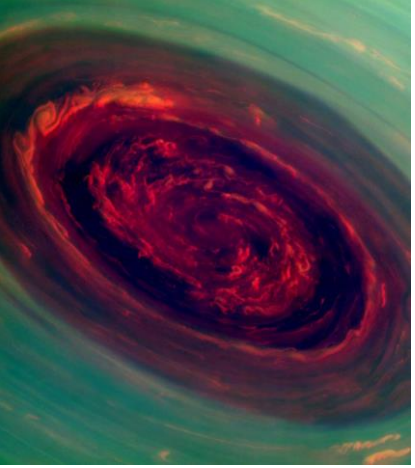

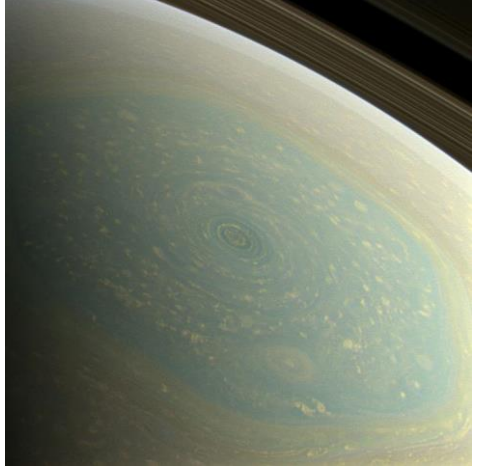
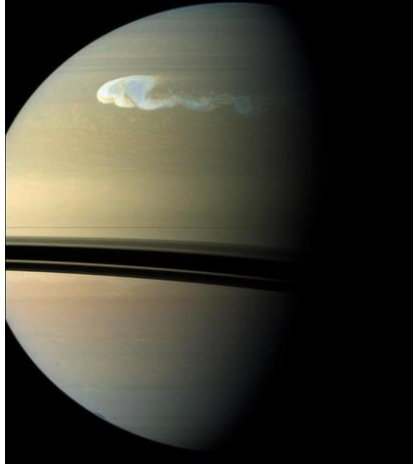

Science Planning & Sequence Team
CASSINI

SATURN TARGET WORKING TEAM

Rev 290_ 291 Segment Legacy Package

Segment Boundary: August 25, 2017– September 3, 2017
2017-237T21:54 – 2017-246T15:38 (SCET)

Integration Began 11/07/2016
Segment Delivered to S101 Sequence 01/19/2017
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

- This segment covered 2 Proximal periapses. Rev 290 focused on RADAR and INMS and Rev 291 focused on INMS. Both periapse days were integrated with custom periods, Live Movable Blocks to account for possible shifts in timing, and Dual Playbacks of the high priority data.

- RADAR: high spatial resolution of Saturn's 2-cm wavelength thermal emission in scans through latitude (highest resolution by an order of magnitude). Addition of active mode, which targets the possibility that there is intense activity in the ammonia cloud region that produces a reflection.

- INMS: in situ composition measurements of Saturn's upper atmosphere.

- Last CIRS limb observation of the mission.

- Potential Pop-down maneuver scheduled.

- A periapse downlink-to-downlink PDT/KPT/RBOT analysis was run on both periapse days. No changes required due to relaxed RBOT constraints.

Final Sequenced SPASS (1 of 3)

Rev290 Jumpstart

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End	Primary	Secondary	Comments
SATURN_290_291 Segment		2017-237T21:54:00		008T17:44:00	2017-246T15:38:00			
SP_290SA_WAYPTTURN237_PRIME		2017-237T21:54:00		000T00:40:00	2017-237T22:34:00	ISS_NAC to Saturn	NEG_X to NSP	
NEW WAYPOINT		**2017-237T22:34:00**		**000T20:29:00**	**2017-238T19:03:00**	**ISS_NAC to Saturn**	**NEG_X to NSP**	
CIRS_290SA_FIRMAP001_PRIME	U	2017-237T22:34:00		000T12:00:00	2017-238T10:34:00	CIRS_FP1 to Saturn	NEG_X to NSP	
290TI (nt) TITAN Inboun...		2017-238T02:27:17		000T00:00:01	2017-238T02:27:18			
VIMS_290SA_EQUAMAP001_PRIME	C, U	2017-238T10:34:00		000T08:00:00	2017-238T18:34:00	ISS_NAC to Saturn	NEG_X to NSP	
SP_290SA_WAYPTTURN238_PRIME		2017-238T18:34:00		000T00:29:00	2017-238T19:03:00	NEG_Z to Saturn	NEG_X to 165.4/32.2	
NEW WAYPOINT		**2017-238T19:03:00**		**000T09:18:59**	**2017-239T04:21:59**	**NEG_Z to Saturn**	**NEG_X to 165.4/32.2**	
CIRS_290SA_LIMBMAP001_PIE	I, U, V	2017-238T19:03:00		000T05:35:00	2017-239T00:38:00	CIRS_FPB to Saturn	PIC	Saturn Equator - 30N, East or West limb; sub s/c lat=40-60N PIE
SP_290SA_DEADTIME239_PRIME	M	2017-239T00:38:00		000T00:18:34	2017-239T00:56:34	NEG_Z to Saturn	NEG_X to 165.4/32.2	Start absolute, End epoch
Begin Custom		2017-239T00:56:34	LMB_E290_Peri-000T01:23:50	000T00:00:01	2017-239T00:56:35	NEG_Z to Saturn	NEG_X to 165.4/32.2	
ENGR_290SC_RADRCS271_PRIME	M	2017-239T00:59:34	LMB_E290_Peri-000T01:20:50	000T00:01:00	2017-239T01:00:34	NEG_Z to Saturn	NEG_X to 165.4/32.2	Collaborative Rider(s): INMS. Pick up at NEG_Z to Saturn, NEG_X to 165.4/32.2; Hand off at NEG_Z to Saturn, NEG_X to 165.4/32.2.
RADAR_290SA_2CMMAP001_PIE	M	2017-239T01:20:24	LMB_E290_Peri-000T01:00:00	000T02:00:00	2017-239T03:20:24	NEG_Z to Saturn	POS_X to COROT	Collaborative Rider(s): INMS. Pick up at NEG_Z to Saturn, NEG_X to 165.4/32.2; Hand off at NEG_Z to Saturn, NEG_X to 25.4/32.2. Collaborative Rider(s): INMS
Begin Dual Playback Science		2017-239T01:41:14	LMB_E290_Peri-000T00:39:10	000T00:00:01	2017-239T01:41:15			
Periapse R = 1.025 Rs, lat ...		2017-239T02:20:25		000T00:00:01	2017-239T02:20:26			
End Dual Playback Science		2017-239T02:51:14	LMB_E290_Peri+000T00:30:50	000T00:00:01	2017-239T02:51:15			
SP_290SA_WAYPTTURN539_PRIME	M	2017-239T03:20:24	LMB_E290_Peri+000T01:00:00	000T00:03:00	2017-239T03:23:24	NEG_Z to 352.01/57.66	NEG_X to 25.4/32.2	Collaborative Rider(s): INMS. Pick up at NEG_Z to Saturn, NEG_X to 25.4/32.2; Hand off at NEG_Z to 352.01/57.66, NEG_X to 25.4/32.2. Turn to Quiescent Attitude for RWA Transition.
ENGR_290SC_DFPWBIAS239_PPS	M	2017-239T03:23:24	LMB_E290_Peri+000T01:03:00	000T00:21:09	2017-239T03:44:33	NEG_Z to 352.01/57.66	NEG_X to 25.4/32.2	Collaborative Rider(s): INMS. Pick up at NEG_Z to 352.01/57.66, NEG_X to 25.4/32.2; Hand off at NEG_Z to 352.01/57.66, NEG_X to 25.4/32.2.
SP_290SA_WAYPTTURN239_PRIME	M	2017-239T03:44:33	LMB_E290_Peri+000T01:24:09	000T00:37:26	2017-239T04:21:59	ISS_NAC to Saturn (0.0,-45.0,0.0 deg. offset)	NEG_Z to NSP	Pick up at NEG_Z to 352.01/57.66, NEG_X to 25.4/32.2; Hand off at ISS_NAC to Saturn (0.0,-45.0,0.0 deg. offset), NEG_Z to NSP.
NEW WAYPOINT		**2017-239T04:21:59**		**000T08:02:01**	**2017-239T12:24:00**	**ISS_NAC to Saturn (0.0,-45.0,0.0 deg. offset)**	**NEG_Z to NSP**	
End Custom		2017-239T04:21:59	LMB_E290_Peri+000T02:01:35	000T00:00:01	2017-239T04:22:00	ISS_NAC to Saturn (0.0,-45.0,0.0 deg. offset)	NEG_Z to NSP	
SP_290SA_DEADTIME439_PRIME		2017-239T04:21:59	LMB_E290_Peri+000T02:01:35	000T00:20:01	2017-239T04:42:00	ISS_NAC to Saturn (0.0,-45.0,0.0 deg. offset)	NEG_Z to NSP	Start epoch, End absolute
UVIS_290SA_AURSTARE001_PRIME		2017-239T04:42:00		000T07:02:00	2017-239T11:44:00	UVIS_FUV to Saturn	NEG_Z to NSP	
SP_290EA_DLTURN239_PRIME		2017-239T11:44:00		000T00:40:00	2017-239T12:24:00	XBAND to Earth	POS_X to NEP	
NEW WAYPOINT		**2017-239T12:24:00**		**000T10:10:00**	**2017-239T22:34:00**	**XBAND to Earth**	**POS_X to NEP**	
ENGR_290SC_KPTYBIAS239_PRIME		2017-239T12:24:00		000T01:30:00	2017-239T13:54:00	NEG_Z to DELTA_H (0.0,0.0,-13.002 deg. offset)	NEG_X to Sun	
SP_290EA_M70METNON239_PRIME	C, E	2017-239T13:54:00		000T08:00:00	2017-239T21:54:00	XBAND to Earth	Rolling	Possible CIRS heating depending on secondary used (update in integration)
Pointer Reset in preparatio...		2017-239T21:54:00		000T00:00:01	2017-239T21:54:01			
SP_290SA_WAYPTTURN439_PRIME		2017-239T21:54:00		000T00:40:00	2017-239T22:34:00	ISS_NAC to Saturn	NEG_X to Sun	
NEW WAYPOINT		**2017-239T22:34:00**		**001T04:20:00**	**2017-241T02:54:00**	**ISS_NAC to Saturn**	**NEG_X to Sun**	
ISS_290TI_ATMOS001_PIE	C, V	2017-239T22:34:00		000T01:45:00	2017-240T00:19:00	ISS_NAC to Titan	NEG_X to Sun	
CIRS_290TI_COMPMAP001_PIE	I, V	2017-240T00:19:00		000T04:16:00	2017-240T04:35:00	CIRS_FPB to Titan	NEG_Z to NTP	CIRS_FPB to 48S; arrays cover 25S-90S
290TI (nt) TITAN Outbou...		2017-240T01:07:17		000T00:00:01	2017-240T01:07:18			
ISS_290TI_ATMOS002_PIE	C, V	2017-240T04:35:00		000T01:45:00	2017-240T06:20:00	ISS_NAC to Titan	NEG_X to Sun	
ISS_290EN_PLUME001_PIE	C, U, V	2017-240T06:20:00		000T14:20:00	2017-240T20:40:00	ISS_NAC to Enceladus	NEG_X to NSP	SOST PIE
ISS_290TI_ATMCLD001_PIE	C, V	2017-240T20:40:00		000T05:34:00	2017-241T02:14:00	ISS_NAC to Titan	NEG_X to Sun	Collaborative Rider(s): CIRS

Final Sequenced SPASS (2 of 3)

