



Daily Downlink Tagup

Wednesday, January 2, 2019 (DOY 002)

OSIRIS-REX™
ASTEROID SAMPLE RETURN MISSION

Welcome 2019!



Agenda & Logistics

- Quicklook 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

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/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: 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	COMPLETE
01	002	01-02-2019	16:49	01-02-2019	18:36	01:47	COMPLETE
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 365/1125Z DR M111104 Hardware/ANT Entered 365/1145Z 0020
 Originating Site:GDSCC Controlling Site:GDSCC

Delayed uplink acquisition (BOT) and earlier than scheduled carrier down time due to masking interlock set at 14.8 degrees. Uplink time adjusted from 112500z to 114500z.

Red Equipment Status:

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

M3A Quicklook Execution Summary

OSIRIS-REx Nav Team Maneuver Quick-look Error Report

Report Date: 31-Dec-2018 21:21:20 UTC

M3A

Nominals:

Nav Design Times:

31-DEC-2018 19:43:56.840 [UTC] Start time at spacecraft

31-DEC-2018 19:44:04.797 [UTC] End time at spacecraft

31-DEC-2018 19:49:54.767 [UTC] Start time at Earth

31-DEC-2018 19:50:02.724 [UTC] End time at Earth

5.979 [cm/s] Total Magnitude

163.316 [deg] RA

-3.497 [deg] Dec

7.957 [s] Duration (Nav Design)

174.028 [deg] Look angle

22.269 [deg] Angle from heliocentric velocity vector

357.927 [s] One-way light time

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

0.056 [Hz per mm/sec] Conversion factor

-0.059 [m/s] Delta-range rate

-3.350 [Hz] Expected Doppler shift seen by DSN

Actuals:

-3.364 [Hz] Actual Doppler shift seen by DSN

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

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

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

176.983 [deg] Look angle, given perfect magnitude

2.955 [deg] Look angle error, given perfect magnitude

Orbit Parameters:

Semi-major axis [km]: 1.824 +/- 6 m

Eccentricity: 0.1576 +/- 0.004

Radius of Periapse [km]: 1.536 +/- 12 m

Radius of Apoapse [km]: 2.111 +/- 1 m

Orbit Period [hrs]: 61.4 +/- 17.86 mins

Uplink Summary

UPLINK

WOY 01 (2018-365 – 2019-007)

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

Ephemeris Updates

- Ephemeris Update : od082 [uplinked 2018-365](#)
- Ephemeris Update : od083 [uplinked 2018-002](#)

Config Files

- M3A Late Update maneuver file [uplinked 2018-365](#)

Execution Summary

Instrument Status:

- All Science Payloads powered OFF

Executed (times in UTC):

- 2018/363 (Saturday, Dec 29)
 - M2A Execution at 17:00 UTC
 - NavCam Opanavs
 - » # of NavCam images expected/**received** (DOY 362 13:30 - DOY 363 13:30) : 28 / **28**
- 2018/364 (Sunday, Dec 30)
 - NavCam Opanavs
 - » # of NavCam images expected/**received** (DOY 363 13:30 - DOY 364 13:30) : 32 / **32**
- 2018/365 (Monday, Dec 31)
 - NavCam Opanavs
 - # of NavCam images expected/**received** (DOY 364 13:30 - DOY 365 13:30) : 36 / **36**
 - M3A Execution scheduled for 19:43 UTC
- 2019/001 (Tuesday, Jan 1)
 - NavCam Opanavs
 - » # of NavCam images expected/**received** (DOY 365 13:30 - DOY 001 13:30) : 28 / **28**
- 2019/002 (Wednesday, Jan 2)
 - NavCam Opanavs
 - » # of NavCam images expected/**received** (DOY 001 13:30 - DOY 002 13:30) : 32 / **32**

Up Next (times in UTC):

- 2019/003 (Thursday, Jan 3)
 - NavCam Opanavs
 - » # of NavCam images expected (DOY 002 13:30 - DOY 003 13:30) : 36
- 2019/004 (Friday, Jan 4)
 - NavCam Opanavs
 - » # of NavCam images expected (DOY 003 13:30 - DOY 004 13:30) : 36
- 2019/005 (Saturday, Jan 5)
 - NavCam Opanavs
 - » # of NavCam images expected (DOY 004 13:30 - DOY 005 13:30) : 36

Downlink Summary

- **Current Data Rate: 916 kbps**

Downlink

- Current 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	322.79	322.79	46.11%	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	0.00	0.00	0.00%	0.00%	
<i>Tagcams/Overflow</i>	0.00	3.50	3.50	0.44%	0.00%	

