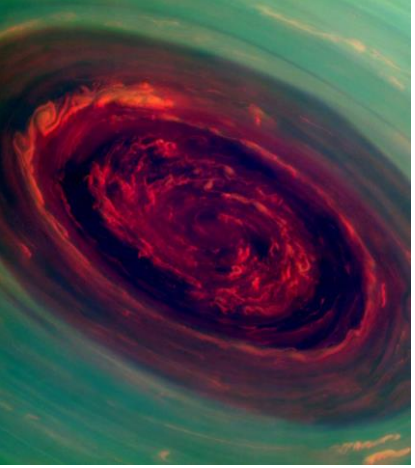

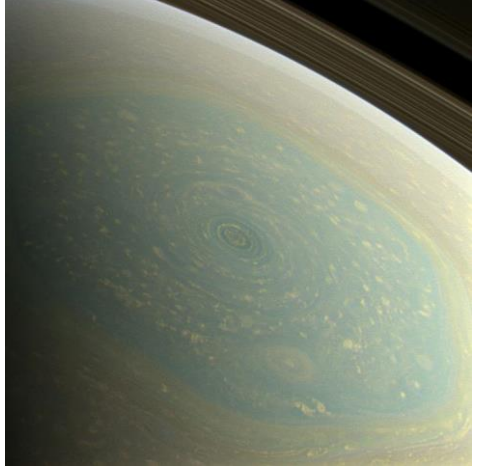
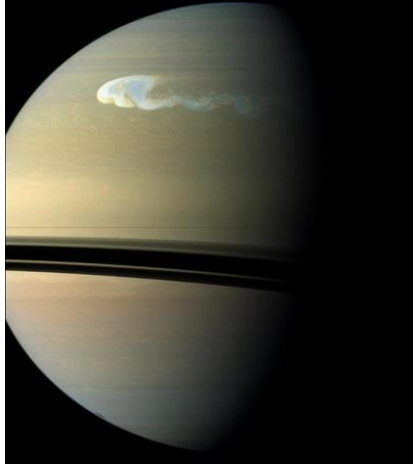

Science Planning & Sequence Team
CASSINI

SATURN TARGET WORKING TEAM

Rev 241_242 Segment Legacy Package

Segment Boundary: Sept. 4, 2016 – Sept 8, 2016
2016-248T10:52:00 – 252T10:36:00 (SCET)

Integration Began 10/05/2015
Segment Delivered to S95 Sequence 12/31/2015
Lead Integrator was Keven Uchida

Legacy Package Assembled by Keven Uchida

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

Segment Overview and Final Products

Segment Summary

- Saturn segment Rev_241_242 was a four day long apoapsis segment, with apoapse occurring at approximately mid-segment. The view was of Saturn's northern hemisphere (sub_S/C latitude range = 14 to 45 degrees)
- All observation periods were filled with "CAKE" template activities, as standard for Saturn apoapsis segments.
- There were no ORS boresight constraints/issues in this segment.
- This segment was immediately followed by Saturn segment Rev_242 (spanning over periapsis). The split was due to the placement of the S95/S96 sequence boundaries. Saturn segment Rev_241_242 was the S95 sequence, and Saturn segment Rev_242 was in the S96 sequence.

