CASSINI TOST T98 SEGMENT

Handoff Package

Segment Boundary 2014-031T23:51:00 – 2014-035T03:52:00

25 June 2013

Kim Steadman

SMT report and SPASS

Science Highlights

Notes & Liens

SMT report

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 (%)	CAROVR (Mb)
SP_201EA_C70METNON032_PRIME	032 14:52	032 23:52	0	2357	64	2420	3322	902	0	863	53	3337	3318	-19	-16	0%	19
SP_201EA_C70METNON034_PRIME	034 15:07	035 01:07	19	3139	181	3339	3322	-16	0	212	59	3593	3551	-42	69	2%	41
SP_201EA_M70METNON035_PRIME	035 01:07	035 03:52	41	0	0	41	3322	3281	0	599	16	657	726	68	69	9%	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	031 23:51	032 14:52	0.0	28.3	146.6	5.4	650.0	26.7	46.0	7.6	1302.8	91.8	30.0	0.0	62.8	2398.0
SP_201EA_C70METNON032_PRIME	032 14:52	032 23:52	0.0	17.0	86.4	3.2	0.0	16.0	27.5	0.0	700.5	4.9	0.0	0.0	0.0	855.6
DAILY TOTAL SCIENCE	031 23:51	032 23:52	0.0	45.3	233.0	8.6	650.0	42.7	73.5	7.6	2003.3	96.8	30.0	0.0	62.8	
OBSERVATION_NOR	032 23:52	034 15:07	0.0	74.0	329.3	24.2	475.0	112.5	129.5	1055.2	685.9	29.9	195.0	0.0	178.5	3289.0
SP_201EA_C70METNON034_PRIME	034 15:07	035 01:07	0.0	18.9	86.4	3.6	0.0	17.8	30.6	0.0	47.2	5.5	0.0	0.0	0.0	209.9
SP_201EA_M70METNON035_PRIME	035 01:07	035 03:52	0.0	5.2	25.2	1.0	0.0	4.9	8.4	0.0	13.0	1.5	0.0	0.0	534.8	593.9
DAILY TOTAL SCIENCE	032 23:52	035 03:52	0.0	98.1	440.9	28.8	475.0	135.2	168.5	1055.2	746.1	36.9	195.0	0.0	713.3	

	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	143.4	674.0	37.4	1125.0	177.9	242.0	1062.8	2749.3	133.6	225.0	0.0

P4 overfilled by 16 Mb is not real. Data utilization will take care of the overage.

