

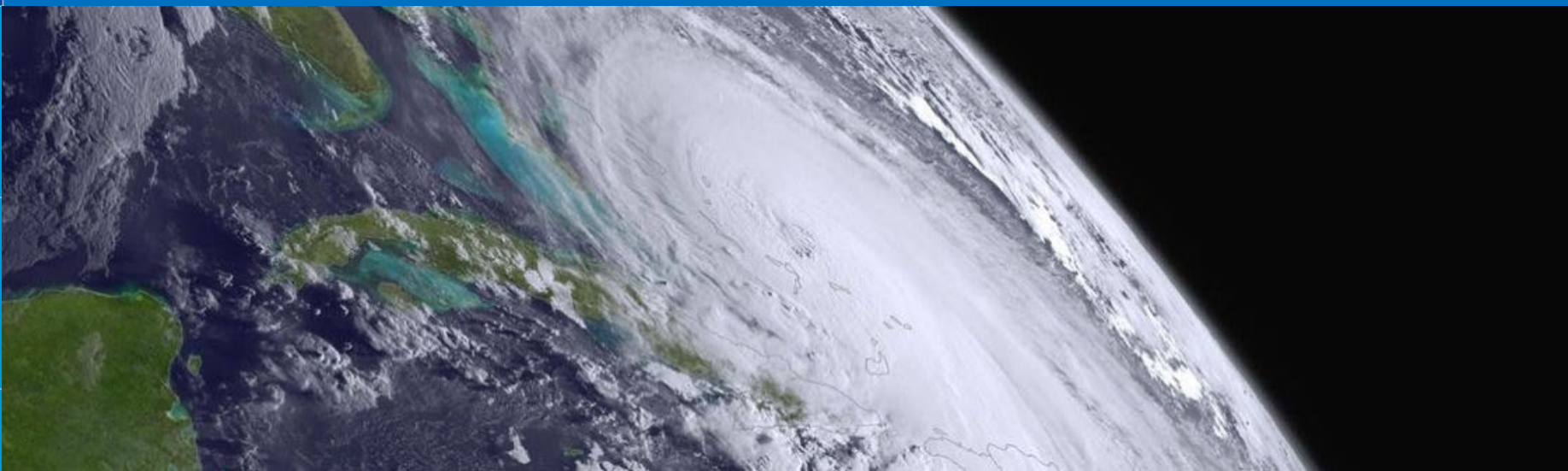


NOAA

HRIT/EMWIN User Group Meeting

8 July 2021

Seth Clevestine
NESDIS/OSPO/SPSD/DSB





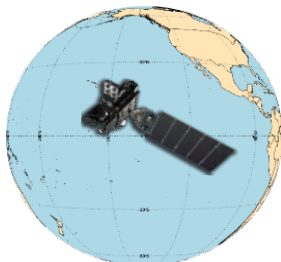
Present GOES Constellation and Flyout



Current

GOES-West

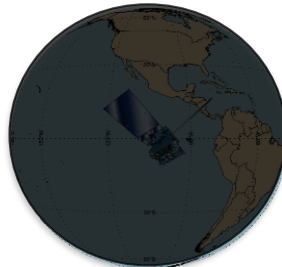
GOES-17
137.2° West



HRIT/EMWIN
Active

Storage

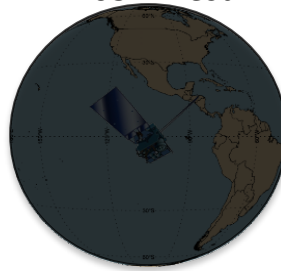
GOES-15
128° West



LRIT Disabled
EMWIN
Disabled

Standby

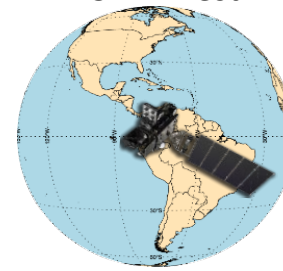
GOES-14
105° West



LRIT Disabled
EMWIN
Disabled

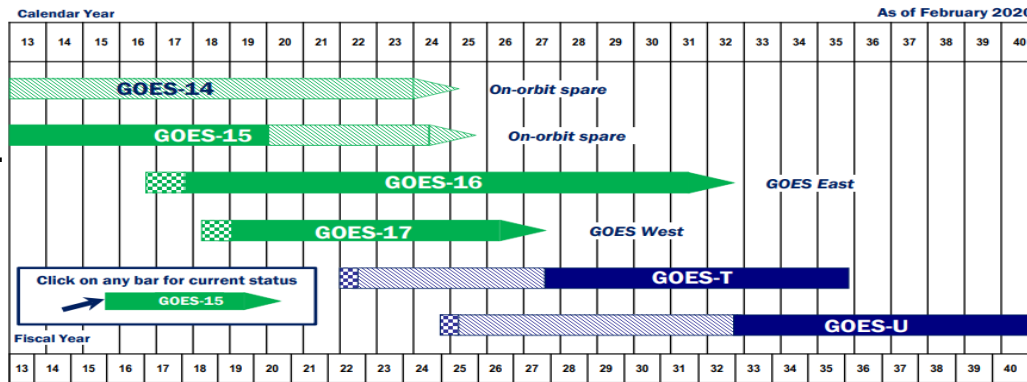
GOES-East

GOES-16
75.2° West



HRIT/EMWIN
Active

GOES-T (GOES-18) scheduled for launch ~FY2022, on-orbit storage after post-launch checkout. GOES-U scheduled for launch sometime in 2024-2025 timeframe.



Approved:
Assistant Administrator for Satellite and Information Services

- In orbit, operational
- In orbit, storage
- In orbit, checkout
- Planned in-orbit Storage
- Planned in-orbit Checkout
- Planned Mission Life

Reliability analysis-based extended weather observation life estimate (60% confidence) for satellites on orbit for a minimum of one year – Most recent analysis: March 1, 2019

