



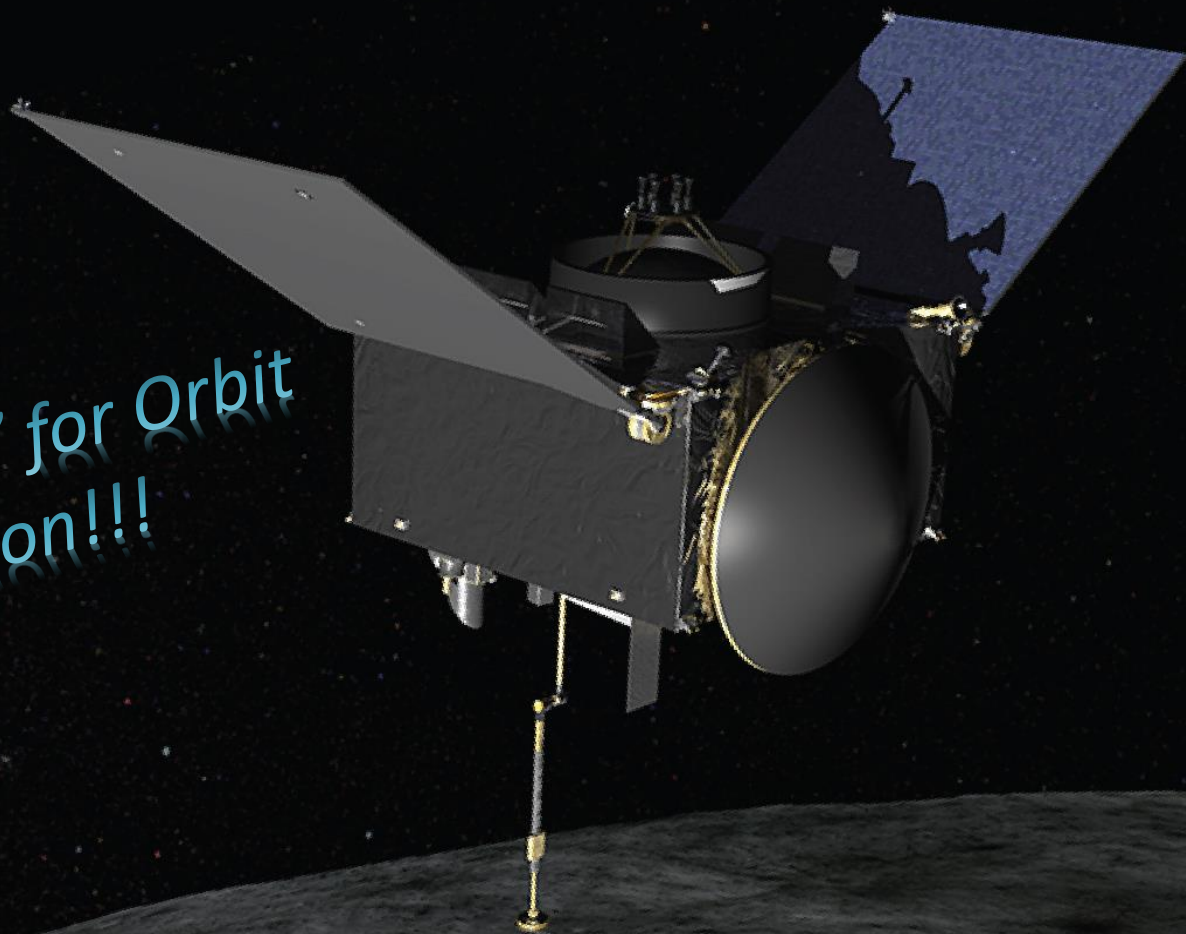
Daily Downlink Tagup

Monday, December 31, 2018 (DOY 365)

CHARTS ONLY!

OSIRIS-REX™
ASTEROID SAMPLE RETURN MISSION

We are "Go" for Orbit
Insertion!!!



