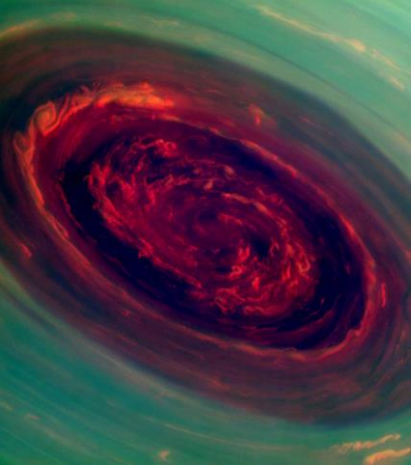

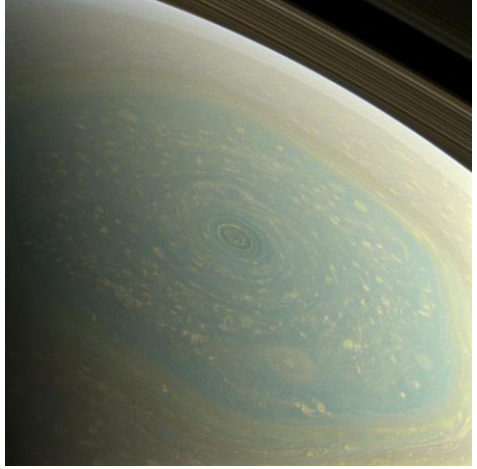
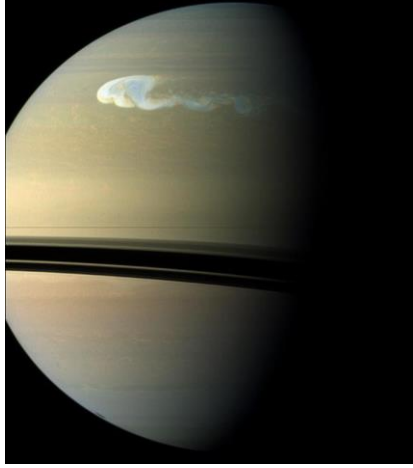

Science Planning & Sequence Team
CASSINI

SATURN TARGET WORKING TEAM

Rev 261 Segment Legacy Package

Segment Boundary: February 10, 2017– February 17, 2017
2017-041T01:25 – 2017-048T01:11 (SCET)

Integration Began 02/22/2016
Segment Delivered to S98 Sequence 08/08/2016
Lead Integrator was Kyle Cloutier

Legacy Package Assembled by Kyle Cloutier

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

Segment Overview and Final Products

Segment Summary

- Rev 261 is an F-ring periapse segment. Key science included:
  - ISS bright limb observations with excellent spatial resolution due to the close proximity of Saturn.
  - VIMS/CIRS observations to attempt to determine the He/H2 ratio in Saturn's lower stratosphere.
  - **Never-done-before** (**first of five** F-ring plane crossing observations) CDA observation to study the dynamics, density, and composition of the dust particles in the ring plane.
  - Multiple VIMS mosaic maps of Saturn, coverage over both hemispheres, as well as a solar ring occultation.
- Periapse science required a custom period. ORS solar viewing constraints impacted science placement and CMT constraint management was required during the occulted period.
- This segment contained a "jumpstart" period. Due to the challenging geometry and unique science of this phase of the mission, the timeline for the days around periapse was decided in advance of full segment integration. Detailed pointing analysis, constraint checking, and reaction-wheel bias optimization (RBOT) was performed on the periapse period. Changes were required to protect the wheels, see RBOT summary on page 26.

Final Sequenced SPASS (1 of 2)

Gap 1

Gap 2

Gap 3

Rev 261 Jumpstart

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End	Primary	Secondary	Comments
SATURN_261 Segment		2017-041T01:25:00		006T23:46:00	2017-048T01:11:00			
SP_260SA_WAYPTTURN041_PRIME		2017-041T01:25:00		000T00:40:00	2017-041T02:05:00	ISS_NAC to Saturn	NEG_X to NSP	
NEW WAYPOINT		**2017-041T02:05:00**		**000T12:42:00**	**2017-041T14:47:00**	**ISS_NAC to Saturn**	**NEG_X to NSP**	
ISS_260SA_LIMBINT003_PRIME	U, V	2017-041T02:05:00		000T02:15:00	2017-041T04:20:00	ISS_NAC to Saturn	POS_Z to 189.3/32.0	
VIMS_260SA_NHEMMAP001_PRIME	C	2017-041T04:20:00		000T09:47:00	2017-041T14:07:00	ISS_NAC to Saturn	NEG_X to NSP	
SP_260EA_DLTURN041_PRIME		2017-041T14:07:00		000T00:40:00	2017-041T14:47:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	MIMI. NEG_Y to Saturn (0,0,-9.5)
NEW WAYPOINT		**2017-041T14:47:00**		**000T11:10:00**	**2017-042T01:57:00**	**XBAND to Earth (0.0,0.0,-9.5 deg. offset)**	**NEG_Y to Saturn**	
SP_260EA_YGAP041_PRIME		2017-041T14:47:00		000T01:30:00	2017-041T16:17:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	
Apoapse Per = 7.2 d, inc =...		2017-041T16:02:19		000T00:00:01	2017-041T16:02:20			
SP_261EA_DSNOUT541_PRIME	C	2017-041T16:17:00		000T04:25:00	2017-041T20:42:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	
SP_261EA_C34BWGNON041_PRIME	C	2017-041T20:42:00		000T04:35:00	2017-042T01:17:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	MIMI. NEG_Y to Saturn (0,0,-9.5)
SP_261SA_WAYPTTURN042_PRIME		2017-042T01:17:00		000T00:40:00	2017-042T01:57:00	ISS_NAC to Saturn	NEG_X to NSP	
NEW WAYPOINT		**2017-042T01:57:00**		**000T12:50:00**	**2017-042T14:47:00**	**ISS_NAC to Saturn**	**NEG_X to NSP**	
UVIS_261SA_AURDSTARE001_PRIME	C, V	2017-042T01:57:00		000T06:05:00	2017-042T08:02:00	UVIS_FUV to Saturn	NEG_X to NSP	Collaborative Rider(s): VIMS. collaborate with VIMS
UVIS_261SA_AURSLEW001_PRIME	C, V	2017-042T08:02:00		000T06:05:00	2017-042T14:07:00	UVIS_FUV to Saturn	NEG_X to NSP	Collaborative Rider(s): VIMS. collaborate with VIMS
SP_261EA_DLTURN042_PRIME		2017-042T14:07:00		000T00:40:00	2017-042T14:47:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	MIMI. NEG_Y to Saturn (0,0,-9.5)
NEW WAYPOINT		**2017-042T14:47:00**		**000T11:10:00**	**2017-043T01:57:00**	**XBAND to Earth (0.0,0.0,-9.5 deg. offset)**	**NEG_Y to Saturn**	
SP_261EA_YGAP042_PRIME		2017-042T14:47:00		000T01:30:00	2017-042T16:17:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	MIMI. NEG_Y to Saturn (0,0,-9.5)
SP_261EA_C34BWGNON042_PRIME	C	2017-042T16:17:00		000T09:00:00	2017-043T01:17:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	MIMI. NEG_Y to Saturn (0,0,-9.5)
SP_261SA_WAYPTTURN043_PRIME		2017-043T01:17:00		000T00:40:00	2017-043T01:57:00	ISS_NAC to Saturn	NEG_X to NSP	
NEW WAYPOINT		**2017-043T01:57:00**		**000T23:35:00**	**2017-044T01:32:00**	**ISS_NAC to Saturn**	**NEG_X to NSP**	
CIRS_261SA_REGMAP003_PRIME	V	2017-043T01:57:00		000T20:55:00	2017-043T22:52:00	CIRS_FPB to Saturn	NEG_X to NSP	
CIRS_261SA_NADIROCC001_PRIME		2017-043T22:52:00		000T02:00:00	2017-044T00:52:00	CIRS_FP4 to Saturn	POS_Z to NSP	PIE, Track occ lat=0.33S (Phil), lon~230 in DIGIT
SP_261EA_DLTURN044_PRIME		2017-044T00:52:00		000T00:40:00	2017-044T01:32:00	XBAND to Earth	POS_X to 14.73/-40.39	
NEW WAYPOINT		**2017-044T01:32:00**		**000T16:23:00**	**2017-044T17:55:00**	**XBAND to Earth**	**POS_X to 14.73/-40.39**	
ENGR_261SC_KPTYBiAS044_PRIME		2017-044T01:32:00		000T01:30:00	2017-044T03:02:00	POS_Z to DELTA_H (0.0,0.0,34.0 deg. offset)	NEG_X to Sun	
SP_261EA_M34HEFNON044_PRIME	C	2017-044T03:17:00		000T07:15:00	2017-044T10:32:00	XBAND to Earth	POS_X to 14.73/-40.39	MIMI. NEG_Y to Saturn (0,0,-9.5) for first half of split pass
SP_261EA_G70METNON044_PRIME	M	2017-044T10:32:00		000T06:52:00	2017-044T17:24:00	XBAND to Earth	Rolling/SRU	MAG Range 1 - Roll Requested. SRU
SP_261SA_WAYPTTURN044_PRIME		2017-044T17:24:00		000T00:31:00	2017-044T17:55:00	ISS_NAC to Saturn	POS_Z to NSP	
NEW WAYPOINT		**2017-044T17:55:00**		**001T08:37:00**	**2017-046T02:32:00**	**ISS_NAC to Saturn**	**POS_Z to NSP**	
VIMS_261SA_NPOLMAP001_PRIME	C, I, U	2017-044T17:55:00		000T02:41:00	2017-044T20:36:00	ISS_NAC to Saturn	POS_Z to 145.391/36.169	
VIMS_261SA_GAMCRUOCC001_PIE	C	2017-044T20:36:00		000T02:10:00	2017-044T22:46:00	VIMS_IR to 187.791/-57.113	NEG_X to NSP	Collaborative Rider(s): CIRS
CIRS_261SA_REGMAP001_PIE	V	2017-044T22:51:00		000T04:00:00	2017-045T02:51:00	CIRS_FPB to Saturn	POS_Z to NSP	slow scans ~87N to 90N