Gap 1

Gap 2

Gap 3

Rev291 Jumpstart

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End	Primary	Secondary	Comments
SP_290EA_DLTURN241_PRIME		2017-241T02:14:00		000T00:40:00	2017-241T02:54:00	XBAND to Earth	POS_X to NEP	
NEW WAYPOINT		2017-241T02:54:00		000T11:10:00	2017-241T14:04:00	XBAND to Earth	POS_X to NEP	
SP_290EA_G70METNON241_PRIME		2017-241T02:54:00		000T01:40:00	2017-241T04:34:00	XBAND to Earth	Rolling	
SP_290EA_C70METNON241_PRIME	C	2017-241T04:34:00		000T08:50:00	2017-241T13:24:00	XBAND to Earth	Rolling/Bias	
SP_290SA_WAYPTTURN241_PRIME		2017-241T13:24:00		000T00:40:00	2017-241T14:04:00	ISS_NAC to Saturn	NEG_Z to NSP	
NEW WAYPOINT		2017-241T14:04:00		000T11:27:00	2017-242T01:31:00	ISS_NAC to Saturn	NEG_Z to NSP	
VIMS_290SA_FULLDISK001_PRIME	C	2017-241T14:04:00		000T10:47:00	2017-242T00:51:00	ISS_NAC to Saturn	NEG_Z to NSP	
SP_290EA_DLTURN242_PRIME		2017-242T00:51:00		000T00:40:00	2017-242T01:31:00	XBAND to Earth	POS_X to NEP	
NEW WAYPOINT		2017-242T01:31:00		000T11:10:00	2017-242T12:41:00	XBAND to Earth	POS_X to NEP	
SP_290EA_YGAP242_PRIME		2017-242T01:31:00		000T01:30:00	2017-242T03:01:00	XBAND to Earth	POS_X to NEP	
SP_290EA_C34BWGOTP242_PRIME	C, N	2017-242T03:01:00		000T08:30:00	2017-242T11:31:00	XBAND to Earth	Rolling	Potential Pop-down maneuver (Prime)
Apoapse Per = 6.5 d, inc =...		2017-242T07:48:54		000T00:00:01	2017-242T07:48:55			
SP_290SA_WAYPTTURN242_PRIME		2017-242T12:01:00		000T00:40:00	2017-242T12:41:00	ISS_NAC to Saturn	NEG_Z to NSP	
NEW WAYPOINT		2017-242T12:41:00		000T12:50:00	2017-243T01:31:00	ISS_NAC to Saturn	NEG_Z to NSP	
ISS_290TI_M120R2HZ242_PRIME	C, V	2017-242T12:41:00	E290_M120R2HZ242+000T00:0(	000T01:30:00	2017-242T14:11:00	ISS_NAC to Titan	NEG_Z to NSP	No Preference to secondary pointing
CIRS_291SA_MIRMAP001_PRIME	U, V	2017-242T14:11:00		000T10:40:00	2017-243T00:51:00	CIRS_FP3 to Saturn	NEG_Z to NSP	
SP_291EA_DLTURN243_PRIME		2017-243T00:51:00		000T00:40:00	2017-243T01:31:00	XBAND to Earth	POS_X to NEP	
NEW WAYPOINT		2017-243T01:31:00		000T11:10:00	2017-243T12:41:00	XBAND to Earth	POS_X to NEP	
SP_291EA_YGAP243_PRIME		2017-243T01:31:00		000T01:30:00	2017-243T03:01:00	XBAND to Earth	POS_X to NEP	
SP_291EA_C34UNQOTB243_PRIME	C, E, N	2017-243T03:01:00		000T09:00:00	2017-243T12:01:00	XBAND to Earth	Rolling	first 2 hours on DSS14 Potential Pop-down maneuver (Backup)
SP_291SA_WAYPTTURN243_PRIME		2017-243T12:01:00		000T00:40:00	2017-243T12:41:00	ISS_NAC to Saturn	NEG_Z to NSP	
NEW WAYPOINT		2017-243T12:41:00		000T11:34:00	2017-244T00:15:00	ISS_NAC to Saturn	NEG_Z to NSP	
ISS_291TI_M150R2HZ243_PRIME	C, V	2017-243T12:41:00	E291_M150R2HZ243+000T00:0(	000T01:30:00	2017-243T14:11:00	ISS_NAC to Titan	NEG_Z to NSP	No Preference to secondary pointing
CIRS_291SA_COMPSIT001_PRIME	I, U, V	2017-243T14:11:00		000T09:24:00	2017-243T23:35:00	CIRS_FP1 to Saturn	NEG_Z to NSP	Ring Rain, right limb, mid-northern latitude
SP_291EA_DLTURN443_PRIME		2017-243T23:35:00		000T00:40:00	2017-244T00:15:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	
NEW WAYPOINT		2017-244T00:15:00		000T11:10:00	2017-244T11:25:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	
ENGR_291SC_KPTYBIAS244_PRIME		2017-244T00:15:00		000T01:30:00	2017-244T01:45:00	POS_Z to DELTA_H (0.0,0.0,69.0 deg. offset)	NEG_X to Sun	
SP_291EA_C70METNON244_PRIME	C	2017-244T01:45:00		000T09:00:00	2017-244T10:45:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	MIMI. XBAND to EARTH (0,0, -9.5), NEG_Y to SA
SP_291SA_WAYPTTURN244_PRIME		2017-244T10:45:00		000T00:40:00	2017-244T11:25:00	ISS_NAC to Saturn	POS_Z to NSP	
NEW WAYPOINT		2017-244T11:25:00		001T03:53:59	2017-245T15:18:59	ISS_NAC to Saturn	POS_Z to NSP	
ISS_291TI_M150R2HZ244_PRIME	C, V	2017-244T11:25:00	E291_M150R2HZ244+000T00:0(	000T01:30:00	2017-244T12:55:00	ISS_NAC to Titan	NEG_X to NSP	No Preference to secondary pointing
UVIS_291SA_AURDSTARE001_PRIME	C, V	2017-244T12:55:00		000T05:32:00	2017-244T18:27:00	VIMS_IR to Saturn	POS_Z to NSP	Collaborative Rider(s): VIMS
UVIS_291SA_AURSLEW001_PRIME	C, V	2017-244T18:27:00		000T05:32:00	2017-244T23:59:00	UVIS_FUV to Saturn	POS_Z to NSP	Collaborative Rider(s): VIMS
CIRS_291SA_NADIROCC001_PIE		2017-244T23:59:00		000T02:00:00	2017-245T01:59:00	CIRS_FP4 to Saturn	POS_Z to NSP	PIE, Track occ lat=0, lon=135; Verify Gam Cru ingress location w/ Phil Nicholson
UVIS_291SA_LIMBINT001_PRIME	C, V	2017-245T01:59:00		000T06:47:00	2017-245T08:46:00	UVIS_EUV to Saturn	PIC	
SP_291SA_DEADTIME245_PRIME		2017-245T08:46:00		000T00:19:59	2017-245T09:05:59	ISS_NAC to Saturn	POS_Z to NSP	Start absolute, End epoch
Begin Custom		2017-245T09:05:59	LMB_E291_Peri-000T04:11:52	000T00:00:01	2017-245T09:06:00	ISS_NAC to Saturn	POS_Z to NSP	
VIMS_291RI_GAMCRUOCC001_PRIME	C	2017-245T09:05:59	LMB_E291_Peri-000T04:11:52	000T01:39:00	2017-245T10:44:59	VIMS_IR to 187.791/-57.113	POS_Z to NSP	Pick up at ISS_NAC to Saturn, POS_Z to NSP; Hand off at VIMS_IR to 187.791/-57.113, POS_Z to NSP.
VIMS_291SA_GAMCRUOCC001_PIE	C, M	2017-245T10:44:59	LMB_E291_Peri-000T02:32:52	000T01:31:52	2017-245T12:16:51	VIMS_IR to 187.791/-57.113	PIC	Collaborative Rider(s): CIRS. Pick up at VIMS_IR to 187.791/-57.113, POS_Z to NSP; Hand off at NEG_Y to Saturn, POS_X to NSP. Collaborative Rider(s): CIRS
ENGR_291SC_ORSRCS245_PRIME	M	2017-245T12:16:51	LMB_E291_Peri-000T01:01:00	000T00:01:00	2017-245T12:17:51	NEG_Y to Saturn	POS_X to NSP	Pick up at NEG_Y to Saturn, POS_X to NSP; Hand off at NEG_Y to Saturn, POS_X to NSP.
VIMS_291CO_SATAMOS001_PIE	I, M	2017-245T12:17:51	LMB_E291_Peri-000T01:00:00	000T02:00:00	2017-245T14:17:51	POS_X to COROT	NEG_Y to Saturn	Pick up at NEG_Y to Saturn, POS_X to NSP; Hand off at NEG_Y to Saturn, NEG_X to NSP. ISS secondary

Final Sequenced SPASS (3 of 3)

Rev291 Jumpstart

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End	Primary	Secondary	Comments
Begin Dual Playback Science		2017-245T13:02:51	LMB_E291_Peri-000T00:15:00	000T00:00:01	2017-245T13:02:52			
Periapse R = 1.025 Rs, lat ...		2017-245T13:17:52		000T00:00:01	2017-245T13:17:53			
End Dual Playback Science		2017-245T13:27:51	LMB_E291_Peri+000T00:10:00	000T00:00:01	2017-245T13:27:52			
SP_291SA_WAYPTTURN445_PRIME	M	2017-245T14:17:51	LMB_E291_Peri+000T01:00:00	000T00:03:00	2017-245T14:20:51	NEG_Y to 351.26/57.74	NEG_X to NSP	Pick up at NEG_Y to Saturn, NEG_X to NSP; Hand off at NEG_Y to 351.26/57.74, NEG_X to NSP. Turn to Quiescent Attitude for RWA Transition.
ENGR_291SC_DFPWBIAS245_PPS	M	2017-245T14:20:51	LMB_E291_Peri+000T01:03:00	000T00:21:05	2017-245T14:41:56	NEG_Y to 351.26/57.74	NEG_X to NSP	Pick up at NEG_Y to 351.26/57.74, NEG_X to NSP; Hand off at NEG_Y to 351.26/57.74, NEG_X to NSP.
SP_291SA_WAYPTTURN245_PRIME	M	2017-245T14:41:59	LMB_E291_Peri+000T01:24:08	000T00:37:00	2017-245T15:18:59	ISS_NAC to Saturn	NEG_Z to NSP	Pick up at NEG_Y to 351.26/57.74, NEG_X to NSP; Hand off at ISS_NAC to Saturn, NEG_Z to NSP.
NEW WAYPOINT		2017-245T15:18:59		000T11:49:01	2017-246T03:08:00	ISS_NAC to Saturn	NEG_Z to NSP	
End Custom		2017-245T15:18:59	LMB_E291_Peri+000T02:01:08	000T00:00:01	2017-245T15:19:00	ISS_NAC to Saturn	NEG_Z to NSP	
SP_291SA_DEADTIME445_PRIME		2017-245T15:18:59	LMB_E291_Peri+000T02:01:08	000T00:20:01	2017-245T15:39:00	ISS_NAC to Saturn	NEG_Z to NSP	Start epoch, End absolute
UVIS_291SA_AURSLEW002_PRIME		2017-245T15:39:00		000T05:25:00	2017-245T21:04:00	UVIS_FUV to Saturn	NEG_Z to NSP	
UVIS_291SA_AURNSTARE001_PRIME	I	2017-245T21:04:00		000T05:24:00	2017-246T02:28:00	ISS_NAC to Saturn	NEG_Z to NSP	
SP_291EA_DLTURN246_PRIME		2017-246T02:28:00		000T00:40:00	2017-246T03:08:00	XBAND to Earth	POS_X to NEP	
NEW WAYPOINT		2017-246T03:08:00		001T22:00:00	2017-248T01:08:00	XBAND to Earth	POS_X to NEP	
SP_291EA_YGAP246_PRIME		2017-246T03:08:00		000T01:30:00	2017-246T04:38:00	XBAND to Earth	POS_X to NEP	
SP_291EA_C70METNON246_PRIME	C, E	2017-246T04:38:00		000T09:00:00	2017-246T13:38:00	XBAND to Earth	Rolling	Possible CIRS heating depending on secondary used (update in integration)
Pointer Reset in preparatio...		2017-246T13:38:00		000T00:00:01	2017-246T13:38:01			
SP_291EA_M70METNON246_PRIME		2017-246T13:38:00		000T02:00:00	2017-246T15:38:00	XBAND to Earth	Rolling	Possible CIRS heating depending on secondary used (update in integration)