Agenda & Logistics

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

NEW! 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/2018

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		

Nationwide CenturyLink Outage

- **One of the two main lines between Denver & JPL was restored overnight on 12/28, and we were able to successfully uplink and downlink from the MSA over the weekend.**
- **As of Sunday, 12/30, both lines between Denver & JPL are up and running to Lockheed Martin. JPL has been monitoring them and they appear to be stable with the same performance prior to the outage.**

Downlink Schedule (times in UTC)

- **Current Data Rate: 916 kbps**

WOY	DOY	Start Date	HGA Start	End Date	HGA End	Duration	Note
52	363	12-29-2018	14:03	12-29-2018	18:36	04:33	COMPLETE
52	364	12-30-2018	14:03	12-30-2018	18:36	04:33	COMPLETE
52	365	12-31-2018	14:03	12-31-2018	16:08	02:05	COMPLETE
01	001	01-01-2019	14:03	01-01-2019	18:36	04:33	
01	002	01-02-2019	16:49	01-02-2019	18:36	01:47	
01	003	01-03-2019	15:19	01-03-2019	19:00	03:41	
01	004	01-04-2019	17:29	01-04-2019	18:36	01:07	
01	005	01-05-2019	14:02	01-05-2019	18:36	04:34	

DSN Notes:

DSS65/ORX 365/1228Z DR M111103 Hardware/X20KW Entered 365/1238Z 0010
 Originating Site:MDSCC Controlling Site:MDSCC
 X20kw transmitter output power dropped down from 18.5kw to 4kw at
 12:28:00z. The output power level was adjusted to 16.5kw by increasing
 the drive power. Unable to get 18.5KW.

Network Latency to LMSCC is nominal, DOY 363/1012z, Closed
 On DOY 363/1012z: A bad network card was removed from the equipment. All services have been restored.

Red Equipment Status:

SPC/DSS	EQUIPMENT	ETRO
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DSS63	MSI	024/1430z
DSS25	AWVR	033/2300z
SPC60	VSR	350/1648z
DSS63	EAC	355/1621z

Transition to Orbital A – NavCam OpNavs, M2A

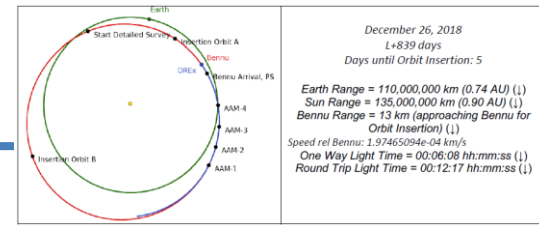
WOY 52 COMPLETE

	Monday																							Tuesday																							Wednesday																						
S2	*****TRANSITIONING the week template boundary to 13:30. Week 1852 will start at 13:30UTC.*****																							*****TRANSITIONING the week template boundary to 13:30. Week 1852 will start at 13:30UTC.*****																							*****TRANSITIONING the week template boundary to 13:30. Week 1852 will start at 13:30UTC.*****																						
Template	358 (12/24) PS-6 / PS-7 Drift Period no DDOR/Drift Period with DDOR																							359 (12/25) PS-7 / PS-6 Drift Period Day without DDOR/ Drift Period Day with DDOR																							360 (12/26) PS-6 / PS-7 Drift Period Day with DDOR/ Drift Period Day without DDOR																						
OpNav wk	<div style="display: flex; justify-content: space-between;"> HGA with Desat Option OpNav </div>																							<div style="display: flex; justify-content: space-between;"> HGA with Desat Option OpNav </div>																							<div style="display: flex; justify-content: space-between;"> HGA with Desat Option OpNav </div>																						
S/C Pointing	N/Sun																							N/Sun																							N/Sun																						
OpNavs	4																							4																							4																						
OCAMS	>> OCAMS off in WOY 52																							>> OCAMS off in WOY 52																							>> OCAMS off in WOY 52																						
OTES	>> OTES off in WOY 52																							>> OTES off in WOY 52																							>> OTES off in WOY 52																						
OVIRS	>> OVIRS off in WOY 52																							>> OVIRS off in WOY 52																							>> OVIRS off in WOY 52																						
OLA	>> OLA off in WOY 52																							>> OLA off in WOY 52																							>> OLA off in WOY 52																						
REXIS	>> REXIS off in WOY 52																							>> REXIS off in WOY 52																							>> REXIS off in WOY 52																						
NAVCAM	opn_atl_18351a_01 Starts: 20:45, Ends: 11:19																							opn_atl_18351a_01 Starts: 20:05, Ends: 00:39																							opn_atl_18351a_01 Starts: 04:45, Ends: 11:19																						

