



Daily Downlink Tagup

Monday, August 12, 2019 (DOY 224)

OSIRIS-REX™
ASTEROID SAMPLE RETURN MISSION



Agenda & Logistics

- Quicklook
- DSN Schedule
- Observation Timeline
- Uplink/Execution/Downlink Summary
- Alarms, Watch items, ISAs, PFRs
- Need for Retransmit, need for Replay?
- Science / PI Comments
- Go-backs / Additional Comments

Daily Downlink Summaries available shortly after each Tagup at on the OREx Ops Wiki:
https://orexwiki.lpl.arizona.edu/wiki/Main_Page (LDAP login)

Daily Downlink Slides available shortly after each Tagup at:

OSIRIS-REx Bennu Proximity Operations/Science Implementation/Downlink_Daily_Summary/2019

Quicklook

Team	Status	Comment
Spacecraft	G	No issues
<i>Electrical Power System</i>	G	No issues
<i>Flight Software</i>	G	No issues
<i>Fault Protection</i>	G	No issues
<i>G&NC</i>	G	No issues
<i>Mechanisms</i>	G	No issues
<i>Propulsion</i>	G	No issues
<i>Telecom</i>	G	No issues
<i>Thermal</i>	G	No issues
<i>Payload Interfaces</i>	G	No issues

	Health				Safety		Performance			Powered State	GO/NO-GO
OCAMS										OFF	GO
OLA										OFF	GO
OTES										OFF	GO
OVIRS										OFF	GO
REXIS										OFF	GO
	Thermal	Power	Command Response	Alarms	Trending	Limited Life & Mechanisms	Data Completeness	Pipeline Status	Science Concurrence		

Downlink Schedule (times in UTC)

- **Current Data Rate: 917 Mbps**

WOY	DOY	Start Date	HGA Start	End Date	HGA End	Duration	Note
32	222	2019-08-10	14:09	2019-08-10	20:30	6:21	COMPLETE
32	223	2019-08-11	14:11	2019-08-11	20:15	6:04	COMPLETE
33	224	2019-08-12	17:55	2019-08-12	20:16	2:21	IN PROGRESS
33	225	2019-08-13	14:50	2019-08-13	16:41	1:51	
33	226	2019-08-14	14:43	2019-08-14	20:16	5:33	
33	227	2019-08-15	14:18	2019-08-15	19:31	5:13	
33	228	2019-08-16	14:20	2019-08-16	20:11	5:51	

SIGNIFICANT EVENTS:

