



Daily Downlink Tagup

Wednesday, November 13, 2019 (DOY 317)

OSIRIS-REX™
ASTEROID SAMPLE RETURN MISSION



Agenda & Logistics

- Quicklook and Instrument Weekly Status
- 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 and Weekly Status

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										ON	GO
OLA										OFF	GO
OTES										ON	GO
OVIRS										ON	GO
REXIS										ON	GO
	Thermal	Power	Command Response	Alarms	Trending	Limited Life & Mechanisms	Data Completeness	Pipeline Status	Science Concurrence		

Downlink Schedule (times in UTC)

- Current Data : 600 kbps – All HGA tracks will be at the 600 kbps rate now.**

WOY	DOY	Start Date	HGA Start	End Date	HGA End	Duration	Note
46	315	2019-11-11	16:06	2019-11-11	17:54	1:48	COMPLETE
46	316	2019-11-12	--	2019-11-12	--	--	NO HGA PASS
46	317	2019-11-13	16:08	2019-11-13	17:50	1:42	
46	318	2019-11-14	--	2019-11-14	--	--	
46	319	2019-11-15	14:13	2019-11-15	17:10	2:57	
46	320	2019-11-16	14:23	2019-11-16	17:50	3:27	
46	321	2019-11-17	14:23	2019-11-17	17:10	2:47	
47	322	2019-11-18	14:18	2019-11-18	17:50	3:32	

DSS26/ORX 312/0120Z DR G120623 Software/CE Closed 312/0125Z 0005
 Originating Site:CDSCC Controlling Site:CDSCC

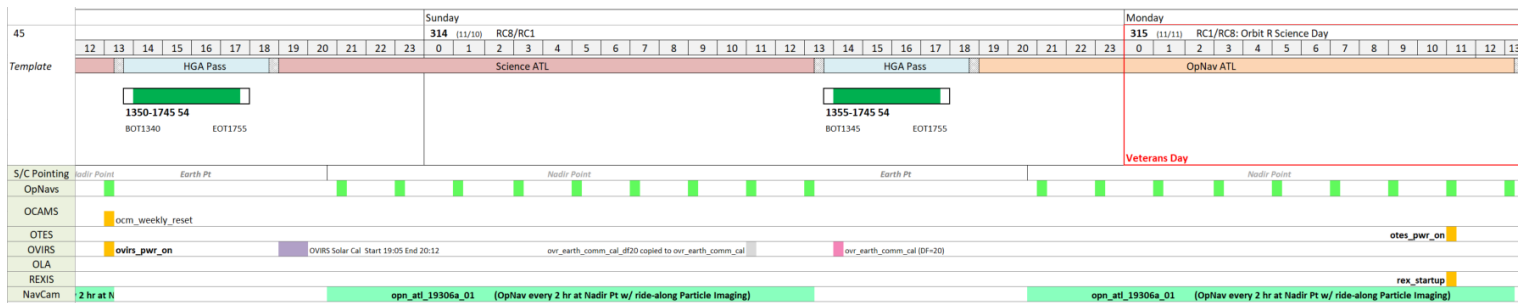
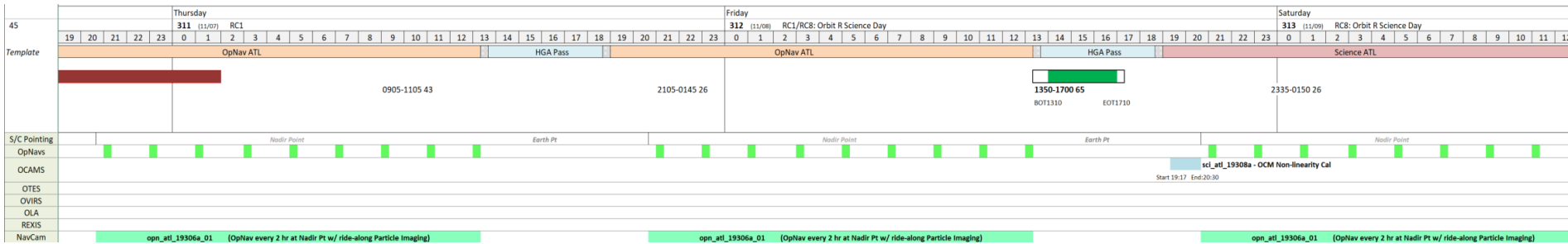
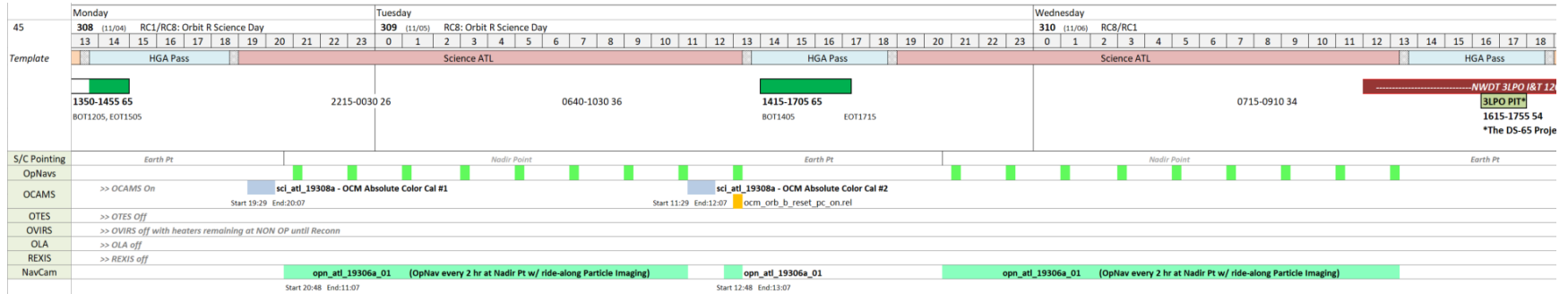
A series of "Lost Contact with Workstation" log entries indicated the start of the issue. A number of TDN blocks stopped as monitor data was lost. Subsystems failed to respond to a "Hi". A restart of the CE by Goldstone TSM restored functionality.