Final Sequenced SPASS (2 of 2)

Rev 261 Jumpstart

Gap 4

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End	Primary	Secondary	Comments
Begin Custom		2017-045T02:51:00		000T00:00:01	2017-045T02:51:01	ISS_NAC to Saturn	POS_Z to NSP	
ISS_261SA_LIMBINT001_PRIME	M, U, V	2017-045T02:51:00		000T02:05:00	2017-045T04:56:00	ISS_NAC to Saturn	POS_Z to NSP	Pick up at ISS_NAC to Saturn, POS_Z to NSP; Hand off at ISS_NAC to Saturn, POS_X to SC_N_Orbit_Pole.
CDA_261DR_FRING001_PIE	E, M	2017-045T04:56:00		000T02:00:00	2017-045T06:56:00	POS_Z to SC_RAM	POS_X to SC_N_Orbit_Pole	Pick up at ISS_NAC to Saturn, POS_X to SC_N_Orbit_Pole; Hand off at ISS_NAC to 295.731/24.449, NEG_Z to 55.727/47.716.
Periapse R = 2.485 Rs, lat ...		2017-045T06:18:13		000T00:00:01	2017-045T06:18:14			
ISS_261SA_LIMBINT002_PRIME	E, M, U, V	2017-045T06:56:00		000T01:40:00	2017-045T08:36:00	ISS_NAC to Saturn	NEG_Z to North_Pole_Dir	Pick up at ISS_NAC to 295.731/24.449, NEG_Z to 55.727/47.716; Hand off at ISS_NAC to Saturn, NEG_Z to NSP.
CIRS_261SA_REGMAP002_PIE	V	2017-045T08:36:00		000T04:00:00	2017-045T12:36:00	CIRS_FPB to Saturn	NEG_Z to NSP	Pick up at ISS_NAC to Saturn, NEG_Z to NSP; Hand off at CIRS_FPB to Saturn, NEG_Z to NSP. slow scans ~87S to 90S
VIMS_261SA_SPOLMAP001_PRIME	C, U	2017-045T12:36:00		000T03:54:00	2017-045T16:30:00	ISS_NAC to Saturn	NEG_Z to NSP	Pick up at CIRS_FPB to Saturn, NEG_Z to NSP; Hand off at ISS_NAC to Saturn (-4.985,0.0,0.0 deg. offset), NEG_Z to NSP.
VIMS_261SA_SSTRMLAT001_PRIME	C, U	2017-045T16:30:00		000T02:00:00	2017-045T18:30:00	ISS_NAC to Saturn	NEG_Z to NSP	Pick up at ISS_NAC to Saturn (-4.985,0.0,0.0 deg. offset), NEG_Z to NSP; Hand off at ISS_NAC to Saturn (3.438,0.0,0.0 deg. offset), NEG_Z to NSP.
VIMS_261SA_SEQREGMAP001_PRIME	C, E, U	2017-045T18:30:00		000T03:18:00	2017-045T21:48:00	ISS_NAC to Saturn	NEG_Z to NSP	Pick up at ISS_NAC to Saturn (3.438,0.0,0.0 deg. offset), NEG_Z to NSP; Hand off at ISS_NAC to Saturn (10.0,0.0,0.0 deg. offset), NEG_Z to NSP.
VIMS_261SA_SPOLMAP002_PRIME	C, U	2017-045T21:48:00		000T04:04:00	2017-046T01:52:00	ISS_NAC to Saturn	NEG_Z to NSP	Pick up at ISS_NAC to Saturn (10.0,0.0,0.0 deg. offset), NEG_Z to NSP; Hand off at ISS_NAC to Saturn, NEG_Z to NSP.
SP_261SA_WAYPTTURN046_PRIME		2017-046T01:52:00		000T00:40:00	2017-046T02:32:00	ISS_NAC to Saturn (0.0,5.0,20.0 deg. offset)	POS_Z to NSP	Pick up at ISS_NAC to Saturn, NEG_Z to NSP; Hand off at ISS_NAC to Saturn (0.0,5.0,20.0 deg. offset), POS_Z to NSP.
NEW WAYPOINT		2017-046T02:32:00		000T06:01:00	2017-046T08:33:00	ISS_NAC to Saturn (0.0,5.0,20.0 deg. offset)	POS_Z to NSP	
End Custom		2017-046T02:32:00		000T00:00:01	2017-046T02:32:01	ISS_NAC to Saturn (0.0,5.0,20.0 deg. offset)	POS_Z to NSP	
VIMS_261RI_SOLAROCC001_PRIME	U	2017-046T02:32:00		000T02:58:00	2017-046T05:30:00	UVIS_SOL_OFF to Sun	POS_Z to NSP	Collaborative Rider(s): UVIS
UVIS_261SA_AURSTARE001_PRIME	C, I, V	2017-046T05:30:00		000T02:23:00	2017-046T07:53:00	UVIS_FUV to Saturn	POS_Z to NSP	Collaborative Rider(s): VIMS
SP_261EA_DLTURN046_PRIME		2017-046T07:53:00		000T00:40:00	2017-046T08:33:00	XBAND to Earth	NEG_X to NSP	
NEW WAYPOINT		2017-046T08:33:00		000T10:40:00	2017-046T19:13:00	XBAND to Earth	NEG_X to NSP	
SP_261EA_YGAP046_PRIME		2017-046T08:33:00		000T01:30:00	2017-046T10:03:00	XBAND to Earth	NEG_X to NSP	
SP_261EA_G70METNON046_PRIME	C	2017-046T10:03:00		000T08:30:00	2017-046T18:33:00	XBAND to Earth	Rolling	
SP_261SA_WAYPTTURN446_PRIME		2017-046T18:33:00		000T00:40:00	2017-046T19:13:00	ISS_NAC to Saturn	POS_Z to 189.1/32.0	Secondary RBOT Friendly
NEW WAYPOINT		2017-046T19:13:00		000T17:20:00	2017-047T12:33:00	ISS_NAC to Saturn	POS_Z to 189.1/32.0	
UVIS_261SA_AURSLEW002_PRIME	C, V	2017-046T19:13:00		000T03:20:00	2017-046T22:33:00	UVIS_FUV to Saturn	NEG_X to NSP	Collaborative Rider(s): VIMS. collaborate with VIMS, 2 VIMS images for stare (~140min), rest of time will be slew
ISS_261SA_LIMBINT004_PRIME	U, V	2017-046T22:33:00		000T02:00:00	2017-047T00:33:00	ISS_NAC to Saturn	POS_Z to 189.3/32.0	
CIRS_261SA_MIRMAP001_PRIME	V	2017-047T00:33:00		000T11:20:00	2017-047T11:53:00	CIRS_FP3 to Saturn (0.0,5.0,0.0 deg. offset)	POS_Z to NSP	
SP_261EA_DLTURN047_PRIME		2017-047T11:53:00		000T00:40:00	2017-047T12:33:00	XBAND to Earth	NEG_X to NSP	
NEW WAYPOINT		2017-047T12:33:00		000T13:18:00	2017-048T01:51:00	XBAND to Earth	NEG_X to NSP	
ENGR_261SC_KPTYBIAS047_PRIME		2017-047T12:33:00		000T01:30:00	2017-047T14:03:00	NEG_Z to DELTA_H (0.0,0.0,2.0 deg. offset)	NEG_X to Sun	
SP_261EA_C70METNON047_PRIME	C	2017-047T14:03:00		000T11:08:00	2017-048T01:11:00	XBAND to Earth	Rolling/SRU	

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)	NET_MARGN (%)	CAROVR (Mb)
SP_261EA_C34BWGNON041_PRIME	041 20:42	042 01:17	577	1160	84	1822	3322	1500	0	79	27	1927	333	-1595	-800	-6%	1595
SP_261EA_C34BWGNON042_PRIME	042 16:17	043 01:17	1595	476	63	2134	3322	1188	0	164	53	2351	660	-1692	-800	-5%	1691
SP_261EA_M34HEFNON044_PRIME	044 03:17	044 10:32	1691	834	110	2635	3322	687	0	290	43	2968	387	-2582	-800	-5%	2581
SP_261EA_G70METNON044_PRIME	044 10:32	044 17:24	2581	0	0	2581	3322	741	0	220	40	2842	2035	-807	-800	-5%	806
SP_261EA_G70METNON046_PRIME	046 10:03	046 18:33	806	3145	172	4123	3322	-800	0	313	50	3685	2174	-1511	163	1%	1511
SP_261EA_C70METNON047_PRIME	047 14:03	048 01:11	1511	1566	82	3159	3322	163	0	233	66	3458	3475	17	426	4%	0