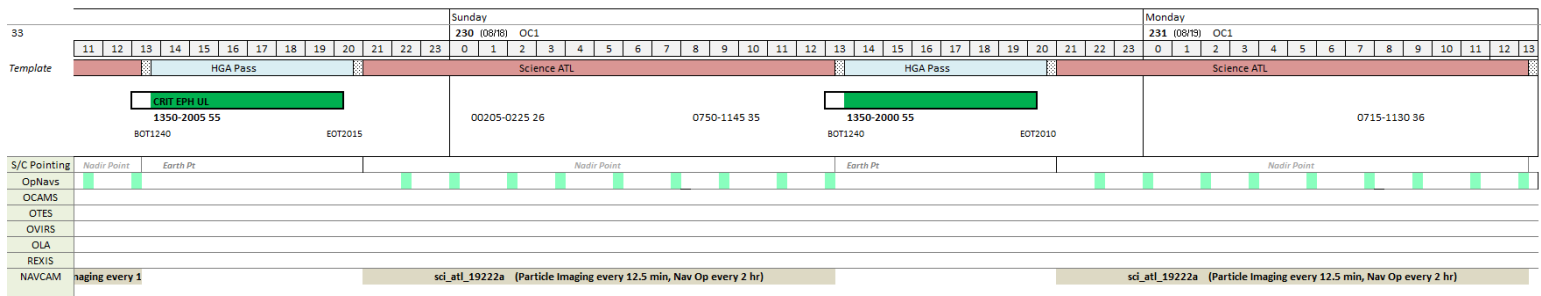
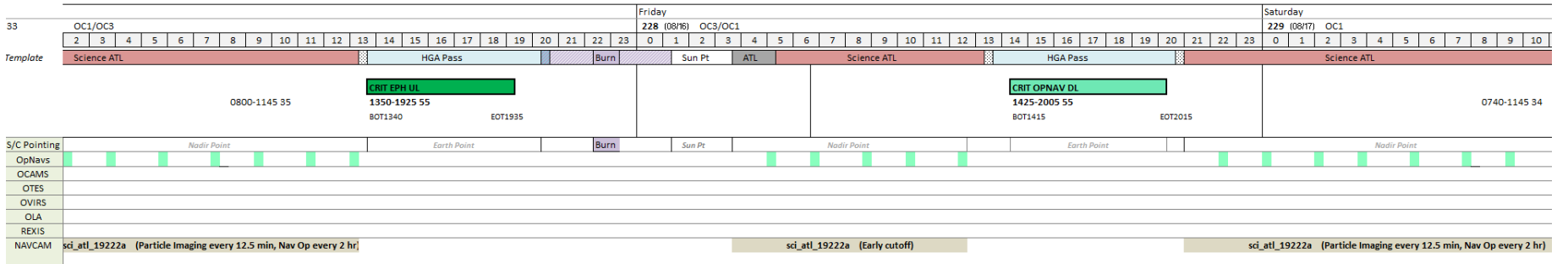
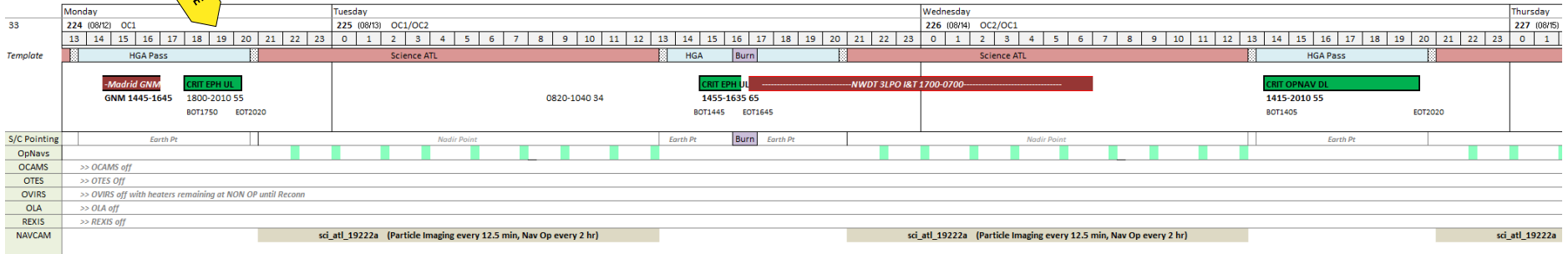
RED EQUIPMENT STATUS:

SPC/DSS	EQUIPMENT	ETRO
SPC10	RSR2	228/2300z
DSS14	X500kw-R	310/2300z
SPC60	VSR	350/1648z
DSS63	EAC	355/1621z

Dedicated NavCam particle monitoring, M3C, M4C (both waived)

WOY 33

We are HERE



Uplink Summary

UPLINK

WOY 33 (2019-224 – 2019-231)

- BG Seq, Sci Genies, Payload Sequences [uplinked 2019-222](#)

Ephemeris Updates

- Ephemeris Update: od172 [uplinked 2019-218](#)
- Ephemeris Update: od173/od174 [uplinked 2019-220](#)

Other Files

Execution Summary

Executed (times in UTC):

- 2019/222 (Saturday, August 10)
 - OpNav with particle imaging riding along
 - # of NavCam OpNav images expected/received : 9 / 9
 - # of NavCam Particle images expected/received: 18 / 18
- 2019/223 (Sunday, August 11)
 - OpNav with particle imaging riding along
 - # of NavCam OpNav images expected/received : 9 / 9
 - # of NavCam Particle images expected/received: 156 / 156
- 2019/224 (Monday, August 12)
 - OpNav with particle imaging riding along
 - # of NavCam OpNav images expected/received : 9 /
 - # of NavCam Particle images expected/received: 66 /