RED EQUIPMENT STATUS:

SPC/DSS	EQUIPMENT	ETRO
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DSS14	X500kw-R	326/2300z
SPC60	MCD3-1	333/1600z
DSS63	EAC	355/1621z
SPC10	RSR2	358/2300z

OCAMS Absolute Color Cal and Non-Linearity Cal, OVIRS Solar Cal, OpNav with ridealong Particle Imaging

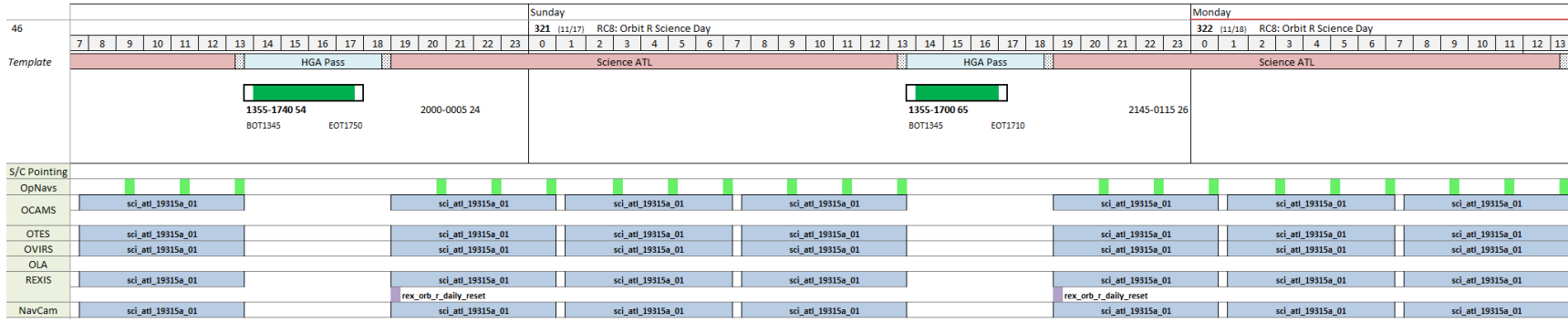
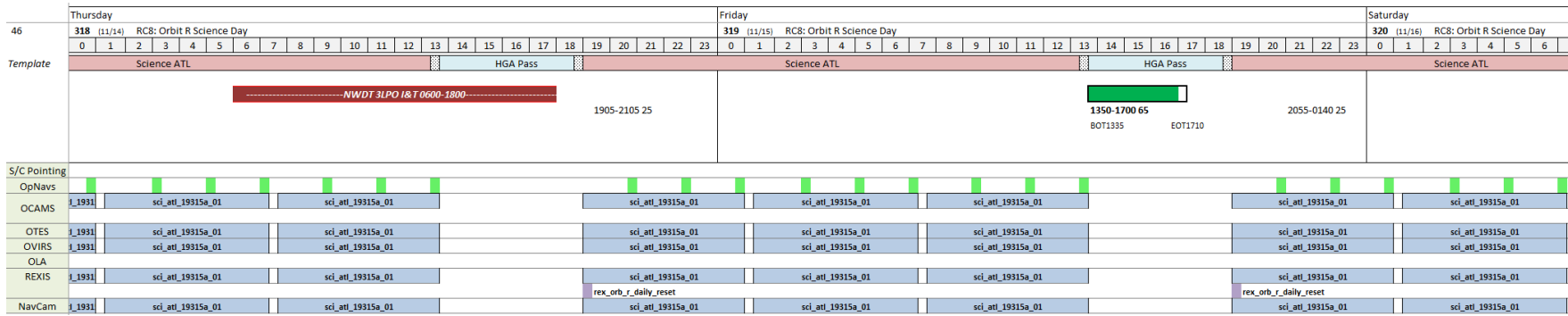
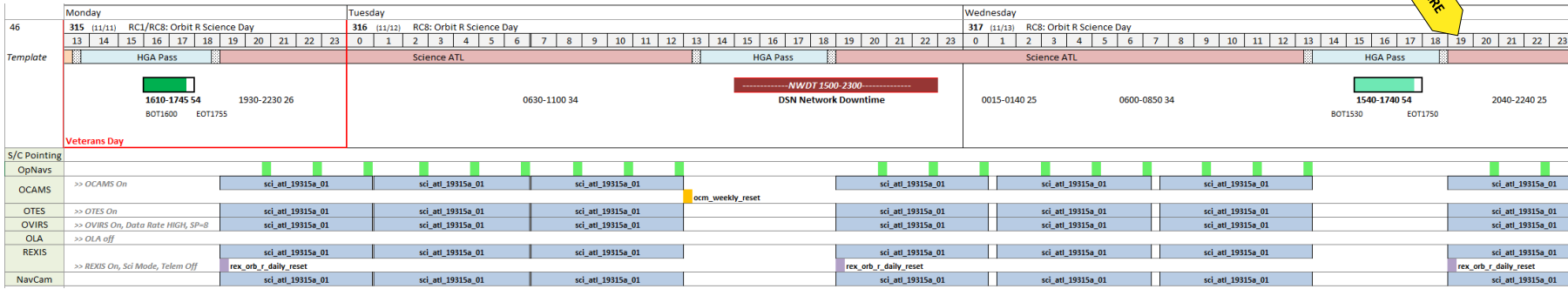
WOY 45 COMPLETE



October 30, 2019
 L+1147 days
 Earth Range = 268,000,000 km (1.79 AU) (↑)
 Sun Range = 190,000,000 km (1.27 AU) (↓)
 Bennu Range = 1.6 km (Orbit-R insertion this week)
 Sun-Probe-Earth Angle = 33.3 deg (↓)
 One Way Light Time = 00:14:55 hh:mm:ss (↑)
 Round Trip Light Time = 00:29:50 hh:mm:ss (↑)

