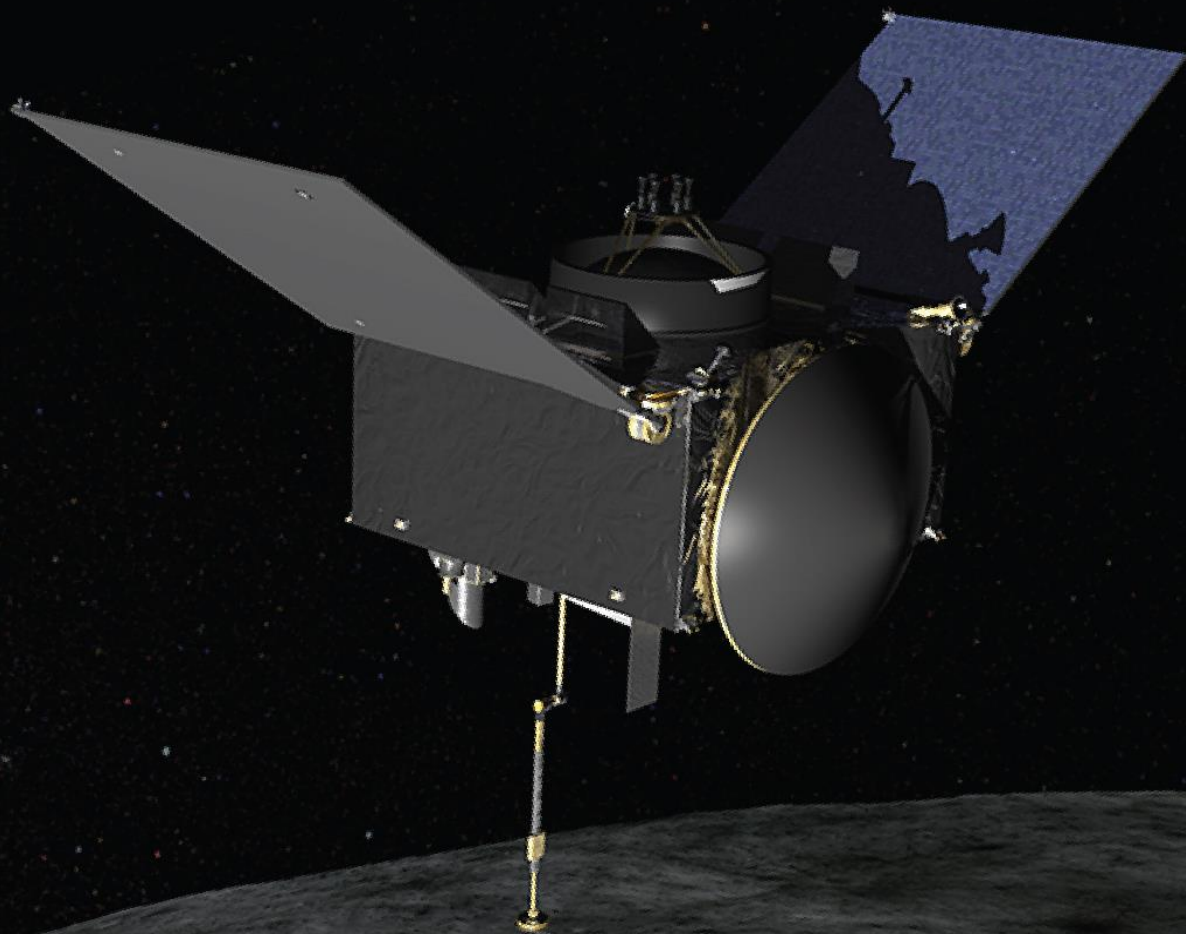




Daily Downlink Tagup

Friday, September 14, 2018 (DOY 257)

OSIRIS-REXTM
ASTEROID SAMPLE RETURN MISSION



Agenda & Logistics

- **Quicklook Status**
- **Weekly Instrument Status (Mondays only)**
- **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 Slides available shortly after each Tagup at:

OSIRIS-REx Bennu Proximity Operations\Science Implementation\Downlink_Daily_Summary