Up Next (times In UTC):

- 2019/225 (Tuesday, August 13)
 - OpNav with particle imaging riding along
 - # of NavCam OpNav images expected/received : 9 /
 - # of NavCam Particle images expected/received: 156 /
- 2019/226 (Wednesday, August 14)
 - OpNav with particle imaging riding along
 - # of NavCam OpNav images expected/received : 9 /
 - # of NavCam Particle images expected/received: 156 /
- 2019/227 (Thursday, August 15)
 - OpNav with particle imaging riding along
 - # of NavCam OpNav images expected/received : 9 /
 - # of NavCam Particle images expected/received: 156 /

Downlink Summary

- **Current Data Rate: 916 kbps**

Downlink

- Today's Partition Status :

	Part. Start Vol (MB)	New Data Vol (MB)	Partition Fill (MB)	Expected Partition Fill (%)	Current End Partition (%)	Comments
<i>OpNav</i>	0.00	99.37	99.37	14.20%	0.00%	
<i>OTES</i>	0.00	0.00	0.00	0.00%	0.00%	
<i>REXIS</i>	0.00	0.00	0.00	0.00%	0.00%	
<i>OLA</i>	0.00	0.00	0.00	0.00%	0.00%	
<i>OVIRS</i>	0.00	0.00	0.00	0.00%	0.00%	
<i>OCAMS</i>	0.00	728.74	728.74	19.73%	14.63%	
<i>Tagcams/Overflow</i>	0.00	0.00	0.00	0.00%	0.00%	

(Partition status as of 19:00 UTC)

Downlink Summary

- **Tomorrow's Data Rate: 916 kbps**

Downlink

- Tomorrow's Expected Partition Status :

	Part. Start Vol (MB)	New Data Vol (MB)	Partition Fill (MB)	Expected Partition Fill (%)	Expected End Partition (%)	Comments
<i>OpNav</i>	0.00	99.37	99.37	14.20%	1.63%	
<i>OTES</i>	0.00	0.00	0.00	0.00%	0.00%	
<i>REXIS</i>	0.00	0.00	0.00	0.00%	0.00%	
<i>OLA</i>	0.00	0.00	0.00	0.00%	0.00%	
<i>OVIRS</i>	0.00	0.00	0.00	0.00%	0.00%	
<i>OCAMS</i>	0.00	1722.45	1722.45	46.64%	46.64%	
<i>Tagcams/Overflow</i>	0.00	0.00	0.00	0.00%	0.00%	

Need for Retransmit? Need for Replay?