Orbital R Global Mapping, OpNav with ridealong Particle Imaging WOY 46

We are HERE



- Mission Statistics as of 11/06/19 (L+1154 days)
- Earth Range = 270,000,000 km (1.81 AU) (↑)
 - Sun Range = 187,000,000 km (1.25 AU) (↓)
 - Bennu Range = 1.2 km (Orbit-R frozen orbit)
 - Sun-Probe-Earth Angle = 31.7 deg (↓)

Uplink Summary

UPLINK

WOY 46 (DOY 315-322 / Nov 11-18, 2019)

- BG Seq, Sci Genies, ATFs, Payload Sequences [uplinked 2019-312](#)

Ephemeris Updates

- OD-200 [uplinked on DOY 2019-309](#)
- OD-201 [uplinked on DOY 2019-317](#)

Other Files

Execution Summary

Executed (times in UTC):

- 2019/312 (Friday, Nov 8) – 2019/313 (Saturday, Nov 9)
 - OpNav with particle imaging riding along
 - # of NavCam OpNav images expected/received : 9 / 9
 - # of NavCam Particle images expected/received: 18 / 18
 - OCAMS Non-Linearity Calibration
 - # of SAMCAM images expected/received: 60 / 60
 - # of MAPCAM images expected/received: 60 / 60
 - # of POLYCAM images expected/received: 60 / 60
- 2019/313 (Saturday, Nov 9) – 2019/314 (Sunday, Nov 10)
 - OpNav with particle imaging riding along
 - # of NavCam OpNav images expected/received : 9 / 9
 - # of NavCam Particle images expected/received: 18 / 18
 - OVIRS Solar Calibration
 - Data volume expected/received: 22.2 MB / 22.2
- 2019/314 (Sunday, Nov 10) – 2019/315 (Monday, Nov 11)
 - OpNav with particle imaging riding along
 - # of NavCam OpNav images expected/received : 9 / 9
 - # of NavCam Particle images expected/received: 18 / 18
- 2019/315 (Monday, Nov 11) – 2019/316 (Tuesday, Nov 12) **NO HGA PASS**
 - OpNav with particle imaging riding along
 - # of NavCam OpNav images expected/received : 9 / 9
 - # of NavCam Particle images expected/received: 18 / 0
 - Global Mapping
 - # of MapCam images expected/received : 114 / 0
 - OVIRS Data volume expected/received: 182 MB / ~40
 - OTES Data volume expected/received: 106 MB / 106

- 2019/316 (Tuesday, Nov 12) – 2019/317 (Wednesday, Nov 13)
 - OpNav with particle imaging riding along
 - # of NavCam OpNav images expected/received : 9 / 9
 - # of NavCam Particle images expected/received: 18 / 0
 - Global Mapping
 - # of MapCam images expected/received : 114 / 0
 - OVIRS Data volume expected/received: 182 MB / 0
 - OTES Data volume expected/received: 106 MB / 106
 - REXIS Data volume expected/received: 20 MB / 20

Up Next (times In UTC):

- 2019/317 (Wednesday, Nov 13) – 2019/318 (Thursday, Nov 14) **NO HGA PASS**
 - OpNav with particle imaging riding along
 - # of NavCam OpNav images expected/received : 9 /
 - # of NavCam Particle images expected/received: 18 /
 - Global Mapping
 - # of MapCam images expected/received : 114 /
 - OVIRS Data volume expected/received: 182 MB /
 - OTES Data volume expected/received: 106 MB /
 - REXIS Data volume expected/received: 20 MB /

Reminder on Downlink Priority

- As a reminder, we have reverted back to the FPT Nom file (which defines downlink priority)
- Downlink Priority has been returned to the following (after S/C Eng):
 1. OpNav, 2. OTES, 3. REXIS, 4. OLA (n/a for Orb R), 5. OVIRS, 6. OCAMS, 7. Overflow/TAGCAMS

Downlink Summary

- **Current Data Rate: 600 kbps**

Downlink

- Today's Partition Status :