GOES-15 Imagery will be used during Pacific Hurricane season



GOES-16 HRIT Product Status



VCID #	Product Name	Period - Min	Format	Resolution	Product Availability
0	Admin Text	60	Text Messages	N/A	Active and available
1	Mesoscale Imagery	15	HRIT/LRIT	0.5km Band 2, 2km for bands 7 and 13	Both mesoscale regions active and available
2	CMI Band 2	30	HRIT/LRIT	2 km	Active and available
7	CMI Band 7	30	HRIT/LRIT	2 km	Active and available
8	CMI Band 8	30	HRIT/LRIT	2 km	Active and available
9	CMI Band 9	30	HRIT/LRIT	2 km	Active and available
13	CMI Band 13	30	HRIT/LRIT	2 km	Active and available
14	CMI Band 14	30	HRIT/LRIT	2 km	Active and available
15	CMI Band 15	30	HRIT/LRIT	2 km	Active and available
17	G17 CMI Band 13	60	HRIT/LRIT	4 km	Active and available
20	EMWIN - Priority	Variable	Text	N/A	Active and available
21	EMWIN - Graphics	Variable	Graphic (e.g. GIF, JPEG)	N/A	Active and available
22	EMWIN - Other	Variable	Text and Graphic	N/A	Active and available
24	NHC Maritime Graphics Products	Variable	Graphic (e.g. GIF, JPEG)	N/A	Active and available
25	GOES-16 Level II Products	60 - 240	HRIT/LRIT	2-10 km	Active and available
30	DCS Admin	Continuous	Text	N/A	Active and available
32	DCS Data New Format	Continuous	Formatted Text	N/A	Active and available

GOES-17 HRIT Product Status

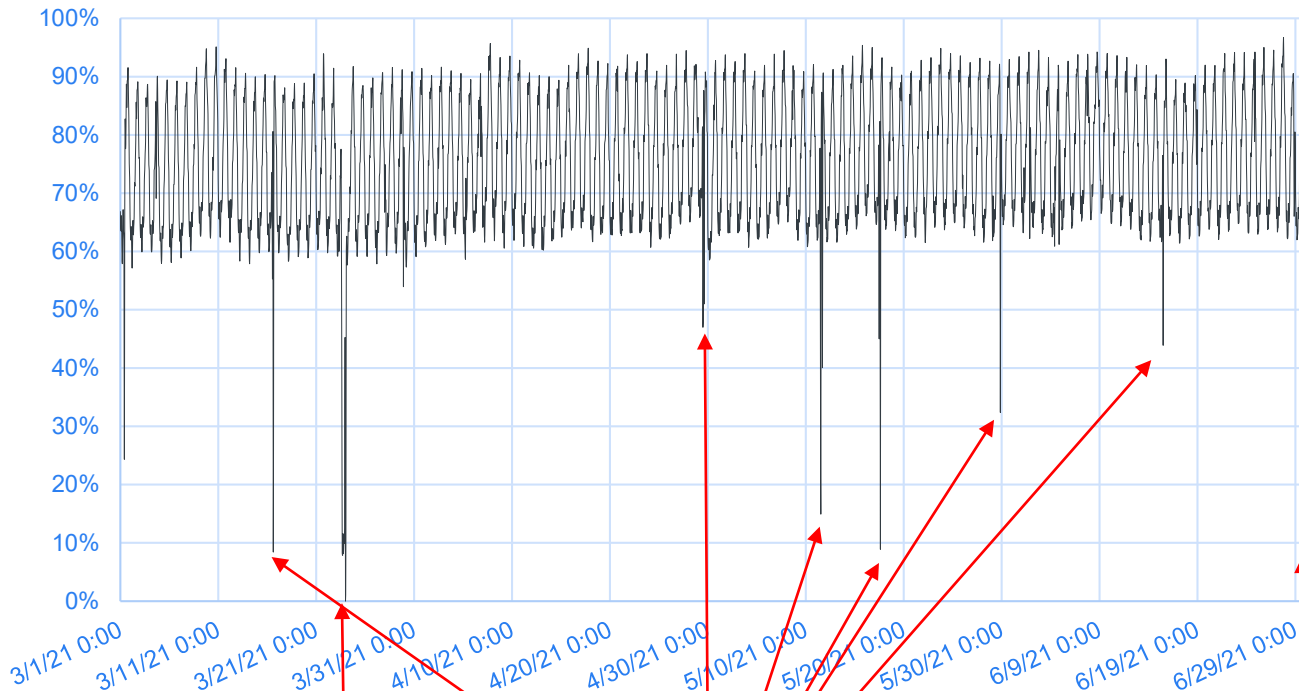


VCID #	Product Name	Period - Min	Format	Resolution	Product Availability
0	Admin Text	60	Text Messages	N/A	Active and available
1	Mesoscale Imagery	15	HRIT/LRIT	0.5km Band 2, 2km for bands 7 and 13	Both mesoscale regions active and available
2	CMI Band 2	30	HRIT/LRIT	2 km	Active and available
5	GOES-15 WV Imagery	30 - 180	LRIT	4 km	Will be activated on Aug 4th, 2021
6	GOES-15 IR Imagery	30 - 180	LRIT	4 km	Will be activated on Aug 4th, 2021
7	CMI Band 7	30	HRIT/LRIT	2 km	Active and available
8	CMI Band 8	30	HRIT/LRIT	2 km	Active and available
9	CMI Band 9	30	HRIT/LRIT	2 km	Active and available
13	CMI Band 13	30	HRIT/LRIT	2 km	Active and available
14	CMI Band 14	30	HRIT/LRIT	2 km	Active and available
15	CMI Band 15	30	HRIT/LRIT	2 km	Active and available
16	G16 CMI Band 13	60	HRIT/LRIT	4 km	Active and available
20	EMWIN - Priority	Variable	Text	N/A	Active and available
21	EMWIN - Graphics	Variable	Graphic (e.g. GIF, JPEG)	N/A	Active and available
22	EMWIN - Other	Variable	Text and Graphic	N/A	Active and available
24	NHC Maritime Graphics Products	Variable	Graphic (e.g. GIF, JPEG)	N/A	Active and available
25	GOES-R/S Level II Products	Variable	HRIT/LRIT	2-10 km	Active and available
30	DCS Admin	Continuous	Text	N/A	Active and available
32	DCS Data New Format	Continuous	Formatted Text	N/A	Active and available
60	Himawari-8	60	LRIT	4 km	Active and available

GOES-16 HRIT Quarterly Statistics



GOES-16 Bandwidth Utilization % March - June 2021



Planned GOES Ground Outage (No Imagery)

GOES Ground/PDA Stream Site Failovers

Planned PDA Maintenance Outage (No Imagery)