Final Sequenced SMT and Data Volume

Saturn 290_291 Legacy

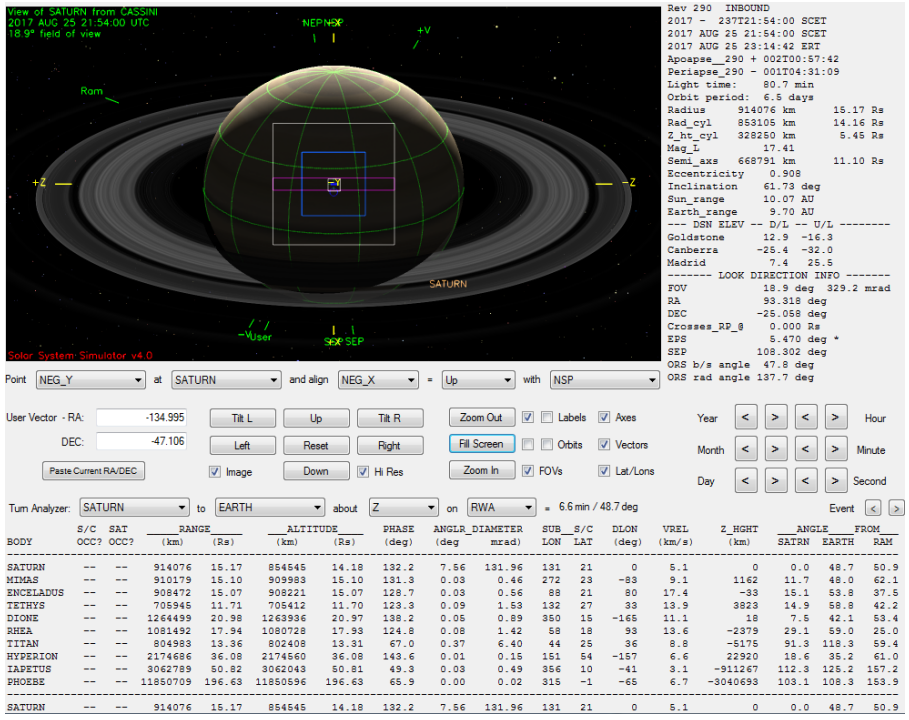
DATA VOLUME SUMMARY --- TRANSFER FRAME OVERHEAD INCLUDED (80 BITS PER 8800-BIT FRAME)

			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_290EA_M70METNON239_PRIME	239 13:54	239 21:54	0	2308	186	2493	3322	829	0	153	47	2694	2009	-686	3	0%	685
SP_290EA_G70METNON241_PRIME	241 02:54	241 04:34	685	2511	123	3319	3322	3	0	19	10	3348	520	-2828	321	2%	2828
SP_290EA_C70METNON241_PRIME	241 04:34	241 13:24	2828	0	0	2828	3322	494	0	557	52	3437	3220	-217	321	2%	216
SP_290EA_C34BWGOTP242_PRIME	242 03:01	242 11:31	216	852	58	1126	3322	2196	0	184	50	1361	606	-755	321	3%	754
SP_291EA_C34UNQOTB243_PRIME	243 03:01	243 12:01	754	761	65	1581	3322	1741	0	196	53	1830	1103	-727	321	2%	727
SP_291EA_C70METNON244_PRIME	244 01:45	244 10:45	727	2050	58	2835	3322	487	0	196	53	3083	3315	231	321	2%	0
SP_291EA_C70METNON246_PRIME	246 04:38	246 13:38	0	2797	192	2988	3322	334	0	196	53	3237	3087	-150	89	1%	150
SP_291EA_M70METNON246_PRIME	246 13:38	246 15:38	150	0	0	150	3322	3172	0	177	12	339	428	89	132	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	237 21:54	239 13:54	0.0	117.3	310.8	27.8	57.0	177.5	136.8	217.6	696.3	115.6	430.0	0.0	183.7	2470.5
SP_290EA_M70METNON239_PRIME	239 13:54	239 21:54	0.0	15.1	56.4	2.9	0.0	28.5	18.4	0.0	26.2	4.4	0.0	0.0	0.0	151.9
DAILY TOTAL SCIENCE	237 21:54	239 21:54	0.0	132.4	367.2	30.7	57.0	206.0	155.2	217.6	722.5	120.0	430.0	0.0	183.7	
OBSERVATION_NOR	239 21:54	241 02:54	0.0	54.7	209.5	10.4	1350.0	103.1	66.8	0.0	95.0	109.1	185.0	0.0	425.7	2609.4
SP_290EA_G70METNON241_PRIME	241 02:54	241 04:34	0.0	3.1	0.0	0.6	0.0	5.9	3.8	0.0	5.5	0.1	0.0	0.0	0.0	19.1
SP_290EA_C70METNON241_PRIME	241 04:34	241 13:24	0.0	16.7	86.4	3.2	0.0	31.4	20.4	0.0	388.9	4.8	0.0	0.0	0.0	551.8
DAILY TOTAL SCIENCE	239 21:54	241 13:24	0.0	74.5	295.9	14.2	1350.0	140.5	91.0	0.0	489.4	114.0	185.0	0.0	425.7	
OBSERVATION_NOR	241 13:24	242 03:01	0.0	25.7	139.8	4.9	0.0	48.4	31.4	0.0	44.6	0.0	550.0	0.0	56.9	901.7
SP_290EA_C34BWGOTP242_PRIME	242 03:01	242 11:31	0.0	16.0	81.0	3.1	0.0	30.2	19.6	0.0	27.8	4.7	0.0	0.0	0.0	182.4
DAILY TOTAL SCIENCE	241 13:24	242 11:31	0.0	41.7	220.8	8.0	0.0	78.7	51.0	0.0	72.5	4.7	550.0	0.0	56.9	
OBSERVATION_NOR	242 11:31	243 03:01	0.0	29.2	165.2	15.6	38.5	55.1	35.7	0.0	50.8	38.9	325.0	0.0	64.8	818.9
SP_291EA_C34UNQOTB243_PRIME	243 03:01	243 12:01	0.0	17.0	86.4	3.2	0.0	32.0	20.7	0.0	29.5	4.9	0.0	0.0	0.0	193.8
DAILY TOTAL SCIENCE	242 11:31	243 12:01	0.0	46.2	251.6	18.9	38.5	87.1	56.4	0.0	80.3	43.9	325.0	0.0	64.8	
OBSERVATION_NOR	243 12:01	244 01:45	0.0	25.9	143.4	4.9	88.5	48.8	31.6	0.0	1319.4	34.1	335.0	0.0	57.4	2089.1
SP_291EA_C70METNON244_PRIME	244 01:45	244 10:45	0.0	17.0	86.4	3.2	0.0	32.0	20.7	0.0	29.5	4.9	0.0	0.0	0.0	193.8
DAILY TOTAL SCIENCE	243 12:01	244 10:45	0.0	42.9	229.8	8.2	88.5	80.9	52.4	0.0	1348.9	39.0	335.0	0.0	57.4	
OBSERVATION_NOR	244 10:45	246 04:38	0.0	119.7	214.0	28.5	293.5	183.9	141.1	0.0	1128.6	341.0	321.0	0.0	189.6	2961.1
SP_291EA_C70METNON246_PRIME	246 04:38	246 13:38	0.0	17.0	86.4	3.2	0.0	32.0	20.7	0.0	29.5	4.9	0.0	0.0	0.0	193.8
SP_291EA_M70METNON246_PRIME	246 13:38	246 15:38	0.0	3.8	0.0	0.7	0.0	7.1	4.6	0.0	6.6	1.1	0.0	0.0	151.7	175.5
DAILY TOTAL SCIENCE	244 10:45	246 15:38	0.0	140.5	300.4	32.5	293.5	223.1	166.5	0.0	1164.6	347.1	321.0	0.0	341.3	

Segment Geometry (1 of 2)




```
Rev 290  INBOUND
2017 -  237T21:54:00 SCET
2017 AUG 25 21:54:00 SCET
2017 AUG 25 23:14:42 ERT
Apoapse__290 + 002T00:57:42
Periapse_290 - 001T04:31:09
Light time:    80.7 min
Orbit period:  6.5 days
Radius      914076 km      15.17 Rs
Rad_cyl     853105 km      14.16 Rs
Z_ht_cyl    328250 km       5.45 Rs
Mag_L          17.41
Semi_axs    668791 km      11.10 Rs
Eccentricity    0.908
Inclination    61.73 deg
Sun_range      10.07 AU
Earth_range     9.70 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone      12.9  -16.3
Canberra      -25.4  -32.0
Madrid          7.4   25.5
------- LOOK DIRECTION INFO -------
FOV            18.9 deg  329.2 mrad
RA             93.318 deg
DEC           -25.058 deg
Crosses_RP_8    0.000 Rs
EPS             5.470 deg *
SEP           108.302 deg
ORS b/s angle  47.8 deg
ORS rad angle 137.7 deg
```

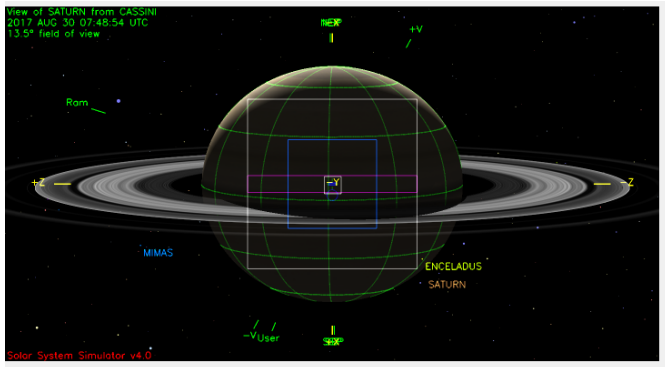
BODY	S/C OCC?	SAT OCC?	RANGE (km)	RANGE (Rs)	ALTITUDE (km)	ALTITUDE (Rs)	PHASE (deg)	ANGLR_DIAMETER (deg)	ANGLR_DIAMETER mrad	SUB_S/C LON	SUB_S/C LAT	DLON (deg)	VREL (km/s)	Z_HGHT (km)	ANGLE_FROM SATRN	ANGLE_FROM EARTH	ANGLE_FROM RAM
SATURN	--	--	914076	15.17	854545	14.18	132.2	7.56	131.96	131	21	0	5.1	0	0.0	48.7	50.9
MIMAS	--	--	910179	15.10	909983	15.10	131.3	0.03	0.46	272	23	-83	9.1	1162	11.7	48.0	62.1
ENCELADUS	--	--	908472	15.07	908221	15.07	128.7	0.03	0.56	88	21	80	17.4	-33	15.1	53.8	37.5
TETHYS	--	--	705945	11.71	705412	11.70	123.3	0.09	1.53	132	27	33	13.9	3823	14.9	58.8	42.2
DIONE	--	--	1264499	20.98	1263936	20.97	138.2	0.05	0.89	350	15	-165	11.1	18	7.5	42.1	53.4
RHEA	--	--	1081492	17.94	1080728	17.93	124.8	0.08	1.42	58	18	93	13.6	-2379	29.1	59.0	25.0
TITAN	--	--	804983	13.36	802408	13.31	67.0	0.37	6.40	44	25	36	8.8	-5175	51.3	118.3	59.4
HYPERION	--	--	2174686	36.08	2174560	36.08	143.6	0.01	0.15	151	54	-157	6.6	22920	18.6	35.2	61.0
IAPETUS	--	--	3062789	50.82	3062043	50.81	49.3	0.03	0.49	356	10	-41	3.1	-911267	112.3	125.2	157.2
PHOEBE	--	--	11850709	196.63	11850596	196.63	65.9	0.00	0.02	315	-1	-65	6.7	-3040693	103.1	108.3	153.9
SATURN	--	--	914076	15.17	854545	14.18	132.2	7.56	131.96	131	21	0	5.1	0	0.0	48.7	50.9