T98 SPASS

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End (SCET)	Primary	Secondary	Comments
Sequence S82, length = 76 days		2013-362T01:47:00		075T19:25:00	2014-072T21:12:00			
Titan Flyby T98 Segment		2014-031T23:51:00		003T04:01:00	2014-035T03:52:00			
SP_201TI_WAYPTTURN031_PRIME		2014-031T23:51:00		000T00:40:00	2014-032T00:31:00	NEG_Y to Titan	POS_X to NTP	
NEW WAYPOINT		**2014-032T00:31:00**		**000T12:51:00**	**2014-032T13:22:00**	**NEG_Y to Titan**	**POS_X to NTP**	
ISS_201TI_CLOUD001_PRIME	C, U, V	2014-032T00:31:00		000T04:00:00	2014-032T04:31:00	ISS_NAC to Titan	POS_X to NTP	No Preference to secondary pointing
ISS_201TI_CLOUD002_PRIME	C, U, V	2014-032T04:31:00		000T04:11:00	2014-032T08:42:00	ISS_NAC to Titan	POS_X to NTP	No Preference to secondary pointing
ISS_201TI_CLOUD003_PRIME	C, U, V	2014-032T08:42:00		000T01:00:00	2014-032T09:42:00	ISS_NAC to Titan	POS_X to NTP	No Preference to secondary pointing
RADAR_201TI_RADIOMCAL129_PRIME		2014-032T09:42:00		000T02:00:00	2014-032T11:42:00	NEG_Z to Titan	POS_X to NTP	No Preference to secondary pointing
ISS_201TI_CLOUD004_PRIME	C, U, V	2014-032T11:42:00		000T01:00:00	2014-032T12:42:00	ISS_NAC to Titan	POS_X to NTP	No Preference to secondary pointing
SP_201EA_DLTURN032_PRIME		2014-032T12:42:00		000T00:40:00	2014-032T13:22:00	XBAND to Earth	NEG_Y to 142.8/8.0	
NEW WAYPOINT		**2014-032T13:22:00**		**000T11:10:00**	**2014-033T00:32:00**	**XBAND to Earth**	**NEG_Y to 142.8/8.0**	
SP_201EA_YGAP032_PRIME	E	2014-032T13:22:00		000T01:30:00	2014-032T14:52:00	XBAND to Earth (0.0	NEG_Y to 142.8/8.0	
SP_201EA_C70METNON032_PRIME	C	2014-032T14:52:00		000T09:00:00	2014-032T23:52:00	XBAND to Earth	Rolling	MIMI. NEG_Y to Saturn (0,0,-9.5). CIRS heating
SP_201TI_WAYPTTURN032_PRIME		2014-032T23:52:00		000T00:40:00	2014-033T00:32:00	NEG_Y to Titan	POS_X to 145.7/-14.2	
NEW WAYPOINT		**2014-033T00:32:00**		**001T14:35:00**	**2014-034T15:07:00**	**NEG_Y to Titan**	**POS_X to 145.7/-14.2**	
SP_201NA_DEADTIME033_PRIME		**2014-033T00:32:00**		**000T00:14:59**	**2014-033T00:46:59**	**NEG_Y to Titan**	**POS_X to 145.7/-14.2**	
CIRS_201TI_MIDIRTMAP001_PRIME	I, V	2014-033T00:46:59	GMB_E201_TITAN_T98-000T18:25:39	000T04:25:39	2014-033T05:12:38	CIRS_FPB to Titan	PIC	Collaborative Rider(s): ISS
CIRS_201TI_FIRNADCMP001_PRIME	I, U, V	2014-033T05:12:38	GMB_E201_TITAN_T98-000T14:00:00	000T05:00:00	2014-033T10:12:38	CIRS_FP1 to Titan	PIC	
ISS_201TI_GLOBMAP001_PRIME	C, U, V	2014-033T10:12:38	GMB_E201_TITAN_T98-000T09:00:00	000T03:00:00	2014-033T13:12:38	ISS_NAC to Titan	POS_X to 145.7/-14.2	No Preference to secondary pointing
RADAR_201TI_T98INRAD001_PRIME		2014-033T13:12:38	GMB_E201_TITAN_T98-000T06:00:00	000T03:45:00	2014-033T16:57:38	NEG_Z to Titan	POS_X to NTP	Use +X to NTP and +Y to NTP secondaries for two polarizations.
RADAR_201TI_T98INSCAT001_PRIME	M	2014-033T16:57:38	GMB_E201_TITAN_T98-000T02:15:00	000T01:03:00	2014-033T18:00:38	NEG_Z to Titan	POS_Y to NTP	