Quicklook 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										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: 916 kbps**

WOY	DOY	Start Date	HGA Start	End Date	HGA End	Duration	Note
37	253	2018-09-10	n/a	2018-09-10	n/a	n/a	<i>No scheduled downlink 253</i>
37	254	2018-09-11	17:15	2018-09-11	19:15	02:00	COMPLETE
37	255	2018-09-12	18:45	2018-09-12	20:10	01:25	COMPLETE
37	256	2018-09-13	17:10	2018-09-13	20:05	02:55	COMPLETE
37	257	2018-09-14	14:40	2018-09-14	17:40	03:00	COMPLETE
37	258	2018-09-15	15:25	2018-09-15	19:20	03:55	
37	259	2018-09-16	14:40	2018-09-16	17:50	03:10	

DSN Notes:

- DSS14 is now Green
- RED EQUIPMENT STATUS: SPC/DSS EQUIPMENT ETRO -----

DSS25 AWVR 257/2300z
SPC60 NMC-SR1 260/1600z
DSS43 S400KW 261/0630z
SPC60 VSR 300/1648z

Approach: Dust Plume Search & REXIS Cover Open Attempt 1

WOY 37

	Monday	Tuesday	Wednesday
37	253 (0910) Template AP4: OpNav and/or Daily Phase Function Day	254 (0911) AP1: Nominal Science Day	255 (0912) AP1: Nominal Science Day
Template	HGA Pass: 5-7 Hour	DDOR window TL 6 Hour, includes OpNav	HGA Pass: 5-7 Hour
Sci Plan	NO DSN HGA TIME (SPF/HYB)	DSN 1715-1915 55 *2hr*	DSN 1845-2010 65 *1hr, 25m*
S/C Pointing		Dust Plume Search PolyCam (93 Images)	Dust Plume Search MapCam (93 Images)
OCAMS		ps1_wl_8254a_01.af (PC Dust Plume) Start: 04:01:22, End: 08:12:00	ps1_wl_8255a_01 (MC Dust Plume) Start: 04:01:14, End: 08:19:00 opn_wl_8255a_01.af - Start: 00:22:14, End: 08:56:25
OTES			
OVIRS			
OLA			
REXIS			
NAVCAM			

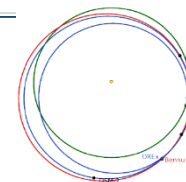
We are HERE

	Thursday	Friday	Saturday
37	256 (0913) Template AP4: OpNav and/or Daily Phase Function Day	257 (0914) Template AP4: OpNav and/or Daily Phase Function Day	258 (0915) Template AP4: OpNav and/or Daily Phase Function Day
Template	DDOR window	DDOR window	DDOR window
Sci Plan	DSN 1710-2005 55	DSN 1440-1740 55	
S/C Pointing		REXIS Cover Open - Primary Attempt	
OCAMS		Earth Pt	Earth Pt
OTES		opn_wl_8255a_01.af - Start: 07:40:00, End: 08:14:01	
OVIRS			
OLA			
REXIS			
NAVCAM			

	Sunday	Monday
37	259 (0916) Template AP4: OpNav and/or Daily Phase Function Day	260 (0917) Template AP4: OpNav and/or Daily Phase Function Day
Template	HGA Pass: 5-7 Hour	DDOR window
Sci Plan	DSN 1525-1920 65	DSN 0200-0300 26/36 N/5
S/C Pointing		
OCAMS	Earth Pt	Earth Pt
OTES		
OVIRS		
OLA		
REXIS		REXIS Cover Open - 2nd Attempt, if needed
NAVCAM		

Statistics as of September 12, 2018, L+734 days

- Days until Arrival: 82 days
- Earth Range = 121,000,000 km (0.81 AU) (↑)
- Sun Range = 180,000,000 km (1.20 AU) (↓)
- Bennu Range = 1,000,000 km (↓)
- Sun-Probe-Earth Angle = 56.0 deg (↑)
- One Way Light Time = 00:06:43 hh:mm:ss (↑)
- Round Trip Light Time = 00:13:27 hh:mm:ss (↑) (↑ increasing, ↓ decreasing)