Final Sequenced SPASS

Gap 1

Gap 2

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End	Primary	Secondary	Comments
SATURN_241_242 Segment		2016-248T10:52:00		003T23:44:00	2016-252T10:36:00			
SP_241SA_WAYPTTURN248_PRIME		2016-248T10:52:00		000T00:40:00	2016-248T11:32:00	ISS_NAC to Saturn	POS_Z to NSP	
NEW WAYPOINT		2016-248T11:32:00		001T12:34:00	2016-250T00:06:00	ISS_NAC to Saturn	POS_Z to NSP	
UVIS_241SA_EUVFUV001_PRIME	C, I	2016-248T11:32:00		000T13:54:00	2016-249T01:26:00	UVIS_FUV to Saturn	POS_Z to NSP	
CIRS_241SA_MIRMAP001_PRIME	I, V	2016-249T01:26:00		000T22:00:00	2016-249T23:26:00	CIRS_FP3 to Saturn	POS_Z to NSP	
SP_241EA_DLTURN249_PRIME		2016-249T23:26:00		000T00:40:00	2016-250T00:06:00	XBAND to Earth	NEG_Y to 147.0/-28.0	
NEW WAYPOINT		2016-250T00:06:00		000T11:10:00	2016-250T11:16:00	XBAND to Earth	NEG_Y to 147.0/-28.0	
SP_241EA_YGAP250_PRIME		2016-250T00:06:00		000T01:30:00	2016-250T01:36:00	XBAND to Earth	NEG_Y to 147.0/-28.0	
SP_241EA_C34HEFSEQ250_PRIME	C, E	2016-250T01:36:00		000T08:20:00	2016-250T09:56:00	XBAND to Earth	NEG_Y to 147.0/-28.0	Neg_Y to 147/-28 and no rolling per MIMI req 10-5-15
SP_241SA_WAYPTTURN250_PRIME		2016-250T10:36:00		000T00:40:00	2016-250T11:16:00	ISS_NAC to Saturn	POS_Z to NSP	
NEW WAYPOINT		2016-250T11:16:00		001T14:20:00	2016-252T01:36:00	ISS_NAC to Saturn	POS_Z to NSP	
CIRS_241SA_COMPSIT001_PRIME	U, V	2016-250T11:16:00		000T10:40:00	2016-250T21:56:00	CIRS_FP1 to Saturn	POS_Z to NSP	
Apoapse Per = 12.0 d, inc ...		2016-250T12:12:33		000T00:00:01	2016-250T12:12:34			
UVIS_242SA_AURSLEW001_PRIME	C, V	2016-250T21:56:00		000T08:00:00	2016-251T05:56:00	UVIS_FUV to Saturn	POS_Z to NSP	Collaborative Rider(s): VIMS
VIMS_242SA_AURSTARE001_PRIME	C, I, U	2016-251T05:56:00		000T08:00:00	2016-251T13:56:00	ISS_NAC to Saturn	POS_Z to NSP	
CIRS_242SA_MIRMAP001_PRIME	I, V	2016-251T13:56:00		000T11:00:00	2016-252T00:56:00	CIRS_FP3 to Saturn	POS_Z to NSP	
SP_242EA_DLTURN252_PRIME		2016-252T00:56:00		000T00:40:00	2016-252T01:36:00	XBAND to Earth	NEG_Y to 147.0/-28.0	
NEW WAYPOINT		2016-252T01:36:00		000T09:00:00	2016-252T10:36:00	XBAND to Earth	NEG_Y to 147.0/-28.0	
SP_242EA_C70METSEQ252_PRIME	C	2016-252T03:36:00		000T07:00:00	2016-252T10:36:00	XBAND to Earth	NEG_Y to 147.0/-28.0	Neg_Y to 147.0/-28 and no rolling per MIMI request 10-05-15

