LSI-VC-18

JAXA Mission Updates

CEOS
Committee on
Earth Observation Satellites

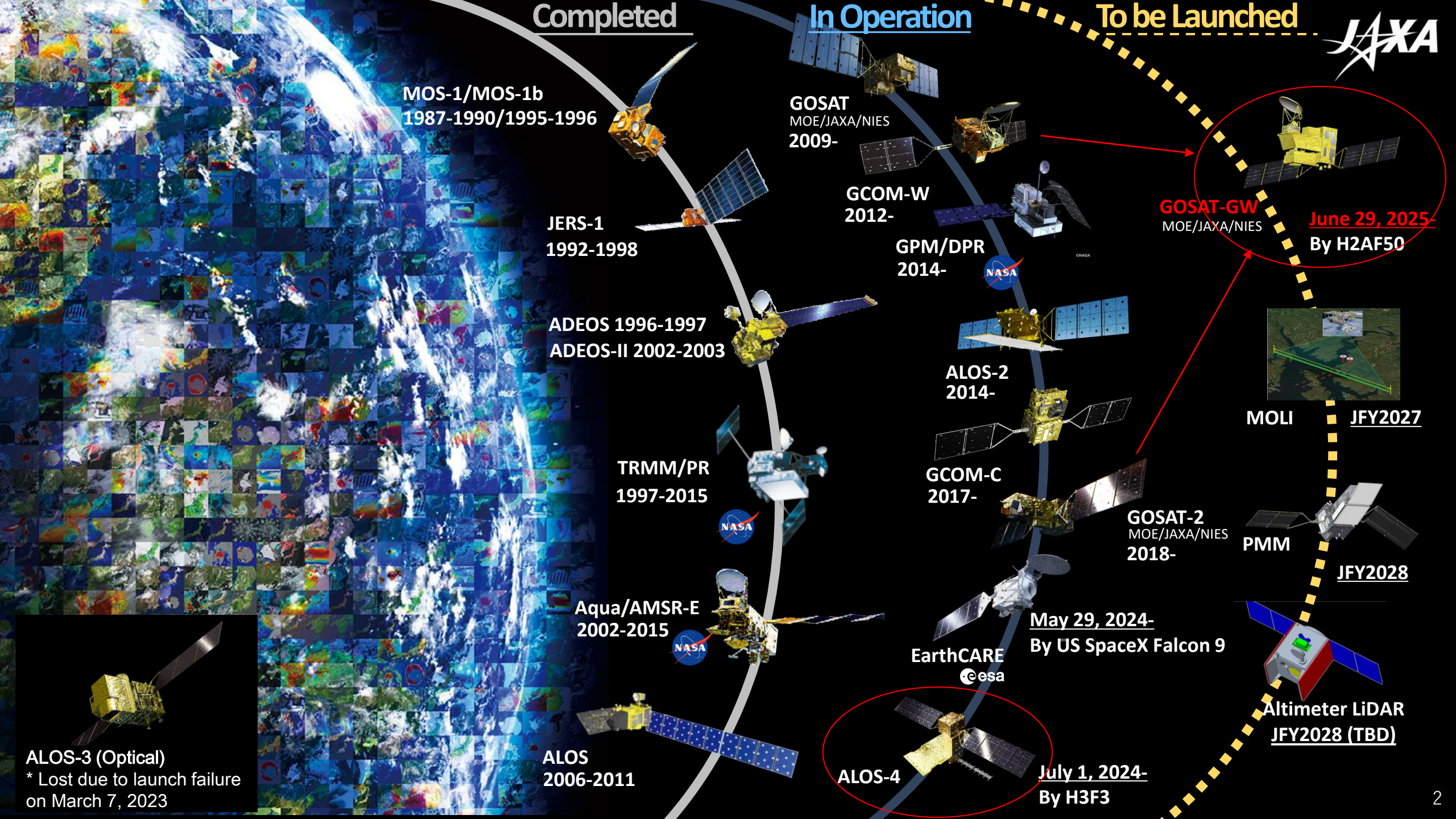
Takeo Tadono, JAXA

Agenda Item 3.7

LSI-VC-18

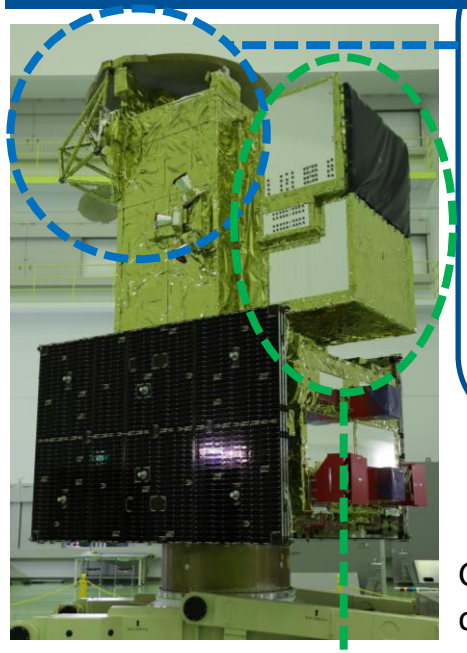
Ispra, Italy

2-5 September, 2025


Completed
In Operation
To be Launched
JAXA
MOS-1/MOS-1b
1987-1990/1995-1996
JERS-1
1992-1998
ADEOS 1996-1997
ADEOS-II 2002-2003
TRMM/PR
1997-2015
Aqua/AMSR-E
2002-2015
ALOS
2006-2011
GOSAT
MOE/JAXA/NIES
2009-
GCOM-W
2012-
GPM/DPR
2014-
ALOS-2
2014-
GCOM-C
2017-
GOSAT-2
MOE/JAXA/NIES
2018-
EarthCARE
esa
May 29, 2024-
By US SpaceX Falcon 9
ALOS-4
July 1, 2024-
By H3F3
GOSAT-GW
MOE/JAXA/NIES
June 29, 2025-
By H2AF50
MOLI
JFY2027
PMM
JFY2028
Altimeter LiDAR
JFY2028 (TBD)
ALOS-3 (Optical)
* Lost due to launch failure
on March 7, 2023

GOSAT-GW: Global Observation SATellite for Greenhouse gases and Water cycle

AMSR3
(Advanced Microwave Scanning Radiometer 3)

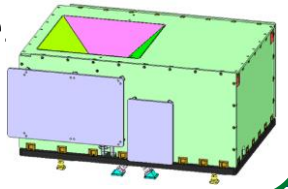


AMSR3, led by JAXA, will succeed AMSR series observations adding new high-frequency channels for solid precipitation retrievals and water vapor analysis in NWP