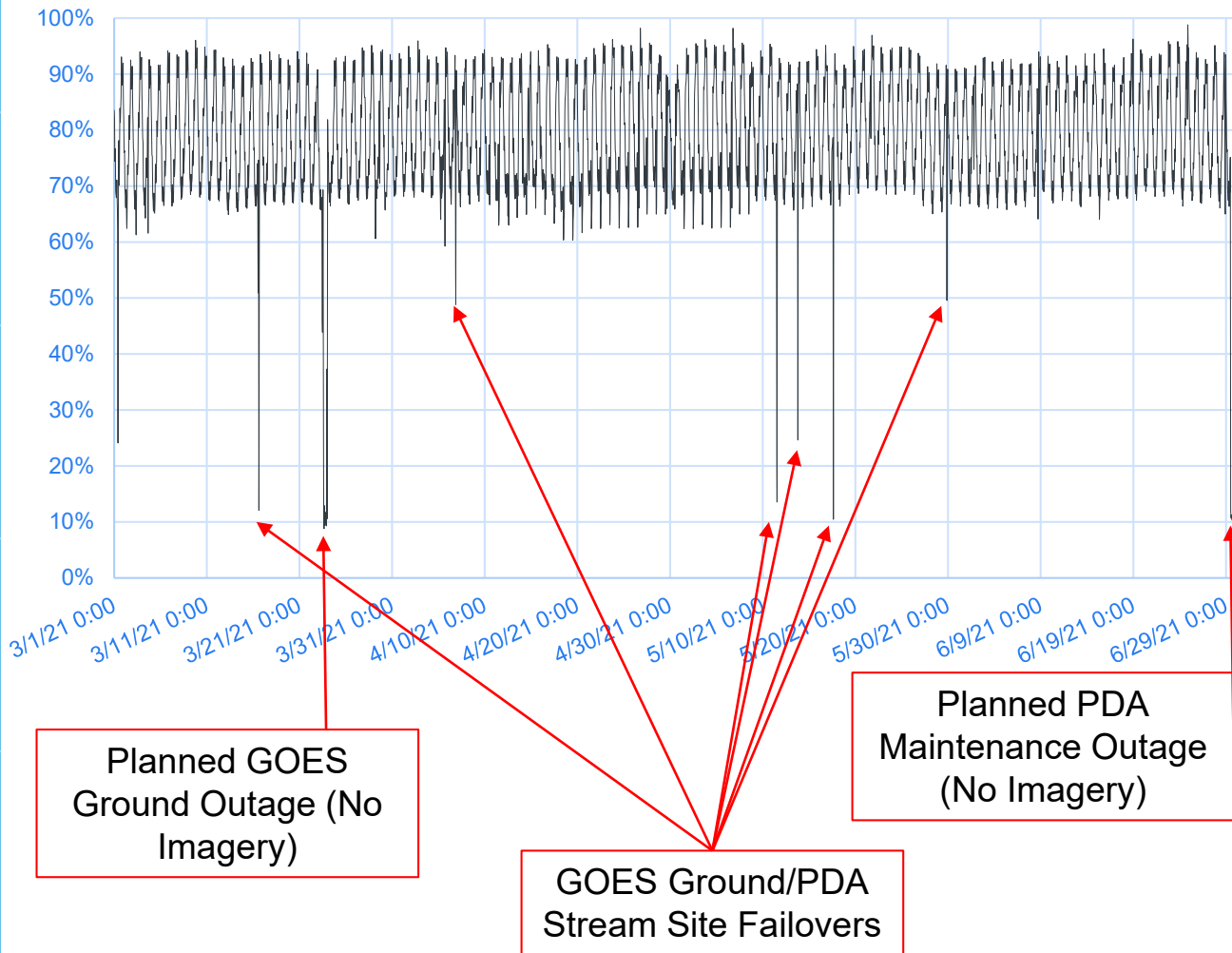
Monthly Averages

Daytime Peak %	89.3%
Imagery Group	82.3%
DCS	3.41%
EMWIN	3.65%
Night Lull %	61.1%
Imagery Group	54.5%
DCS	3.39%
EMWIN	3.26%
Daily Total Data Size	50.7 Gb