Final Sequenced SMT and Data Volume

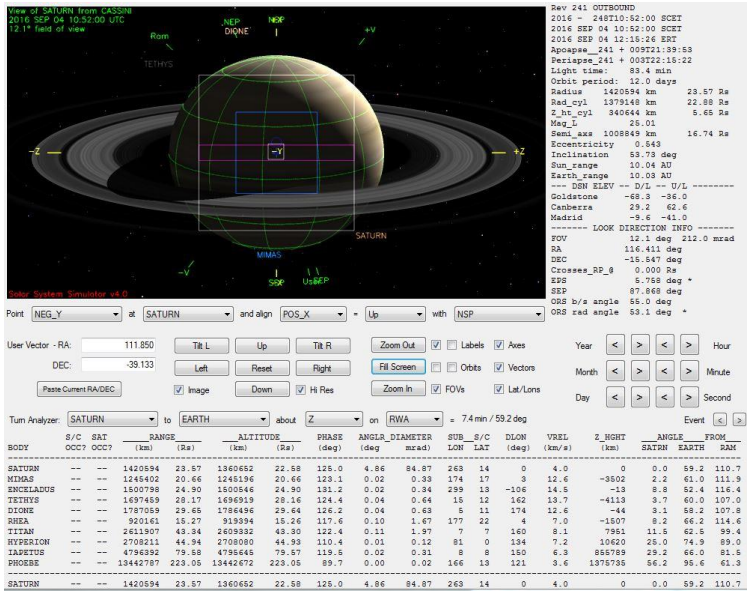
DATA VOLUME SUMMARY --- TRANSFER FRAME OVERHEAD INCLUDED (80 BITS PER 8800-BIT FRAME)

			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_241EA_C34HEFSEQ250_PRIME	250 01:36	250 09:56	344	1171	166	1681	3322	1641	0	116	49	1846	747	-1099	0	0%	1099
SP_242EA_C70METSEQ252_PRIME	252 03:36	252 10:36	1099	1862	176	3137	3322	185	0	103	41	3282	2612	-670	0	0%	670

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	248 10:22	250 01:36	0.0	37.5	263.7	14.1	101.2	35.3	85.2	0.0	127.1	166.2	330.0	0.0	164.0	1324.3
SP_241EA_C34HEFSEQ250_PRIME	250 01:36	250 09:56	0.0	7.9	47.5	3.0	0.0	7.4	18.0	0.0	27.0	4.6	0.0	0.0	0.0	115.4
DAILY TOTAL SCIENCE	248 10:22	250 09:56	0.0	45.3	311.2	17.1	101.2	42.7	103.2	0.0	154.1	170.8	330.0	0.0	164.0	
OBSERVATION_NOR	250 09:56	252 03:36	0.0	39.3	282.0	25.1	185.6	37.0	90.0	0.0	135.0	209.1	842.0	0.0	174.1	2019.2
SP_242EA_C70METSEQ252_PRIME	252 03:36	252 10:36	0.0	6.6	45.4	2.5	0.0	6.2	15.1	0.0	22.7	3.8	0.0	0.0	0.0	102.3
DAILY TOTAL SCIENCE	250 09:56	252 10:36	0.0	45.9	327.4	27.6	185.6	43.3	105.1	0.0	157.7	212.9	842.0	0.0	174.1	