GOSAT-GW at Tanegashima Space Center on 20 May 2025

TANSO-3
(Total Anthropogenic and Natural emissions mapping SpectrOmeter-3)

TANSO-3, led by Japanese Ministry of the Environment (MOE) and National Institute of Environment Studies (NIES), will improve observation capability of greenhouse gases from GOSAT-2/TANSO-2



The GOSAT-GW was successfully launched on 29th June 2025 (JST) by H-IIA F50 rocket (final flight)

GOSAT-GW Satellite Specifications

Mission Instruments		AMSR3 (JAXA) TANSO-3 (MOE/NIES)
Orbit	**Type**	Sun-synchronous, Sub-recurrent orbit
	Altitude	666km, recurrent cycle 3days (same as GOSAT)
	Local sun time at ascending	13:30±15min (same as GCOM-W)
	Revisit time	3 days
Satellite Mass		2.6 tons (including propellant)
Designed lifetime		> 7 years
Launch		**29 June 2025 (JST)** by H-IIA F50

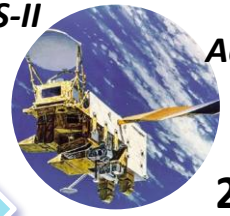
Advanced Microwave Scanning Radiometer series

Mission Targets and AMSR3 Products

Aims of AMSR3

- Succeed AMSR series' observation of water-related parameters
- Respond to new user needs by hardware/software improvements