Downlink Summary

Looking ahead

- Expected Partition Status going into the next pass, scheduled for DOY 003:

	Part. Start Vol (MB)	New Data Vol (MB)	Partition Fill (MB)	Expected Partition Fill (%)	Expected End Partition (%)	Comments
<i>OpNav</i>	0.00	363.14	363.14	51.88%	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	0.00	0.00	0.00%	0.00%	
<i>Tagcams/Overflow</i>	0.00	3.50	3.50	0.44%	0.00%	

Downlink Summary

Looking ahead

- Expected Partition Status going into Friday's pass, scheduled for DOY 004:

	Part. Start Vol (MB)	New Data Vol (MB)	Partition Fill (MB)	Expected Partition Fill (%)	Expected End Partition (%)	Comments
<i>OpNav</i>	0.00	363.14	363.14	51.88%	13.75%	Friday Nav Images are Criticality 5
<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	0.00	0.00	0.00%	0.00%	
<i>Tagcams/Overflow</i>	0.00	3.50	3.50	0.44%	0.44%	

Need for Retransmit? Need for Replay?

- As of 2019-002 / 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

Science Status and/or PI Status

Looking Ahead

	1						2						3						4									
	365	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	12/31	1/1	1/2	1/3	1/4	1/5	1/6	1/7	1/8	1/9	1/10	1/11	###	###	1/14	1/15	1/16	1/17	1/18	###	###	1/21	1/22	1/23	1/24	1/25	###	###
	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	xm1909 - DS BBD Start - Map Imaging for SPC						xm1910 - 12:30 Station - Flyby 1						xm1911 - 12:30 Station - Flyby 2						xm1912 - 10 AM Station - Flyby 3									
Week 7 - SOS	xm1908 - Orbital A + Map Imaging for SPC						xm1909 - DS BBD Start - Map Imaging for SPC						xm1910 - 12:30 Station - Flyby 1						xm1911 - 12:30 Station - Flyby 2									
Week 6 - J-A 1	xm1907 - Orbital A						xm1908 - Orbital A + Map Imaging for SPC						xm1909 - DS BBD Start - Map Imaging for SPC						xm1910 - 12:30 Station - Flyby 1									
Week 5 - J-A 2	xm1906 - Orbital A						xm1907 - Orbital A						xm1908 - Orbital A + Map Imaging for SPC						xm1909 - DS BBD Start - Map Imaging for SPC									
Week 4 - TCR approval, Handshake	xm1905 - L+30 C/o & Cals, Orb A OpNavs						xm1906 - Orbital A						xm1907 - Orbital A						xm1908 - Orbital A + Map Imaging for SPC									
Week 3 - FA Kickoff	xm1904 - Orbital A, OpNav only						xm1905 - L+30 C/o & Cals, Orb A OpNavs						xm1906 - Orbital A						xm1907 - Orbital A									
Week 2 - Final Build/Delivery/Test	xm1903 - Orbital A, OpNav only						xm1904 - Orbital A, OpNav only						xm1905 - L+30 C/o & Cals, Orb A OpNavs						xm1906 - Orbital A									
Week 1 - Review/Uplink	xm1902 - Orbital A, OpNav only						xm1903 - Orbital A, OpNav only						xm1904 - Orbital A, OpNav only						xm1905 - L+30 C/o & Cals, Orb A OpNavs									
Week 0 - Execution	xm1901 - Orbital A, OpNav only						xm1902 - Orbital A, OpNav only						xm1903 - Orbital A, OpNav only						xm1904 - Orbital A, OpNav only									
L+30 Checkout/Cal Development																												
L+30 Checkout/Cal Delivery to MSA																												
L+30 Checkout/Cal Pass 1 Test																												
L+30 Pass 1 Review / Pass 2 (if needed)																												

Looking Ahead

Observation completion forecast dates:						
Source	WG	Task Name	Related DP #	MRD	Baseline Finish	WOY BL Finish
	No Science Obs					2018-52
	No Science Obs					2019-01
	No Science Obs					2019-02