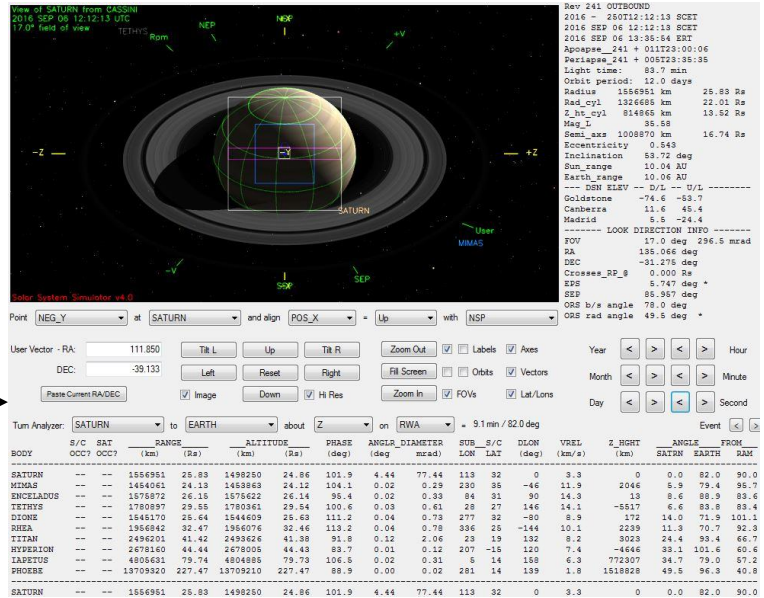
Segment Geometry

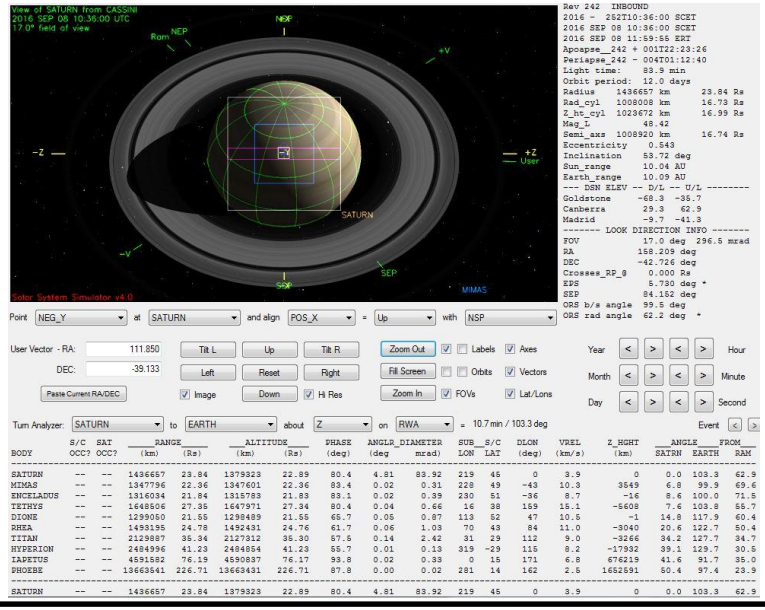


Start:
248T10:52

Apoapsis:
250T12:12:13

End:
252T10:36:00





	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	23.63	124.6	+14
Apoapse	25.83	101.9	+32
Segment End	23.84	80.4	+45

Solar Geometry – ORS Boresight Concerns

No ORS Boresight Solar Constraints/Issues on Science Pointing in this Segment

Daily Science Highlights

DOY 248: The Saturn 241_242 segment started on this day. It was a short CAKE segment (5 days long, spanning two downlinks), and is the last segment of the S95 sequence. Science began with nearly 14 hours of UVIS EUV/FUV imaging, using UVIS's FUV high resolution boresight, to study the distribution of hazes and organics in Saturn's northern hemisphere – CIRS and ISS rode along.

DOY 249: Early on this day we began with CIRS mid-infrared mapping (CIRS_MIRMAP), over the course of two complete rotations (22 hours), to measure upper troposphere and tropopause temperatures. It was immediately followed by a downlink.

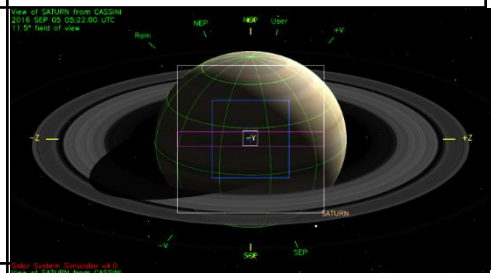
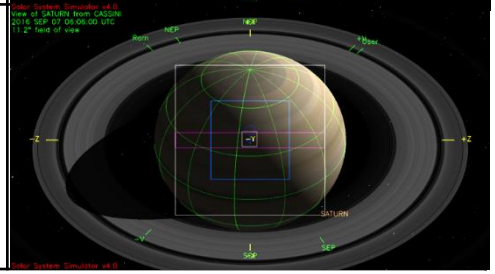
DOY 250: Upon return from Earth point for downlink, CIRS stared (with UVIS and VIMS as riders) at the northern hemisphere of Saturn, for nearly one rotation period, to study its atmospheric composition (CIRS_COMPSIT). Toward the end of DOY 250, as phase angle decreases, UVIS and VIMS then turned toward observations of Saturn's northern aurora: UVIS first led with an 8 hour auroral slew observation (AURSLEW), with CIRS and VIMS riding. VIMS then took the lead with an 8 hour stare observation (AURSTARE), with CIRS, ISS and UVIS riding.