Approach: OpNavs & REXIS Cover Open Attempt 2 & 3

WOY 38

38	Monday							Tuesday							Wednesday								
	260 (0917) Template AP4: OpNav and/or Daily Phase Function Day							261 (0918) Template AP4: OpNav and/or Daily Phase Function Day							262 (0919) Template AP4: OpNav and/or Daily Phase Function Day								
Template	HGA Pass: 5-7 Hour							DDOR window							HGA Pass: 5-7 Hour								
Sci Plan	DSN 1440-1740 55							NO DSN HGA TIME (DSN Madrid stations security scan downtime)							DSN 0200-0300 26/36 N/S								
S/C Pointing	Earth Pt														HGA Pass: 5-7 Hour								
OCAMS															opn_at_18255a_01.at - Start 06:40:22, End 06:14:01								
OTES																							
OVIRS																							
OLA																							
REXIS	REXIS powered on 12:40 Frangbolt timer seq4: res_bolt_fire_seq4.igo Start: ~14:50, dur 121 min																						
NAVCAM																							

38	Thursday							Friday							Saturday													
	263 (0920) Template AP4: OpNav and/or Daily Phase Function Day							264 (0921) Template AP4: OpNav and/or Daily Phase Function Day							265 (0922) Template AP4: OpNav and/or Daily Phase Function Day													
Template	DDOR window							HGA Pass: 5-7 Hour							DDOR window													
Sci Plan								DSN 1445-1730 65							DSN 1430-1650 54 Data cutoff AAM1 Final Design							REXIS Cover Open - 3rd Attempt, if needed						
S/C Pointing	Earth Pt														Earth Pt													
OCAMS															opn_at_18255a_01.at - Start 07:30:00, End 07:44:01													
OTES																												
OVIRS																												
OLA																												
REXIS																												

	Saturday							Sunday							Monday								
	267 (0923) Template AP4: OpNav and/or Daily Phase Function Day							266 (0923) Template AP4: OpNav and/or Daily Phase Function Day							267 (0924) Template AP4: OpNav and/or Daily Phase Function Day								
Template	HGA Pass: 5-7 Hour							DDOR window							HGA Pass: 5-7 Hour								
Sci Plan	DSN 1430-2000 55														DSN 1430-1730 65								
S/C Pointing	Earth Pt														Earth Pt								
OCAMS															Start of continuous coverage								
OTES																							
OVIRS																							
OLA																							
REXIS	opn_at_18255a_01.at - Start 07:30:00, End 07:44:01 ocm_eeeb3g_reset1et.NET 11:59:42 1830																						
SPAVN res_cover_open_seq2 NLT 11:40	REXIS powered on 12:40 Frangbolt timer seq4: res_bolt_fire_seq4.igo Start: ~14:50, dur 121 min																						

Uplink Summary

UPLINK

WOY 37 (2018/253 – 2018/260 UTC)

- xm1837 BG Seq [uplinked 2018-250/16:01](#)
- xm1837 Sci-genies, OpNav ATF, Dust Plume ATF and sequences [uplinked 2018-250/17:24](#)
- rex_cover_open_seq1 (Setup sequence to power on REX on DOY 257 and set Frangibolt timer for 1st Attempt) and rexis_cover_fp (disables Fault Protection and increases imu data rate) [uplinked 2018-250/16:23](#)
- rex_bolt_fire_seq4 [uplinked 2018-257/15:41:28](#)
 - Uplinked after we confirmed that REXIS has powered on nominally and Frangibolt time was confirmed set to 57 sec
- rex_cover_open_seq2 [uplinked 2018-257/15:57](#)
 - This sequence will run on Monday, DOY 260, powering REXIS ON and setting the Frangibolt timer to 72 sec.
 - If decision today is to stand down from Attempt 2, we will send a sequence to power REXIS off and disable the cover heaters.