On DOY 222, SPOC database ran out of space

New space was added, images processed normally

Delay of ~5 hrs uploading images to FOB – no impact to OD activities

List of Unexpected Alarms, Watch Items, ISAs, PFRs

Unexpected Alarms - None

New or Updated Watch Items, ISA's and PFR's

- **ISA # 10979 – Delayed reconstructed CK delivery on a Crit 2 OpNav Downlink Day**
 - ISA Status: In Progress
 - ISA Type: Ground Minor
 - ISA Criticality: 3 – minimal impact
- **ISA # 10939 – REXIS SXM recording significantly fewer counts**
 - ISA Status: In Progress
 - ISA Type: Spacecraft minor
 - ISA Criticality: 3 – minimal impact
- **ISA # 10936 – OLA operated from the GOLD side on DOY 210**
 - ISA Status: In Progress
 - ISA Type: Spacecraft minor
 - ISA Criticality: 3 – minimal impact
- **ISA # 10854 – TAGCAMS DOY 2019-208 Bad Image SP Header**
 - ISA Status: In Progress
 - ISA Type: Spacecraft minor
 - ISA Criticality: 3 – minimal impact
- **ISA # 10751 – TAGCAMS DOY 2019-202/203 Images Not Transferred**
 - ISA Status: In Progress
 - ISA Type: Spacecraft Minor
 - ISA Criticality: 3 – Minimal impact
- **ISA # 10702 – ORX MSA Flight Machines Frozen on 2019-197**
 - ISA Status: In Progress
 - ISA Type: Ground Major
 - ISA Criticality: 2 - Significant Impact
- **ISA # 10665 – REXIS background counts higher than expected**
 - ISA Status: In Progress
 - ISA Type: Spacecraft minor
 - ISA Criticality: 3 - Minimal Impact
- **ISA # 10466 – TAGCAMS DOY 2019-175 Uncorrectable errors, rejected commands and images not transferred**
 - ISA Status: In Progress
 - ISA Type: Spacecraft minor
 - ISA Criticality: 3 – minimal impact
- **ISA #10004 - 1923 ote_spacecal_002 missing from payload bundle and weeklong softsim**
 - ISA Status: In Progress
 - ISA Type: Ground Minor
 - ISA Criticality: 3 – minimal impact
- **ISA # 8767 - Re-occurrence: STL intermittent downlink issues during setup**
 - ISA Status: In Progress
 - ISA Type: Ground minor
 - ISA Criticality: 3 – minimal impact

Instrument Presentations

Science Status and/or PI Status

Looking Ahead

31							32							33							34						
210	211	212	213	214	###	###	217	218	219	220	221	###	###	224	225	226	227	228	###	###	231	232	233	234	235	###	###
7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	###	###	8/12	8/13	8/14	8/15	8/16	###	###	8/19	8/20	8/21	8/22	8/23	###	###
M	T	W	R	F	Sa	Su	M	T	W	R	F	Sa	Su	M	T	W	R	F	Sa	Su	M	T	W	R	F	Sa	Su
Traj #2, 3, 4 Delivered																											
							xm1939 - DS Flyby 2 Redux							xm1940 - High FB1 - EX07							xm1941 - High FB2 - DL06						
														xm1939 - DS Flyby 2 Redux							xm1940 - High FB1 - EX07						
xm1936 - Orbit C (Opnav, Particle Img Only)							xm1937 - TBD - Transition to Recon A							xm1938 - Transition to Recon A							xm1939 - DS Flyby 2 Redux						
xm1935 - Orbit C (Opnav, Part Img)							xm1936 - Orbit C (Opnav, Particle Img Only)							xm1937 - TBD - Transition to Recon A							xm1938 - Transition to Recon A						
xm1934 - Orbit C (Opnav, Particle Img Only)							xm1935 - Orbit C (Opnav, Part Img)							xm1936 - Orbit C (Opnav, Particle Img Only)							xm1937 - TBD - Transition to Recon A						
xm1933 - Orbit C (Opnav, Particle Img Only)							xm1934 - Orbit C (Opnav, Particle Img Only)							xm1935 - Orbit C (Opnav, Part Img)							xm1936 - Orbit C (Opnav, Particle Img Only)						
xm1932 - Orbit C (Opnav, Particle Img Only)							xm1933 - Orbit C (Opnav, Particle Img Only)							xm1934 - Orbit C (Opnav, Particle Img Only)							xm1935 - Orbit C (Opnav, Part Img)						
xm1931 - Orbit B Global Week 5							xm1932 - Orbit C (Opnav, Particle Img Only)							xm1933 - Orbit C (Opnav, Particle Img Only)							xm1934 - Orbit C (Opnav, Particle Img Only)						

Go Backs?