	Part. Start Vol (MB)	New Data Vol (MB)	Partition Fill (MB)	Expected Partition Fill (%)	Current Partition Fill (%)	Comments
<i>OpNav</i>	99.37	99.37	198.75	28.39%	0.00%	
<i>OTES</i>	106.80	106.80	213.59	77.39%	0.00%	
<i>REXIS</i>	19.90	19.90	39.80	26.89%	0.00%	
<i>OLA</i>	0.00	0.00	0.00	0.00%	0.00%	
<i>OVIRS</i>	182.47	182.47	364.94	34.89%	29.66%	
<i>OCAMS</i>	385.18	385.18	733.06	18.97%	18.97%	
<i>Overflow</i>	0.00	0.00	0.00	0.00%	0.00%	

Downlink Summary

- *Tomorrow's Data Rate: 600 kbps**

**NO HGA PASS TOMORROW!*

Downlink

- Tomorrow's Expected Partition Status :

	Part. Start Vol (MB)	New Data Vol (MB)	Partition Fill (MB)	Expected Partition Fill (%)	Expected End Partition Fill (%)	Comments
<i>OpNav</i>	0.00	99.37	99.37	14.20%	14.20%	
<i>OTES</i>	0.00	106.26	106.26	40.89%	40.89%	
<i>REXIS</i>	0.00	19.90	19.90	40.34%	40.34%	
<i>OLA</i>	0.00	0.00	0.00	0.00%	0.00%	
<i>OVIRS</i>	310.42	182.47	492.89	48.33%	48.33%	
<i>OCAMS</i>	733.06	347.88	1080.94	29.27%	29.27%	
<i>Overflow</i>	0.00	0.00	0.00	0.00%	0.00%	

Need for Retransmit? Need for Replay?

None

List of Unexpected Alarms, Watch Items, ISAs, PFRs

Unexpected Alarms

- NONE

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

- **ISA # 12047 Single Corrupted TAGCAMS NavCam 1 Image**
 - ISA Status: In Progress
 - ISA Type: Spacecraft Minor
 - ISA Criticality: 3 – Minimal impact
- **ISA # 11980 No 2-way Doppler Tracking after M3R maneuver in Recon-A**
 - ISA Status: In Progress
 - ISA Type: Ground Minor
 - ISA Criticality: 2 – Significant impact
- **ISA # 11464 Maneuver Automation froze after executing PEF Gen- M30D Late Update**
 - ISA Status: In Progress
 - ISA Type: Ground Minor
 - ISA Criticality: 3 – Minimal impact
- **ISA # 11268 IMU1 Configuration Issue**
 - ISA Status: In Progress
 - ISA Type: Spacecraft Major
 - ISA Criticality: 2 – Significant impact

Science Status and/or PI Status

Looking Ahead

46							47							48							49						
315	316	317	318	319	###	###	322	323	324	325	326	###	###	329	330	331	332	333	###	###	336	337	338	339	340	341	342
11/11	11/12	11/13	11/14	11/15	###	###	11/18	11/19	11/20	11/21	11/22	###	###	11/25	11/26	11/27	11/28	11/29	###	###	12/2	12/3	12/4	12/5	12/6	###	###
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
xm2004 - Medium Pass Flyby														xm2007 - Medium Pass Flyby #2													
							xm2004 - Medium Pass Flyby																				
														xm2004 - Medium Pass Flyby													
xm1951 - Orbital R - OpNavs							xm1952/01 - Orbital R - OpNavs							xm2002 - OpNav / xm2004 - Medium Pass													
xm1950 - Orbital R - OpNavs							xm1951 - Orbital R - OpNavs							xm1952/01 - Orbital R - OpNavs													
xm1949 - Orbital R - OpNavs							xm1950 - Orbital R - OpNavs							xm1951 - Orbital R - OpNavs													
xm1948 - Orbital R - OpNavs							xm1949 - Orbital R - OpNavs							xm1950 - Orbital R - OpNavs													
xm1947 - Orbital R - Global Mapping							xm1948 - Orbital R - OpNavs							xm1949 - Orbital R - OpNavs													
xm1946 - Orbital R - Global Mapping							xm1947 - Orbital R - Global Mapping							xm1948 - Orbital R - OpNavs													
														xm1949 - Orbital R - OpNavs													

Reminders, Go Backs...