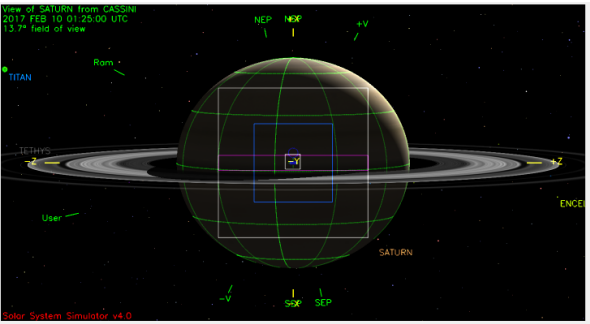
DATA VOLUME REPORT --- TRANSFER FRAME OVERHEAD NOT INCLUDED

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	041 00:50	041 20:42	0.0	23.0	70.9	7.2	249.8	34.8	60.4	0.0	65.1	38.8	600.0	0.0	83.0	1232.9
SP_261EA_C34BWGNON041_PRIME	041 20:42	042 01:17	0.0	8.6	27.9	1.7	0.0	8.2	14.0	0.0	15.0	2.5	0.0	0.0	0.0	77.9
DAILY TOTAL SCIENCE	041 00:50	042 01:17	0.0	31.7	98.8	8.8	249.8	43.0	74.4	0.0	80.1	41.3	600.0	0.0	83.0	
OBSERVATION_NOR	042 01:17	042 16:17	0.0	28.3	87.6	5.4	0.0	26.7	45.9	0.0	49.1	132.2	96.0	0.0	62.7	533.9
SP_261EA_C34BWGNON042_PRIME	042 16:17	043 01:17	0.0	17.0	64.8	3.2	0.0	16.0	27.5	0.0	29.5	4.9	0.0	0.0	0.0	163.0
DAILY TOTAL SCIENCE	042 01:17	043 01:17	0.0	45.3	152.4	8.6	0.0	42.7	73.4	0.0	78.6	137.2	96.0	0.0	62.7	
OBSERVATION_NOR	043 01:17	044 03:17	0.0	49.0	330.0	9.4	0.0	46.2	79.6	0.0	197.4	0.0	115.0	0.0	108.7	935.2
SP_261EA_M34HEFNON044_PRIME	044 03:17	044 10:32	0.0	13.7	67.5	2.6	0.0	12.9	22.2	0.0	164.4	4.0	0.0	0.0	0.0	287.3
SP_261EA_G70METNON044_PRIME	044 10:32	044 17:24	0.0	13.0	0.0	12.5	0.0	12.2	21.0	0.0	155.7	3.8	0.0	0.0	0.0	218.2
DAILY TOTAL SCIENCE	043 01:17	044 17:24	0.0	75.7	397.5	24.5	0.0	71.3	122.8	0.0	517.5	7.7	115.0	0.0	108.7	
OBSERVATION_NOR	044 17:24	046 10:03	0.0	92.2	278.4	24.7	552.1	140.3	124.4	0.0	387.7	212.0	1305.0	0.0	169.9	3286.7
SP_261EA_G70METNON046_PRIME	046 10:03	046 18:33	0.0	16.0	59.4	3.1	0.0	15.1	26.0	0.0	186.5	3.6	0.0	0.0	0.0	309.7
DAILY TOTAL SCIENCE	044 17:24	046 18:33	0.0	108.2	337.8	27.8	552.1	155.4	150.4	0.0	574.2	215.6	1305.0	0.0	169.9	
OBSERVATION_NOR	046 18:33	047 14:03	0.0	36.8	105.6	7.0	499.5	34.7	59.7	0.0	396.8	94.8	317.0	0.0	81.5	1633.4
SP_261EA_C70METNON047_PRIME	047 14:03	048 01:11	0.0	21.0	109.4	4.0	0.0	19.8	34.1	0.0	36.5	6.1	0.0	0.0	0.0	230.9
DAILY TOTAL SCIENCE	046 18:33	048 01:11	0.0	57.8	215.0	11.0	499.5	54.5	93.7	0.0	433.3	100.9	317.0	0.0	81.5	

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

Segment Geometry

Start: 2017-041T01:25




```
Rev 260 OUTBOUND
2017 -  041T01:25:00 SCET
2017 FEB 10 01:25:00 SCET
2017 FEB 10 02:52:56 ERT
Apoapse__260 + 006T13:51:05
Periapse_260 + 002T23:38:27
Light time:     87.9 min
Orbit period:   7.2 days
Radius     1261540 km       20.93 Rs
Rad_cyl    1258364 km       20.88 Rs
Z_ht_cyl     89456 km        1.48 Rs
Mag_L           21.04
Semi_axs    718306 km       11.92 Rs
Eccentricity     0.791
Inclination     63.54 deg
Sun_range       10.06 AU
Earth_range     10.57 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone      -69.1  -34.5
Canberra        30.5   65.6
Madrid         -11.0  -44.1
------- LOOK DIRECTION INFO -------
FOV             13.7 deg  238.7 mrad
RA             103.729 deg
DEC             -7.016 deg
Crosses_RP_0     0.000 Rs
EPS              4.671 deg *
SEP             56.096 deg
ORS b/s angle   37.1 deg
ORS rad angle   59.6 deg  *
```

Point NEG_Y at SATURN and align POS_X = Up with NSP

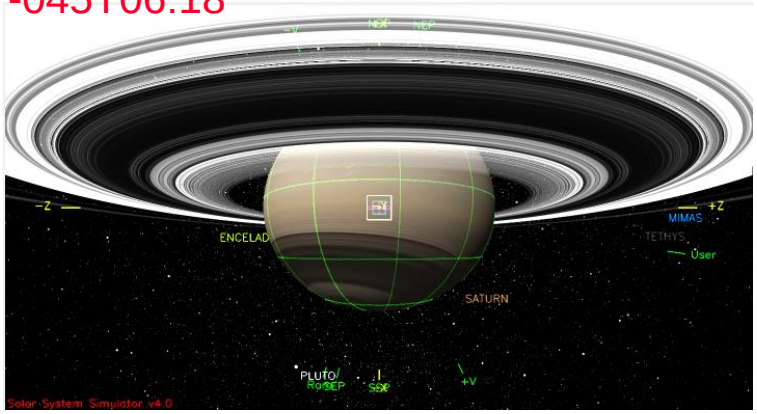
User Vector - RA: 152.756 DEC: -10.205 — Paste Current RA/DEC — Tilt L, Up, Tilt R, Left, Reset, Right, Down, Image, Hi Res — Zoom Out, Fill Screen, Zoom In — Labels, Axes, Orbits, Vectors, FOVs, Lat/Lons — Year, Month, Day, Hour, Minute, Second

Turn Analyzer: SATURN to EARTH about Z on RWA = 5.5 min / 34.5 deg — Event

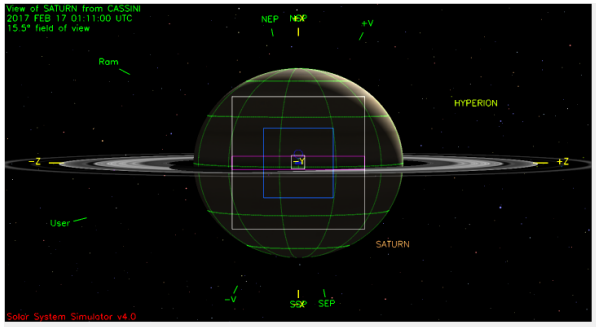
BODY	S/C OCC?	SAT OCC?	RANGE (km)	RANGE (Rs)	ALTITUDE (km)	ALTITUDE (Rs)	PHASE (deg)	ANGLR_DIAMETER (deg	mrad)	SUB_S/C LON	SUB_S/C LAT	DLON (deg)	VREL (km/s)	Z_HGHT (km)	ANGLE_FROM SATRN	ANGLE_FROM EARTH	ANGLE_FROM RAM
SATURN	--	--	1261540	20.93	1201300	19.93	142.9	5.48	95.58	351	4	0	2.7	0	0.0	34.5	101.1
MIMAS	--	--	1340512	22.24	1340313	22.24	146.4	0.02	0.31	299	2	-112	16.0	-3056	7.2	31.8	107.5
ENCELADUS	--	--	1060210	17.59	1059956	17.59	145.2	0.03	0.48	219	5	-29	12.3	-18	6.2	32.9	107.0
TETHYS	--	--	1511297	25.08	1510759	25.07	139.4	0.04	0.72	29	3	145	12.1	-5578	6.5	37.4	95.2
DIONE	--	--	1637695	27.17	1637131	27.16	143.7	0.04	0.69	0	3	-180	11.4	-19	0.9	33.6	100.8
RHEA	--	--	984752	16.34	983990	16.33	148.1	0.09	1.56	253	5	-47	8.7	874	23.2	32.5	122.1
TITAN	--	--	2487452	41.27	2484877	41.23	140.5	0.12	2.07	2	2	166	6.9	8776	7.1	36.1	94.1
HYPERION	--	--	699029	11.60	698904	11.60	104.8	0.03	0.47	143	54	-29	5.4	-20533	89.2	79.6	159.0
IAPETUS	--	--	4609891	76.49	4609144	76.48	127.9	0.02	0.32	10	5	139	4.7	858154	33.3	47.3	67.8
PHOEBE	--	--	15889434	263.65	15889322	263.64	176.6	0.00	0.01	46	-20	-160	2.5	6803887	34.1	2.4	100.9
SATURN	--	--	1261540	20.93	1201300	19.93	142.9	5.48	95.58	351	4	0	2.7	0	0.0	34.5	101.1