GOES-17 HRIT Quarterly Statistics

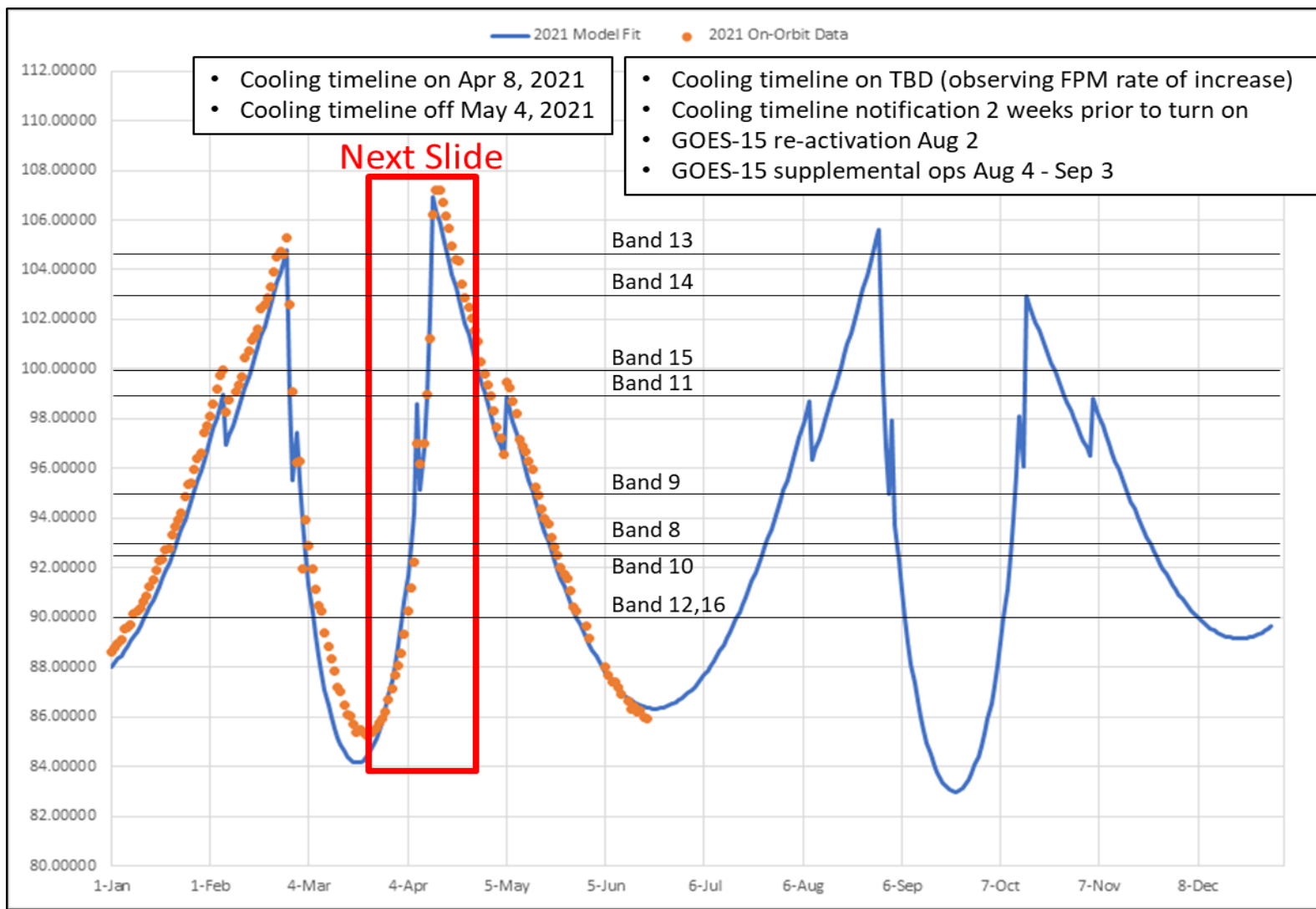


GOES-17 Bandwidth Utilization % March - June 2021



Monthly Averages	
Daytime Peak %	92.7%
Imagery Group	85.1%
DCS	4.00%
EMWIN	3.45%
Night Lull %	67.8%
Imagery Group	60.1%
DCS	3.43%
EMWIN	3.70%
Daily Total Data Size	49.9 Gb

Past GOES-17 ABI FPM Temperatures

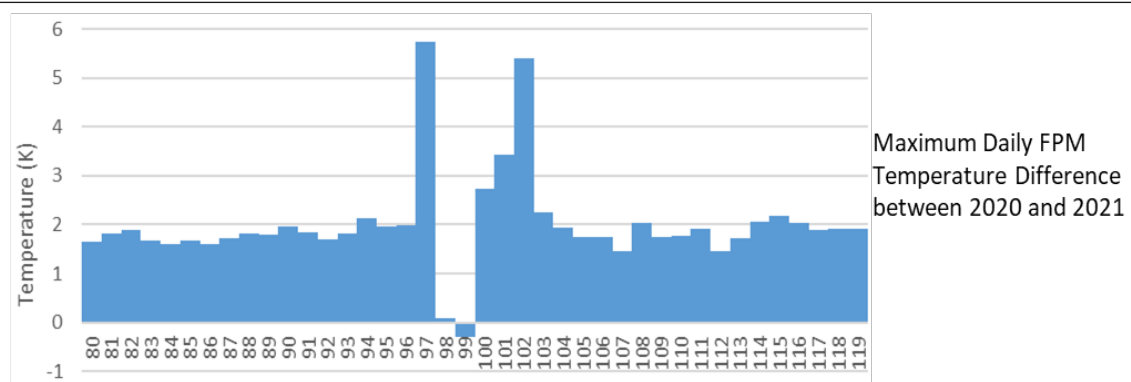
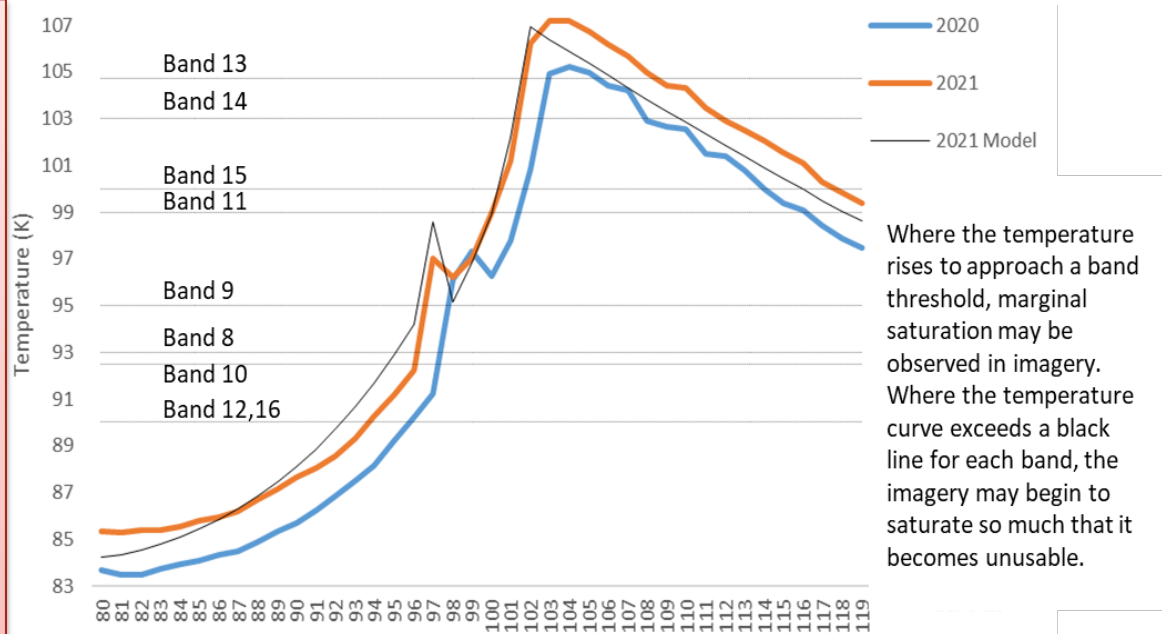




Past GOES-17 ABI FPM Temperatures



- Cooling Timeline Ops Implementation was JD 80 (March 20th) 2020
- JD 104 (April 13, 2020 and April 14, 2021) was warmest single day of April warm period.
- 2021 was 1.9 K warmer than 2020 on JD 104
- Still 2.4 K cooler than 2019 (pre cooling timeline)
- Cooling Timeline is still beneficial; however, **continued ABI degradation is driving temperatures higher and the original cooling timeline benefit will eventually be overcome**



