23:55:00**	**2005-304T17:40:00**	**ISS_NAC to Saturn**	**POS_X to NSP**	
ISS_017OT_RETARGREP001_PRIME		2005-303T17:45:00		000T02:45:00	2005-303T20:30:00	ISS_NAC to Satellites	POS_X to NSP	
CIRS_017SA_FIRMAP010_PRIME	C, U, V	2005-303T20:30:00		000T11:00:00	2005-304T07:30:00	CIRS_FP1 to Saturn	POS_X to NSP	
SP_017EA_DLTURN304_PRIME		2005-304T07:30:00		000T00:29:00	2005-304T07:59:00	XBAND to Earth	NEG_X to 230.0/-19.0	
SP_017EA_G34BWGOTP304_PRIME	N	2005-304T07:59:00		000T09:15:00	2005-304T17:14:00	XBAND to Earth	5_Hr_Rolling	

Final Sequenced SMT and Data Volume

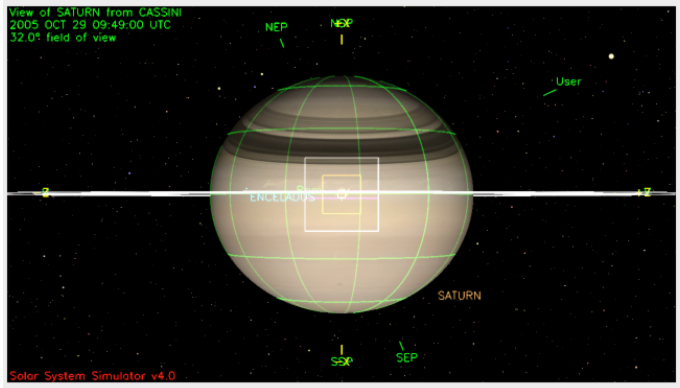
DATA VOLUME SUMMARY --- TRANSFER FRAME OVERHEAD INCLUDED (80 BITS PER 8800-BIT FRAME)

			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_017EA_G70METNON303_PRIME	303 08:15	303 17:15	0	3227	76	3303	3342	38	0	476	53	3832	3681	-151	3	0%	151
SP_017EA_G34BWGOTP304_PRIME	304 07:59	304 17:14	151	1134	50	1336	3342	2006	0	163	55	1553	718	-834	3	0%	835

DATA VOLUME REPORT --- TRANSFER FRAME OVERHEAD NOT INCLUDED

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)	Event		
OBSERVATION_NOR	302 09:49	303 08:15	259.1	255.7	172.8	6.3	517.4	73.2	146.3	0.0	829.8	88.7	847.0	0.0	0.0	3196.2		
OBSERVATION_SI	302 09:49	303 08:15	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5		
SP_017EA_G70METNON303_PRIME	303 08:15	303 17:15	49.7	16.7	86.4	2.5	0.0	19.4	58.3	0.0	235.7	2.5	0.0	0.0	0.0	471.3		
DAILY TOTAL SCIENCE	302 09:49	303 17:15	308.8	272.4	260.7	8.8	517.4	92.7	204.6	0.0	1065.5	91.2	847.0	0.0				
OBSERVATION_NOR	303 17:15	304 07:59	53.0	83.2	158.4	78.2	400.0	52.4	47.7	0.0	170.0	39.9	30.0	0.0	0.0	1112.9		
OBSERVATION_SI	303 17:15	304 07:59	0.0	0.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.0		
SP_017EA_G34BWGOTP304_PRIME	304 07:59	304 17:14	33.3	17.5	0.0	1.7	0.0	32.9	30.0	0.0	43.6	2.5	0.0	0.0	0.0	161.5		
DAILY TOTAL SCIENCE	303 17:15	304 17:14	86.3	100.7	169.4	79.9	400.0	85.3	77.7	0.0	213.6	42.4	30.0	0.0				