	Thursday																							Friday																							Saturday																						
S2	361 (12/27) OA 1: Nominal OpNav Only Day - Sun Pt or Nadir Pt default attitude																							362 (12/28) OA 1: Nominal OpNav Only Day - Sun Pt or Nadir Pt default attitude																							363 (12/29) OA 2 OA 2: Fixed Burn Day - Sun Pt or Nadir Pt default att																						
Template	DDOR OpNavs HGA Pass DDOR																							DDOR OpNavs HGA Pass DDOR																							DDOR OpNavs HGA Pass DDOR																						
OpNav wk	0845-1125 35																							1130-2035 55																							1130-2030 55																						
S/C Pointing	N/Sun																							N/Sun																							N/Sun																						
OpNavs	4																							2																							5																						
OCAMS	>> OCAMS off in WOY 52																							>> OCAMS off in WOY 52																							>> OCAMS off in WOY 52																						
OTES	>> OTES off in WOY 52																							>> OTES off in WOY 52																							>> OTES off in WOY 52																						
OVIRS	>> OVIRS off in WOY 52																							>> OVIRS off in WOY 52																							>> OVIRS off in WOY 52																						
OLA	>> OLA off in WOY 52																							>> OLA off in WOY 52																							>> OLA off in WOY 52																						
REXIS	>> REXIS off in WOY 52																							>> REXIS off in WOY 52																							>> REXIS off in WOY 52																						
NAVCAM	opn_atl_18351a_01 Starts: 20:45, Ends: 13:19																							opn_atl_18351a_01 Starts: 21:05, Ends: 23:39																							opn_atl_18351a_01 Starts: 21:05, Ends: 23:39																						

	Saturday																							Sunday																							Monday												
S2	364 (12/30) OA 1: Nominal OpNav Only Day - Sun Pt or Nadir Pt default attitude																							365 (12/31) OA 3: Variable Burn Day - Sun Pt or Nadir Pt default attitude																							365 (12/31) OA 3: Variable Burn Day - Sun Pt or Nadir Pt default attitude												
Template	HGA Pass Burn DDOR																							HGA Pass DDOR																							HGA Pass DDOR												
OpNav wk	1200-1645 65																							1930-2030 55/25 E/W																							0720-1115 35												
S/C Pointing	N/S4																							N/Sun																							N/Sun												
OpNavs	5																							2																							2												
OCAMS	>> OCAMS off in WOY 52																							>> OCAMS off in WOY 52																							>> OCAMS off in WOY 52												
OTES	>> OTES off in WOY 52																							>> OTES off in WOY 52																							>> OTES off in WOY 52												
OVIRS	>> OVIRS off in WOY 52																							>> OVIRS off in WOY 52																							>> OVIRS off in WOY 52												
OLA	>> OLA off in WOY 52																							>> OLA off in WOY 52																							>> OLA off in WOY 52												
REXIS	>> REXIS off in WOY 52																							>> REXIS off in WOY 52																							>> REXIS off in WOY 52												
NAVCAM	opn_atl_18351a_01 Starts: 04:45, Ends: 13:19																							opn_atl_18351a_01 Starts: 21:05, Ends: 01:39																							opn_atl_18351a_01 Starts: 20:45, Ends: 13:21												

Orbital A Start – M3A and NavCam OpNavs WOY 2019-01



We are HERE

1	Monday 365 (12/31) OA 3: Variable Earth - Sun Pt or Nadir Pt default attitude	Tuesday 1 (01/01) OA 1: Nominal OpNav Only Day - Sun Pt or Nadir Pt default attitude	Wednesday 2 (01/02) OA 1: Nominal OpNav Only Day - Sun Pt or Nadir Pt default attitude	Thursday 3 (01/03) OA 1: Nominal OpNav Only Day - Sun Pt or Nadir Pt default attitude
Template	HGA Pass	OpNavs	HGA Pass	DDOR
Sci Plan	1120-2115 65, 1200-1645 55 M3A - Orbital A - orbit A insertion	2105-0450 25 ORBIT INSERTION		
S/C Pointing	Earth Pt	N/Sun	N/Sun	N/Sun
OpNavs	3	3	3	3
OCAMS	>> OCAMS off in WOY 01			
OTES	>> OTES off in WOY 01			
OVIRS	>> OVIRS off in WOY 01			
OLA	>> OLA off in WOY 01			
REXIS	>> REXIS off in WOY 01			
NAVCAM		opn_atl_19001a_01 Starts 00:00, Ends: 12:38	opn_atl_19001a_01 Starts 20:30, Ends: 01:08	opn_atl_19001a_01 Starts 04:01, Ends: 12:39