ADEOS-II



Aqua

AMSR

2002.5-2011.10

AMSR-E

GCOM-W

2012.5-present

AMSR2

GOSAT-GW

2025.6-present

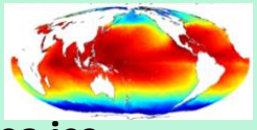
AMSR3

New stakeholder's needs

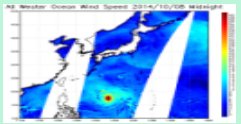
AMSR3 products

AMSR Products

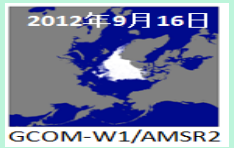
SST



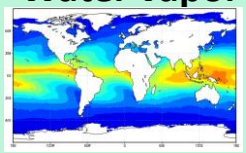
Surface wind speed



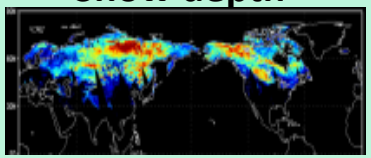
Sea ice



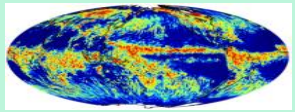
Water vapor



Snow depth



Rainfall



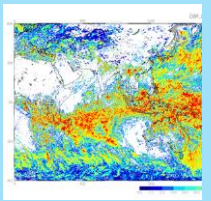
Soil Moisture