Apoapse: 2017-041T16:02

Periapse: 2017-045T06:18



End: 2017-048T01:11

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Rev 261 OUTBOUND
2017 -  048T01:11:00 SCET
2017 FEB 17 01:11:00 SCET
2017 FEB 17 02:38:06 ERT
Apoapse__261 + 006T09:08:40
Periapse_261 + 002T18:52:45
Light time:     87.1 min
Orbit period:   7.2 days
Radius     1242124 km       20.61 Rs
Rad_cyl    1241136 km       20.59 Rs
Z_ht_cyl     49639 km        0.82 Rs
Mag_L           20.64
Semi_axs    718069 km       11.91 Rs
Eccentricity     0.792
Inclination     63.62 deg
Sun_range       10.06 AU
Earth_range     10.47 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone      -70.8  -37.0
Canberra        28.4   63.4
Madrid          -9.2  -41.8
------- LOOK DIRECTION INFO -------
FOV             15.5 deg  270.1 mrad
RA             102.443 deg
DEC             -5.355 deg
Crosses_RP_0     0.000 Rs
EPS              5.004 deg *
SEP             62.613 deg
ORS b/s angle   34.9 deg
ORS rad angle   61.2 deg  *
```

Point NEG_Y at SATURN and align POS_X = Up with NSP

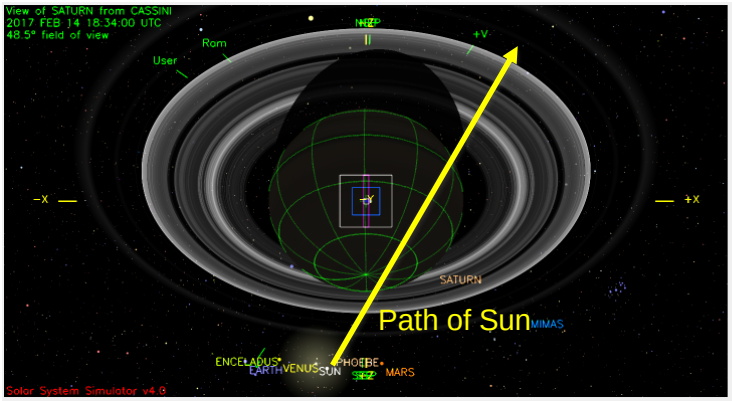
User Vector - RA: 152.756 DEC: -10.205 — Paste Current RA/DEC — Tilt L, Up, Tilt R, Left, Reset, Right, Down, Image, Hi Res — Zoom Out, Fill Screen, Zoom In — Labels, Axes, Orbits, Vectors, FOVs, Lat/Lons — Year, Month, Day, Hour, Minute, Second

Turn Analyzer: SATURN to EARTH about Z on RWA = 5.3 min / 32.1 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	DLON (deg)	VREL (km/s)	Z_HGHT (km)	ANGLE_FROM SATRN	ANGLE_FROM EARTH	ANGLE_FROM RAM
SATURN	--	--	1242124	20.61	1181865	19.61	145.1	5.56	97.08	260	2	0	2.9	0	0.0	32.1	104.6
MIMAS	--	--	1270144	21.07	1269947	21.07	140.0	0.02	0.33	75	1	94	13.3	1532	8.5	36.3	97.0
ENCELADUS	--	--	1167973	19.38	1167722	19.38	149.5	0.03	0.44	261	2	-67	13.6	-5	10.8	29.2	114.2
TETHYS	--	--	1369019	22.72	1368485	22.71	150.2	0.05	0.79	302	2	-110	13.1	2017	11.7	28.7	114.7
DIONE	--	--	898029	14.90	897465	14.89	148.1	0.07	1.26	209	3	-20	9.8	76	8.5	30.3	112.5
RHEA	--	--	1537909	25.52	1537144	25.51	133.2	0.06	1.00	50	2	115	8.4	-1756	18.2	42.5	88.3
TITAN	--	--	286622	4.76	284047	4.71	78.1	1.03	17.97	91	12	13	5.0	-8087	77.2	96.9	47.4
HYPERION	--	--	2614545	43.38	2614401	43.38	148.6	0.01	0.13	152	38	-172	7.2	25737	4.4	28.9	107.3
IAPETUS	--	--	4190495	69.53	4189748	69.52	105.0	0.02	0.36	18	5	108	4.2	502539	56.5	69.8	51.3
PHOEBE	--	--	15879320	263.48	15879211	263.48	178.0	0.00	0.01	82	-20	-157	2.6	6715370	33.8	5.9	106.4
SATURN	--	--	1242124	20.61	1181865	19.61	145.1	5.56	97.08	260	2	0	2.9	0	0.0	32.1	104.6

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	20.9	142.9	4
Apoapse	21.4	137.0	9
Periapse	2.5	42.8	-9
Segment End	20.6	145.1	2

Solar Geometry – ORS Boresight Concerns

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Rev 261 OUTBOUND
2017 -  045T18:34:00 SCET
2017 FEB 14 18:34:00 SCET
2017 FEB 14 20:01:21 ERT
Apoapse__261 + 004T02:31:40
Periapse_261 + 12:15:45
Light time:    87.4 min
Orbit period:  7.2 days
Radius      500540 km       8.31 Rs
Rad_cyl     393400 km       6.53 Rs
Z_ht_cyl   -309479 km      -5.14 Rs
Mag_L          13.45
Semi_axs    718249 km      11.92 Rs
Eccentricity    0.791
Inclination    63.52 deg
Sun_range      10.05 AU
Earth_range    10.50 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone       7.2   29.7
Canberra       59.8   24.4
Madrid        -71.3  -45.6
------- LOOK DIRECTION INFO -------
FOV             48.5 deg  847.3 mrad
RA              75.155 deg
DEC             32.955 deg
Crosses_RP_@     0.000 Rs
EPS              4.905 deg *
SEP             60.502 deg
ORS b/s angle   12.0 deg  *
ORS rad angle   93.5 deg
```

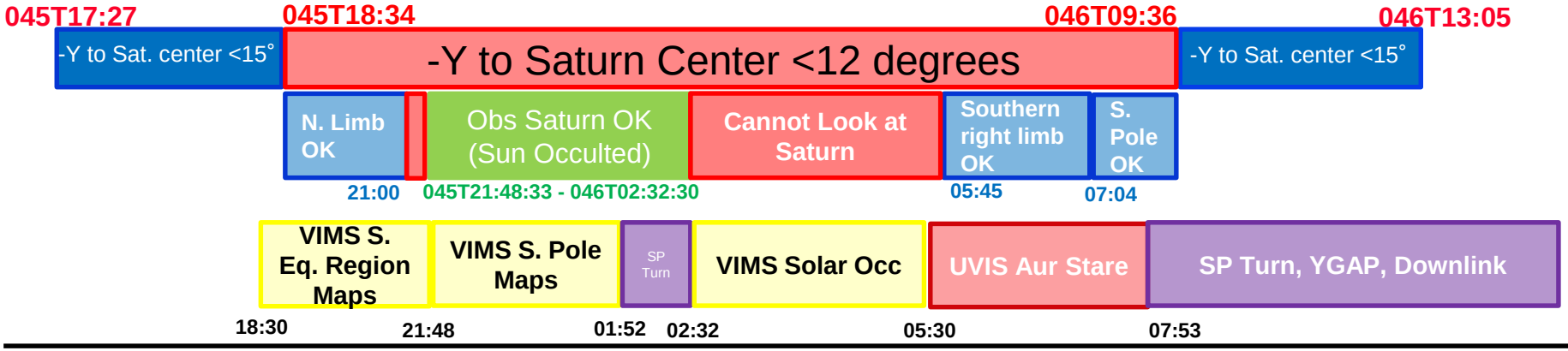
Point NEG_Y at SATURN and align NEG_Z = Up with NSP