DOY 251: The segment (and sequence) was concluded with another CIRS mid-infrared map (MIRMAP) (with I and V riding) at higher sub-SC latitude, and lower phase angle, than that performed on DOY 249.

DOY 252: The CIRS MIRMAP started on DOY 251 continued into the first hour of DOY 252. It was then followed by a downlink, to a 70m, to clear the SSR.

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 See Note 1	2016-248T11:32:00	2016-249T23:26:00	001T11:54:00	124.6 – 107.6	23.63 – 25.68	+14 to +27	
2 See Note 1	2016-250T11:16:00	2016-252T00:56:00	001T13:40:00	102.4 – 85.2	25.83 – 24.59	+31 to +43	

Note 1: All gaps/observation periods were filled with “CAKE” template activities.

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_241EA_C34HEFSEQ250_PRIME	250 01:36	250 10:36	0	1740	164	1904	3322	1418	0	161	53	2118	801	-1318	-128	-2%	1317
SP_242EA_C70METSEQ252_PRIME	252 01:36	252 10:36	1317	1969	165	3451	3322	-128	0	161	53	3536	3354	-183	0	0%	183

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	248 10:52	250 01:36	0.0	36.5	0.0	13.9	1430.4	34.4	83.7	0.0	125.5	0.0	0.0	0.0	161.9	1886.3
SP_241EA_C34HEFSEQ250_PRIME	250 01:36	250 10:36	0.0	8.5	86.4	3.2	0.0	8.0	19.4	0.0	29.2	4.9	0.0	0.0	0.0	159.7
DAILY TOTAL SCIENCE	248 10:52	250 10:36	0.0	45.0	86.4	17.2	1430.4	42.4	103.1	0.0	154.7	4.9	0.0	0.0	161.9	
OBSERVATION_NOR	250 10:36	252 01:36	0.0	36.8	0.0	24.1	1644.9	34.7	84.2	0.0	126.4	0.0	0.0	0.0	163.0	2114.1
SP_242EA_C70METSEQ252_PRIME	252 01:36	252 10:36	0.0	8.5	86.4	3.2	0.0	8.0	19.4	0.0	29.2	4.9	0.0	0.0	0.0	159.7
DAILY TOTAL SCIENCE	250 10:36	252 10:36	0.0	45.3	86.4	27.3	1644.9	42.7	103.7	0.0	155.5	4.9	0.0	0.0	163.0	

	CAPS (Mb)	CDA (Mb)	CIRS (Mb)	INMS (Mb)	ISS (Mb)	MAG (Mb)	MIMI (Mb)	RADAR (Mb)	RPWS (Mb)	UVIS (Mb)	VIMS (Mb)	PROBE (Mb)
TOTAL RECORDED (OPNAV data not included)	0.0	90.3	172.8	44.5	3075.3	85.1	206.8	0.0	310.2	9.9	0.0	0.0