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	15.17	132.2	21
Periapse (290)	1.03	27.5	1
Apoapse	21.17	145.8	7
Periapse (291)	1.03	26.9	2
Segment End	14.52	156.2	-8

Segment Start: 2017-237T21:54

290 Periapse: 2017-239T02:20:25
(not pictured)

Apoapse: 2017-242T07:48:54




```
Rev 290 OUTBOUND
2017 -  242T07:48:54 SCET
2017 AUG 30 07:48:54 SCET
2017 AUG 30 09:10:12 ERT
Apoapse__290 + 006T10:52:36
Periapse_290 + 003T05:23:45
Light time:    81.3 min
Orbit period:  6.5 days
Radius     1275964 km      21.17 Rs
Rad_cyl    1266669 km      21.02 Rs
Z_ht_cyl    153730 km       2.55 Rs
Mag_L          21.48
Semi_axs    668786 km      11.10 Rs
Eccentricity    0.908
Inclination    61.71 deg
Sun_range      10.07 AU
Earth_range     9.78 AU
--- DSN ELEV -- D/L -- U/L --------
Goldstone     -19.4   10.5
Canberra       75.9   55.9
Madrid        -57.6  -69.9
------- LOOK DIRECTION INFO -------
FOV            13.5 deg  236.0 mrad
RA             82.592 deg
DEC           -11.751 deg
Crosses_RP_8    0.000 Rs
EPS             5.582 deg *
SEP           104.054 deg
ORS b/s angle  34.2 deg
ORS rad angle 123.5 deg
```

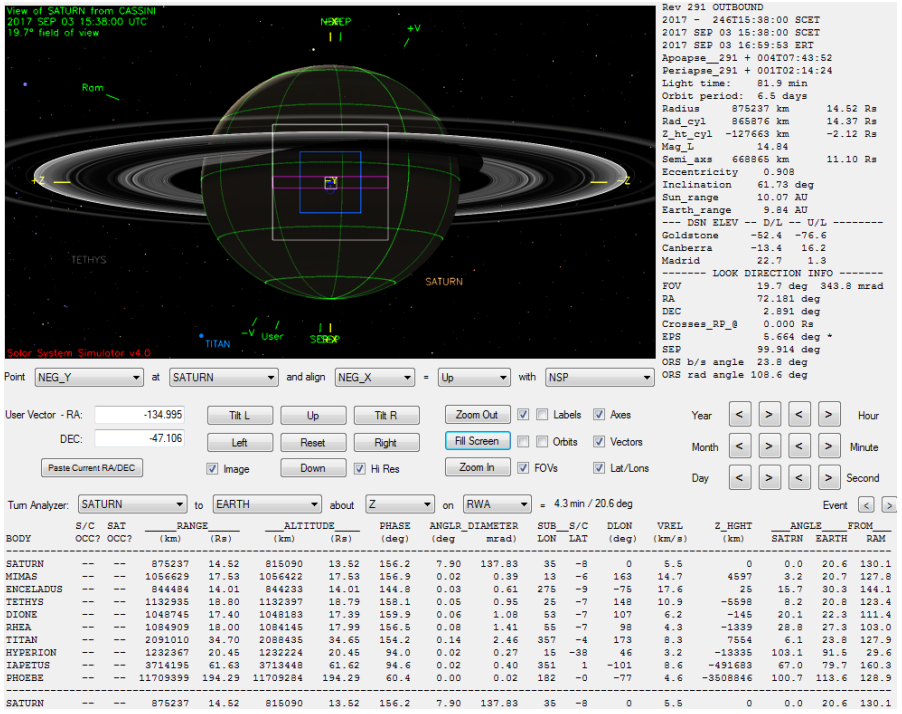
BODY	S/C OCC?	SAT OCC?	RANGE (km)	RANGE (Rs)	ALTITUDE (km)	ALTITUDE (Rs)	PHASE (deg)	ANGLR_DIAMETER (deg	ANGLR_DIAMETER mrad	SUB_S/C LON	SUB_S/C LAT	DLON (deg)	VREL (km/s)	Z_HGHT (km)	ANGLE_FROM SATRN	ANGLE_FROM EARTH	ANGLE_FROM RAM
SATURN	--	--	1275964	21.17	1215778	20.17	145.8	5.41	94.50	118	7	0	1.7	0	0.0	33.8	90.1
MIMAS	--	--	1116002	18.52	1115797	18.51	145.1	0.02	0.37	151	10	25	14.0	-4915	4.2	35.2	86.7
ENCELADUS	--	--	1043751	17.32	1043495	17.31	143.9	0.03	0.49	195	8	-8	12.0	-5	2.4	35.4	92.3
TETHYS	--	--	1347822	22.36	1347290	22.35	142.0	0.05	0.80	291	6	-98	11.4	1397	12.5	35.6	101.9
DIONE	--	--	992498	16.47	991936	16.46	139.8	0.07	1.14	227	9	-35	9.4	93	12.7	37.9	102.7
RHEA	--	--	1401670	23.26	1400907	23.24	143.6	0.06	1.09	68	6	92	8.8	-2050	22.1	39.5	69.0
TITAN	--	--	1522068	25.25	1519493	25.21	116.6	0.19	3.38	304	6	-76	5.6	-5625	49.2	58.3	137.0
HYPERION	--	--	2392941	39.70	2392813	39.70	138.4	0.01	0.14	86	17	115	5.6	16369	36.3	46.0	54.9
IAPETUS	--	--	3348579	55.56	3347833	55.55	79.8	0.03	0.45	345	8	-71	3.1	-746565	85.4	94.7	175.0
PHOEBE	--	--	11699456	194.12	11699345	194.12	64.8	0.00	0.02	107	-0	-71	3.1	-3282236	100.4	109.3	169.4
SATURN	--	--	1275964	21.17	1215778	20.17	145.8	5.41	94.50	118	7	0	1.7	0	0.0	33.8	90.1

Segment Geometry (2 of 2)

291 Periapse: 2017-245T13:17:52
(not pictured)

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	15.17	132.2	21
Periapse (290)	1.03	27.5	1
Apoapse	21.17	145.8	7
Periapse (291)	1.03	26.9	2
Segment End	14.52	156.2	-8

Segment End: 2017-246T15:38



Solar Geometry – ORS Boresight Concerns

No ORS Boresight Solar Constraints on Science Pointing Noted.

Periapse Quicklooks

Rev 290

CIRS_290SA_FIRMAP001_PRIME	U, V
VIMS_290SA_EQUAMAP001_PRIME	C, U
SP_290SA_WAYPTTURN238_PRIME	
NEW WAYPOINT	
CIRS_290SA_LIMBMAP001_PIE	I, U, V
SP_290SA_DEADTIME239_PRIME	M
Begin Custom	
ENGR_290SC_RADRCS271_PRIME	M
Begin Dual Playback Science	
RADAR_290SA_2CMMAP001_PIE	M
Periapse R = 1.025 Rs, lat ...	
End Dual Playback Science	
SP_290SA_WAYPTTURN539_PRIME	M
NEW WAYPOINT	
ENGR_290SC_DFPWBIAS239_PPS	M
SP_290SA_WAYPTTURN239_PRIME	M
NEW WAYPOINT	
End Custom	
SP_290SA_DEADTIME439_PRIME	
UVIS_290SA_AURSTARE001_PRIME	I

- CIRS performed a far IR map with a spatial resolution of about two degrees of latitude and longitude of Saturn's northern hemisphere to determine upper troposphere and tropopause temperature.
- VIMS created a map of Saturn's equatorial region with 8 3*2 mosaics.
- CIRS performed Saturn limb mapping at 10 deg S. latitude, the **last CIRS limb observation of Saturn in the mission**. CIRS studied Saturn's quasi-quadrennial oscillation in which the equatorial temperature changes occur over several Earth years due to vertical motions in the stratosphere.
- RADAR obtained high spatial resolution observations of Saturn's 2-cm wavelength thermal emission in scans through latitude. The 2-cm thermal emission measures the variation in ammonia concentration in the atmosphere just below the ammonia cloud base, giving unique insights into the actual weather occurring in and below Saturn's ammonia clouds. This rev's RADAR pass was to yield not only the **highest resolution RADAR map by an order of magnitude**, but also used for the first time the **active mode** on Saturn in a search for intense ammonia cloud activity that produces a reflection.
- INMS took in-situ composition measurements of Saturn's upper atmosphere (**2nd of 4 measurements)**. INMS measured densities of H_2, HD, and He in the neutral exospheres of Saturn and the rings, and perhaps oxygen-bearing species depending on their densities. INMS mapped the very important ion species, H_3^+, in the high ionosphere with 100-km resolution along Cassini's trajectory. INMS also studied the ionosphere of Saturn and ring sputtering by measuring neutral densities and composition in the region linking Saturn's atmosphere with the rings. There, INMS measured ions such as O_2^+ created on the surface of the rings and transported along field lines to other locations.
- UVIS observed the southern auroral oval.

Periapse Quicklooks

Rev 291

ISS_291TI_M150R2HZ244_PRIME	C, V
UVIS_291SA_AURDSTARE001_PRIME	C, V
UVIS_291SA_AURSLEW001_PRIME	C, V
CIRS_291SA_NADIROCC001_PIE	
UVIS_291SA_LIMBINT001_PRIME	C, V
SP_291SA_DEADTIME245_PRIME	
Begin Custom	
VIMS_291RI_GAMCRUOCC001_PRIME	C
VIMS_291SA_GAMCRUOCC001_PIE	C, M
ENGR_291SC_ORSRCS245_PRIME	M
INMS_291CO_SATAMOS001_PIE	I, M
Begin Dual Playback Science	
Periapse R = 1.025 Rs, lat ...	
End Dual Playback Science	
SP_291SA_WAYPTTURN445_PRIME	M
NEW WAYPOINT	
ENGR_291SC_DFPWBIAS245_PPS	M
SP_291SA_WAYPTTURN245_PRIME	M
NEW WAYPOINT	
End Custom	
SP_291SA_DEADTIME445_PRIME	
UVIS_291SA_AURSLEW002_PRIME	
UVIS_291SA_AURNSTARE001_PRIME	I

- ISS preformed haze observations of Titan's atmosphere as part of the Titan Monitoring Campaign (phase 131.2 and range 1.8 Mkm)
- UVIS and VIMS observed the illuminated north polar auroral zone
- UVIS performed a Saturn limb integration observation to study Saturn's upper atmosphere.
- CIRS and VIMS worked together to study Saturn's atmosphere. The CIRS NADIROCC PIE, when combined with the VIMS Saturn GAMCRUOCC PIE, will help to determine the He/H_2 ratio in Saturn's lower stratosphere. First, the stellar occultation by VIMS was to yield the scale height, or T/mu. Next, the CIRS limb scan followed the stellar occultation to yield the temperature profile, T(Z)) at the same latitude (4.5 deg N). Finally, the CIRS NADIROCC PIE measured the variation of temperature with longitude centered on the location of the Gamma Crucis stellar occultation point.
- INMS took in-situ composition measurements of Saturn's upper atmosphere (**3rd of 4 measurements)**. INMS measured densities of H_2, HD, and He in the neutral exospheres of Saturn and the rings, and perhaps oxygen-bearing species depending on their densities. INMS mapped the very important ion species, H_3^+, in Saturn's topside ionosphere with 100-km resolution along Cassini's trajectory. INMS also studied the ionosphere of Saturn and the ring atmosphere-ionosphere by measuring neutral densities and composition in the region linking the rings with the atmosphere. There, INMS measured ions such as O_2^+ created on the surface of the rings and transported along field lines to other locations.
- UVIS observed the dark south polar auroral zone.