Understanding and anticipation of Water cycle

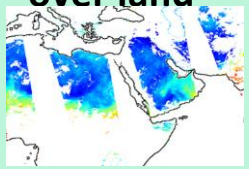
Operational utilization

New AMSR3 Products

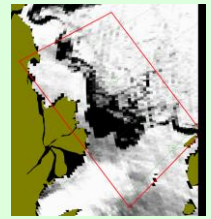
Snowfall



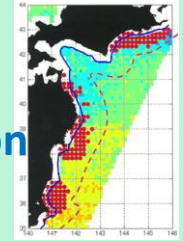
Water Vapor over land



High-res. Sea ice concentration



High-res. SST



Understanding and anticipation of Water cycle

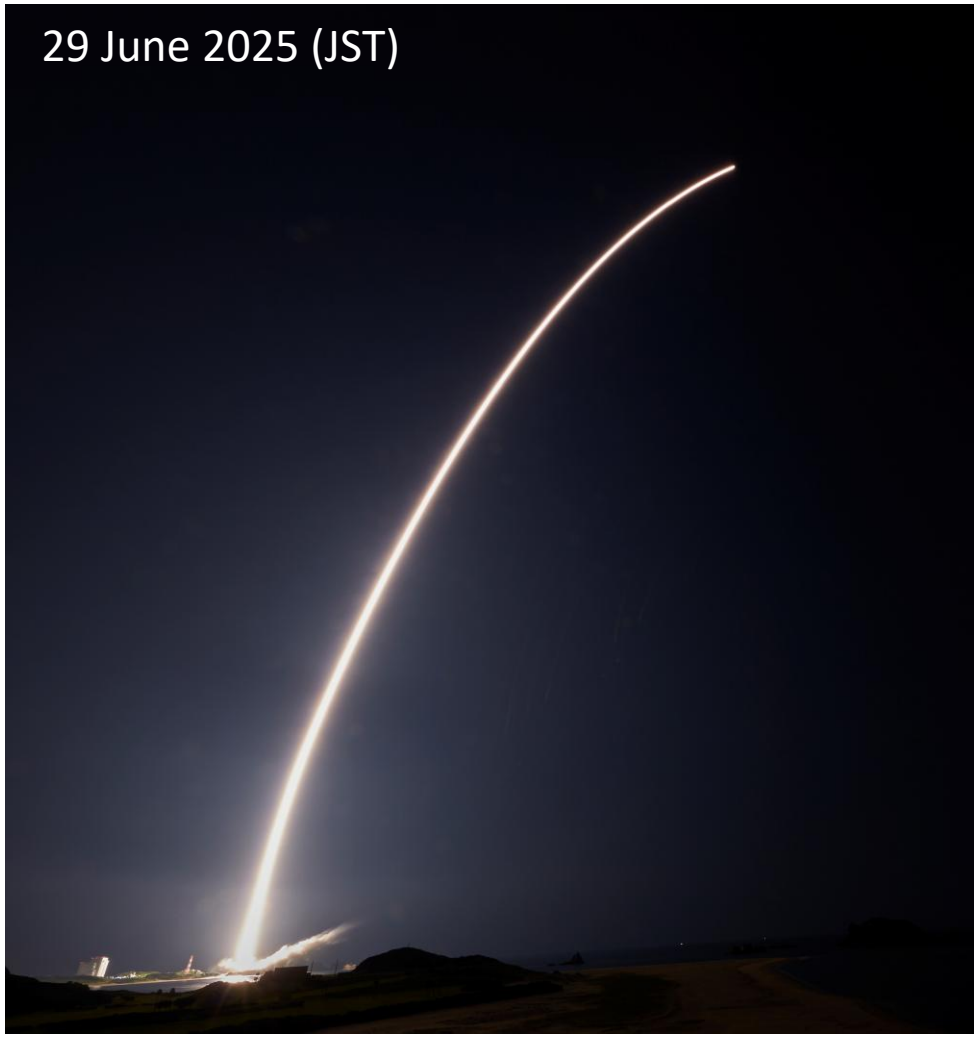
Operational utilization

Launch of the GOSAT-GW by H-IIA F50

28 June 2025 (JST)

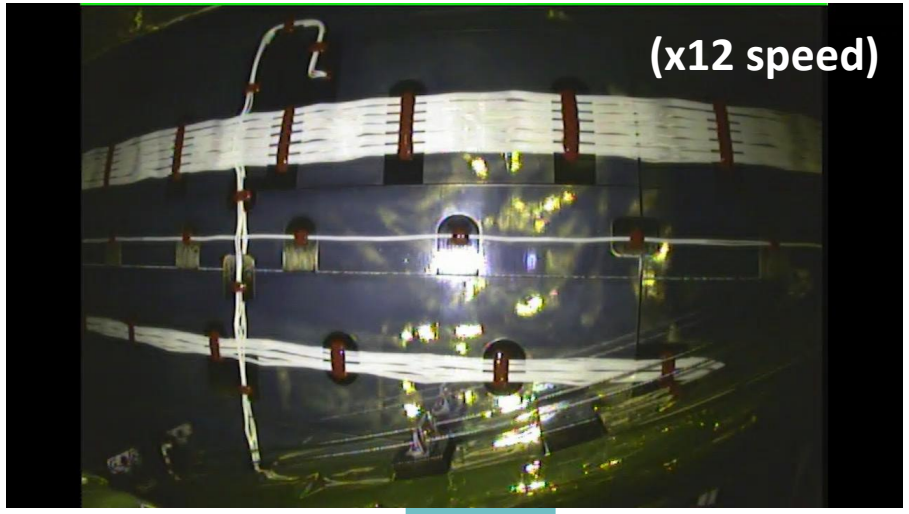
1:33 on 29 June 2025 (JST)