Segment Geometry




```
Rev 017  INBOUND
2005 -  302T09:49:00 SCET
2005 OCT 29 09:49:00 SCET
2005 OCT 29 11:04:51 ERT
Apoapse__017 + 008T09:49:26
Periapse_017 - 13:07:09
Light time:    75.8 min
Orbit period:  28.9 days
Radius      538075 km       8.93 Rs
Rad_cyl     538063 km       8.93 Rs
Z_ht_cyl     -3539 km      -0.06 Rs
Mag_L           8.93
Semi_axs   1814734 km      30.11 Rs
Eccentricity    0.847
Inclination     0.39 deg
Sun_range       9.09 AU
Earth_range     9.12 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone      45.7   14.9
Canberra      -50.9  -72.5
Madrid         29.3   56.8
------- LOOK DIRECTION INFO -------
FOV            32.0 deg  557.7 mrad
RA            128.468 deg
DEC             0.140 deg
Crosses_RP_@    0.000 Rs
EPS             6.249 deg +
SEP            85.296 deg
ORS b/s angle 160.5 deg
ORS rad angle 109.5 deg
```

Point NEG_Y at SATURN and align POS_X = Up with NSP

User vector - RA: +69.451 DEC: +17.084 | Tilt L Up Tilt R | Left Reset Right | Zoom Out Zoom In | Fill Screen | Labels Axes Orbits Vectors Lat/lons FOVs | Image Down Hi Res | Year Month Day Hour Minute Second | Paste Current RA/DEC

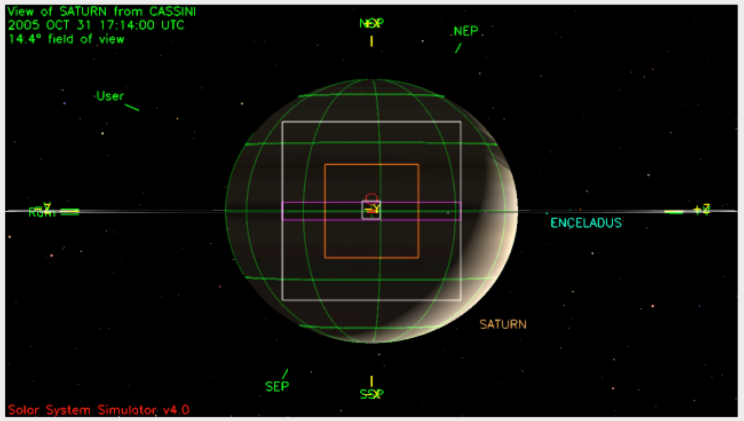
Turn analyzer: SATURN to EARTH about Z on RWA = 15.0 min / 161.5 deg Event

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	--	--	538075	8.93	477807	7.93	19.5	12.86	224.48	37	-0	0	11.0	0	0.0	161.5	1.6
MIMAS	--	--	413009	6.85	412809	6.85	25.1	0.06	1.00	124	0	39	16.8	-4586	16.2	160.1	14.6
ENCELADUS	--	--	303475	5.04	303219	5.03	19.6	0.10	1.69	174	-1	6	9.7	-12	4.7	162.9	3.1
TETHYS	--	--	557403	9.25	556871	9.24	36.5	0.11	1.94	290	0	-78	7.0	4710	31.1	139.1	32.7
DIONE	--	--	913423	15.16	912859	15.15	20.0	0.07	1.23	356	-0	-173	19.2	-109	2.8	160.2	4.4
RHEA	--	--	886287	14.71	885522	14.69	37.4	0.10	1.73	37	-0	113	19.0	2251	33.3	148.8	31.8
TITAN	--	--	672938	11.17	670363	11.12	152.4	0.44	7.65	8	0	11	8.6	-7809	160.9	30.8	159.3
HYPERION	--	--	1932979	32.07	1932860	32.07	52.6	0.01	0.17	267	47	-116	10.4	22878	49.5	122.1	51.1
IAPETUS	--	--	4106306	68.13	4105559	68.12	27.4	0.02	0.36	5	2	149	14.0	6999991	28.7	158.8	27.2
PHOEBE	--	--	10534708	174.80	10534599	174.80	132.8	0.00	0.02	101	25	48	11.3	-5016219	124.5	53.2	123.2
SATURN	--	--	538075	8.93	477807	7.93	19.5	12.86	224.48	37	-0	0	11.0	0	0.0	161.5	1.6