RADAR_201TI_T98IHISAR001_PRIME	M	2014-033T18:00:38	GMB_E201_TITAN_T98-000T01:12:00	000T00:41:00	2014-033T18:41:38	NEG_Z to Titan	POS_Y to NTP	
ENGR_201SC_RADRCS033_PRIME	M	2014-033T18:41:38	GMB_E201_TITAN_T98-000T00:31:00	000T00:01:00	2014-033T18:42:38	NEG_Z to Titan	PIC	Deadband = (0.5, 0.5, 2.0)
RADAR_201TI_T98INALT001_PRIME	M	2014-033T18:42:38	GMB_E201_TITAN_T98-000T00:30:00	000T00:12:00	2014-033T18:54:38	NEG_Z to Titan	NEG_X to Titan_SC_RAM	
Begin Dual Playback Science		2014-033T18:54:38	GMB_E201_TITAN_T98-000T00:18:00	000T00:00:01	2014-033T18:54:39			
RADAR_201TI_T98INOSAR001_PRIME	M	2014-033T18:54:38	GMB_E201_TITAN_T98-000T00:18:00	000T00:36:00	2014-033T19:30:38	NEG_Z to Titan	NEG_X to Titan_SC_RAM	
201TI (t) T98 TITAN Inboun...		2014-033T19:12:38		000T00:00:01	2014-033T19:12:39			
End Dual Playback Science		2014-033T19:30:38	GMB_E201_TITAN_T98+000T00:18:0(	000T00:00:01	2014-033T19:30:39			
RADAR_201TI_T98OUTALT001_PRIME	M	2014-033T19:30:38	GMB_E201_TITAN_T98+000T00:18:0(	000T00:17:00	2014-033T19:47:38	NEG_Z to Titan	NEG_X to NTP	
ENGR_201SC_RADRWBIAS033_PPS	M	2014-033T19:47:38	GMB_E201_TITAN_T98+000T00:35:0(	000T00:22:00	2014-033T20:09:38	NEG_Z to Titan	PIC	Deadband=(2, 2, 20)
RADAR_201TI_T98OHISAR001_PRIME	M	2014-033T20:09:38	GMB_E201_TITAN_T98+000T00:57:0(	000T00:21:00	2014-033T20:30:38	NEG_Z to Titan	NEG_Y to NTP	
RADAR_201TI_T98OUTSCT001_PRIME	M	2014-033T20:30:38	GMB_E201_TITAN_T98+000T01:18:0(	000T00:57:00	2014-033T21:27:38	NEG_Z to Titan	NEG_Y to NTP	
RADAR_201TI_T98OUTRAD001_PRIME		2014-033T21:27:38	GMB_E201_TITAN_T98+000T02:15:0(	000T03:45:00	2014-034T01:12:38	NEG_Z to Titan	NEG_Y to NTP	Use -Y to NTP and +X to NTP for polarizations.
CIRS_201TI_MIRLMBINT002_PRIME	I, V	2014-034T01:12:38	GMB_E201_TITAN_T98+000T06:00:0(	000T03:00:00	2014-034T04:12:38	CIRS_FPB to Titan	PIC	
CIRS_201TI_FIRNADCMP002_PRIME	I, U, V	2014-034T04:12:38	GMB_E201_TITAN_T98+000T09:00:0(	000T04:00:00	2014-034T08:12:38	CIRS_FP1 to Titan	PIC	
CIRS_201TI_MIDIRTMAP002_PRIME	I, V	2014-034T08:12:38	GMB_E201_TITAN_T98+000T13:00:0(	000T05:59:00	2014-034T14:11:38	CIRS_FPB to Titan	PIC	Collaborative Rider(s): ISS
SP_201NA_DEADTIME034_PRIME		**2014-034T14:11:59**	**GMB_E201_TITAN_T98+000T18:59:2**	**000T00:15:00**	**2014-034T14:26:59**	**NEG_Y to Titan**	**POS_X to 145.7/-14.2**	
SP_201EA_DLTURN034_PRIME		2014-034T14:27:00		000T00:40:00	2014-034T15:07:00	XBAND to Earth	NEG_Y to 296.0/55.0	
NEW WAYPOINT		**2014-034T15:07:00**		**000T12:45:00**	**2014-035T03:52:00**	**XBAND to Earth**	**NEG_Y to 296.0/55.0**	
SP_201EA_C70METNON034_PRIME	C	2014-034T15:07:00		000T10:00:00	2014-035T01:07:00	XBAND to Earth	NEG_Y to 296.0/55.0	MIMI. NEG_Y to Saturn (0,0,-9.5). SID suspend. CIRS heating. post-TOST
Pointer Reset in preparatio...		2014-035T01:07:00		000T00:00:01	2014-035T01:07:01			
SP_201EA_M70METNON035_PRIME	C	2014-035T01:07:00		000T02:45:00	2014-035T03:52:00	XBAND to Earth	NEG_Y to 296.0/55.0	MIMI. NEG_Y to Saturn (0,0,-9.5). SID suspend. CIRS heating. post-TOST