WOY 38 (2018/260 – 2018/267 UTC)

- xm1838 BGSeq and Sci Genies [uplinked 2018-257/15:20:49](#)
 - xm1838 will re-use the xm1837 OpNav-only ATF and sequence
- rex_cover_open_seq3 will be uplinked after Attempt 2 if needed
- hlfp_spm_safe_rexis.mod will be uplinked after REXIS cover confirmed open

Execution Summary

- **Instrument Status:**
 - OCAMS is powered-on
 - All other payloads remain powered off
 - REXIS powered-on today 2018/257-12:30 UTC
 - REXIS scheduled to power off today 2018/257-17:48 (*this happened after the HGA pass ended*)

Executed (times in UTC):

- **2018/255 (Wednesday, Sept 12)**
 - 04:01 kick off MapCam Dust Plume Search
 - 64 targets (8x8 grid), taking a single 10 sec panchromatic image at each target allowing a 180 sec settle time
 - 9 targets, taking a single 10 sec panchromatic image with 0 sec settle time at each target
 - Darks before and after dust plume search
 - Total # of Images: 93 **(# of images expected=93 / # of images received= 93)**
 - 08:22 kick off OpNav-only ATF
 - 10 PolyCam opnav images **(# of images expected=10 / # of images received= 10)**
- **2018/257 (Friday, Sept 14)**
 - 07:40 kick off OpNav-only ATF
 - 10 PolyCam opnav images **(# of images expected=10 / # of images received= 10)**
 - 11:30 kick off rex_cover_open_seq1
 - Powered on REXIS with 1 hr Preheat. Approximate REXIS Power-ON time 2018/257-11:30 UTC
 - Sets the Frangibolt timer to 57 sec
 - 14:40 Start of HGA Pass
 - 15:40 SPOC “Go” provided to MSA to proceed with rex_bolt_fire_seq4
 - We remained in contact with the S/C for 112 out of 121 minutes of rex_bolt_fire_seq4 execution
 - Switch washer was noted as switching to (1) = open at ~16:38 UTC. Review of science data is still on-going this afternoon. More to come at the Go/NoGo meeting.
 - HGA Pass ended a few minutes prior to seeing REXIS power-off
 - 23:30 (16:30 MST) (*potentially moving earlier in the day*) we will hold a REXIS Cover Open Attempt 2 Go/No Go
 - This will be the forum for expressing desire to proceed with Attempt 2 or stand down from Attempt 2 if the Cover if Attempt 1 successfully opens the REXIS cover or if there is an anomalous situation after Cover Open Attempt 1

Up Next (times in UTC):

- **2018/258 – 2018/259 (Saturday, Sept 15-16)**
 - No scheduled activities
- **2018/260 (Monday, Sept 17)**
 - 10 PolyCam opnav images
 - 11:15 ocams_weekly_reset
 - 11:30 rex_cover_open_seq2
 - Transition to xm1838

Downlink Summary

Current Data Rate: 916 kbps

DOWNLINK

- **Partition Status as of 19:00 UTC:**

	Part. Start Vol (MB)	New Data Vol (MB)	New Data Vol (Mb)	Expected Partition Fill (%)	Current Partition Fill (%)	Comments
<i>OpNav</i>	0.00	22.40	179.20	3.20	0.00	
<i>OTES</i>	0.00	0.00	0.00	0.00	0.00	
<i>REXIS</i>	0.00	1.39	11.12	0.30	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	6.70	53.60	0.18	0.00	
<i>Tagcams/Overflow</i>	0.00	0.00	0.00	0.00	0.00	

List of Unexpected Alarms, Watch Items, ISAs, PFRs

Alarms

- None

Watch Items, ISA's and PFR's

- None

Need for Retransmit? Need for Replay?