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

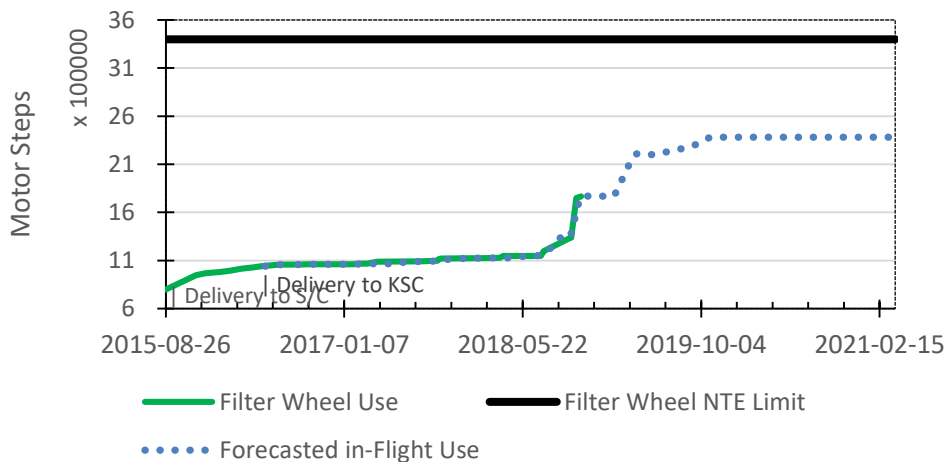
- For the remainder of Orbital A, Daily Downlink Tagups will be on Mon/Wed/Fri

Backup

OCAMS Mechanism Life Tracking

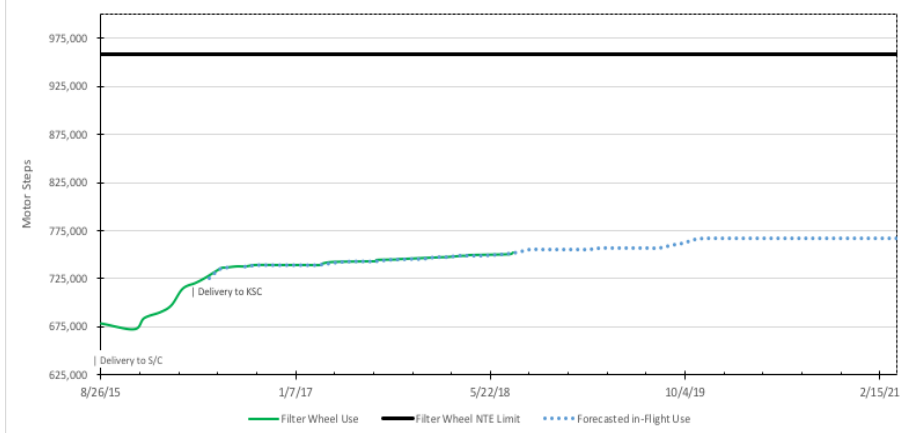
Status as of December 28, 2018

MapCam Flight Filter Wheel Margin

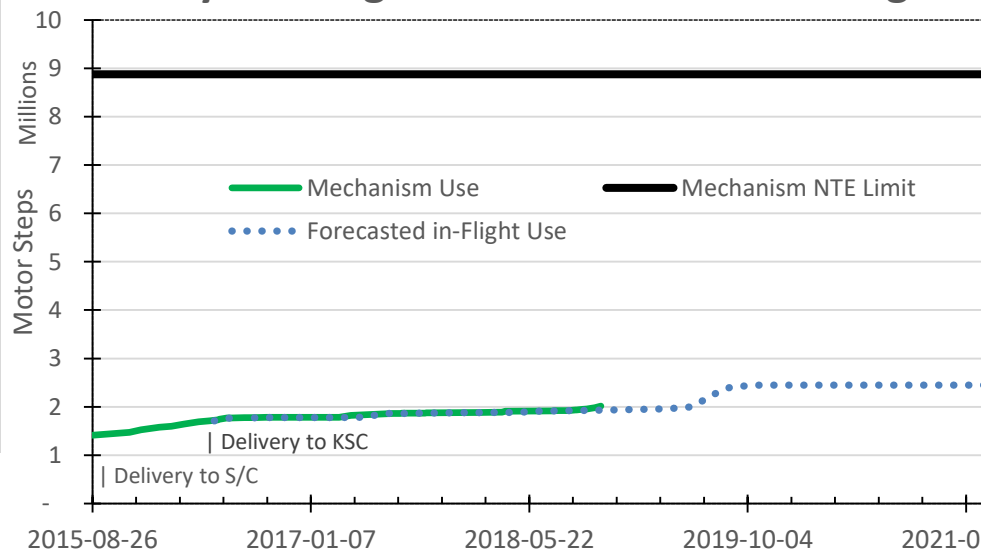


	Launch (steps)	Flight (steps)	NTE (steps)
MapCam	1057475	772545	3400320
SamCam	738110	15246	958384
PolyCam	1775496	305594	8876160

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