T98 Master Timeline

201TI_T98	1236					
Start Time	**End Time**	**Prime Activity**	**Obs. Detail**	**Op Mode**	**TLM Mode**	**Comments**
2014-031T23:51:00	**2014-032T00:31:00**	SP Turn to WP	**NEG_Y to Titan, POS_X to NTP**	DFPW Normal	S_N_ER_3	
2014-032T00:31:00	2014-032T04:31:00	ISS	*ISS mosaic at first, then sit and stare for CIRS and VIMS (TN2c, TN2d)*	RADWU @ 04:16	S_N_ER_3, S_N_ER_5a for 15 min @ 04:16	
2014-032T04:31:00	2014-032T8:42:00	ISS	*ISS mosaic at first, then sit and stare for CIRS and VIMS (TN2c, TN2d)*	RADWU	S_N_ER_3	
2014-032T8:42:00	2014-032T9:42:00	ISS mosaic	*ISS mosaic (TN2c, TN2d)*	RADWU	S_N_ER_3	
2014-032T9:42:00	2014-032T11:42:00	RADAR Calibration		RADWU	S_N_ER_8	
2014-032T11:42:00	2014-032T12:42:00	ISS mosaic	*ISS mosaic (TN2c, TN2d)*	DFPW Normal	S_N_ER_3	
2014-032T12:42:00	**2014-032T13:22:00**	SP Turn to Earth for		DFPW Normal	S_N_ER_3	
2014-032T13:22:00	2014-032T14:52:00	Ybias window		DFPW Normal	S_N_ER_3	
2014-032T14:52:00	**2014-032T23:52:00**	Canberra 70M		DFPW Normal	RTE_N_SPB	

T98 Master Timeline

2014-032T23:52:00	2014-033T00:32:00	SP Turn to WP	NEG_Y to Titan, POS_X to 145.7/-14.2	DFPW Normal	S_N_ER_3	
2014-033T00:32:00	C/A-18:25:38	OD Uncertainty Dead Time				
C/A-18:25:38	-14:00	CIRS	A3 (Tc1b)	DFPW Normal	S_N_ER_3	ISS rider
-14:00	-09:00	CIRS	C (TN1c)	DFPW Normal	S_N_ER_3	VIMS rider
-09:00	-06:00	ISS	H1 (TC1a, TN1a, TN2c (Could also be TC1b and/or TN1c, depending on geometry, or TN2d, depending on timing.))	RADWU	S_N_ER_5a for 15 min @ -09:00, then S_N_ER_3	RADAR warm-up @ -09:00
-06:00	-02:15	RADAR	L+H1 (TN2c, TN2c)	RADRWA	S_N_ER_8	ISS and VIMS sleep
-02:15	-01:12	RADAR scatterometry/radiometry		RADRWA	S_N_ER_8	
-01:12	-00:31	RADAR HiSAR	TC1a, TN1a, TN1b, TN2b	RADRWA	S_N_ER_8	
-00:31	-00:30	RWA to RCS Transition			S_N_ER_8	
-00:30	-00:18	RADAR Altimetry	TN2b	RADRCS	S_N_ER_8	
-00:18	0	RADAR SAR	TC1a, TN1a, TN1b, TN2b	RADRCS	S_N_ER_8	
2014-033T19:12:38		CLOSEST APPROACH	NEG_Z to Titan (Tc2a)			T98L Change detection on Ontario + stereo w T99
0	+00:18	RADAR SAR	TC1a, TN1a, TN1b, TN2b	RADRCS	S_N_ER_8	
+00:18	+00:35	RADAR Altimetry	TN2b	RADRCS	S_N_ER_8	
+00:35	+00:57	RCS to RWA Transition				
+00:57	+01:18	RADAR HiSAR	TC1a, TN1a, TN1b, TN2b	RADRWA	S_N_ER_8	ISS and VIMS sleep
+01:18	+02:15	RADAR scatterometry/radiometry	TN2c, TN1a	RADRWA	S_N_ER_8	
+02:15	+06:00	RADAR	L+R1 (TN2c, TN2c)	RADRWA	S_N_ER_8	
+06:00	+09:00	CIRS	R1 (TN1c or Tc1b, decided in implementation)	DFPW Normal	S_N_ER_3	
+09:00	+13:00	CIRS	N1 (Tc1b, TN1c aerosol)	DFPW Normal	S_N_ER_3	
+13:00	C/A+18:59:22	CIRS	M4 (Tc1b (TN1c on outbound))	DFPW Normal	S_N_ER_3	
C/A+18:59:22	2014-034T14:27:00	OD Uncertainty Dead Time				
2014-034T14:27:00	2014-034T15:07:00	SP Turn to Earth for downlink		DFPW Normal	S_N_ER_3	
2014-034T15:07:00	2014-035T01:07:00	Canberra 70M		DFPW Normal	RTE_N_SPB	
2014-035T01:07:00	2014-035T03:52:00	Madrid 70M		DFPW Normal	RTE_N_SPB	Dual playback for RADAR, -00:18 to +00:18