- SPOCFlight Reports showing we have all data down through DOY 255

Science Status and/or PI Status

Looking Ahead

	37							38							39							40							
	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	
	9/10	9/11	9/12	9/13	9/14	###	###	9/17	9/18	9/19	9/20	9/21	###	###	9/24	9/25	9/26	9/27	9/28	###	###	10/1	10/2	10/3	10/4	10/5	###	###	
	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	
Week 8 - Tactical kickoff	xm1845 + Preliminary Survey Phase Kickoff							xm1846							xm1847							xm1848							
Week 7 - SOS	xm1844							xm1845							xm1846							xm1847							
Week 6 - J-A 1	xm1843							xm1844							xm1845							xm1846							
Week 5 - J-A 2	xm1842							xm1843							xm1844							xm1845							
Week 4 - TCR approval, Handshake	xm1841							xm1842							xm1843							xm1844							
Week 3 - FA Kickoff	xm1840							xm1841							xm1842							xm1843							
Week 2 - Final Build/Delivery/Test	xm1839							xm1840							xm1841							xm1842							
Week 1 - Review/Uplink	xm1838							xm1839							xm1840							xm1841							
Week 0 - Execution	xm1837 / REX Cover Open							xm1838							xm1839							xm1840							
Activities Currently Executing	Pol OpNav	Dust Plume Search PolyCam	Pol OpNav, Dust Plume Search MapCam	Pol OpNav, REX Cover Open Att. 1				Pol OpNav	REX Cover Open Att. 2	Pol OpNav		Pol OpNav	REX Cover Open Att. 3		Pol OpNav		Pol OpNav	Phase Function	Pol OpNav				Pol OpNav	Pol OpNav, Daily Phase Function	Pol OpNav, Daily Phase Function	Pol OpNav, Daily Phase Function	Pol OpNav, Daily Phase Function	Pol OpNav, Daily Phase Function	Pol OpNav, Daily Phase Function

Observation completion forecast dates:

Task Name	DP#	MRD	Start	Finish	WOY 2018 Finish	Completed?
Dust Plume Search: PolyCam Images		142a		9/11/2018	37	
Dust Plume Search: MapCam Images		142a		9/12/2018	37	
Phase Function: MapCam Images		149abc, 158		9/27/2018	39	

Validated L2 Data available forecast dates (includes 1 weekday for Downlink)

Task Name	DP#	MRD	Start	Finish	WOY 2018 Finish	Completed?
Dust Plume Search: PolyCam Images validated		142a	9/11/2018	9/18/2018	38	
Dust Plume Search: MapCam Images validated		142a	9/12/2018	9/19/2018	38	

Science Data Product completion forecast dates:

Task Name	DP#	MRD	Start	Finish	WOY 2018 Finish	Completed?
Dust Plume Image (AP-18)	AP-18	142a	9/19/2018	9/20/2018	38	