Backup

Instrument Weekly Status

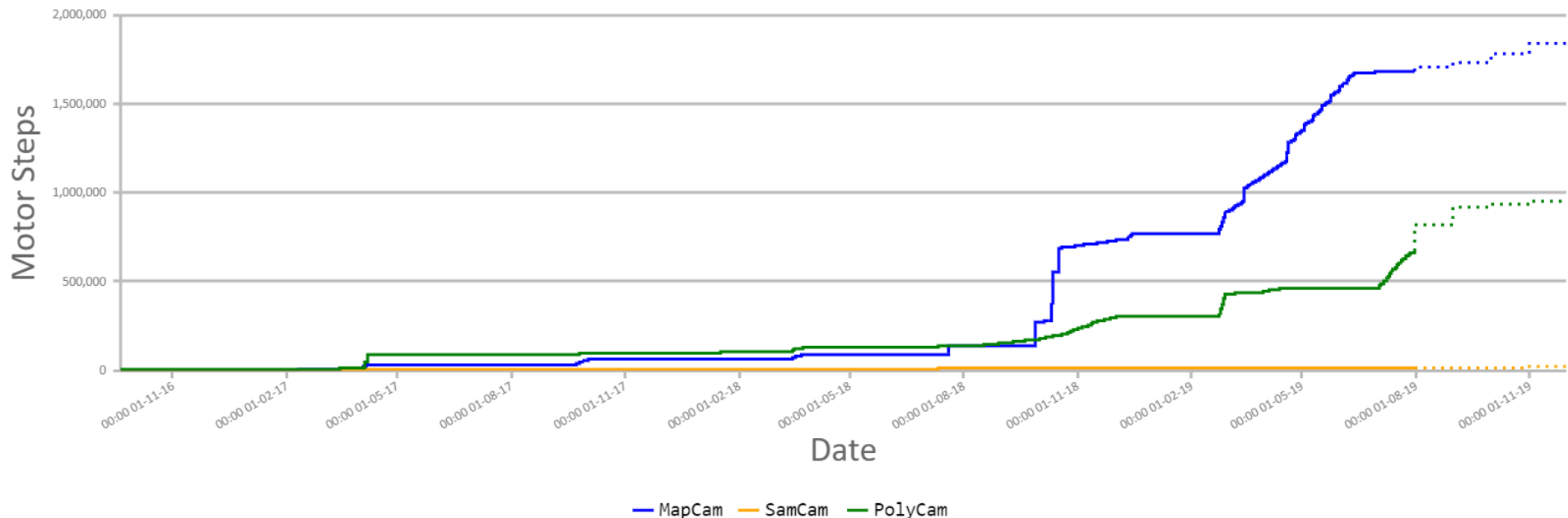
- **OCAMS – OCAMS is ON and nominal. Orbital B campaign has been very successful. Poly thru focus got 18 images on Aug 3 and 4, and after a quick look, things look good. Phase angle was good, so that's lucky. Anchor focus position was well chosen.**
- **OLA – OFF and nominal**
- **OTES – ON and nominal. Will be powering off shortly.**
- **OVIRS – OFF and nominal.**
- **REXIS – REXIS is ON and nominal. All commands processed. Excess noise in CCDs from July 5th was resolved by the July 19th power cycle. About 2 weeks of data were lost, but we may be able to recover some of it with noise reduction. Offset in SXM also happened on July 5th, and this was also resolved by the power cycle. Power cycle appears to have fixed both of these problems.**

OCAMS Mechanism Life Tracking

	Launch (steps)	Flight (steps)	NTE (steps)
MapCam	1057475	1688326	3400320
SamCam	738110	15246	958384
PolyCam	1775496	671821	8876160