Heating at c/a for VIMS and CIRS. Consumable usage likely.

Science Highlights

DOY 32: ISS will monitor Titan's high northern latitudes, where it will be important to track clouds and the evolution thereof as summer approaches . VIMS will ride along to map the lakes and seas of the Pole and to monitor cloud formation at high northern latitudes. Downlink will be over the Canberra 70M.

DOY 33: Inbound to Titan, CIRS increases temporal mapping coverage of Titan's stratospheric temperatures to monitor seasonal change. ISS will acquire a medium-resolution mosaic of high northern latitudes approaching northern summer (multiple observations of high northern latitudes may be needed in case of cloud cover obscuring the surface). ISS will ride along with CIRS on approach to track clouds at high northern latitudes. VIMS will ride along with CIRS and ISS to map the lakes and seas of the North Pole and to monitor cloud formation at high northern latitudes.

T98 is local noon (Cassini relative to Titan) in the southern latitudes. INMS will be observing neutrals and ions at closest approach. Additionally, ion outflow with be observed between 1400 and 2500 km in altitude on inbound and outbound. MIMI Measure energetic ion and electron energy input to atmosphere. RPWS will measure thermal plasmas in Titan's ionosphere and surrounding environment; search for lightning in Titan's atmosphere; investigate the interaction of Titan with Saturn's magnetosphere. T98 is another high inclination flyby in the noon sector of Saturn's magnetosphere, very similar to T97 but at an altitude of 1236 km. With closest approach in the dayside, MAG will be able to study the diffusion of the external magnetic field at low altitudes and over the flank facing away from Saturn. A comparison with flybys at similar local times (T83-T97) will be very useful.

RADAR is the prime instrument from 6 hours before closest approach to 6 hours after c/a. RADAR will perform SAR of Ontario Lacus (providing change detection from T57/58 and T65) along with inbound and outbound scatterometry/radiometry, HiSAR and altimetry.