GOES-T Update

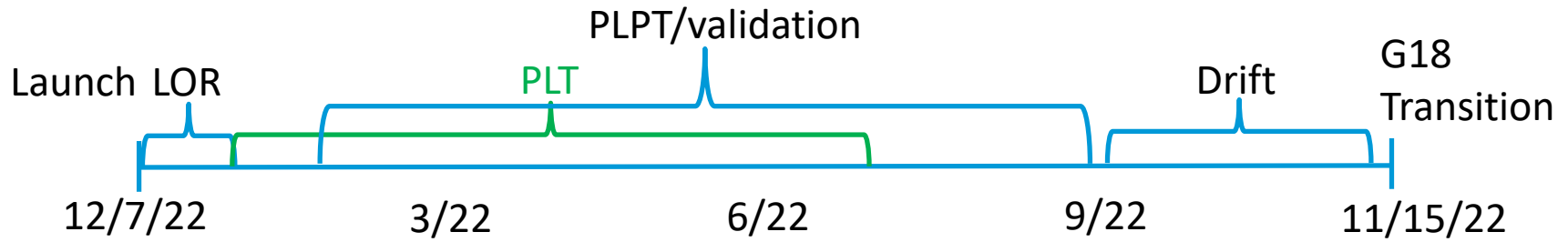


- NESDIS AA Dr. Volz has written a memo stating GOES-18 will assume the GOES-West operational assignment
- A number of schedule options proposed by GOES-R Program are currently under consideration by NESDIS/OSPO and NWS
- Nominal time for GOES-T from launch to GOES-West ops is 11 months
 - This allows all products to be mature, nominal drift and PLPT schedule
- Given a request by NWS to put GOES-West into operations as soon as possible
 - Primary motivation is to have GOES-18 ABI in ops before the August 2022 warm season when GOES-17 ABI will have degraded imagery
 - GOES-R has proposed a 9 month transition with greater schedule risk and some GOES-18 products not achieving an operational level of maturity, but with a mitigation strategy for both issues
 - Secondary benefit is the elimination of need to operate GOES-15 in supplemental operations for the August 2022 warm season
- Schedule proposals are designed for a December 2021 launch, but concepts still apply if a launch slip occurs
- OSPO and NWS responses are due in early July, 2021

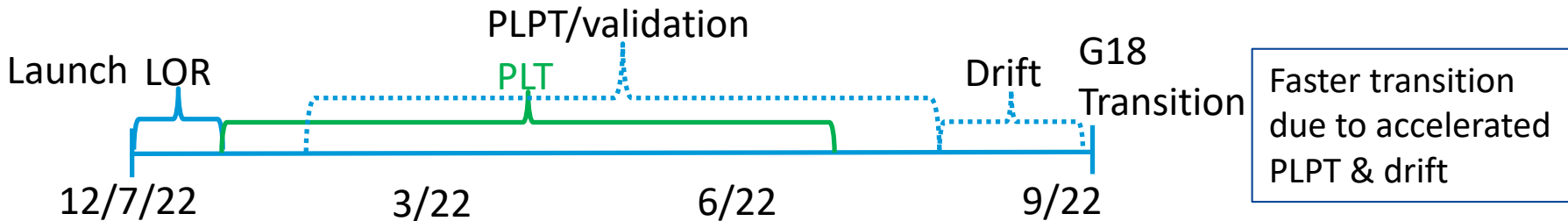
GOES-T Schedule Options



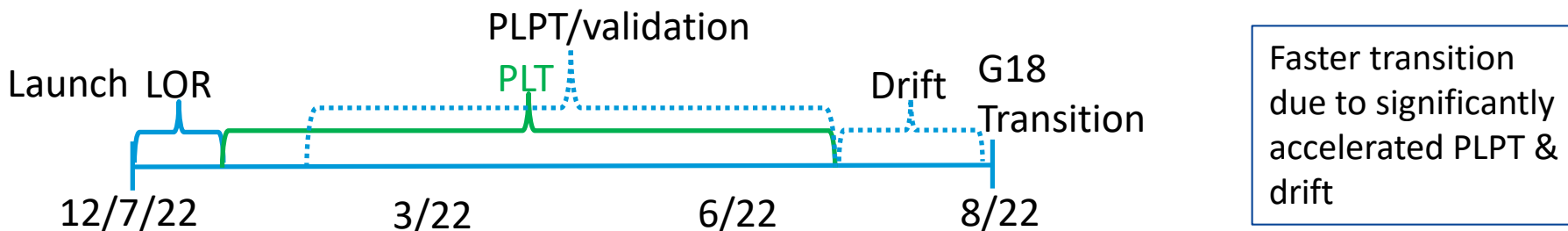
Baseline schedule – November 2022 Transition (Option 8.0)



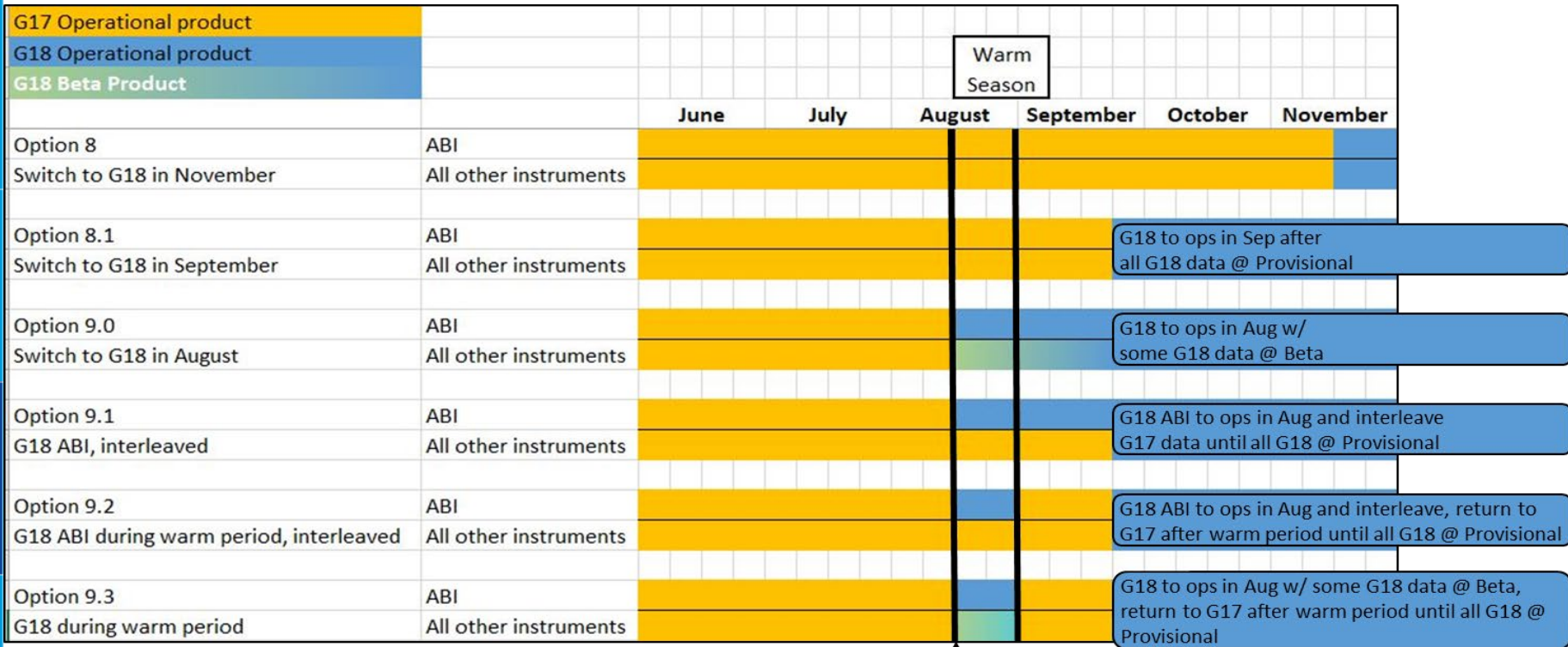
Accelerated schedule – September 2022 Transition (Option 8.1)