Daily Science Highlights (1 of 3)

DOY 237 (25 August 2017): Saturn_290_291 was an almost 9 day segment, covering 2 periapses during ~1.5 orbits around Saturn. Starting at the end of DOY 237, the segment began with a CIRS far IR map with ~ 2,000 km spatial resolution of Saturn's northern hemisphere to determine temperatures in the upper troposphere and tropopause. UVIS rode along.

DOY 238 (26 August 2017): CIRS continued its 12h far IR map. VIMS, along with CIRS and UVIS, then created a map of Saturn's equatorial region with 8 3*2 mosaics over ~8 hours. CIRS then performed a 6 hour Saturn limb mapping (LIMBMAP) PIE at 10 deg S. latitude. This PIE level science observation was of highest priority for this orbit and is the **last CIRS limb observation of Saturn in the Cassini mission**. CIRS placed its arrays at 100, 400, and 700 km above the 1-bar level on Saturn, allowing the derivation of the vertical profile of temperature from 10 microbars to 10 millibars . CIRS studied Saturn's QQO (quasi-quadrennial oscillation) in which the equatorial temperature changes over several Earth years due to vertical motion in the stratosphere.

DOY 239 (27 August 2017): The Cassini spacecraft transitioned to thrusters for periapse science. Previously, the Saturn-only RADAR passes performed during the proximal orbits were in the passive mode only, and were nadir-looking to obtain high spatial resolution of Saturn's 2-cm wavelength thermal emission in scans through latitude. The 2-cm thermal emission measures the variation in ammonia concentration in the atmosphere just below the ammonia cloud base. Previous measurements on Saturn of this thermal emission are at spatial resolution > 700 km; the proximal scans improves this by well over an order of magnitude. This enables studies of the small-scale structure of Saturn's atmosphere as opposed to regional averages, and gives unique insights into the actual weather occurring in and below Saturn's ammonia clouds. In short, this is a unique opportunity to address an important question about outer planet atmospheres.

Saturn_290_291's RADAR pass was not only the **highest resolution RADAR by an order of magnitude**, but also has the addition of the active mode (this is the **only active mode pass**) which addresses the possibility that there is intense activity in the ammonia cloud region that produces a reflection. Previous passive mapping by the RADAR 2-cm indicated that the equatorial region of Saturn was strongly upwelling, which could be expected to produce turbulence and cloud activity in the region sampled at 2 cm. The new Juno results show the same for Jupiter, indicating a strong equatorial upwelling rising from very deep levels of the atmosphere, at pressure levels > 100 bars or possibly much deeper. The discovery of an active return correlated with passive small scale structure would be a great discovery that would shed light on the microstructure of this interesting region.

Daily Science Highlights (2 of 3)

DOY 239 (27 August 2017) continued… : While RADAR was observing, in the two hours surrounding periapse, INMS was also collecting high priority unique science. During the proximal orbits, INMS made in-situ composition measurements of Saturn's upper atmosphere—this orbit is **the 2nd of 4 measurements**. INMS measured densities of H_2, HD, and He in the neutral exospheres of Saturn and the rings, and perhaps oxygen-bearing species depending on their densities. INMS mapped the very important ion species, H_3^+, in Saturn's topside ionosphere with 100-km resolution along Cassini's trajectory. H_2^+ and other species are expected to have lower densities than H_3^+ (Nagy et al., 2009), and can be characterized with coarser resolution. INMS studied the ionosphere of Saturn and the ring atmosphere-ionosphere by measuring neutral densities and composition in the region linking Saturn's atmosphere with the rings (e.g., erosion of the rings through drag and chemical modification of the planetary atmosphere). In this region, INMS measured ions such as O_2^+ created on the surface of the rings and transported along field lines to other locations.

The spacecraft returned to reaction wheel assembly (RWA) control and science on the day of periapse continues with UVIS observing the southern auroral oval, first with repeated slews for 3.5hr, then staring for 3.5hr. After a downlink, the Cassini spacecraft prepared for a non-targeted flyby of Titan. ISS, with CIRS and VIMS, observes Titan's atmosphere.

DOY 240 (28 August 2017): As Cassini encountered Titan, CIRS stared at Titan. This untargeted Titan encounter characterized the buildup in hydrocarbons and nitriles from mid-southern latitudes to the South Pole. The winter pole has a polar vortex analogous to the Antarctic ozone hole on Earth. Within this region hydrocarbons such as benzene and nitriles such as HC_3N are enhanced by several orders of magnitude and they may alter the chemistry in Titan's stratosphere. ISS, again with CIRS and VIMS, observed Titan's atmosphere. ISS then turned its attention to Enceladus. ISS captured its **last Enceladus Plume PIE observation** as part of our plume monitoring campaign. This 14.5hr observation allows us to observe brightness variations in the entire plume on short timescales, which is excellent for testing theories of the plume production. Data collected from this observation helps characterize plume variations and helps lead to a better understanding of the long term plume behavior. ISS then observed Titan's atmosphere and clouds 5.5hr.

DOY 241 (29 August 2017): Turning towards Earth, the spacecraft downlinked data over the Canberra 70M antenna. Along with other data on the recorder, Cassini downlinked a 2nd copy of the high priority RADAR periapse data (dual playback). VIMS mapped the full disk of Saturn in an 11hr observation that includes 4 4*4 mosaics of the full disk. CIRS rode along.

DOY 242 (30 August 2017): Following apoapse, ISS preformed a haze observation of Titan's atmosphere as part of the Titan Monitoring Campaign (phase 118.8 and range 1.6 Mkm) with CIRS and VIMS riding. CIRS, with UVIS and VIMS riding, then performed a temperature mapping observation in the mid-IR (MIRMAP), sitting at one latitude on the Central Meridian Longitude as Saturn rotated almost 11hr. This was to get upper troposphere and tropopause temperatures at all longitudes at this specific latitude. CIRS used this data to look for waves.

Daily Science Highlights (3 of 3)

DOY 243 (31 August 2017): ISS preformed another haze observation of Titan's atmosphere as part of the Titan Monitoring Campaign (phase 125.8 and range 1.8 Mkm) with CIRS and VIMS riding. CIRS led an observation to study the composition of Saturn's atmosphere, with all other ORS instruments riding, for 9.5hr.

DOY 244 (1 September 2017): ISS preformed another haze observation of Titan's atmosphere as part of the Titan Monitoring Campaign (phase 131.2 and range 1.8 Mkm) with CIRS and VIMS riding. UVIS and VIMS, with CIRS, observed the illuminated north polar auroral zone, first staring for 5.5hr, then repeated slews for 5.5hr.

DOY 245 (2 September 2017): For the first half of DOY 245, CIRS and VIMS worked together to study Saturn's atmosphere. The CIRS NADIROCC PIE, when combined with the VIMS Saturn GAMCRUOCC PIE, helps to determine the He/H_2 ratio in Saturn's lower stratosphere. First, the stellar occultation by VIMS was to yield the scale height, or T/mu. Next, the CIRS limb scan following the stellar occultation was to yield the temperature profile, T(Z)) at the same latitude (4.5 deg N). Finally, the CIRS NADIROCC PIE measured the variation of temperature with longitude centered on the location of the Gamma Crucis stellar occultation point. Between these observations, UVIS, with CIRS and VIMS, performed a Saturn limb integration observation to study Saturn's upper atmosphere.

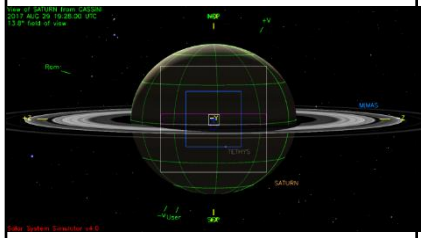
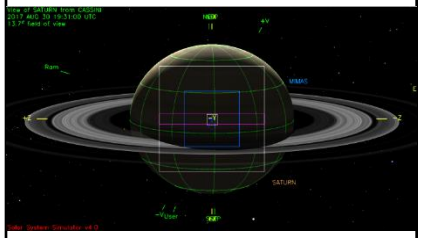
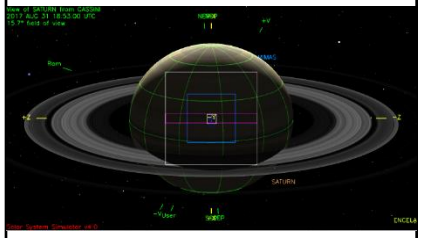
Once again, Cassini transitioned to thrusters for periapse. VIMS completed its portion of the Gamma Crucis occulation observations. In the two hours surrounding periapse, just as in rev 290's periapse, INMS made in-situ composition measurements of Saturn's upper atmosphere—this orbit is **the 3rd of 4 measurements**. INMS measured densities of H_2, HD, and He in the neutral exospheres of Saturn and the rings, and perhaps oxygen-bearing species depending on their densities. INMS mapped the very important ion species, H_3^+, in Saturn's topside ionosphere with 100-km resolution along Cassini's trajectory. $H_2^+$and other species are expected to have lower densities than H_3^+ (Nagy et al., 2009), and are characterized with coarser resolution. INMS also studied the ionosphere of Saturn and the ring atmosphere-ionosphere by measuring neutral densities and composition in the region linking Saturn's atmosphere with the rings (e.g., erosion of the rings through drag and chemical modification of the planetary atmosphere). In this region, INMS measured ions such as O_2^+ created on the surface of the rings and transported along field lines to other locations.

The spacecraft returned to reaction wheel assembly (RWA) control and science on the day of periapse continued with UVIS observing the dark south polar auroral zone, first with repeated slews for 5.5hr, then staring for 5.5hr.

DOY 246 (3 September 2017): The segment completed on DOY 246 with two contiguous downlinks. The first downlink was on the 70m antenna at Canberra, Australia and the second, which not only cleared the recorder of all data, but downlinked a 2nd copy of the high priority INMS periapse data (dual playback), was on the 70m antenna at Madrid, Spain.