1	Thursday 8 (01/04) OA 1: Nominal OpNav Only Day - Sun Pt or Nadir Pt default attitude	Friday 4 (01/05) OA 1: Nominal OpNav Only Day - Sun Pt or Nadir Pt default attitude	Saturday 5 (01/06) OA 1: Nominal OpNav Only Day - Sun Pt or Nadir Pt default attitude
Template	HGA Pass	OpNavs	HGA Pass
Sci Plan			
S/C Pointing	Nadir	Nadir	Nadir
OpNavs	5	5	5
OCAMS			
OTES			
OVIRS			
OLA			
REXIS			
NAVCAM	opn_atl_19002a_01 Starts: 20:41, Ends: 13:19	opn_atl_19002a_01 Starts: 20:41, Ends: 13:19	opn_atl_19002a_01 Starts: 20:41, Ends: 13:19

1	Sunday 6 (01/06) OA 1: Nominal OpNav Only Day - Sun Pt or Nadir Pt default attitude	Monday 7 (01/07) OA 1: Nominal OpNav Only Day - Sun Pt or Nadir Pt default attitude
Template	OpNavs	HGA Pass
Sci Plan		
S/C Pointing	Nadir	Nadir
OpNavs	5	5
OCAMS		
OTES		
OVIRS		
OLA		
REXIS		
NAVCAM	opn_atl_19002a_01 Starts: 20:41, Ends: 13:19	opn_atl_19002a_01 Starts: 20:41, Ends: 13:19

Uplink Summary

UPLINK

WOY 01 (2018-365 – 2019-007)

- xm1901 BG Seq, Sci Genies, Payload Sequences [uplinked 2019-362](#)

Ephemeris Updates

- Ephemeris Update : od080 [uplinked 2018-362](#)
- Ephemeris Update : od081 [uplinked 2018-363](#)
- Ephemeris Update : od082 [uplinked 2018-365](#)

Config Files

- M3A Preliminary Design maneuver file [uplinked 2018-362](#)
- M2A Late Update maneuver file [uplinked 2018-363](#)
- M3A Late Update maneuver file [uplinked 2018-365](#)

M2A Quicklook Execution Summary

OSIRIS-REx Nav Team Maneuver Quick-look Error Report

Report Date: 29-Dec-2018 17:34:16 UTC

M2A

Nominals:

Nav Design Times:

29-DEC-2018 17:00:00.000 [UTC] Start time at spacecraft

29-DEC-2018 17:00:19.091 [UTC] End time at spacecraft

29-DEC-2018 17:06:01.911 [UTC] Start time at Earth

29-DEC-2018 17:06:21.002 [UTC] End time at Earth

14.918 [cm/s] Total Magnitude

311.658 [deg] RA

-24.207 [deg] Dec

19.091 [s] Duration (Nav Design)

33.601 [deg] Look angle

161.718 [deg] Angle from heliocentric velocity vector

361.911 [s] One-way light time

8.446 [GHz] Received downlink frequency, 2-way tracking

0.056 [Hz per mm/sec] Conversion factor

0.124 [m/s] Delta-range rate

7.001 [Hz] Expected Doppler shift seen by DSN

Actuals:

7.025 [Hz] Actual Doppler shift seen by DSN

14.969 [cm/s] Delta-V magnitude, given perfect pointing

0.052 [cm/s] Delta-V magnitude error, given perfect pointing

0.347 [%] Percentage Delta-V magnitude error, given perfect pointing

33.300 [deg] Look angle, given perfect magnitude

-0.300 [deg] Look angle error, given perfect magnitude

Execution Summary

Instrument Status:

- All Science Payloads powered OFF

Executed (times in UTC):