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	8.93	19.5	0
Periapse	4.6	92.4	0
Segment End	19.93	131.6	0

Seg Start (Left)

Seg End (below)




```
Rev 017 OUTBOUND
2005 -  304T17:14:00 SCET
2005 OCT 31 17:14:00 SCET
2005 OCT 31 18:29:36 ERT
Apoapse__017 + 010T17:14:26
Periapse_017 + 001T18:17:51
Light time:    75.6 min
Orbit period:  28.5 days
Radius     1201128 km      19.93 Rs
Rad_cyl    1201122 km      19.93 Rs
Z_ht_cyl      4022 km       0.07 Rs
Mag_L          19.93
Semi_axs   1799404 km      29.86 Rs
Eccentricity    0.846
Inclination     0.38 deg
Sun_range       9.10 AU
Earth_range     9.09 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone      28.7   58.8
Canberra       30.8    8.6
Madrid        -31.6  -21.7
------- LOOK DIRECTION INFO -------
FOV            14.4 deg  250.7 mrad
RA             -5.736 deg
DEC            -4.666 deg
Crosses_RP_@    0.000 Rs
EPS             6.254 deg +
SEP            87.475 deg
ORS b/s angle  48.3 deg
ORS rad angle 109.7 deg
```

Point NEG_Y at SATURN and align POS_X = Up with NSP

User vector - RA: +69.451 DEC: +17.084 | Tilt L Up Tilt R | Left Reset Right | Zoom Out Zoom In | Fill Screen | Labels Axes Orbits Vectors Lat/lons FOVs | Image Down Hi Res | Year Month Day Hour Minute Second | Paste Current RA/DEC

Turn analyzer: SATURN to EARTH about Z on RWA = 6.1 min / 42.1 deg Event

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	--	--	1201128	19.93	1140861	18.93	131.6	5.75	100.39	243	0	0	6.5	0	0.0	42.1	159.9
MIMAS	--	--	1260478	20.91	1260280	20.91	124.0	0.02	0.33	68	1	104	10.9	5133	8.4	49.8	151.6
ENCELADUS	--	--	971707	16.12	971451	16.12	134.7	0.03	0.53	202	0	-14	12.1	-42	3.4	39.0	163.4
TETHYS	--	--	1122313	18.62	1121782	18.61	118.8	0.06	0.96	99	0	68	5.2	3769	14.0	55.0	145.9
DIONE	--	--	1371313	22.75	1370751	22.74	117.9	0.05	0.82	56	0	109	8.0	-4	15.1	55.9	144.8
RHEA	--	--	1691400	28.06	1690633	28.05	124.6	0.05	0.91	21	-0	154	11.4	-2068	7.7	49.1	152.2
TITAN	--	--	2388853	39.64	2386278	39.59	132.3	0.12	2.16	356	0	-178	10.9	-3444	0.8	41.4	160.7
HYPERION	--	--	1841289	30.55	1841174	30.55	73.9	0.01	0.18	106	59	79	2.9	30652	61.6	100.4	98.3
IAPETUS	--	--	2478476	41.12	2477729	41.11	36.7	0.03	0.60	5	-4	5	5.0	572569	165.1	149.2	18.4
PHOEBE	--	--	10803518	179.26	10803408	179.26	139.1	0.00	0.02	86	22	-84	5.0	-4970940	89.0	46.9	108.6
SATURN	--	--	1201128	19.93	1140861	18.93	131.6	5.75	100.39	243	0	0	6.5	0	0.0	42.1	159.9

Solar Geometry – ORS Boresight Concerns

No ORS Boresight Solar Constraints on Science Pointing

Daily Science Highlights - SATURN 17

No Detailed Science Highlights Info Available

- Oct 29, 2017 - Non Targeted Flybys of Methone And Calypso occurred today.