User Vector - RA: 189.3 DEC: 32 — 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 = 3.5 min / 14.0 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	DLON (deg)	VREL (km/s)	Z_HGHT (km)	ANGLE FROM SATRN	ANGLE FROM EARTH	ANGLE FROM RAM
SATURN	--	--	500540	8.31	442490	7.34	168.0	13.83	241.40	239	-38	0	9.9	0	0.0	14.0	136.2
MIMAS	--	--	623052	10.34	622851	10.33	164.9	0.04	0.67	332	-31	-138	23.8	-3417	13.9	19.9	149.7
ENCELADUS	--	--	683501	11.34	683247	11.34	172.8	0.04	0.75	25	-27	148	14.5	22	15.1	2.3	134.3
TETHYS	--	--	473397	7.85	472867	7.85	136.7	0.13	2.28	287	-41	-60	19.2	5578	35.1	47.5	138.5
DIONE	--	--	686210	11.39	685648	11.38	144.0	0.09	1.64	322	-27	-105	19.9	170	32.6	40.9	155.2
RHEA	--	--	718778	11.93	718013	11.91	128.2	0.12	2.13	325	-25	-88	18.1	1686	47.1	56.6	146.8
TITAN	--	--	1019708	16.92	1017133	16.88	72.1	0.29	5.05	16	-17	40	5.9	-2858	104.2	103.6	32.9
HYPERION	--	--	1695698	28.14	1695572	28.13	149.9	0.01	0.19	45	49	-150	14.9	17521	34.2	34.5	170.4
IAPETUS	--	--	3754761	62.30	3754013	62.29	108.0	0.02	0.40	8	-3	93	7.3	639695	73.8	67.0	72.0
PHOEBE	--	--	15354260	254.77	15354150	254.76	178.7	0.00	0.01	122	-23	177	9.6	6747292	11.1	6.1	141.4
SATURN	--	--	500540	8.31	442490	7.34	168.0	13.83	241.40	239	-38	0	9.9	0	0.0	14.0	136.2

- Pointing to NEG_Y to Saturn (center) would lead to a CMT violation between ~2017-045T18:34:00 and ~2017-046T09:36:00.
- Minimum NEG_Y to Sun angle is ~3.55° from 2017-046T00:06 to 00:16.
- Until 21:00, pointing at the north limb brings one out of the 12° cone, but not the 15° cone. *A waiver will be required.*
- Cannot observe Saturn from 21:00-21:48:33
- *Sun is occulted from 21:48:33 – 02:32:30, can observe Saturn, CMT management required*
- Cannot observe Saturn from 02:32:30-05:45
- From 05:45 – 07:04, pointing at the southern right limb or, after 07:04, pointing at the south pole, brings one out of the 12° cone, but not the 15° cone. *A waiver will be required.*



Periapse Quicklooks

Rev 261

VIMS_261SA_NPOLMAP001_PRIME
VIMS_261SA_GAMCRUOCC001_PIE
CIRS_261SA_REGMAP001_PIE
Begin Custom
ISS_261SA_LIMBINT001_PRIME
CDA_261DR_FRING001_PIE
Periapse R = 2.485 Rs, lat ...
ISS_261SA_LIMBINT002_PRIME
CIRS_261SA_REGMAP002_PIE
VIMS_261SA_SPOLMAP001_PRIME
VIMS_261SA_SSTRMLAT001_PRIME
VIMS_261SA_SEQREGMAP001_PRIME
VIMS_261SA_SPOLMAP002_PRIME
SP_261SA_WAYPTTURN046_PRIME
NEW WAYPOINT
End Custom
VIMS_261RI_SOLAROCC001_PRIME
UVIS_261SA_AURSTARE001_PRIME

- VIMS took a North Pole mosaic map then observed the occultation of the star Gamma Cru. This observation combined with an earlier CIRS observation to measure Saturn's helium abundance.
- CIRS took a regional map of the north polar region, obtaining temperature data of the northern vortex. This observation, was at a higher resolution than regional maps taken near apoapse.
- ISS imaged along the bright limb of Saturn. Due to the closeness to Saturn, this observation allowed for excellent spatial resolution for both ISS and UVIS and vertical and horizontal profiles of airglow, aurora, and hydrocarbons. At the close distance near periapse, Cassini could measure the vertical distribution of the hydrocarbons, which is what is needed to test and improve photochemical models of Saturn's high atmosphere.
- CDA studied the dynamics, density and composition of the micron and sub-micron sized icy dust grains in Saturn's ring plane during ring plane crossing.
- ISS imaged along the bright limb in high resolution. CIRS created a regional map of the south polar region, obtaining temperature data of the southern vortex
- VIMS mapped the South Pole, then mosaics the South Storm Alley region, centered at 35deg S. latitude, then mosaics the South Equatorial region, centered at 5deg S. latitude. VIMS then returned to the South Pole to map again.
- VIMS observed a solar ring occultation as the sun passed behind the C-F rings. UVIS observed the southern auroral oval between 55deg – 90deg latitudes, alternating between staring and slewing.

Daily Science Highlights (1 of 3)

DOY 041 (10 February 2017): Saturn_261 was a ~7 day periapse segment. Science started with ISS imaging along the bright limb of Saturn, working with VIMS and UVIS to study the composition of the high atmosphere. VIMS then led a 10hr mosaic mapping observation of Saturn's northern hemisphere, with CIRS riding.

DOY 042 (11 February 2017): UVIS performed a collaborative observation with VIMS, first staring at the illuminated northern aurora for 6hr, then repeatedly slewing in the same region for another 6hrs.

DOY 043 (12 February 2017): CIRS observed during a 21hr observation, creating a regional map of the north polar region of Saturn as the planet rotated, studying the temperature of the northern vortex. VIMS and ISS rode. CIRS performed an observation to yield the temperature at the point of latitude and longitude of an upcoming occultation of the star Gamma Cru. This will be used to help determine Saturn's helium abundance.

DOY 044 (13 February 2017): VIMS created a North Pole mosaic map of Saturn with CIRS, ISS, and UVIS riding. VIMS then observed the occultation of the star Gamma Cru. This was **1 of 5** very similar requests in the F/Prox period to attempt to determine the He/H2 ratio in Saturn's lower stratosphere by obtaining quasi-simultaneous observations of a stellar occultation by VIMS (which yields the scale height, or T/\mu) and a limb scan by CIRS (which yields the temperature profile, T(Z)). (Previous similar attempts had been unsuccessful due to various technical issues, so this was one of the last chances to get this key measurement. The companion requests were on revs 268, 291 and 292, with those on 291 and 292 being the closest, and thus highest resolution for CIRS. All but rev 268 were Saturn PIEs.) The observation was very sensitive to pointing errors. The VIMS occultation had to be done on RWAs, with inertially-fixed pointing to keep the star in the 0.25 mrad VIMS pixel. The CIRS limb observation must have had the CIRS arrays oriented perpendicular to the limb, within about 10 deg. Using both the CIRS and VIMS observations, it would be possible to solve for the mean molecular weight of the atmosphere, and thus the helium abundance. Following this observation, CIRS took the lead, with VIMS riding, for another regional map of the north polar region, obtaining temperature data of the northern vortex. This observation, a PIE (pre-integrated event) and occurring close to periapse, was of a much narrower region and at higher resolution than regional maps taken near apoapse.

Daily Science Highlights Saturn (2 of 3)

DOY 045 (14 February 2017): A densely packed periapse observation period began with ISS imaging along the bright limb of Saturn. Due to the close proximity to Saturn, this observation provided excellent spatial resolution for both ISS and UVIS (riding; the UVIS spatial resolution was especially important because a UVIS pixel is 1mrad across), vertical and horizontal profiles of airglow, aurora, and hydrocarbons. At the close distance near periapse, Cassini could measure the vertical distribution of the hydrocarbons, which is what is needed to test and improve photochemical models of Saturn's high atmosphere. CDA then took the lead during periapse to take **never-done-before** in situ measurements to gather information about the F-Ring itself. CDA studied the micron and sub-micron sized icy dust grains in Saturn's ring plane during ring plane crossing. Three aspects were of interest: dynamics, density and composition of the dust particles. Grains with mean size larger than approx. one micron are constrained to the ring plane. They move outwards by plasma-drag or move inwards by Poynting-Robertson-drag forces. Depending on the density, collisions may also play a role. Compositional measurements of the grains with the integrated time-of-flight mass spectrometer of CDA are essential to understanding the origin, age and evolution of the ring. The extremely thin structure of the main rings together with the fast Cassini speed are demanding and allow only a short snapshot such that CDA integrated the results of up to four crossings in order to have a statistical meaningful data set. The observation CDA_261DR_FRING001_PIE was **one out of four** FRING observations. This observation would also give insight into the upcoming proximal phase measurements, when Cassini was to be inside the D-Ring. Coming out of periapse, ISS (with UVIS and VIMS) took over to continue imaging along the bright limb, once again at spectacular resolution. Now in view of Saturn's southern hemisphere, CIRS created a regional map of the south polar region, obtaining temperature data of the southern vortex. This observation, a PIE (pre-integrated event) and occurring close to periapse, was of a much narrower region and at higher resolution than regional maps taken near apoapse. VIMS then began a series of mapping observations of Saturn's southern latitudes, moving northward over time, beginning with a map of the South Pole, then performing mosaics of the South Storm Alley region, centered at 35deg S. latitude, and mosaics of the South Equatorial region, centered at 5deg S. latitude. VIMS then returned to the South Pole to map for 4hr. CIRS and UVIS rode on all 4 of these VIMS observations.