Accelerated schedule – August 2022 Transition (Option 9s)



GOES-T Schedule Options and GOES West Operations



All options based on a December 2021 launch

	ECI test during PLT	ECI test after PLT
ABI	On Time	On Time
GLM	+10 weeks	+6 weeks
EXIS	+7 weeks	+3 weeks
MAG	On Time	On Time
SEISS	+1 week	+1 week
SUVI	+3 weeks	On Time
ABI L2+	On Time	On Time

GOES-T Schedule Options and GOES West Operations



G16 ▲ G17 ▲ G18 ▲



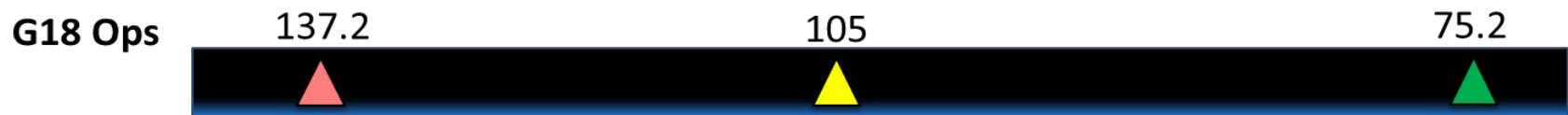
G18 GRB (not operational)

- All instruments when approved by project in RF
- All instruments on TGRB for validation work
- Will include short duration interleaved test in operational G17 GRB broadcast for user validation



G17 GRB

- ABI G18, All other instruments from G17
- GRB broadcast from G17, mapped to 137.0 just as it is today



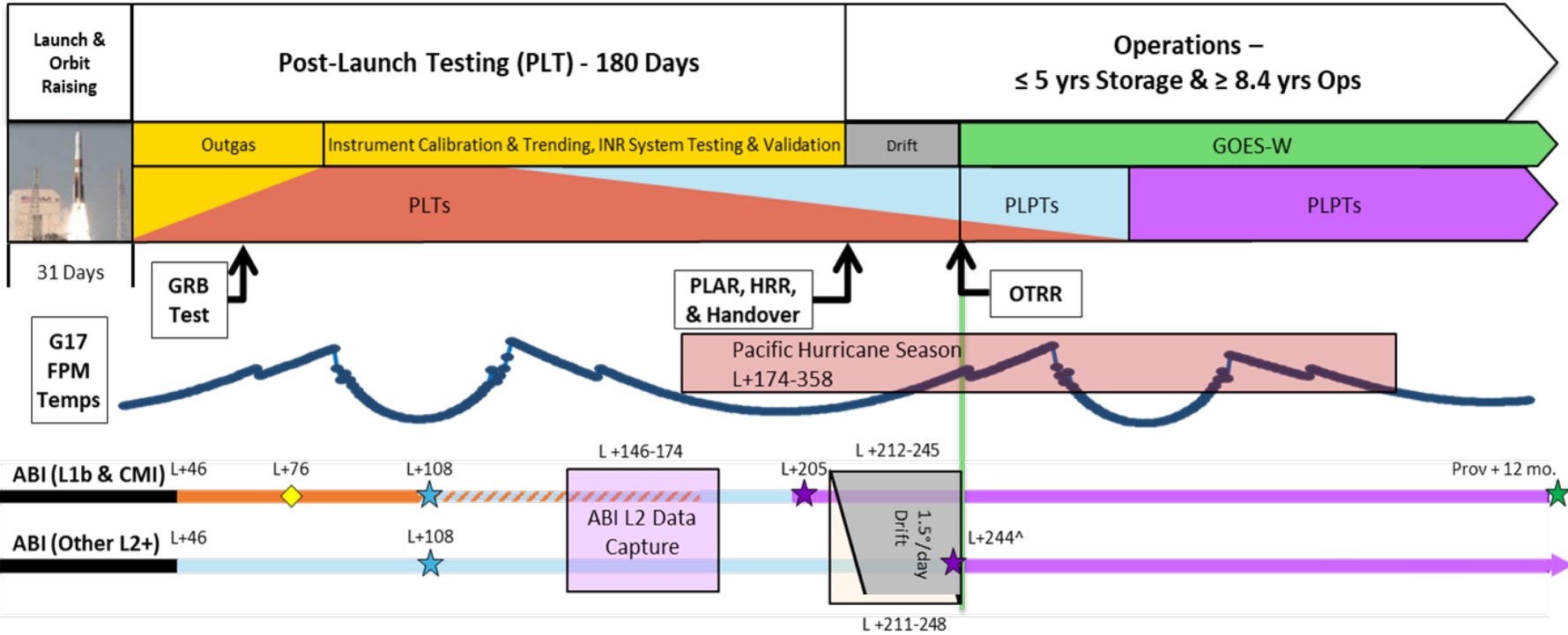
G18 GRB

- All instruments from G18

GOES-T Schedule Options and GOES West Operations



GOES-T Option 9.0 Science Product Validation Schedule



LEGEND

- Science Products Not Flowing
- Post-Launch Testing (PLT)
- Both PLT/PLPT
- Post-Launch Product Testing (PLPT)
- Post-Launch Product Testing (PLPT) / Full validation testing
- ◆ First public imagery media outreach
- ★ Beta* / GRB Release
- ★ Provisional PS-PVR
- ★ Full Validation PS-PVR

Current as of June 23, 2021 (SOE v1.6)

[^]ABI L2+ Provisional PS-PVR to be held during drift based of early testing.