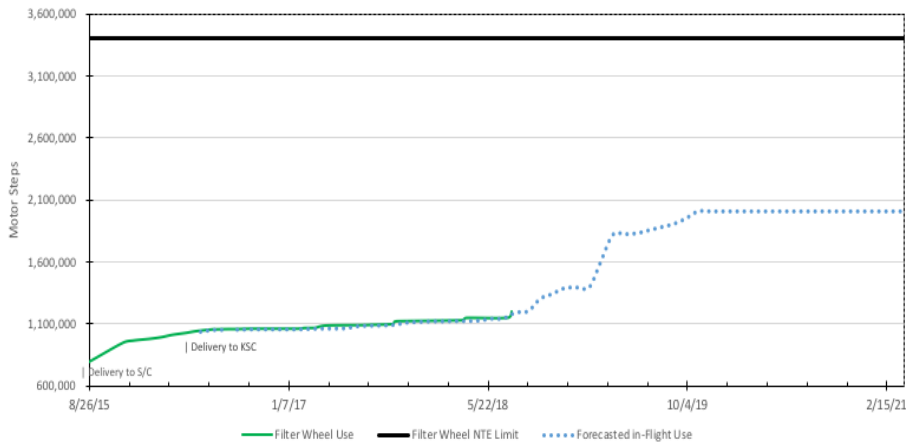
Go Backs / Additional Comments

Backup

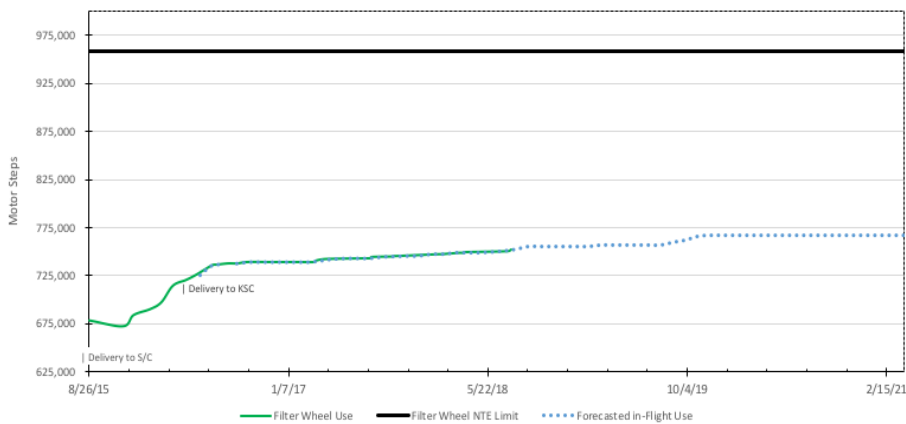
OCAMS Mechanism Life Tracking

Status as of September 05, 2018

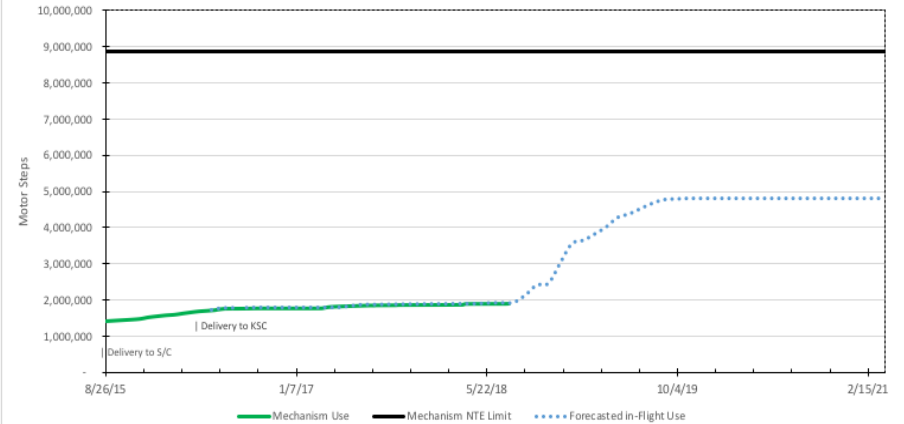
MapCam Flight Filter Wheel Margin



SamCam Flight Filter Wheel Margin



PolyCam Flight Focus Mechanism Margin

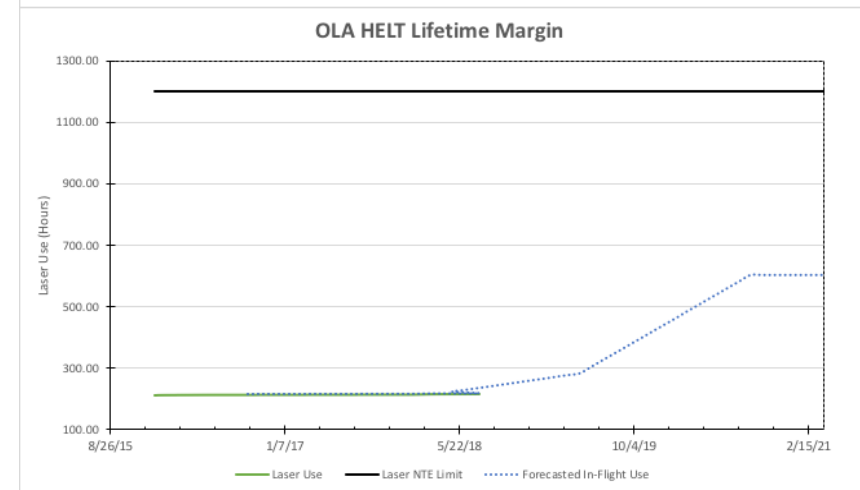
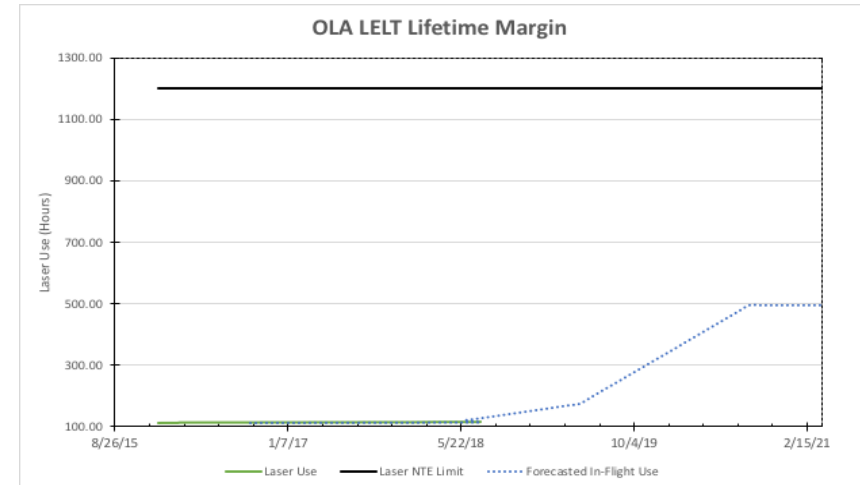