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	2017-241T14:04:00 Suggested observations: VIMS mapping Apo: 242T07:48:54	2017-242T00:51:00	000T10:47:00	149.4 to 147.2	20.44 to 21.06	3 to 5	
2	2017-242T14:11:00 Suggested observations: CIRS mapping	2017-243T00:51:00	000T10:40:00	144.5 to 142.1	21.08 to 20.51	8 to 11	
3	2017-243T14:11:00 Suggested observations: Limb Integration, CIRS Compsit	2017-243T23:35:00	000T09:24:00	138.7 to 135.8	19.02 to 17.37	15 to 18	

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_290EA_M70METNON239_PRIME	239 13:54	239 21:54	0	4939	185	5125	3322	-1802	0	481	47	3850	2009	-1842	-2523	-17% 1841
SP_290EA_C70METNON241_PRIME	241 04:24	241 13:24	1841	3876	129	5846	3322	-2523	0	216	53	3591	3284	-307	1566	13% 306
SP_290EA_C34HEFNON242_PRIME	242 03:01	242 12:01	306	187	58	551	3322	2771	0	216	53	819	835	16	1566	19% 0
SP_291EA_C34BWGNON243_PRIME	243 03:01	243 12:01	0	281	63	345	3322	2977	0	216	53	613	775	161	1550	20% 0
SP_291EA_C70METNON244_PRIME	244 01:45	244 10:45	0	254	58	312	3322	3010	0	264	53	629	3315	2686	1389	20% 0
SP_291EA_C70METNON246_PRIME	246 04:38	246 13:38	0	4426	193	4620	3322	-1296	0	542	53	3917	3087	-830	0	0% 830
SP_291EA_M70METNON246_PRIME	246 13:38	246 15:38	830	0	0	830	3322	2492	0	204	12	1045	428	-618	0	0% 617

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	237 21:54	239 13:54	0.0	117.3	310.8	24.5	189.0	177.5	151.9	290.8	2506.6	296.0	830.0	0.0	183.5	5077.9
SP_290EA_M70METNON239_PRIME	239 13:54	239 21:54	0.0	15.1	75.6	2.9	0.0	28.5	24.5	0.0	325.4	4.4	0.0	0.0	0.0	476.3
DAILY TOTAL SCIENCE	237 21:54	239 21:54	0.0	132.4	386.4	27.3	189.0	206.0	176.4	290.8	2832.1	300.3	830.0	0.0	183.5	
OBSERVATION_NOR	239 21:54	241 04:24	0.0	57.5	358.3	11.0	1750.0	108.5	93.3	0.0	450.1	220.7	185.0	0.0	733.8	3968.2
SP_290EA_C70METNON241_PRIME	241 04:24	241 13:24	0.0	17.0	86.4	3.2	0.0	32.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	213.6
DAILY TOTAL SCIENCE	239 21:54	241 13:24	0.0	74.5	444.7	14.2	1750.0	140.5	120.9	0.0	492.6	225.6	185.0	0.0	733.8	
OBSERVATION_NOR	241 13:24	242 03:01	0.0	25.7	0.0	4.9	0.0	48.4	41.7	0.0	64.2	0.0	0.0	0.0	56.9	241.8
SP_290EA_C34HEFNON242_PRIME	242 03:01	242 12:01	0.0	17.0	86.4	3.2	0.0	32.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	213.6
DAILY TOTAL SCIENCE	241 13:24	242 12:01	0.0	42.7	86.4	8.1	0.0	80.4	69.2	0.0	106.7	4.9	0.0	0.0	56.9	
OBSERVATION_NOR	242 12:01	243 03:01	0.0	28.3	21.6	15.5	38.5	53.4	45.9	0.0	70.7	0.0	5.0	0.0	62.7	341.5
SP_291EA_C34BWGNON243_PRIME	243 03:01	243 12:01	0.0	17.0	86.4	3.2	0.0	32.0	27.5	0.0	42.4	4.9	0.0	0.0	0.0	213.6
DAILY TOTAL SCIENCE	242 12:01	243 12:01	0.0	45.3	108.0	18.7	38.5	85.4	73.4	0.0	113.2	4.9	5.0	0.0	62.7	
OBSERVATION_NOR	243 12:01	244 01:45	0.0	25.9	21.6	4.9	38.5	48.8	42.0	0.0	64.8	0.0	5.0	0.0	57.4	309.0
SP_291EA_C70METNON244_PRIME	244 01:45	244 10:45	0.0	17.0	86.4	3.2	0.0	32.0	27.5	0.0	90.4	4.9	0.0	0.0	0.0	261.5
DAILY TOTAL SCIENCE	243 12:01	244 10:45	0.0	42.9	108.0	8.2	38.5	80.9	69.6	0.0	155.2	4.9	5.0	0.0	57.4	
OBSERVATION_NOR	244 10:45	246 04:38	0.0	119.7	214.0	25.1	93.5	183.9	157.7	0.0	2601.8	519.3	471.0	0.0	191.3	4577.4
SP_291EA_C70METNON246_PRIME	246 04:38	246 13:38	0.0	17.0	86.4	3.2	0.0	32.0	27.5	0.0	366.1	4.9	0.0	0.0	0.0	537.2
SP_291EA_M70METNON246_PRIME	246 13:38	246 15:38	0.0	3.8	0.0	0.7	0.0	7.1	6.1	0.0	81.4	1.1	0.0	0.0	101.5	201.7
DAILY TOTAL SCIENCE	244 10:45	246 15:38	0.0	140.5	300.4	29.1	93.5	223.1	191.3	0.0	3049.3	525.3	471.0	0.0	292.8	

Waypoint Selection

RBOT – Friendly (Primary is NEG_Y to Saturn Center)

OBSERVATION PERIOD	START	END	POS_X	NEG_X	POS_Z	NEG_Z
SP_290NA_OBSERV237_NA	2017-237T21:54:00	2017-239T13:54:00	------	------	------	------
SP_290NA_OBSERV239_NA	2017-239T21:54:00	2017-241T04:24:00	------	165.1/ 32.1	165.1/ 32.1	------
SP_290NA_OBSERV241_NA	2017-241T13:24:00	2017-242T03:01:00	------	165.1/ 32.1	165.1/ 32.1	------
SP_290NA_OBSERV242_NA	2017-242T12:01:00	2017-243T03:01:00	------	165.1/ 32.1	165.1/ 32.1	------
SP_291NA_OBSERV243_NA	2017-243T12:01:00	2017-244T01:30:00	------	165.1/ 32.1	165.1/ 32.1	------
SP_291NA_OBSERV244_NA	2017-244T13:02:00	2017-246T04:38:00	------	------	------	------

Standard (Primary is NEG_Y to Saturn Center)

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_290NA_OBSERV237_NA	2017-237T21:54:00	2017-239T13:54:00	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**
SP_290NA_OBSERV239_NA	2017-239T21:54:00	2017-241T04:24:00	**BAD**	**BAD**	OK	OK	**BAD**	**BAD**	**BAD**	**BAD**	OK	**BAD**
SP_290NA_OBSERV241_NA	2017-241T13:24:00	2017-242T03:01:00	**BAD**	**BAD**	OK	OK	**BAD**	**BAD**	OK	OK	OK	OK
SP_290NA_OBSERV242_NA	2017-242T12:01:00	2017-243T03:01:00	**BAD**	**BAD**	OK	OK	**BAD**	**BAD**	OK	OK	OK	OK
SP_291NA_OBSERV243_NA	2017-243T12:01:00	2017-244T01:30:00	**BAD**	**BAD**	OK	OK	**BAD**	OK	OK	**BAD**	OK	OK
SP_291NA_OBSERV244_NA	2017-244T13:02:00	2017-246T04:38:00	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**	**BAD**

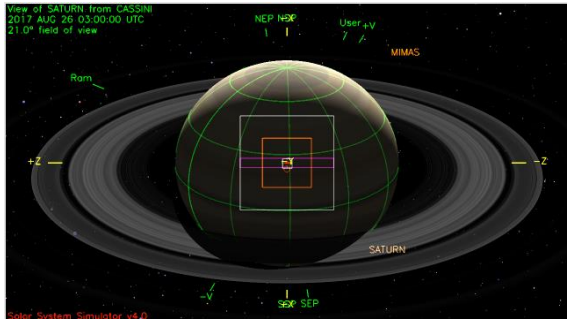
Custom period from 2017-239T00:57:34 – 04:21:59
Custom period from 2017-245T09:05:59 – 15:18:59

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_290EA_M70METNON239_PRIME	2017-239T13:54:00	2017-239T21:54:00	OK	OK	OK	OK	OK	OK	**BAD**	**BAD**	OK
SP_290EA_C70METNON241_PRIME	2017-241T04:24:00	2017-241T13:24:00	OK	OK	OK	OK	OK	OK	**BAD**	**BAD**	OK
SP_290EA_C34HEFNON242_PRIME	2017-242T03:01:00	2017-242T12:01:00	OK	OK	OK	OK	OK	OK	**BAD**	**BAD**	OK
SP_291EA_C34BWGNON243_PRIME	2017-243T03:01:00	2017-243T12:01:00	OK	OK	OK	OK	OK	OK	**BAD**	**BAD**	OK
SP_291EA_C70METNON244_PRIME	2017-244T01:30:00	2017-244T13:02:00	OK	OK	OK	OK	OK	OK	**BAD**	**BAD**	95
SP_291EA_C70METNON246_PRIME	2017-246T04:38:00	2017-246T13:38:00	OK	OK	OK	OK	OK	OK	**BAD**	**BAD**	OK
SP_291EA_M70METNON246_PRIME	2017-246T13:38:00	2017-246T15:38:00	OK	OK	OK	OK	OK	OK	**BAD**	**BAD**	OK

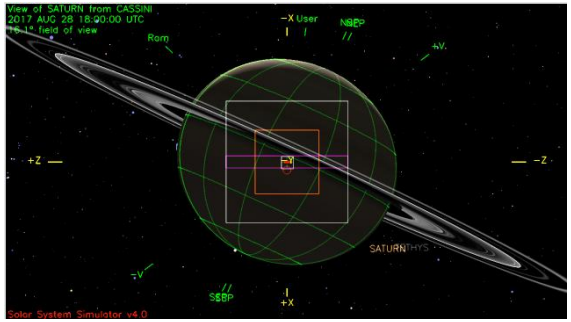
Waypoints Chosen

Waypoint 1 (2017-237T22:34 – 238T19:03):
NAC to Saturn, NEG_X to NSP

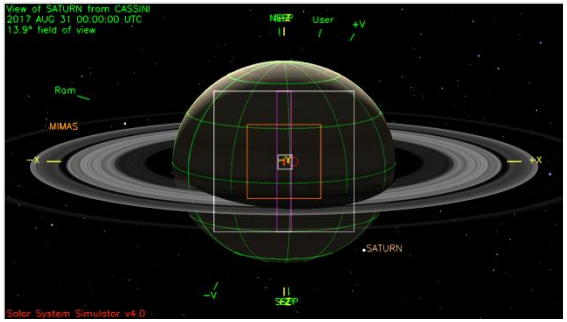


(2017-238T19:03 – 239T22:34):
No acceptable valid waypoint, custom period used.

Waypoint 2 (2017-239T22:34 – 241T14:04):
NAC to Saturn, NEG_X to Sun

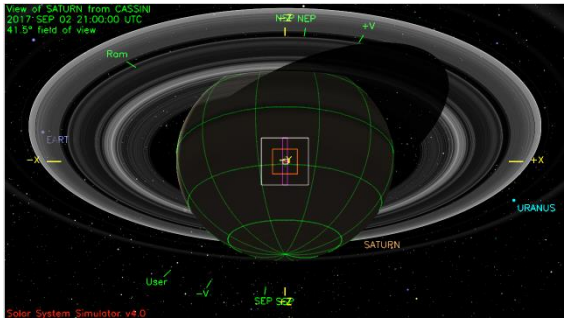


Waypoint 3 (2017-241T14:04 – 244T11:25):
NAC to Saturn, NEG_Z to NSP



(2017-244T11:25 – 248T15:18:59):
No acceptable valid waypoint, custom period used.

Waypoint 4 (2017-245T15:18:59 – 246T03:08):
NAC to Saturn, NEG_Z to NSP



Notes (1/5)

- Pointing:
  - **Waypoint has excessive heating for rev290 periapse observation period** 2017-238T19:03 – 239T04:21:59 due to POST design
    - Custom period
    - There are CIRS and VIMS consumable heating for which waivers will be required. This is part of the jumpstart/POST predesign period, which has been verified in PDT.
  - **Waypoint has excessive heating for rev291 periapse observation period** 2017-244T11:25 – 245T15:18:59 due to POST design
    - Custom period
    - There are CIRS and VIMS consumable heating for which waivers will be required. This is part of the jumpstart/POST predesign period, which has been verified in PDT.
  - MAPS prime, secondary chosen for ORS
    - INMS is prime for rev 291 periapse, the secondary is chosen for ISS
  - Earth-pointed bias
    - Per agreement with SCO/NAV there is no Y-Gap/Bias preceding SP_290EA_C70METNON241_PRIME. An Earth-pointed bias will be used if needed.
    - This downlink is rolling, so if bias is required, some rolls may need to be killed.