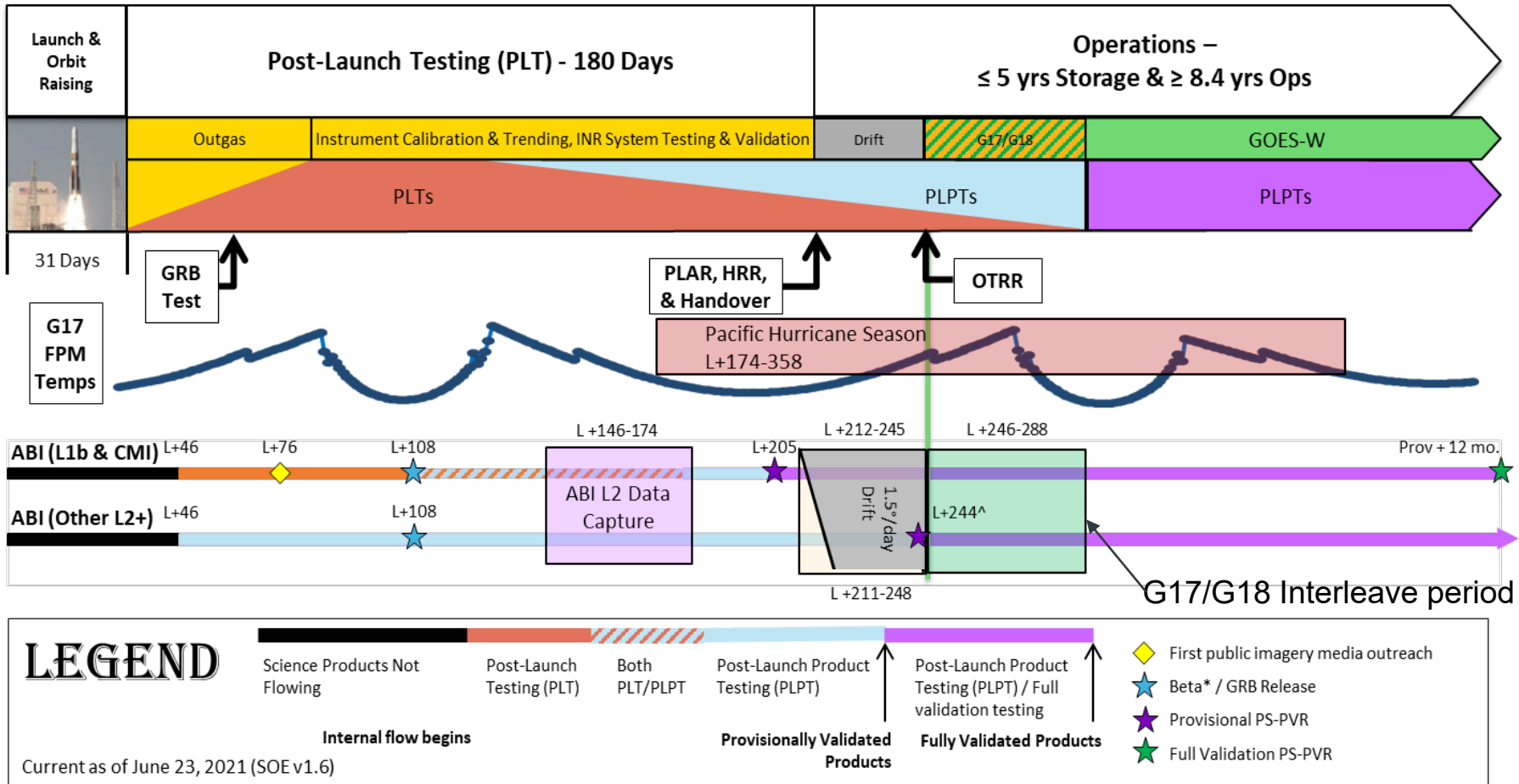
* No PS-PVR to be held for Beta; determination mechanism in work.
 Note: All dates are coordinated with Flight/MOST PLT SOE group and are subject to change.



GOES-T Schedule Options and GOES West Operations



GOES-T Option 9.1 Science Product Validation Schedule



^ABI L2+ Provisional PS-PVR to be held during drift based of early testing.

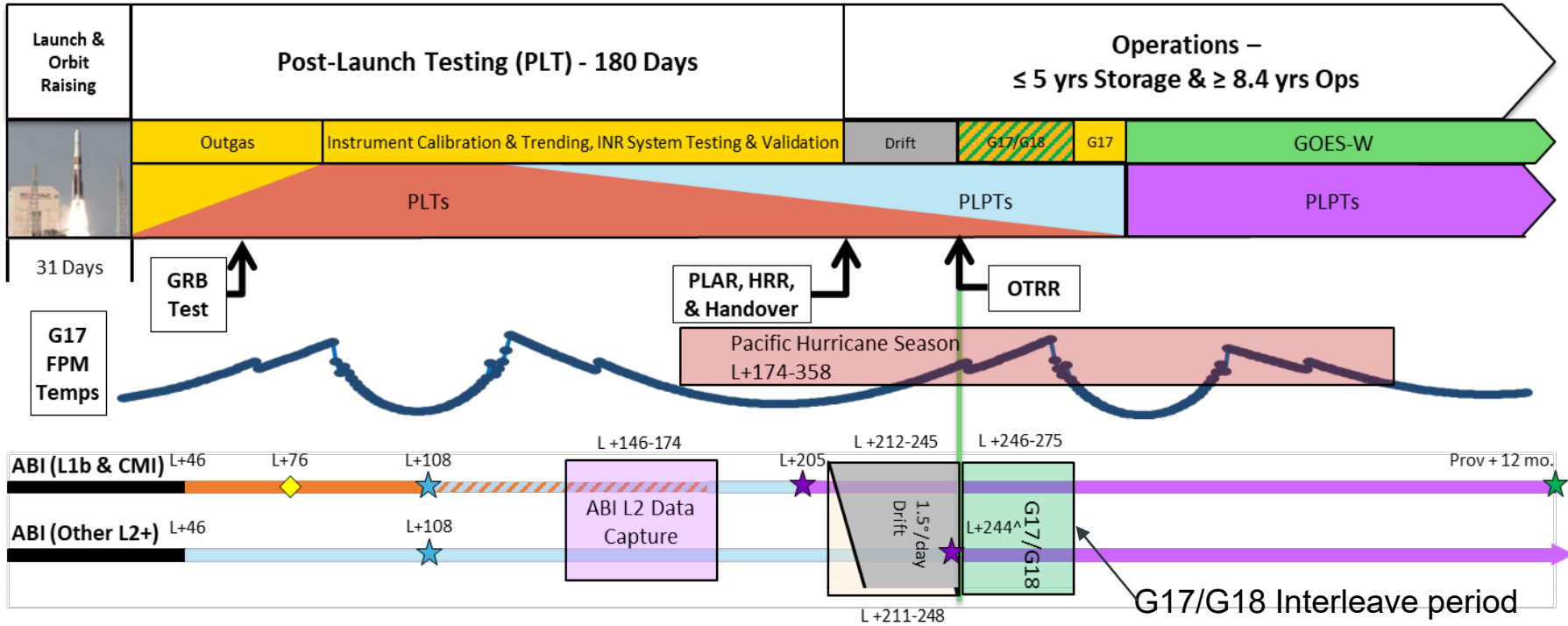
* No PS-PVR to be held for Beta; determination mechanism in work.
 Note: All dates are coordinated with Flight/MOST PLT SOE group and are subject to change.