	Launch (steps)	Flight (steps)	NTE Margin (steps)
MapCam	1,057,475	139,099	2,464,384
SamCam	738,110	14,525	265,526
PolyCam	1,775,496	157,043	7,307,263

OLA Limited Life Laser Tracking

	Launch (hours)	Flight (hours)	NTE Margin (hours)
LELT	110.70	4.29	1,085.01
HELT	212.50	3.70	983.80

Status as of September 05, 2018



SPOC Watch Item List

Todays Date: 9/07/2018		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	9/30/16		Item1	REXIS	CCD Hot Pixels	Some hot pixels were noted on the CCD array.	Hardware Performance	707		Watch	None as of now. If this item trends up, an assessment of masking pixels will need to be made. Update 08/06/2018: REXIS team reports that no additional hot pixels have been noted since the opening of this item, but they will continue to monitor.
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	157		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.
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	2		Watch	Will monitor for future occurrences across all of the OCAMS cameras and assess if any action is warranted.

Anomaly Response & Status

ISA #	Date Created	Type	Priority	Title	Detailed Description - Action Plan	Notes	Status	Resolved Date	Need Date
5708	8/22/18	GroundMinor	Normal	FEDS not reconstructing packets that encounter a frame counter rollover	SPOC noticed a missing image line for one image. The image line had a packet in it which one of the frames within rolled over the frame counter. The packet was not reassembled and was not available from the FEDS at both LM and the SPOC.		In Progress	TBD	TBD
5855	9/5/18	Spacecraft Minor	Normal	OCAMS settings for OpNavs in Approach	The OCAMS performance specific to early Approach at low DN values warranted updates to previously delivered exposure settings in several OpNav Requests that was not necessarily expected or anticipated. This is relatively easily accommodated but is being captured more as a 'surprise' in the ISA then an anomaly or a problem, and as a place to capture the changes, the rationale for the changes, and any other implications or analyses that go with the exposure setting updates for posterity.		Draft	TBD	TBD
5854	9/5/18	Spacecraft Minor	Normal	Previously known OCAMS 'finger regions' implications on Nav solutions	Although this is not an issue for science because nominal observations are planned with pointing to avoid the finger regions when targeting or it's N/A due to the nature of the target and the scene entropy, there could be low probability but non-zero situations where the dispersion following a maneuver places Bennu in one of these less desirable locations overlapping a finger region causing bright blooming issues which can affect the center-finding algorithms. The project will likely document an acceptance of this low probability risk but the ISA is a logical place to capture any extra work, analysis, or implications this phenomenon can cause with other elements, particularly navigation.		Draft	TBD	TBD
5380	7/20/18	Ground Minor	Normal	SCLK SCET file error in rev 31	<p>The SCLK SCET file released on July 10 (rev 31) has an error in it that results in a 5 second offset due to an incorrect incorporation of the DUT.</p> <p>Rev 32 is in work to replace this file and remove the incorrect entry from the sclk-scet interpolation history.</p> <p>On Friday, 7/20 the SPOC was notified that the SCLKSCET kernel delivered on July 10, 2018 (FILENAME: ORX_SCLKSCET.00031), did not have the inclusion of Leap Seconds, therefore resulting in an ~5 second shortage in timing. This kernel had been applied to all the L+22 data up until notification late Friday afternoon.</p> <p>A new SCLKSCET has been released as of this morning 07/23/18 (FILENAME: ORX_SCLKSCET.00032) with this issue corrected. Please Note: SPOC will be kicking off reprocessing of all L+22 data using ORX_SCLKSCET.00032 after the conclusion of today's DSN pass (at ~21:00 UTC) 07/23/18.</p>		In Progress	TBD	TBD
5285	6/11/18	Ground Minor	Normal	OVIRS encountered two missed aliveness checks after a RESET	During the OVIRS L+22 BPM and LUT loads and checkouts OVIRS experience two instances of two missed Aliveness Checks. Three would have safed the instrument. This occurred after the RESET post loading of the BPM and LUT files. It did not occur after the first RESET prior to loading the files. It was consistent for both the Super Pixel 2 and 8 loads.		In Progress	TBD	9/7/18