Status as of July 31, 2019

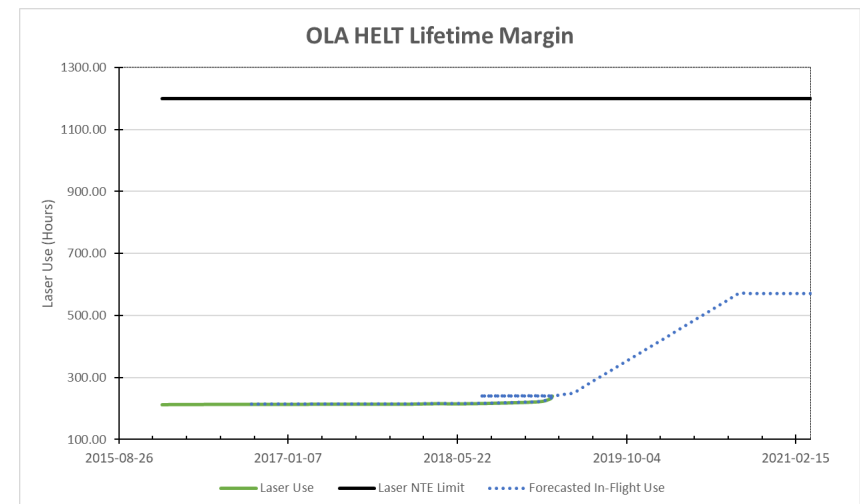
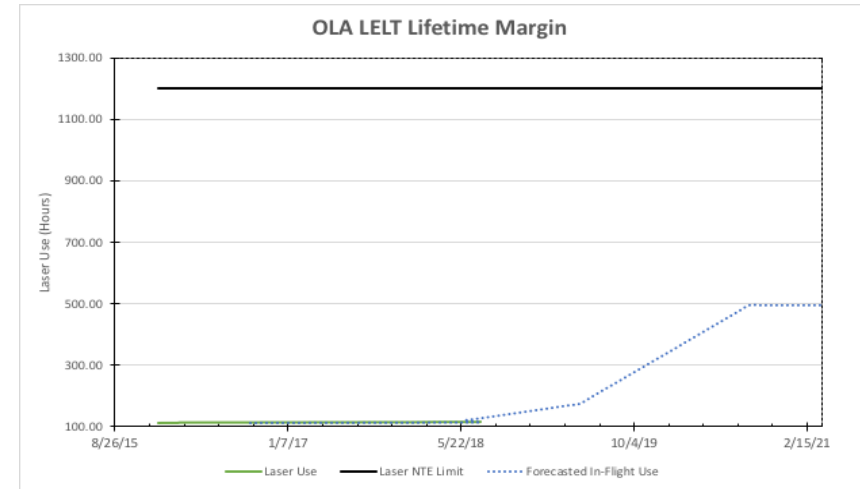
OCAMS Limited Life Items



OLA Limited Life Laser Tracking

	Launch (hours)	Flight (hours)	NTE Margin (hours)
LELT	110.70	82.81	1,085.01
HELT	212.50	108.43	983.80

Status as of July 31, 2019





SPOC Watch Item List

Todays Date: 08/02/2019		SPOC Watch Item List									
Status	Date Added	Date Removed	Item ID	Instrument	Title	Watch Item Description	Impact Type	Watch Item Age	ISA # or TCR #	Watch Item Action	Watch Item Action Plan
Open	4/3/18		Item10	OLA	OLA T0 Intensity	L+10 day, L+6 mo, and L+10 mo On-orbit checkouts showed that OLA's T0 signal intensity (Return Intensity) is an order of magnitude lower than expected as compared with pre-launch spacecraft and stand-alone test data. The L+18 calibrations revealed that the T0 intensity is at pre-launch levels on both the Gold and Silver sides of OLA. SPOC has opted to close ISA 2257 and continue to monitor T0 intensity as a watch item.	Instrument Performance	486		Watch	Monitor the T0 Intensity at the L+22 and L+30 OLA checkouts Update 08/06/2018: Based on results from L+18 and L+22, OLA has not been able to discern a temperature dependency with t0 Intensity value. We will continue to watch, but may never fully understand the cause. OLA can still operate as expected despite the inconsistency seen in the t0 value. Update 5/9/2019: The OLA Team continues to monitor the T0 intensity. Since it was first detected, the behavior of the HELT laser has remained constant through Orbital A and Detailed Survey. At this time, our recommendation is to maintain this item on the watch list through (at least) Orbital-B so as to observe behavior of the second laser (LELT).
Open	9/5/18		Item11	OCAMS	OCAMS Error on Polycam Startup	During power on of the OCAMS cameras there is the possibility of a 4 byte packet being created due to line noise. SPOCFLIGHT is unsure what to do with this packet, so flags it as an error. So far this has only occurred twice during flight, both times with Polycam but it is possible this could occur with any of the OCAMS cameras. As OCAMS has only been used sparingly during Cruise, it is not certain how frequently this error will occur.	Instrument Performance	331		Watch	Will monitor for future occurrences across all of the OCAMS cameras and assess if any action is warranted. Update 5/7/2019: We are continuing to monitor this behavior. We have seen this issue crop up all when powering on PolyCam.