Daily Science Highlights Saturn (3 of 3)

DOY 046 (15 February 2017): VIMS and UVIS used their solar ports to collaboratively observe a solar ring occultation. As the sun egressed, passing behind the C through F rings of Saturn, the instruments could study the size and spatial distributions of the smallest particles in the rings. UVIS and VIMS then took advantage of the dark south polar region to observe the southern auroral oval between 55deg – 90deg latitudes, alternating between staring and slewing. ISS, with UVIS and VIMS riding, imaged the bright limb of Saturn to study the composition of the high atmosphere.

DOY 047 (16 February 2017): CIRS mapped Saturn in the mid-IR to determine upper troposphere and tropopause temperatures. VIMS rode. Saturn_261 ended with a downlink of all data to Earth via the 70M antenna in Canberra, Australia.

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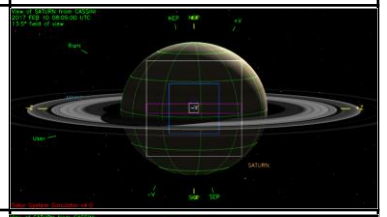
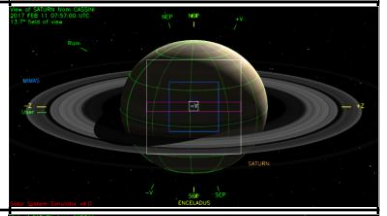
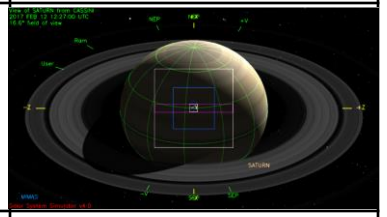
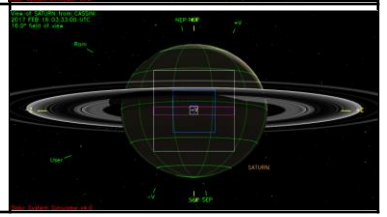
Segment Integration Planning

Timeline Gaps and Suggested Observations

Gap	Start	End	Duration	Phase angle (range)	Rs range	Sub-S/C Lat.	Snapshot (mid-gap)
1	2017-041T02:05:00	2017-041T14:07:00	000T12:02:00	142.6 to 137.8	20.97 to 21.34	4 to 9	
	Suggested Observations: ISS Limb or VIMS N. Hemisphere						
2	2017-042T01:57:00	2017-042T14:07:00	000T12:10:00	133.1 to 128.0	21.16 to 20.4	13 to 17	
	Suggested Observations: UVIS Auroral						
3	2017-043T01:57:00	2017-043T22:52:00	000T20:55:00	122.5 to 109.6	19.04 to 14.9	22 to 33	
	Suggested Observations: CIRS N. Pole Mapping						
4	2017-046T19:13:00	2017-047T11:53:00	000T16:40:00	160.5 to 151.1	16.25 to 19.21	-12 to -3	
	Suggested Observations: Auroral Stare, CIRS Map						

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 (%)	CAROVR (Mb)
SP_261EA_C34BWGNON041_PRIME	041 16:17	042 01:17	0	163	63	226	3322	3096	0	199	53	478	655	177	8%	0
SP_261EA_C34BWGNON042_PRIME	042 16:17	043 01:17	0	179	63	242	3322	3080	0	199	53	494	660	165	0%	0
SP_261EA_M70METNON044_PRIME	044 03:02	044 10:47	0	497	109	606	3322	2716	0	451	46	1103	1799	695	-2%	0
SP_261EA_G70METNON044_PRIME	044 10:47	044 17:15	0	0	0	0	3322	3322	0	325	38	364	1945	1581	-12%	0
SP_261EA_G70METNON046_PRIME	046 10:03	046 16:33	0	5685	172	5858	3322	-2535	0	287	38	3648	1842	-1806	17%	1806
SP_261EA_C70METNON047_PRIME	047 14:03	048 01:11	1806	364	91	2261	3322	1061	0	249	66	2576	3475	899	26%	0

Initial SMT and Data Volume

Beginning of Integration:

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	041 01:25	041 16:17	0.0	14.2	0.0	5.4	0.0	26.4	45.5	0.0	70.1	0.0	0.0	0.0	62.1	223.7
SP_261EA_C34BWGNON041_PRIME	041 16:17	042 01:17	0.0	17.0	86.4	3.2	0.0	16.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	197.5
DAILY TOTAL SCIENCE	041 01:25	042 01:17	0.0	31.1	86.4	8.6	0.0	42.4	73.0	0.0	112.6	4.9	0.0	0.0	62.1	
OBSERVATION_NOR	042 01:17	042 16:17	0.0	28.3	0.0	5.4	0.0	26.7	45.9	0.0	70.7	0.0	0.0	0.0	62.7	239.7
SP_261EA_C34BWGNON042_PRIME	042 16:17	043 01:17	0.0	17.0	86.4	3.2	0.0	16.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	197.5
DAILY TOTAL SCIENCE	042 01:17	043 01:17	0.0	45.3	86.4	8.6	0.0	42.7	73.4	0.0	113.2	4.9	0.0	0.0	62.7	
OBSERVATION_NOR	043 01:17	044 03:02	0.0	48.6	28.8	9.3	0.0	45.8	78.8	0.0	281.5	0.0	0.0	0.0	107.6	600.3
SP_261EA_M70METNON044_PRIME	044 03:02	044 10:47	0.0	14.6	72.9	2.8	0.0	13.8	23.7	0.0	315.3	4.3	0.0	0.0	0.0	447.3
SP_261EA_G70METNON044_PRIME	044 10:47	044 17:15	0.0	12.2	0.0	12.4	0.0	11.5	19.8	0.0	263.1	3.5	0.0	0.0	0.0	322.5
DAILY TOTAL SCIENCE	043 01:17	044 17:15	0.0	75.4	101.7	24.5	0.0	71.1	122.3	0.0	859.8	7.8	0.0	0.0	107.6	
OBSERVATION_NOR	044 17:15	046 10:03	0.0	103.4	304.2	24.8	552.1	140.6	150.0	0.0	2161.3	592.4	1605.0	0.0	170.5	5804.3
SP_261EA_G70METNON046_PRIME	046 10:03	046 16:33	0.0	12.3	59.4	2.3	0.0	11.6	19.9	0.0	175.7	3.6	0.0	0.0	0.0	284.7
DAILY TOTAL SCIENCE	044 17:15	046 16:33	0.0	115.6	363.6	27.1	552.1	152.1	169.9	0.0	2337.0	596.0	1605.0	0.0	170.5	
OBSERVATION_NOR	046 16:33	047 14:03	0.0	40.6	28.8	7.7	73.5	38.2	65.8	0.0	101.4	0.0	5.0	0.0	89.9	450.9
SP_261EA_C70METNON047_PRIME	047 14:03	048 01:11	0.0	21.0	109.4	4.0	0.0	19.8	34.1	0.0	52.5	6.1	0.0	0.0	0.0	246.9
DAILY TOTAL SCIENCE	046 16:33	048 01:11	0.0	61.6	138.2	11.7	73.5	58.0	99.9	0.0	153.9	6.1	5.0	0.0	89.9	

	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)	0.0	329.0	776.3	80.5	625.6	366.4	538.6	0.0	3576.4	619.8	1610.0	0.0

Waypoint Selection

Good Waypoints

OBS_NAME	START	END	POS_X_2_NSP	POS_X_2_NEP	NEG_X_2_NSP	NEG_X_2_NEP	POS_Z_2_NSP	POS_Z_2_NEP	NEG_Z_2_NSP	NEG_Z_2_NEP	NEG_X_2_SUN	NEG_Z_2_EARTH
SP_260NA_OBSERV041_NA	2017-041T01:25:00	2017-041T16:17:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	**BAD**
SP_261NA_OBSERV042_NA	2017-042T01:17:00	2017-042T16:17:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	**BAD**
SP_261NA_OBSERV043_NA	2017-043T01:17:00	2017-044T03:02:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	**BAD**
SP_261NA_OBSERV044_NA	2017-044T17:15:00	2017-046T10:03:00	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**
SP_261NA_OBSERV046_NA	2017-046T16:33:00	2017-047T14:03:00	**BAD**	**BAD**	OK	OK	**BAD**	OK	**BAD**	**BAD**	OK	**BAD**

RBOT - Friendly

OBSERVATION PERIOD	START	END	POS_X	NEG_X	POS_Z	NEG_Z
SP_260NA_OBSERV041_NA	2017-041T01:25:00	2017-041T16:17:00	189.3/ 32.0	------	189.3/ 32.0	------
SP_261NA_OBSERV042_NA	2017-042T01:17:00	2017-042T16:17:00	189.3/ 32.0	------	189.3/ 32.0	------
SP_261NA_OBSERV043_NA	2017-043T01:17:00	2017-044T03:02:00	189.3/ 32.0	------	189.3/ 32.0	------
SP_261NA_OBSERV044_NA	2017-044T17:15:00	2017-046T10:03:00	------	------	------	------
SP_261NA_OBSERV046_NA	2017-046T16:33:00	2017-047T14:03:00	------	------	189.1/ 32.0	------