Anomaly Response & Status

ISA #	Date Created	Type	Priority	Title	Detailed Description - Action Plan	Notes	Status	Resolved Date	Need Date
4861	5/12/18	Ground Minor	Normal	Planning Complications with Early ATL Stop	<p>During ORT 4/5, we ran into a previously unrecognized complication of stopping a re-usable ATL early.</p> <p>As it processes the ATL, the FSW will load each next target at the end of the current target. The result is that if an ATL is stopped before the end of the full target list, there will be one more target loaded that will execute after the stop. (The original design of the ATL was based on absolute times so there was no plan to stop a running ATL outside of Safe Mode.)</p> <p>If we want to be able to stop an ATL early, the MSA needs to send the ATL Stop command in the window between the load of the last desired target (4 seconds before the target time of the penultimate target) and the load of the next target (4 seconds before the target time of the last target). This time cannot be calculated by the MSA until the MSA has received the ATF and UPBL so the load times can be resolved. Alternatively, the relative ATL could be truncated at the appropriate times to avoid this.</p>	7/19/18: MSA has identified all needed apps, they will require implementation to close this ISA.	In Progress	TBD	TBD
4762	5/3/18	Ground Minor	Normal	JAsteroid and ATARPS FOV disagreement	JAsteroid did not show that Bennu was in the star tracker field of view but ATARPS did, even when using the same initial conditions. There is concern that this may also extend past just the ST FOV. This needs further investigation.	6/15/18: All data has been provided to MSA for analysis	In Progress	TBD	TBD

Current ISA Status

#	Status	Priority	Subject	Assignee	Updated
5855	Draft	Normal	OCAMS settings for OpNavs in Approach		9/5/18 22:07
5854	Draft	Normal	Previously known OCAMS 'finger regions' implications on Nav solutions		9/5/18 21:55
5786	In Progress	High	Corruption of local disk and OS on NavMSA iMac workstations	Michael Moreau	9/5/18 21:44
5708	In Progress	Normal	FEDS not reconstructing packets that encounter a frame counter rollover	Mark Fisher	8/23/18 12:31
5701	In Progress	Normal	Missing Downlink Table during Station 55 pass on 18229	Andy Calloway	8/23/18 12:54
5506	In Progress	Normal	TAGSAM Convoluted Tube (flex hose)	Beau Bierhaus	8/9/18 7:15
5380	In Progress	Normal	SCLK SCET file error in rev 31	Mark Fisher	7/23/18 9:48
5285	In Progress	Normal	OVIRS encountered two missed aliveness checks after a RESET	Allen Lunsford	7/19/18 9:48
4868	In Progress	Normal	Dropped data during STL run	Mike Skeen	5/25/18 9:45
4861	In Progress	Normal	Planning Complications with Early ATL Stop	Olivia Billett	8/3/18 14:40
4762	In Progress	Normal	JAsteroid and ATARPS FOV disagreement	Sandy Freund	9/5/18 21:42