Anomaly Response & Status

ISA #	Date Created	Type	Priority	Title	Detailed Description - Action Plan	Notes	Status	Resolved Date	Need Date
10939	8/2/19	Spacecraft Minor	Normal	REXIS SXM recording significantly fewer counts	During Orbital B operations (starting Jul 1 2019) the REXIS Solar X-ray Monitor (SXM)		New	TBD	TBD
10936	8/2/19	Spacecraft Minor	Normal	OLA operated from the GOLD side on DOY 210	On DOY 210 nominal operations had the usual 3 ATLS planned to run, A, D and E. A and E have OLA operating and OLA is powered on prior to each ATL starting. ATL A executed nominally but for ATL E OLA was operating from the GOLD side as opposed to the commanded SILVER side.		New	TBD	TBD
10854	7/29/19	Spacecraft Minor	Normal	TAGCAMS DOY 2019-208 Bad Image SP Header	Received the following alarms during the DOY 208 pass: 19-208-14:18:34.302 [TGM_HSDI_CUM] = (3) is now RED HIGH. (at 19-208-14:06:36.883) 19-208-14:18:34.307 [QLC_TAG_FAIL] = FAILURE (1) is now RED HIGH. (at 19-208-14:06:36.887) 19-208-14:18:34.318 [NFT_CON] = FAILED (3) is now RED HIGH. (at 19-208-14:06:36.906) 19-208-14:18:34.319 [TGM_CON] = FAILED (3) is now RED HIGH. (at 19-208-14:06:36.906)		In Progress	TBD	TBD
10799	7/22/19	Ground Minor	Normal	DSN BOT track shortening change not conveyed via SAF prior to BG load build	These alarms were due to TAGCAMS failing the High Speed Data Integrity component fault protection check. Three consecutive counts on this fault check were received as follows:		In Progress	TBD	TBD
10751	7/21/19	Spacecraft Minor	Normal	TAGCAMS DOY 2019-202/203 Images Not Transferred	Hyabusa-2 requested OREx time for a critical event, which shortened a track in Week 31 by about an hour on the front end, was not conveyed to the MSA via an updated SAF revision prior to the BG load build, so xm1931 was built with the original SAF and track BOT. This resulted in about an hour of temporary data loss.		In Progress	TBD	TBD
10655	7/10/19	Spacecraft Minor	Normal	REXIS background counts higher than expected	Received 30 additional counts of TAGCAMS_IMAGE_NOT_RECORDED_CNT (I-0129 = TGM_ImNotRec) on DOY 2019-202 and 203 (21 and 22-July-2019).		In Progress	TBD	TBD
10600	7/3/19	Ground Minor	Normal	Madrid antenna in Stow Position and not responding to Goldstone control for 2nd half of a split track (2nd occurrence)	The REXIS team has indicated that there are a couple of anomalies in their Orbital-B data. The background counts have gone up making it difficult to see the elemental lines in the data coming from the CCD nodes. There seems to be an offset of 32k in the SXM data.		In Progress	TBD	TBD
				Antenna would not respond to remote operator directives (ultimately traced to incorrect IP Address entered after a Ground Net Maintenance (GNM) activity) and never came out of stow position to support the track.			In Progress	TBD	TBD
				A small amount of OTES data was overwritten and lost, but it is a global mapping campaign.			In Progress	TBD	TBD