- Oct 31, 2017 - Orbit trim maneuver #41 (OTM-41) was successfully completed today. This T8 +3 day maneuver had two purposes: to clean up after the Titan-8 flyby on October 28, and to set up targeting for the 500 km flyby of Rhea on November 26. The main engine burn began at 7:14 am PDT. Telemetry immediately after the maneuver showed the burn duration was 77.6 seconds, giving a delta-V of approximately 12.4 m/s. The "burn settling time" was increased from 2 minutes to 38 minutes for this maneuver as part of an AACS investigation into post-maneuver Reaction Wheel Assembly torque roughness. As a result, the "off-Earth time" was 55 min. All subsystems reported nominal performance after the OTM.

Segment Integration Planning

Timeline Gaps and Suggested Observations

- No Gap information available

- Proposal to Extend segment by 1-day into following XD segment. Science Benefits:
  - CIRS FIR Map
  - VIMRS Cylindrical Map
- Suggested Observations:
  - CDA Tethys Obs
  - CIRS LIMBINT
  - CIRS Tethys Obs
  - CIRS DSCAL
  - ISS RETARG
  - ISS Feature Tracks
  - VIMS Feature Tracks
  - UVIS LIMBSKIM
  - UVIS EUV/FUV

Initial SMT and Data Volume

Beginning of Integration:

Playback	Start doy hh:mm	End doy hh:mm	Volume (Mb)	5% (Mb)	ENG+HK (Mb)	SCIENCE (Mb)	TOTAL (Mb)	MARGIN (Mb)
PLAYBACK**	303 08:00	303 17:15	1057	53	131	5186	5317	-4313
PLAYBACK**	304 07:55	304 17:10	1061	53	105	1435	1540	-532

Science data allocation > SSR Capacity

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)	VIMS (Mb)	ENG (Mb)	SCIENC (Mb)	TOTAL (Mb)
OBSERVATION	302 09:49	303 08:00	79.9	132.8	242.6	4.0	992.4	47.9	135.3	0.0	762.2	103.2	1781.3	0.0	57.3	20.5	4359.5
PLAYBACK**	303 08:00	303 17:15	33.3	39.2	174.0	1.7	40.0	20.0	37.5	0.0	219.1	0.0	339.2	0.0	53.2	0.0	957.1
OBSERVATION	303 17:15	304 07:55	52.8	27.5	207.6	2.6	257.5	31.7	47.5	0.0	68.6	0.0	0.0	0.0	37.9	13.6	747.4
PLAYBACK**	304 07:55	304 17:10	33.3	13.8	86.4	1.7	397.5	20.0	30.0	0.0	43.3	113.5	0.0	0.0	53.2	0.0	792.6