- RCS
  - Rev 290 RCS period 2017-239T00:59:24 – 2017-239T03:23:24
    - RCS Deadband agreement is (2,2,20) for RADAR and INMS
    - Following periapse, tracking Saturn center is not quiescent enough to enable the transition from RCS to RWA control. A small SP turn (SP_290SA_WAYPTTURN539_PRIME) has been placed to turn from Saturn center to the RA/Dec equivalent of Saturn center, as defined at the end of the POST period
      - SPTURN Hand Edit: SP_290SA_WAYPTTURN539_PRIME MUST be **modeled** on RCS **and use the appropriate** RCS rates & accelerations. Using RWA rates & accels will result in turn margin errors.
  - Rev 291 RCS period 2017-245T12:16:51 – 2017-245T14:20:51
    - RCS Deadband agreement is (2,2,2) for INMS and ISS
    - Following periapse, tracking Saturn center is not quiescent enough to enable the transition from RCS to RWA control. A small SP turn (SP_291SA_WAYPTTURN445_PRIME) has been placed to turn from Saturn center to the RA/Dec equivalent of Saturn center, as defined at the end of the POST period
      - SPTURN Hand Edit: SP_291SA_WAYPTTURN445_PRIME MUST be **modeled** on RCS and **use the appropriate** RCS rates & accelerations. Using RWA rates & accels will result in turn margin errors.

Notes (2/5)

- LMBs
  - Rev 290: LMB from 2017-239T00:56:34 – 2017-239T04:21:59
    - OBSMOV block overlay spans LMB period, containing epoch relative telemetry mode changes for RADAR. RADAR will need to update their IEB and trigger as part of the LMB process **(See SPLAT item)**
  - Rev 291: LMB from 2017-245T09:05:59 – 2017-245T15:18:59

- Rev290 CIRS and VIMS temperature/ FR violations:
  - CIRS Max Temp = 91.68K (ΔT = 17.08K) @ 239T02:50 SCET
    - CIRS provided approval via email (Mike Flasar 12/19)
    - **Consumable FR Waiver will be required (See SPLAT item)**
  - VIMS Max Temp = 68.38K (ΔT = 8.72K) @ 239T02:53 SCET
    - VIMS provided approval via email (Ed Audi 12/02)
    - **Consumable FR Waiver will be required (See SPLAT item)**
  - **CMT Management + FR waiver required** for +X to Sun > 83° 2017-239T02:05 – 02:51 (during RADAR_290SA_2CMMAP001_PIE) **(See SPLAT item)**
  - KPT complaints (from Dave Bates):
    - CIRS/VIMS heating and POS X to SUN violations during RADAR_290SA_2CMMAP001_PIE

- Rev291 CIRS and VIMS temperature/ FR violations:
  - CIRS Max Temp = 91.44K (ΔT = 16.84K) @ 245T13:48 SCET
    - CIRS provided approval via email (Mike Flasar 12/15)
    - **Consumable FR Waiver will be required (See SPLAT item)**
  - VIMS Max Temp = 66.86K (ΔT = 7.2K) @ 245T14:15 SCET
    - VIMS provided approval via email (Ed Audi 12/14)
    - **Consumable FR Waiver will be required (See SPLAT item)**
  - **CMT Management + FR waiver required** for +X to Sun < 83° 2017-245T12:52 – 13:48 (during INMS_291CO_SATAMOS001_PIE) **(See SPLAT item)**
  - KPT complaints (from Dave Bates):
    - CIRS/VIMS heating and POS X to SUN violations during VIMS_291SA_GAMCRUOCC001_PIE and INMS_291CO_SATAMOS001_PIE
      - The VIMS_291SA_GAMCRUOCC_PIE violation was not seen in the PDT run, a waiver MAY be required **(See SPLAT item)**

Notes (3/5)

- Resource Checker
  - ENGR_290SC_DFPWBIAS239_PPS: Prior to the LMB S/C in RADWU, After the LMB S/C in DFPW_normal
    - The RADWU is outside the LMB and the RADRWA and DFPWBIAS are within the LMB so the LMB *has* to go up in order for the opmode strategy to work
  - SP_290SA_WAYPTTURN539_PRIME: Request Name and Pointing indicate this request should have SPASS type of New Waypoint
    - Ignore – In custom period, this is not a new waypoint; This is a turn to a quiescent attitude for RWA transition
  - SP_291SA_WAYPTTURN445_PRIME: Request Name and Pointing indicate this request should have SPASS type of New Waypoint
    - Ignore – In custom period, this is not a new waypoint; This is a turn to a quiescent attitude for RWA transition
  - SP_290NA_OBSMOV239_NA: Request name does not match SP naming convention
    - Naming convention is correct. Contains epoch relative telemetry mode changes for RADAR
  - Ignore 4 Dual Playback A4/B4 warnings (M70METNON239, C70METNON241, C70METNON246, M70METNON246)
  - Ignore known gaps
    - 3min gap between SP_290SA_DEADTIME239_PRIME and ENGR_290SC_RADRCS271_PRIME: AACS Dual playback starts 3 minutes before RCS transition
    - 19m50s gap between ENGR_290SC_RADRCS271_PRIME and RADAR_290SA_2CMMAP001_PIE: RCS transition
  - SP_290EA_C34BWGOTP242_PRIME: Downlink containing Prime OTM is rolling for more than four hours Rolling
    - Ignore – Possible pop-down maneuver. AACS will interrupt roll if pop-down is required

- Data volume
  - No data volume issues
  - Ignore 2 RADAR_290SA_WARMUP001_RIDER data loss warnings, these are normal due to telemetry mode changes
  - Ignore 4 Dual Playback SSR A4/B4 priority warnings (M70METNON239, C70METNON241, C70METNON246, M70METNON246)

Notes (4/5)

- DSN
  - Potential Pop-down OTM scheduled for DOYs 242/243
  - Dual Playbacks
    - Rev290: 2017-239T01:41:14e – 239T02:51:14e (305 Mb)
    - Rev291: 2017-245T13:02:51e – 245T13:27:51e (152 Mb)
  - Level 3 requests
    - SP_290EA_M70METNON239_PRIME & SP_290EA_C70METNON241_PRIME: for environmental data to assess need for pop-down maneuver on DOYs 242/243
  - AP Downlink dispositions
    - Ignore 4 Dual Playback SSR A4/B4 priority warnings (M70METNON239, C70METNON241, C70METNON246, M70METNON246)
    - SP_291EA_M70METNON246_PRIME has an unusual DSN lockup time; usual for post-handover passes is 60 sec
      - Ignore, viewperiods barely overlap, not enough time for a handover, so playback delay was left at 300 sec
    - SP_290NA_C70METNON241_SP overlaps end of DSS-43 weekly maintenance by 165 minute(s); move later to resolve
      - Request to waive: 10hr30min 70M needed for high-priority/unique periapse and dual playback data downlink.
- Opmodes
  - No RWA slow opmodes
  - RADWU for RADAR warm up @ 2017-238T18:34
    - SNER-5A required for first 15 min (occurs during WAYPTTURN, no ISS or VIMS activities during this time)
  - RCS
    - Rev 290 transition to RCS (RADRCS) start 2017-239T00:59:34 (deadband 2,2,20)
    - Rev 290 return to RWA (DFPW_BIAS) start 2017-239T03:23:24
    - Rev 291 transition to RCS (ORSRCS) start 2017-245T12:16:51 (deadband 2,2,2)
    - Rev 291 return to RWA (DFPW_BIAS) start 2017-245T14:20:51
- Hydrazine: Yes

Notes (5/5)

- Special Activities
  - Potential pop-down maneuver DOY 242/243
  - RADAR_290SA_2CMMAP001_PIE (2017-239T01:20:24) – Dual Playback; **Highest resolution RADAR by an order of magnitude**
    - SNER_8 required for active mode (attempt to detect rain)
  - INMS_291CO_SATAMOS001_PIE (2017-245T12:17:51) – Dual Playback
  - CIRS_290SA_LIMBMAP001_PIE (2017-238T19:03) – **LAST in mission**
  - ISS_290TI_ATMOS001_PIE (2017-239T22:34)
  - CIRS_290TI_COMPMAP001_PIE (2017-240T00:19)
  - ISS_290TI_ATMOS002_PIE (2017-240T04:35)
  - ISS_290EN_PLUME001_PIE (2017-240T06:20)
  - ISS_290TI_ATMCLD001_PIE (2017-240T20:40)
  - CIRS_291SA_NADIROCC001_PIE (2017-244T23:59)
  - VIMS_291SA_GAMCRUOCC001_PIE (2017-245T10:44:59)

Liens (1/3)

Sequence Liens (should all be SPLAT items):

- Target Motion Violations
  - None

- CIRS heating violation **Consumable FR waiver** required for rev290 periapse (SPLAT #S101000371)
  - CIRS Max Temp = 91.68K (ΔT = 17.08K) @ 239T02:50 SCET
  - CIRS provided approval via email (Mike Flasar 12/19)
- VIMS heating violation **Consumable FR waiver** required for rev290 periapse (SPLAT #S101000372)
  - VIMS Max Temp = 68.38K (ΔT = 8.72K) @ 239T02:53 SCET
  - VIMS provided approval via email (Ed Audi 12/02)
- CIRS heating violation **Consumable FR waiver** required for rev291 periapse (SPLAT #S101000373)
  - CIRS Max Temp = 91.44K (ΔT = 16.84K) @ 245T13:48 SCET
  - CIRS provided approval via email (Mike Flasar 12/15)
- VIMS heating violation **Consumable FR waiver** required for rev291 periapse (SPLAT #S101000374)
  - VIMS Max Temp = 66.86K (ΔT = 7.2K) @ 245T14:15 SCET
  - VIMS provided approval via email (Ed Audi 12/14)

- **CMT Management + FR waiver required** for +X to Sun < 83˚ 2017-239T02:05 – 02:51 (during RADAR_290SA_2CMMAP001_PIE) (SPLAT #S101000375)
- **CMT Management + FR waiver required** for +X to Sun < 83˚ 2017-245T12:52 – 13:48 (during INMS_291CO_SATAMOS001_PIE) (SPLAT # S101000376)
- KPT also showed POS X to SUN violation for VIMS_291SA_GAMCRUOCC_PIE. Violation was not seen in the PDT run, a waiver MAY be required (SPLAT #S101000377)

Liens (2/3)

Sequence Liens (should all be SPLAT items):

- Rev 290 Dual Playback: During DSN negotiations ensure that SSR-A is emptied before the pointers are reset. This item cannot be closed until the DSN negotiations are complete for both downlink passes, or the dual playback is deleted. (SPLAT #S101000378)

- Rev 291 Dual Playback: During DSN negotiations ensure that SSR-A is emptied before the pointers are reset. This item cannot be closed until the DSN negotiations are complete for both downlink passes, or the dual playback is deleted. (SPLAT #S101000379)

- SP_290SA_WAYPTTURN239_PRIME: This waypoint turn is in an LMB. If the LMB fails to execute, the S/C will be **left in an unsafe attitude and opmode strategy will not work**. The LMB is tied to the epoch LMB_E290_Peri. Can be closed following the successful execution of the LMB mini-sequence. (SPLAT #S101000002)

- SP_291SA_WAYPTTURN245_PRIME: This waypoint turn is in an LMB. If the LMB fails to execute, the S/C will **be left in an unsafe attitude**. The LMB is tied to the epoch LMB_E291_Peri. Can be closed following the successful execution of the LMB mini-sequence. (SPLAT #S101000003)

- Radar activity within the Saturn 290 LMB. OBSMOV block spanning the LMB contains epoch relative telemetry mode changes for radar. Radar will need to update their IEB and trigger as part of the LMB process. Close once IEB/trigger update has been completed. (SPLAT #S101000380)

- SIP Leads to check that the POST science requests from 2017-239T01:20:24e – 239T03:20:24e for Rev290 in Saturn 290_291 are the same as what has been approved in integration: (SPLAT #S101000381)

https://cassini.jpl.nasa.gov/tools/index.php?q=file_exchange/view/sip_xxm/s101/integration/sasf/Saturn_290_170103.sasf