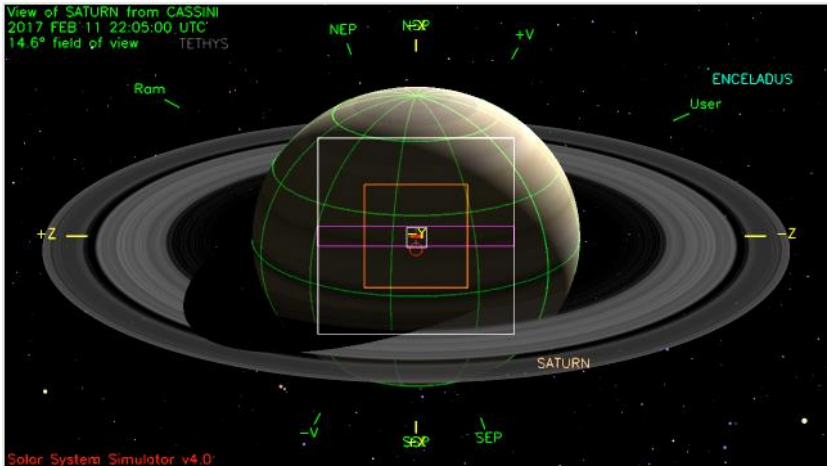
Downlinks

DOWNLINK	START	END	POS_X_2_NSP	POS_X_2_NEP	NEG_X_2_NSP	NEG_X_2_NEP	POS_Y_2_NSP	POS_Y_2_NEP	NEG_Y_2_NSP	NEG_Y_2_NEP	ROLL_FLAG
SP_261EA_C34BWGNON041_PRIME	2017-041T16:17:00	2017-042T01:17:00	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK	OK
SP_261EA_C34BWGNON042_PRIME	2017-042T16:17:00	2017-043T01:17:00	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK	73
SP_261EA_M70METNON044_PRIME	2017-044T03:02:00	2017-044T10:47:00	OK	OK	**BAD**	**BAD**	**BAD**	**BAD**	OK	OK	0
SP_261EA_G70METNON044_PRIME	2017-044T10:47:00	2017-044T17:15:00	OK	OK	**BAD**	**BAD**	**BAD**	**BAD**	OK	OK	0
SP_261EA_G70METNON046_PRIME	2017-046T10:03:00	2017-046T16:33:00	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK	OK
SP_261EA_C70METNON047_PRIME	2017-047T14:03:00	2017-048T01:11:00	OK	OK	OK	OK	**BAD**	**BAD**	**BAD**	**BAD**	OK

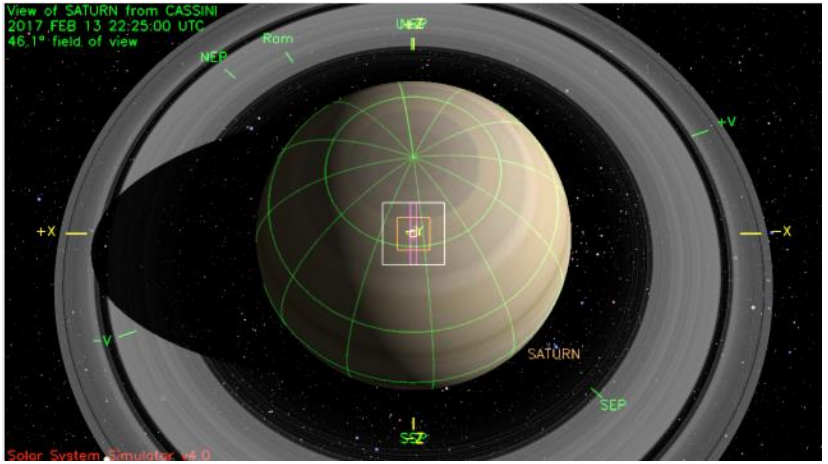
- **NEG_Y to Saturn not safe from 2017-045T17:27 to 046T13:05 (ORS to Sun < 15 deg)**
  - ORS to SUN angle < 12 deg from 2017-045T18:34 to 046T09:36
  - Minimum ORS to SUN angle is appx. 3.55 deg.

Waypoints Chosen

Waypoint 1 (2017-041T02:05 – 044T17:55): NAC to Saturn, NEG_X to NSP

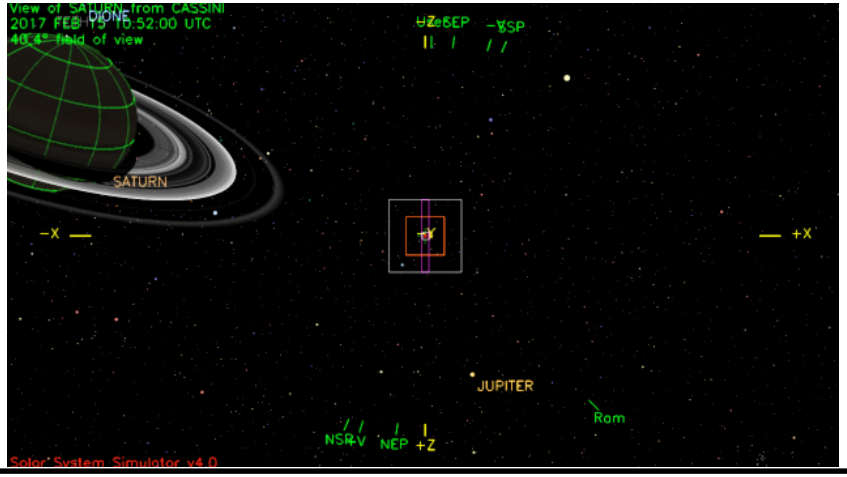


Waypoint 2 (2017-044T17:55 – 045T02:51): NAC to Saturn, POS_Z to NSP



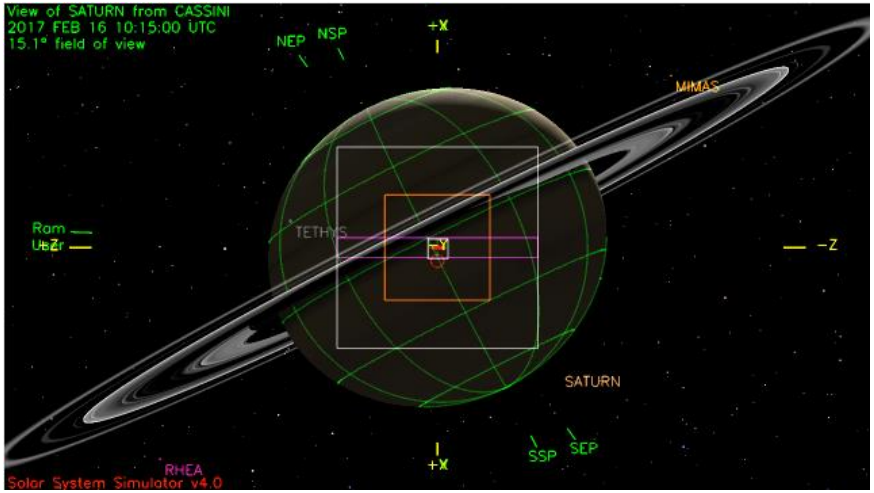
Waypoint 3 (2017-045T02:51 – 046T02:32): No acceptable valid waypoint, custom period used.

Waypoint 4 (2017-046T02:32 – 046T19:13): NAC to Saturn (0, 15, 20 deg. offset), POS_Z to NSP



Waypoints Chosen

Waypoint 5 (2017-046T19:13 – 048T01:51):
NAC to Saturn, POS_Z to 189.1/32.0



Notes (1/3)

- Pointing:
  - Waypoints:
    - RBOT friendly waypoints used when compatible with science
    - No valid waypoint for Periapse Period (2017-044T17:55 – 046T02:32 SCET; Duration 001T08:37): Used custom period
  - Custom Period (2017-045T02:51 – 046T02:32 SCET)
  - CIRS and VIMS temperature/ boresight violations:
    - CIRS Max Temp = 77.1K (ΔT = 2.5K) @ 045T08:12 SCET (During ISS LIMBINT002)
      - CIRS provided approval via email (Paul Romani 8/04)
      - **Operational FR Waiver will be required (See SPLAT item)**
    - VIMS Max Temp = 63.25K (ΔT = 3.59K) @ 045T08:30 SCET (During ISS LIMBINT002)
      - VIMS provided approval via email (Ed Audi/Kevin Baines 3/20)
      - **Consumable FR Waiver will be required (See SPLAT item)**
    - CIRS Boresight to Sun < 15° during DOY 045 - 046 (During VIMS SPOL / SSTRMLAT / SEQREG / SPOL Maps, SP WAYPTTURN, UVIS AURSTARE, & SP DLTURN)
      - CIRS Boresight to Sun < 12° occur only during Solar Occultation
      - CIRS provided approval via email (Paul Romani 3/21)
      - **Operational FR Waiver will be required (see SPLAT item)**
  - **CMT Management & FR waiver required during the period 2017-045T21:55:55 – 046T02:03:35 SCET (See SPLAT item)**
    - -Y to Sun < 12°
      - CMT Management required during VIMS_261SA_SPOLMAP002_PRIME and SP_261SA_WAYPTTURN046_PRIME
    - Sun occulted between 045T21:48:33 - 046T02:32:30 (from Tour Atlas)
  - Periapse Jumpstart of Merged PDT & AACS analysis for teams early PDT deliveries during 2017-044T00:52 – 046T18:33 **(See SPLAT item)**
  - Rate violations on DOY 045 @ 04:54 during ISS LIMBINT001. This is okay inside +/- 3hr of periapse per FRPO G&Cs.
  - There is a 19 min quiescent period carved out at the beginning of the ISS LIMBINT002 (045T06:56 – 07:15) for a bias **(See SPLAT item)**