- 2018/358 (Monday, Dec 24)
 - NavCam Optrons
 - » # of NavCam images expected/**received** (DOY 357 12:00 - DOY 358 13:30) : 32 / **32**
- 2018/359 (Tuesday, Dec 25)
 - NavCam Optrons
 - » # of NavCam images expected/**received** (DOY 358 13:30 - DOY 359 13:30) : 32 / **32**
- 2018/360 (Wednesday, Dec 26)
 - NavCam Optrons
 - » # of NavCam images expected/**received** (DOY 359 13:30 - DOY 360 13:30) : 28 / **28**
- 2018/361 (Thursday, Dec 27)
 - NavCam Optrons
 - » # of NavCam images expected/**received** (DOY 360 13:30 - DOY 361 13:30) : 36 / **36**
- 2018/362 (Friday, Dec 28)
 - NavCam Optrons
 - » # of NavCam images expected/**received** (DOY 361 13:30 - DOY 362 13:30) : 28 / **28***
- 2018/363 (Saturday, Dec 29)
 - M2A Execution at 17:00 UTC
 - NavCam Optrons
 - » # of NavCam images expected/**received** (DOY 362 13:30 - DOY 363 13:30) : 28 / **28**
- 2018/364 (Sunday, Dec 30)
 - NavCam Optrons
 - » # of NavCam images expected/**received** (DOY 363 13:30 - DOY 364 13:30) : 32 / **32**
- 2018/365 (Monday, Dec 31)
 - NavCam Optrons
 - # of NavCam images expected/received (DOY 364 13:30 - DOY 365 13:30) : 36 / **36**
 - M3A Execution scheduled for 19:43 UTC

Up Next (times in UTC):

- 2019/001 (Tuesday, Jan 1)
 - NavCam Optrons
 - » # of NavCam images expected (DOY 365 13:30 - DOY 001 13:30) : 28
- 2019/002 (Wednesday, Jan 2)
 - NavCam Optrons
 - » # of NavCam images expected (DOY 001 13:30 - DOY 002 13:30) : 32
- 2019/003 (Thursday, Jan 3)
 - NavCam Optrons
 - » # of NavCam images expected (DOY 002 13:30 - DOY 003 13:30) : 36

Need for Retransmit? Need for Replay?

- As of 2018-365 / 18:00:00 UTC - No gaps showing in Frame_Retrans_Report for OpNav images thru this mornings pass.
- SPOC Ops Team still reviewing gap reports to determine if any gaps exist on SPOCFlight

List of Unexpected Alarms, Watch Items, ISAs, PFRs

Unexpected Alarms

- None

Watch Items, ISA's and PFR's

- **ISA #7533 – Maneuver Automation added 1.8 seconds to burn start time as compared to MPF due to subseconds conversions of 4 digit subseconds**
 - Date of Incident: December 31, 2018
 - Status: New
 - Criticality: Minimal Impact
 - Anomaly Type: Ground Minor

- **ISA #7518 – CenturyLink National Outage**
 - Date of Incident: December 27, 2018
 - Status: new
 - Priority: High
 - Criticality: Significant Impact
 - Anomaly Type: Ground Major
 - Other Projects Affected: Insight, MAVEN, MRO, Juno, Odyssey
 - Description: A nationwide CenturyLink outage did not allow normal ground activities for OSIRIS-REx including uplink, downlink, and moving data between elements.

Go Backs / Additional Comments

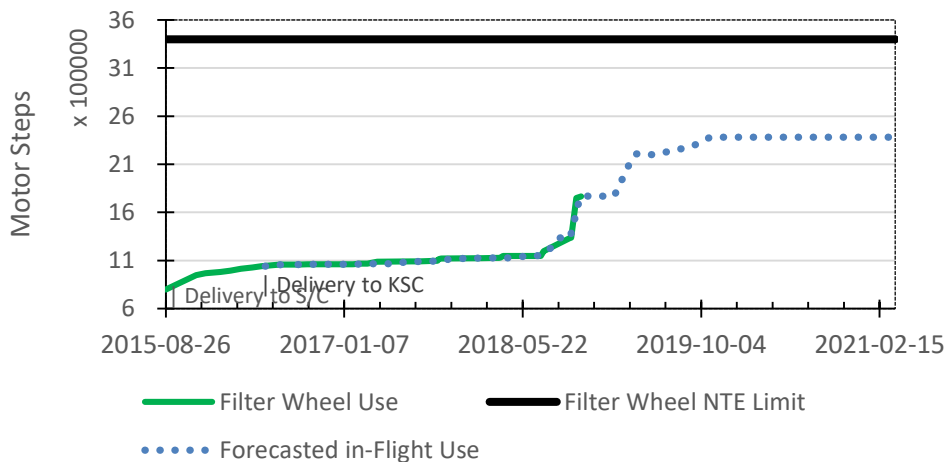
- **The remainder of Orbital A, we will have Daily Downlink Tagups on Mon/Wed/Fri**
- **There will be no Daily Downlink tomorrow, January 1, 2019**
- **Have a happy and safe New Years and talk to you all in 2019!**