- **REMINDER: Daily Downlinks are now on a Monday / Wednesday / Friday only**

Backup

Instrument Weekly Status

- **OCAMS (Bashar, Dathan, Christian):**
 - OCAMS is on and nominal
 - Mapcam Linearity exposures were calculated for the wrong side of the instrument
 - This lead to the D/N values being insufficient to catch the “tail” drop in sensitivity
 - As this was the primary purpose of this calibration, IPWG recommending calibration be re-run
 - While not urgent, needs to be as close to the MapCam color observations (taken in September) as possible
 - Dathon / Christian to take this offline with Sara / Anjani
- **OTES (Chris):**
 - On and nominal.
 - Approximately 6 ATFs of data received, as expected.
- **OVIRS (Rick):**
 - On and nominal
 - Big update on Friday
- **OLA (Emily):**
 - Off and nominal
- **REXIS (Dan):**
 - On and nominal.
 - Data from power on through today looking good.
 - One gap in data, unsure if real yet.



SPOC Watch Item List

Todays Date: 11/01/2019		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	577		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 Polyacam 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	422		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
12047	9/13/19	Spacecraft Minor	Normal	Single Corrupted TAGCAMS NavCam 1 Image	One TAGCAMS NavCam 1 image out of 165 images taken on September 13, 2019 was significantly corrupted. Initially it appeared to be due to missing packets and nothing out of the ordinary but further investigation by the SPOC and MSA teams found inconsistencies which are still not fully understood.		In Progress	TBD	TBD
11287	9/9/19	Ground Minor	Normal	Incorrect Spacing Between OVIRS BPM Update Sequences	During review of the OVIRS bad pixel map update, it was discovered that one of the OVIRS BPM sequences needed to be rebuilt for a pass 2 cycle. This update resulted in a change to the sequence execution duration which was not communicated to the MSA. This drove a change to the OVIRS BPM activity sequence built by the MSA to prevent sequence collisions during the activity as a result of the longer execution duration. When the correct runtime was presented by the SPOC, the MSA interpreted the sequence runtime without the original 2-minute padding planned during the activity at kickoff.		In Progress	TBD	TBD
11268	9/5/19	Spacecraft Major	Normal	IMU1 Configuration Issue	During MIMU procurement on the LUCY program, it was found that the OSIRIS-REx IMU1 (S/N 502) was loaded with an incorrect Built-In-Test (BIT) parameter file at Honeywell prior to delivery to Lockheed Martin. This file defines the bit mapping of the MIMU status word. The status word contains a set of bits that are set high in the presence of various errors detected internally by the MIMU when performing Built-In-Tests.		In Progress	TBD	TBD
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)		Monitor	TBD	TBD
7704	1/10/19	Spacecraft Major	Normal	Potential particles detected in NavCam images while in Benuu 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 Benuu (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.		Monitor	TBD	TBD

Current ISA Status

#	Status	Priority	Subject	Assignee	Updated
12047	In Progress	Normal	Single Corrupted TAGCAMS NavCam 1 Image	Mark Fisher	10/28/19 13:37
11980	In Progress	Normal	No 2-way Doppler Tracking after M3R maneuver in Recon-A	Andy Calloway	10/28/19 13:40
11464	In Progress	Normal	Maneuver Automation froze after executing PEF Gen - M30D Late Update	Paul Falkenstern	10/22/19 19:55
11268	In Progress	Normal	IMU1 Configuration Issue	Mark Fisher	9/13/19 10:18
11180	In Progress	Normal	orxmsanfs System Patching Issue with ZFS	Lance Tanaka	8/29/19 10:36
10939	Monitor	Normal	REXIS SXM recording significantly fewer counts	Karl Harshman	10/25/19 14:35
8767	In Progress	Normal	Re-occurrence: STL intermittent downlink issues during setup	Amir Mirfakhrai	9/29/19 20:07
7704	Monitor	Normal	Potential particles detected in NavCam images while in Bennu Orbit-A Phase	Ron Mink	9/13/19 9:07