Notes (2/3)

- Data Volume
  - No SMT warnings
  - SSR cleared before periapse observation period and at end of segment
- DSN
  - ap_downlink report check warnings can be ignored:
    - Ignore “Warning: 70m usage for sequence exceeds project commitment <=35%; is at 50%” ---necessary to clear SSR before and after periapse/end of segment. Downgraded 70 on DOY 044 to 34 during integration.
    - Ignore “Warning: number of sequence upload passes is 0; should be 5 or more” ---not the last segment in sequence
  - Note: the handover from M34HEFNON044 to G70METNON044 occurs on the 34M. This was done on purpose for better TLM rates/data volume return.
  - No level 3 requests, no OTMs
  - MAG Range 1 roll on DOY044
- Resource Checker
  - All gaps (3) can be ignored
    - Gap on 2017-044T03:02 – 03:17 SCET (dur = 15 min) expected (due to downgrade to M34)
    - Gap on 2017-044T22:46 – 22:51 SCET (dur = 5 min) expected
    - Gap on 2017-046T07:43 – 07:53 SCET (dur = 10 min) expected
- Opmodes
  - None
- Hydrazine
  - N/A

Notes (3/3)

- Special Activities
  - Collaborative PRIME/RIDER activities:
    - UVIS_261SA_AURDSTARE001_PRIME - Collab w/ VIMS
    - UVIS_261SA_AURSLEW001_PRIME - Collab w/ VIMS
    - VIMS_261SA_GAMCRUOCC001_PIE - Collab w/ CIRS
    - VIMS_261RI_SOLAROCC001_PRIME - Collab w/ UVIS
    - UVIS_261SA_AURSTARE001_PRIME - Collab w/ VIMS
    - UVIS_261SA_AURSLEW002_PRIME - Collab w/ VIMS
  - PIES:
    - VIMS_261SA_GAMCRUOCC001_PIE (044T20:36)
    - CIRS_261SA_REGMAP001_PIE (044T22:51)
    - CDA_261DR_FRING001_PIE (045T04:56)
    - CIRS_261SA_REGMAP002_PIE (045T08:36)
  - MAG Range 1 Roll (DOY 044)
  - -Y to Sun CMT management and flight rule waivers required (mentioned in pointing area)

Liens (1/2)

Sequence Liens (should all be SPLAT items):

- Target Motion Violations
  - None

- **-Y to Sun < 12˚ CMT Management + FR waiver** required during the period 2017-045T21:55:55 – 046T02:03:35 SCET
  - CMT Management required during VIMS_261SA_SPOLMAP002_PRIME and SP_261SA_WAYPTTURN046_PRIME
    - Sun occulted between 045T21:48:33 - 046T02:32:30 (from Tour Atlas)

    - CIRS heating violation **Operational FR waiver** required during ISS LIMBINT002
  - CIRS Max Temp = 77.1K (ΔT = 2.5K) @ 045T08:12 SCET
  - CIRS provided approval via email (Paul Romani 8/04)

    - VIMS heating violation **Consumable FR waiver** required during ISS LIMBINT002
  - VIMS Max Temp = 63.25K (ΔT = 3.59K) @ 045T08:30 SCET
    - VIMS provided approval via email (Ed Audi/Kevin Baines 3/20)

- CIRS Boresight to Sun < 15˚ **Operational FR waiver** required during DOY 045 - 046 during VIMS SPOL / SSTRMLAT / SEQREG / SPOL Maps, SP WAYPTTURN, UVIS AURSTARE, & SP DLTURN
  - CIRS Boresight to Sun < 12˚ occur only during Solar Occultation
  - CIRS provided approval via email (Paul Romani 3/21)

Liens (2/2)

Sequence Liens (should all be SPLAT items):

- The following science requests from 2017-044T00:52 – 046T18:33 in Saturn_261 have been designed in PDT during integration. Teams identified shall deliver these designs as part of the Port 1 delivery; SIP leads to monitor.

  VIMS_261SA_NPOLMAP001_PRIME

  VIMS_261SA_GAMCRUOCC001_PIE

  CIRS_261SA_REGMAP001_PIE

  ISS_261SA_LIMBINT001_PRIME

  CDA_261DR_FRING001_PIE

  ISS_261SA_LIMBINT002_PRIME

  CIRS_261SA_REGMAP002_PIE

  VIMS_261SA_SPOLMAP001_PRIME

  VIMS_261SA_SSTRMLAT001_PRIME

  VIMS_261SA_SEQREGMAP001_PRIME

  VIMS_261SA_SPOLMAP002_PRIME

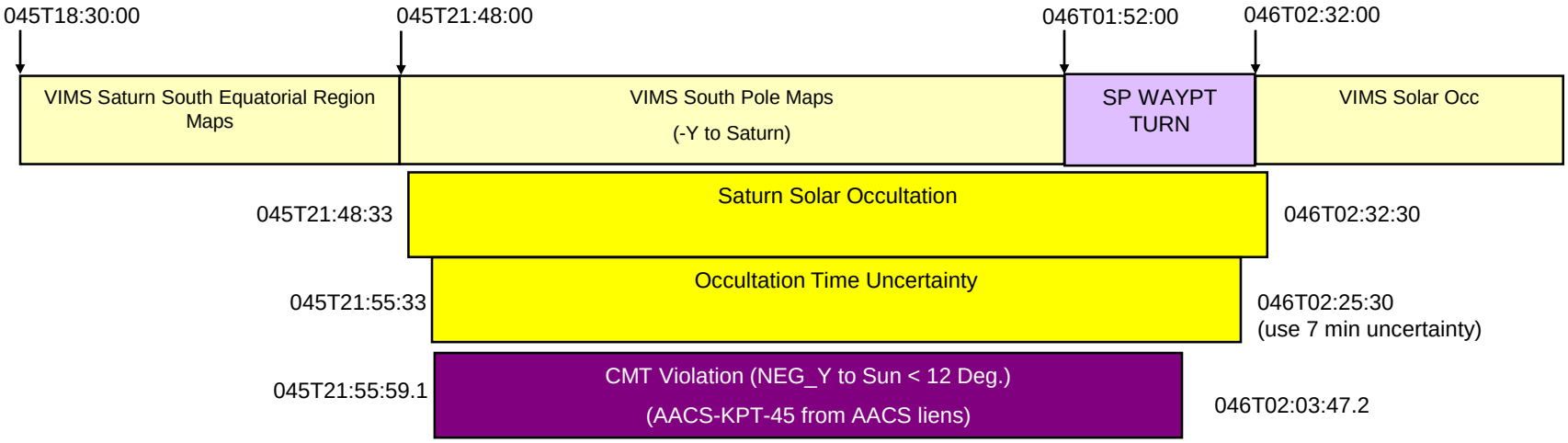
  VIMS_261RI_SOLAROCC001_PRIME

  UVIS_261SA_AURSTARE001_PRIME

- There is a 19 min window carved out at the beginning of the ISS LIMBINT002 (045T06:56 – 07:15) for a bias, see RBOT slides

CMT Management: -Y to Sun violation

- -Y to Sun CMT Management and <12° boresight to sun flight rule waivers will be needed for the VIMS South Pole Maps on DOY 045/046 and the SP WAYPT Turn on DOY 046 during the solar occultation
  - Time of Saturn Solar Occultation is from the tour atlas.
  - Timing uncertainty is ± 1.4 minutes as determined using Brad Wallis' "ask_carnac.pro" with a total of ± 7 minutes pad recommended



RBOT Summary

AACS evaluation of Saturn_261 Jumpstart by David Bates

•Carving out 19 minutes for a bias before the first turn in ISS_261SA_LIMBINT002_PRIME should solve most of the problems and avoid the tweaks below:

- Large tweak needed in the middle of two observations
  - 2017-045T01:12 UVIS_279SA_AURSLEW001_PIE
  - 2017-045T10:55 CIRS_261SA_REGMAP002_PIE
  - And two more tweaks
  - 2017-046T02:32 VIMS_261RI_SOLAROCC001_PRIME
  - 2017-046T06:59 UVIS_261SA_AURSTARE001_PRIME

•Even with the bias during the ISS LIMBINT002, CIRS_261SA_REGMAP001 and CIRS_261SA_REGMAP002 will still need tweaks

- Would require at least another bias to clean it up, maybe two. There are already two biases in this Rev, so Dave is not sure if we want to insert more biases or tweak the observations