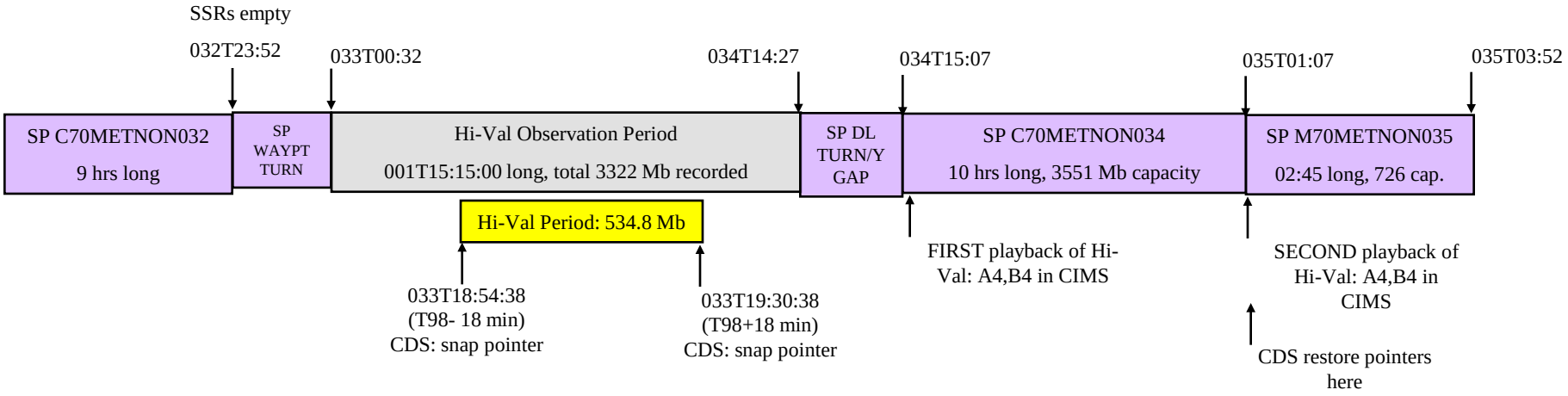
DOY 34: Outbound from Titan, CIRS increases temporal mapping coverage of Titan's stratospheric temperatures to monitor seasonal change. VIMS will ride along with CIRS and will observe the evolution of the south polar vortex. The geometry for specular reflection is obtained at 44N and 40S on the inbound and outbound, respectively. Although liquid surfaces are not expected at these latitudes, VIMS will observe these regions at 5 microns. ISS will ride along with CIRS to track clouds over Titan's southern hemisphere.

Playback of the Titan data will occur on the Canberra 70M with a dual playback of c/a data on the Madrid 70M.

T98 Dual Playback (RADAR)

Flyby	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?)
T98	T98-18 min	T98+18 min	534.8 Mb	Yes	Yes	Yes	Yes

Playbacks contiguous:



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 T98

Notes

- Pointing:
  - CIRS and VIMS heating will occur at c/a. A consumable may be used. CIRS and VIMS have agreed to this during integration.
- Data Volume:
  - RADAR 2014-032T04:16:00 RADAR_201OT_WU4RADCAL129_RIDER Found an activity whose data are NOT recorded in this telemetry mode "S_N_ER_3" commanded at 2014-032T04:31:00.000. Volume of 8.985462 Mb not given data policing space. OK, small overlap with telem mode change.
  - RADAR 2014-033T10:12:38 RADAR_201TI_T98WARMUP001_RIDER Found an activity whose data are NOT recorded in this telemetry mode "S_N_ER_3" commanded at 2014-033T10:27:38.000. Volume of 4.694976 Mb not given data policing space. OK, small overlap with telem mode change.
  - SP 2014-032T23:52:00 SP_201NA_OBSERV032_NA P4 is overfilled by 16.89981 Mb. Possible data loss might occur during observation period. OK, TOST data utilization isn't 100% so this will go away.
- DSN:
  - DSS-43 on DOY 034 overlaps weekly maintenance and a proposed downtime. Emily working this.
  - SP_201NA_M70METNON035_SP seems to be a handover pass and should overlap previous DSN pass by 15 min. Overlap is as long as it can be due to view period issues.
- Resource checker:
  - 000072 ISS 2014-032T00:31:00 ISS_201TI_CLOUD001_PRIME Telemetry Mode change during an ISS observation
  - 000073 ISS 2014-033T10:12:38 ISS_201TI_GLOBMAP001_PRIME Telemetry Mode change during an ISS observation
  - ISS is aware of both of these and are ok with them.
- Opmodes:
  - None
- Hydrazine:
  - KPT predict 276 grams.
  - Deadband for RADAR is (0.5,0.5,2)
- Special Activities:
  - None

Liens

Sequence Liens (should all be SPLAT items):

- List any Liens to be worked in SIP, ie
  - Dual playback downlink passes will need to be watched during DSN negotiations.