RADAR_290SA_2CMMAP001_PIE

- SIP Leads to check that the POST science requests from 2017-245T12:17:51e – 245T14:17:51e for Rev291 in Saturn 290_291 are the same as what has been approved in integration: (SPLAT #S101000382)

https://cassini.jpl.nasa.gov/tools/index.php?q=file_exchange/view/sip_xxm/s101/integration/sasf/Saturn_291_170103.sasf

INMS_291CO_SATAMOS001_PIE

Liens (3/3)

Sequence Liens (should all be SPLAT items):

- The following science requests from 2017-237T21:54 – 239T21:54 for Rev290 in Saturn_290_291 have been designed in PDT during integration. Teams identified shall deliver these designs as part of the Port 1 delivery; SIP leads to monitor. (SPLAT #S101000383)
  - CIRS_290SA_FIRMAP001_PRIME
  - VIMS_290SA_EQUAMAP001_PRIME
  - CIRS_290SA_LIMBMAP001_PIE
  - RADAR_290SA_2CMMAP001_PIE
  - UVIS_290SA_AURSLEW001_PRIME

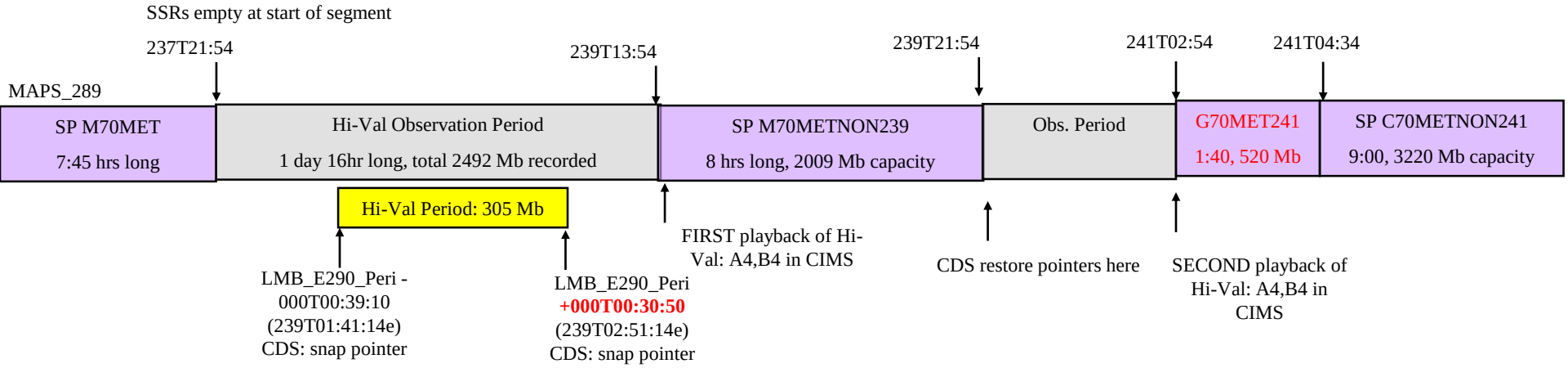
- The following science requests from 2017-243T23:35 – 246T15:38 for Rev291 in Saturn_290_291 have been designed in PDT during integration. Teams identified shall deliver these designs as part of the Port 1 delivery; SIP leads to monitor. (SPLAT #S101000384)
  - ISS_291TI_M150R2HZ244_PRIME
  - UVIS_291SA_AURDSTARE001_PRIME
  - UVIS_291SA_AURSLEW001_PRIME
  - CIRS_291SA_NADIROCC001_PIE
  - UVIS_291SA_LIMBINT001_PRIME
  - VIMS_291RI_GAMCRUOCC001_PRIME
  - VIMS_291SA_GAMCRUOCC001_PIE
  - INMS_291CO_SATAMOS001_PIE
  - UVIS_291SA_AURSLEW002_PRIME
  - UVIS_291SA_AURNSTARE001_PRIME

Dual Playback Saturn_290

Saturn 290	BEGHIVAL	ENDHIVAL	P4 Dual Playback Data Volume	SSR empty before hi-val observation period? (if not verify any carryover on A fits with Hi-Val data)	SSR-A empty after first playback?	PPL set to A4,B4 for first AND second playbacks?	SSRs empty after second playback? (if not does any Hi-Val data carry over?)
RADAR, RPX	LMB_PERI – 00:39:10	LMB_PERI + 00:30:50	305 Mb	Yes	Yes	Yes	Yes

Playbacks NOT contiguous:

Negotiated!

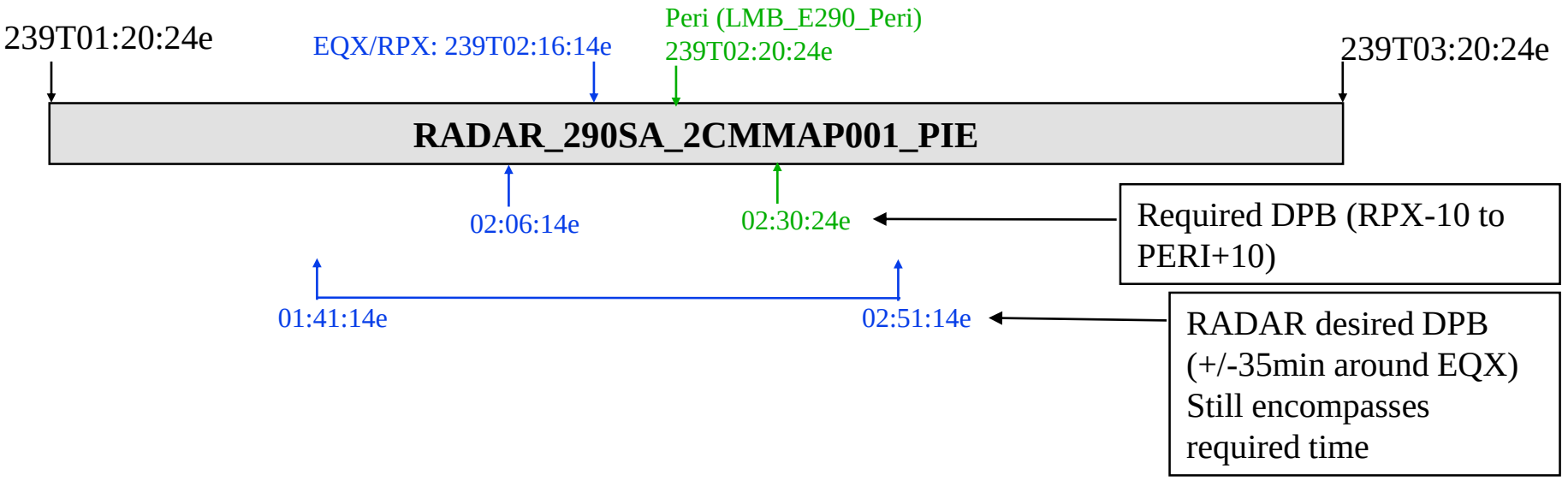


Reminder - ALL instruments' data is played back twice during P4 dual playback periods

In addition to the P4 dual playback, SCO/AACS has asked for P6 playback for 290 RCS data

Calculation of Rev 290 DPB Timing

DPB requirement was RPX-10 to PERI+10 then expand to cover as much of RADAR obs as possible. RADAR requests to be centered about equatorial crossing.

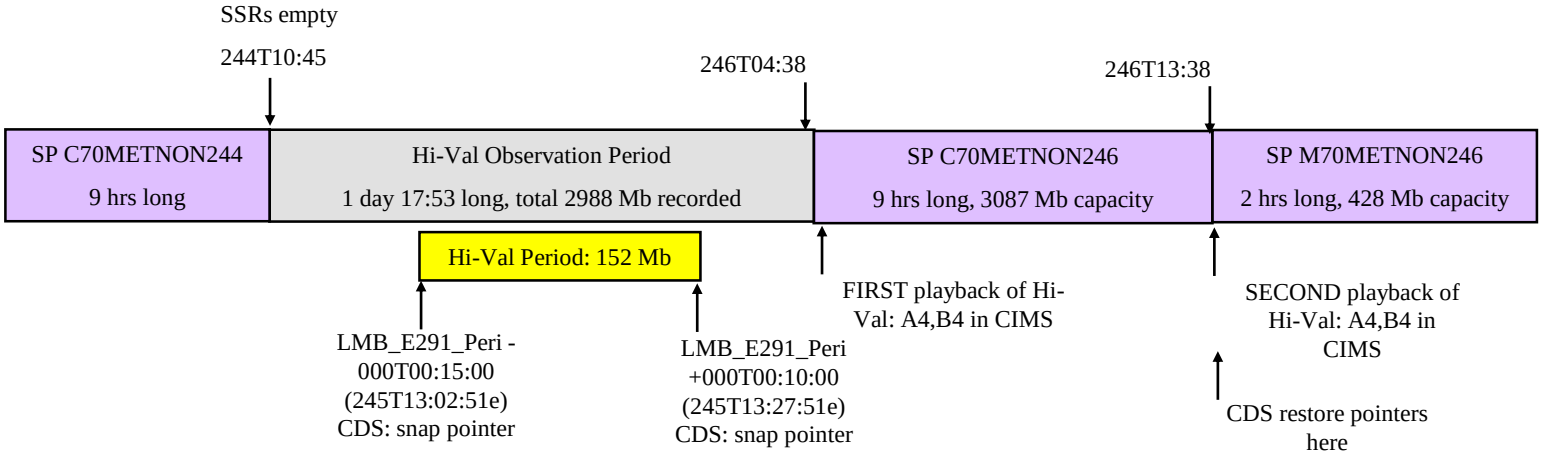


Dual Playback Saturn_291

Saturn 291	BEGHIVAL	ENDHIVAL	P4 Dual Playback Data Volume	SSR empty before hi-val observation period? (if not verify any carryover on A fits with Hi-Val data)	SSR-A empty after first playback?	PPL set to A4,B4 for first AND second playbacks?	SSRs empty after second playback? (if not does any Hi-Val data carry over?)
RPX	LMB_PERI – 15min (RPX-10min)	LMB_PERI + 10min (PERI+10min)	152 Mb	Yes	Yes	Yes	Yes

Playbacks contiguous:

Negotiated!



Reminder - ALL instruments' data is played back twice during P4 dual playback periods

In addition to the P4 dual playback, SCO/AACS has asked for P6 playback for 291 RCS data

RBOT Summary

AACS Evaluation of Saturn 290_291 by David Bates:

Rev 290:
The RBOT plots are good.

Below are the kpt liens.

-Dave Bates

2017-239T01:38:45.450 RADAR_290SA_2CMMAP001_PIE$2_7CMD VIMS Temperature Rise is above 2 deg
2017-239T02:10:15.450 RADAR_290SA_2CMMAP001_PIE$5_7CMD CMT Violation POS_X_SUN (DETECT); Min Angle: 2.423197e+01 deg
2017-239T02:12:39.700 RADAR_290SA_2CMMAP001_PIE$5_7CMD CIRS Temperature Rise is above 5 deg
2017-239T02:29:23.170 RADAR_290SA_2CMMAP001_PIE$5_7CMD CIRS Temperature Rise is above 10 deg

Rev 291:
The RBOT evaluation looks good.
Below are the kpt liens.

-Dave Bates

2017-245T11:16:52.770 VIMS_291SA_GAMCRUOCC001_PIE$3_7CMD POS_X_SUN (DETECT); Min Angle: 8.071693e+01 deg
2017-245T12:50:57.240 INMS_291CO_SATAMOS001_PIE$2_7CMD VIMS Temperature Rise is above 2 deg
2017-245T12:52:36.240 INMS_291CO_SATAMOS001_PIE$2_7CMD POS_X_SUN (DETECT); Min Angle: 4.499215e+01 deg
2017-245T13:07:02.870 INMS_291CO_SATAMOS001_PIE$2_7CMD CIRS Temperature Rise is above 5 deg
2017-245T13:22:26.440 INMS_291CO_SATAMOS001_PIE$2_7CMD CIRS Temperature Rise is above 10 deg