Anomaly Response & Status

ISA #	Date Created	Type	Priority	Title	Detailed Description - Action Plan	Notes	Status	Resolved Date	Need Date
10004	5/24/19	Ground minor	Normal	1923 ote_spacecal_002 missing from payload bundle and weeklong softsim	The 1923 SS test revealed ote_spacecal_002 was missing from our uplink product set for the week. As we started digging, we noticed it was not explicitly included in the UPBL under "Previously delivered sequences". This has been true for the past couple of weeks, and somehow the engineers added it without the explicit call out in the UPBL. Unfortunately, this time it did not get included in the payload bundle for the week.		In Progress	TBD	TBD
7704	1/10/19	Spacceraft Major	Normal	Potential particles detected in NavCam images while in Bennu Orbit-A Phase	Investigation and detailed image analysis are underway to determine if particles detected in a pair of NavCam images taken on 01/06/19 may have originated from Bennu (or from other causes such as cold traps on the spacecraft, cosmic rays, etc.) MPB convened to determine if it was safe for the spacecraft to remain in orbit and agreed to remain in orbit but to collect more data for the remaining weeks of the orbit phase as a precaution. The details of the additional and more efficient and targeted observations are being worked.		In Progress	TBD	TBD
7518	1/4/19	Ground Major	High	CenturyLink National Outage	A nationwide CenturyLink outage did not allow normal ground activities for OSIRIS-REx including uplink, downlink, and moving data between elements. Outage Start December 27, 2018 08:40 GMT Outage Stop December 29, 2018 10:12 GMT Approximately 50 hours		Monitor	TBD	TBD
7246	12/6/18	Ground Minor	High	FOB connection down	A FOB connectivity issue was discovered when team members were looking for the 12/06/18 downlink of OpNav images (criticality 3) on the FOB. The OpNav images were obtained via SpocFlight. Investigation ongoing.		In Progress	TBD	TBD

Current ISA Status

#	Status	Priority	Subject	Assignee	Updated
10939	New	Normal	REXIS SXM recording significantly fewer counts	Karl Harshman	8/2/19 8:26
10936	New	Normal	OLA operated from the GOLD side on DOY 210	Karl Harshman	8/2/19 8:20
10854	In Progress	Normal	TAGCAMS DOY 2019-208 Bad Image SP Header	Brent Bos	7/30/19 12:10
10799	In Progress	Normal	DSN BOT track shortening change not conveyed via SAF prior to BG load build	Andy Calloway	8/1/19 19:30
10751	In Progress	Normal	TAGCAMS DOY 2019-202/203 Images Not Transferred	Brent Bos	7/24/19 8:47
10702	In Progress	Normal	ORX MSA Flight Machines Frozen on 2019-197	Paul Falkenstern	7/22/19 8:20
10665	In Progress	Normal	REXIS background counts higher than expected	Karl Harshman	7/22/19 8:18
10600	In Progress	Normal	Madrid antenna in Stow Position and not responding to Goldstone control for 2nd half of a split track (2nd occurrence)	Andy Calloway	7/10/19 8:03
10466	In Progress	Normal	TAGCAMS DoY 2019-175 Uncorrectable errors, rejected commands, and images not transferred	Brent Bos	7/15/19 9:36
10004	In Progress	Normal	1923 ote_spacecal_002 missing from payload bundle and weeklong softsim	OSIRIS-REx	7/3/19 17:14
8767	In Progress	Normal	Re-occurrence: STL intermittent downlink issues during setup	Operations	3/29/19 14:44
8672	In Progress	Normal	JPL Firewall Config Changed without LM Notification - affected Matlab license access/use and Maneuver Automation	Mike Skeen	5/24/19 9:56
8542	In Progress	Normal	Uplink Products Could not be Radiated due to SEQ Configuration Change	Andy Calloway	5/24/19 10:03
7994	Monitor	Normal	ACSTBT Overburn	Mark Fisher	5/10/19 9:45
7704	In Progress	Normal	Potential particles detected in NavCam images while in Bennu Orbit-A Phase	Ryan Olds	3/28/19 12:37
7518	Monitor	High	CenturyLink National Outages	Ron Mink	7/10/19 15:14
7246	In Progress	High	FOB connection down	Andy Calloway	7/10/19 15:14
				Paul Falkenstern	5/21/19 14:27