Backup

OCAMS Mechanism Life Tracking

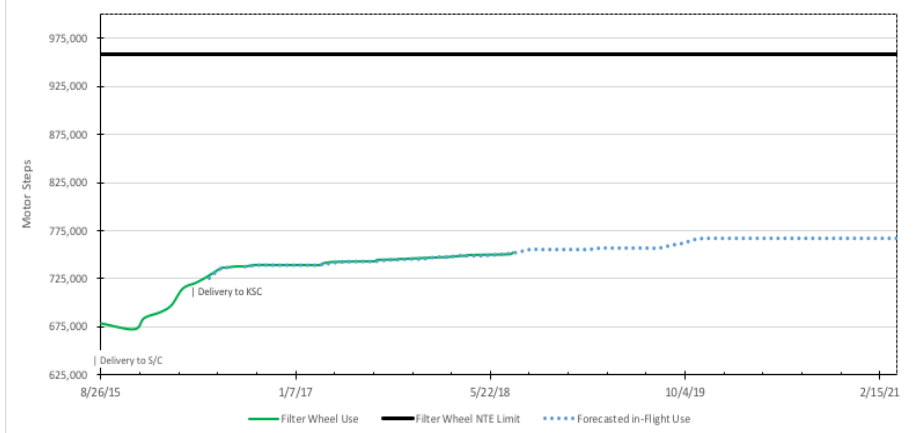
Status as of December 28, 2018

MapCam Flight Filter Wheel Margin

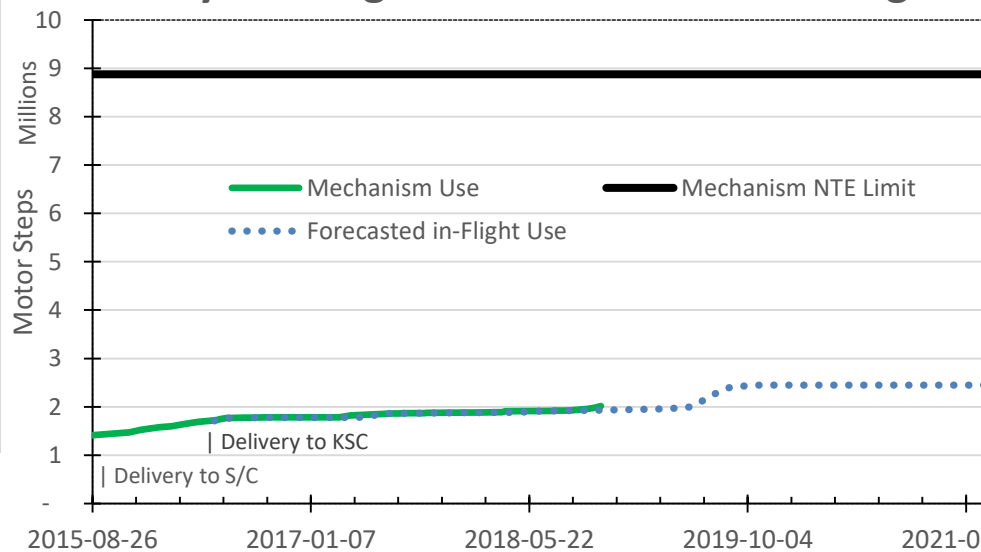


	Launch (steps)	Flight (steps)	NTE (steps)
MapCam	1057475	772545	3400320
SamCam	738110	15246	958384
PolyCam	1775496	305594	8876160

SamCam Flight Filter Wheel Margin



PolyCam Flight Focus Mechanism Margin



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 November 20, 2018