Waypoint Selection

No Waypoint Selection Info Available

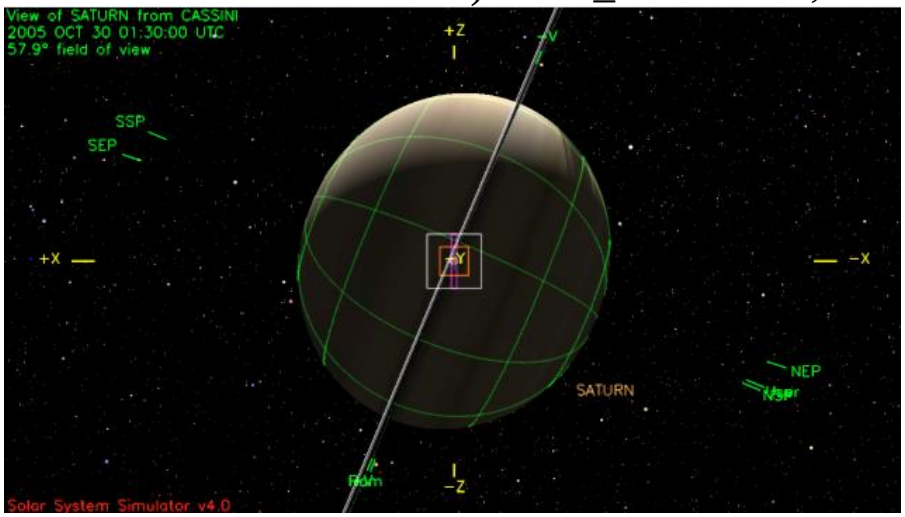
Waypoints

– 302T09:49 to 303T17:15 = NAC to Saturn, + Z to Sun

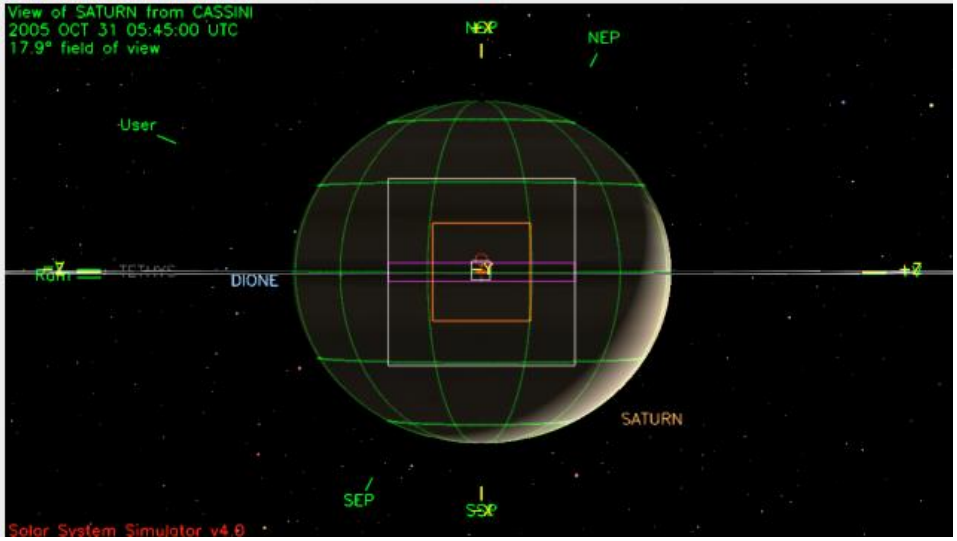
– 303T17:45 to 304T17:45 = NAC to Saturn, + X to Saturn N. Pole

Waypoints Chosen

Waypoint 1 (2005-302T09:49 – 2005-303T17:15): NEG_Y to Saturn, POS_Z to Sun



Waypoint 2 (2005-303T17:45 – 2005-304T17:45): NEG_Y to Saturn, POS_X to NSP



Notes/Liens (1/2)

- **Pointing Issues**
  - From 302T09:49 to 303T17:45, the waypoint is NAC to Saturn (+Z to Sun)
  - From 303T17:45 to 304T17:45, the waypoint is NAC to Saturn (+X to NSP)
  - UVIS Limb Skims 001 and 002 at 302T19:10 and 19:50 did not have enough time allocated to slew from waypoint to target RA/Dec and back, so they were combined into a single observation.
  - Downlinks at 303T08:15 and 304T08:00 are not rolling; 2nd axis was chosen by CDA
  - There are no OpNavs in this segment per agreement of Nav; bad geometry.
- **Data Volume Issues**
  - There are 113 Mb of extra margin after the 303T08:15 downlink, and 19 Mb of margin after the 304T08:00 downlink.
  - There are no OpNavs in this segment.
- **CIMS Issues**
  - All requests for this delivery were approved in CIMS, even though some of the MAPS requests crossed segment boundaries.
- **Power Issues**
  - None

Notes/Liens (2/2)

- **Flight Rule / Mission Planning Guideline & Constraint Issues**
  - None known at this time.
- **Other Issues**
  - MAG has a SCAS activity scheduled for 2005-302T12:00 - 17:00 (MAG_017IC_SCAS001_RIDER), which interferes with RPWS measurements. RPWS has requested that the SCAS activity be moved outside of 15 Rs. MAG agrees to move it, but was unable to find a new time for the activity prior to the delivery deadline for this and the surrounding segments. **A new time for this activity must be found.**