GOES-T Schedule Options and GOES West Operations



GOES-T Option 9.2 Science Product Validation Schedule



LEGEND

	Science Products Not Flowing		Post-Launch Testing (PLT)		Both PLT/PLPT		Post-Launch Product Testing (PLPT)		Post-Launch Product Testing (PLPT) / Full validation testing		First public imagery media outreach
	Beta* / GRB Release		Provisional PS-PVR		Full Validation PS-PVR		Provisionally Validated Products		Fully Validated Products		

Internal flow begins

Current as of June 23, 2021 (SOE v1.6)

^ABI L2+ Provisional PS-PVR to be held during drift based of early testing.

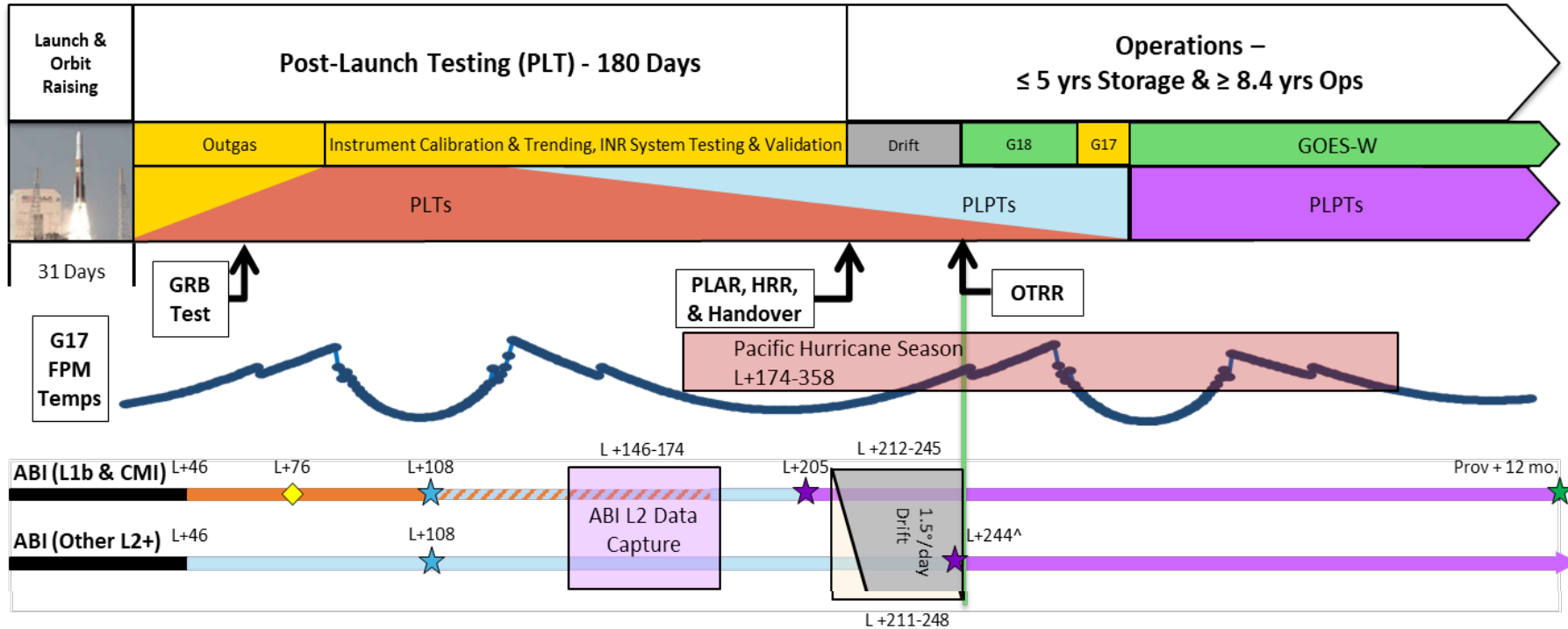
* No PS-PVR to be held for Beta; determination mechanism in work.
 Note: All dates are coordinated with Flight/MOST PLT SOE group and are subject to change.



GOES-T Schedule Options and GOES West Operations



GOES-T Option 9.3 Science Product Validation Schedule



LEGEND

- Science Products Not Flowing
 - Post-Launch Testing (PLT)
 - Both PLT/PLPT
 - Post-Launch Product Testing (PLPT)
 - Provisionally Validated Products
 - Fully Validated Products
 - First public imagery media outreach
 - Beta* / GRB Release
 - Provisional PS-PVR
 - Full Validation PS-PVR
- Internal flow begins

Current as of June 23, 2021 (SOE v1.6)

^ABI L2+ Provisional PS-PVR to be held during drift based of early testing.

* No PS-PVR to be held for Beta; determination mechanism in work.
 Note: All dates are coordinated with Flight/MOST PLT SOE group and are subject to change.



Benefits of Interleaving Schedule



- Demonstrates merging of instrument data from different spacecraft into one virtual satellite
- In the event of on-orbit instrument failures in the future, interleaving creates an option for operating a complete virtual satellite

GOES-T Conclusion



- Further work is needed for detailed planning but at this point the level of effort to implement is low
- Extra effort to analyze data is needed by Calibration/Validation and user community
- The plan has a rapid, solid, easily executable back out which would be to revert to the G18 only data
- There is low risk to executing the plan to run the interleaved data (G17 + G18)
- Next Steps:
 - With NESDIS and NWS feedback, select the plan for GOES-T transition to operations (BLUF: Stay Tuned)

GOES-15 Activation



- GOES-15 Imager and the GVAR broadcast will be activated on August 4th and will remain on until September 3rd.
- HRIT will provide the necessary IR and WV imagery that it provided last year during the Fall warming period on GOES-17's ABI.
 - Imagery will be solely N/S Hemispheric and Full disk Water Vapor and Long-wave Infrared imagery
 - Available on HRIT's GOES West broadcast listed as VCID 5 and 6.

Latest GEO-XO Update

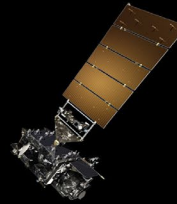


Recommended GeoXO Constellation

(Preliminary, pending program approval)



GEO-West
Visible/Infrared Imager
Lightning Mapper
Ocean Color
Space Weather Suite*



GEO-Central
Hyperspectral Infrared Sounder
Atmospheric Composition
Partner Payload



GEO-East
Visible/Infrared Imager
Lightning Mapper
Ocean Color
Space Weather Suite*



*Instruments provided by NOAA Space Weather Program



For more information please visit the following URL: <https://www.nesdis.noaa.gov/GeoXO>