Waypoint Selection

Good Waypoints

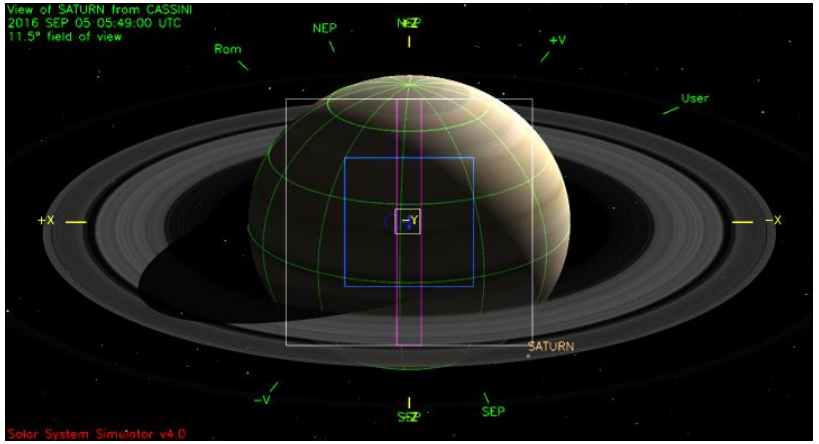
START	END	POS X 2 NSP	POS X 2 NEP	NEG X 2 NSP	NEG X 2 NEP	POS Z 2 NSP	POS Z 2 NEP	NEG Z 2 NSP	NEG Z 2 NEP	NEG X 2 SUN	NEG Z 2 EARTH
2016-248T10:52:00	2016-250T01:36:00	**BAD**	**BAD**	OK	OK	OK	OK	**BAD**	**BAD**	OK	OK
2016-250T10:36:00	2016-252T01:36:00	**BAD**	**BAD**	OK	**BAD**	OK	OK	**BAD**	**BAD**	OK	OK

RBOT Friendly

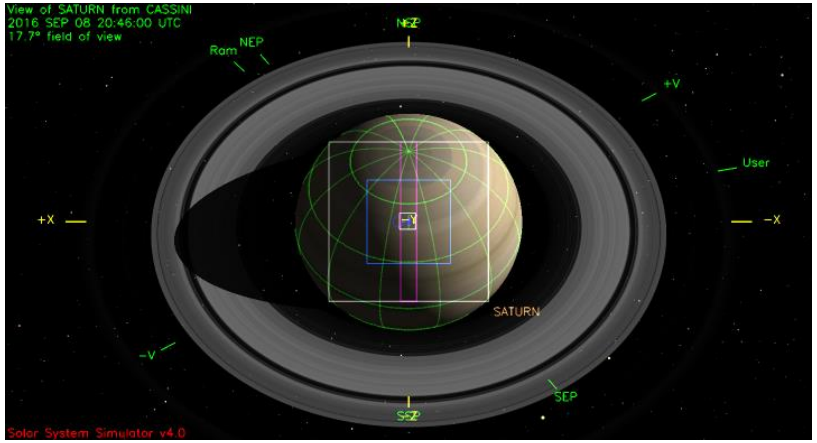
OBSERVATION PERIOD	START	END	POS_X	NEG_X	POS_Z	NEG_Z
SP_241NA_OBSERV248_NA	2016-248T10:52:00	2016-250T01:36:00	191.9/ 42.0	------	191.9/ 42.0	------
SP_241NA_OBSERV250_NA	2016-250T10:36:00	2016-252T01:36:00	191.9/ 42.0	------	191.9/ 42.0	------

Waypoints Chosen

Waypoint 1 (2016-248T11:32:00 to 250T00:06:00): UVIS_FUV to Saturn, POS_Z to NSP



Waypoint 2 (2016-250T11:16:00 to 252T01:36:00): UVIS_FUV to Saturn, POS_Z to NSP



Notes & Liens

- Pointing:
  - Waypoints are RBOT friendly when compatible with science.
- SMT
  - No SMT warnings
- DSN:
  - 70m usage for sequence exceeds project commitment of <= 35%; is at 50%
    - Disposition: Only 2 passes in this segment, with one being a 70m.
  - Number of sequence upload passes is 2; should be 5 or more
    - Disposition: Only 2 DLs in this last segment of S95, all of which are specified as uplink passes. All remaining UL passes are in the prior segment(s).
- Resource checker:
  - No resource checker items.
- Opmodes:
  - No unusual OPMODES
- Hydrazine:
  - N/A
- Special Activities:
  - None

Sequence Liens (should all be SPLAT items):

- No liens