29 June 2025 (JST)

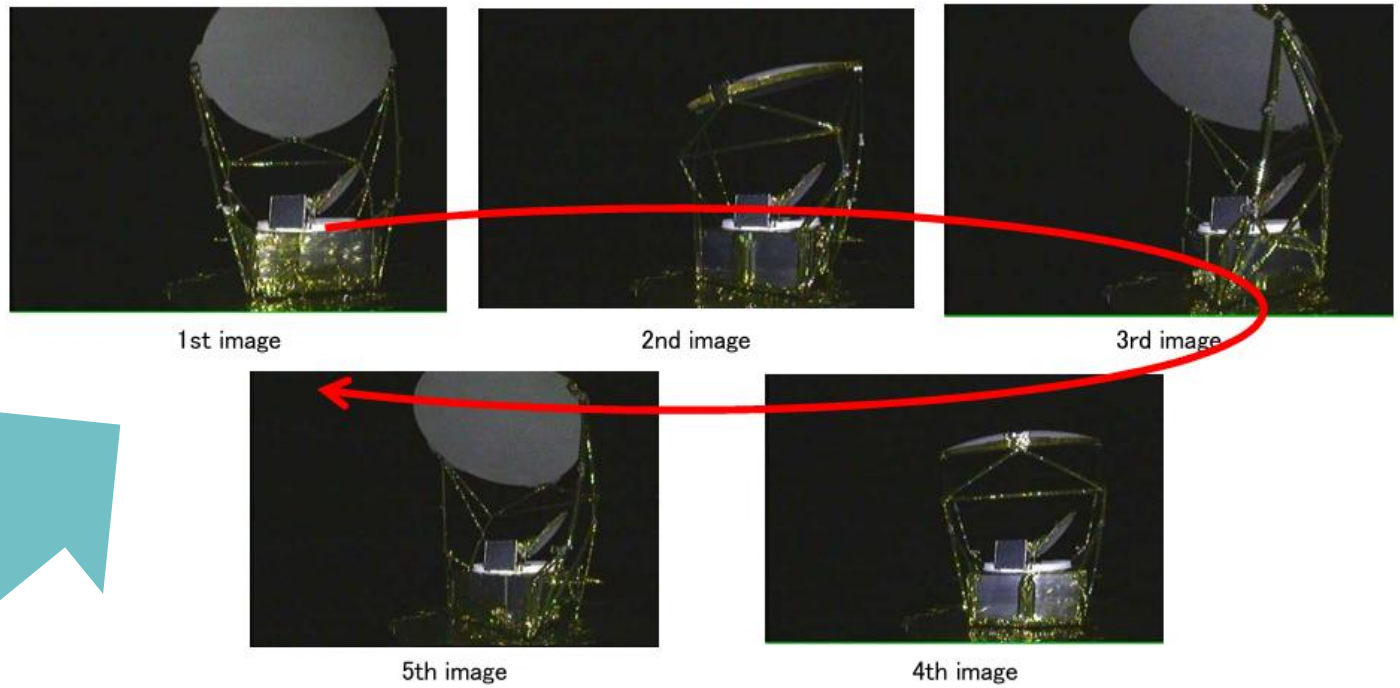


Results of Critical Operations Phase

Deployment of solar array paddle #1 at 2:25JST on 29 June



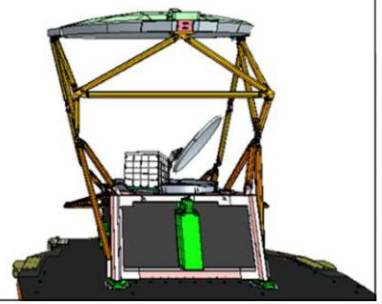
Initial run-up of AMSR3 at 19:45JST on 30 June



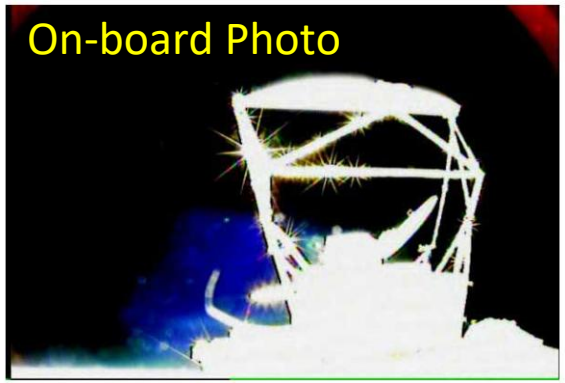
Antenna drive mechanism of AMSR3 is slowly rotated (4rpm) to confirm that the angular momentum reaches the set target value.

Deployment of AMSR3 antenna at 14:57JST on 30 June

Antenna CG



On-board Photo



<u>Completed Critical Operations Phase on 1 July</u>

The satellite is in a stable condition to remain in orbit, and moved to Initial Functional Verification Operations Phase.

Mission Schedule after the Launch

29 June 2025
Launch

Critical Operations Phase	Initial Functional Verification Operations Phase	Initial Calibration and Validation Operations Phase	Nominal Mission Operations Phase
After the satellite separation, Deployment of the solar array paddles, antenna deployment & initial run-up of AMSR3, release of the pointing mirror lock for TANSO-3	Verify the functions of satellite and onboard instruments	Calibration and validation of AMSR3 and TANSO-3 **Early data release** to partner agencies and selected principal investigators is planned during this period.	Release of AMSR3 standard product to public *TANSO-3 products will be released by MOE/NIES.

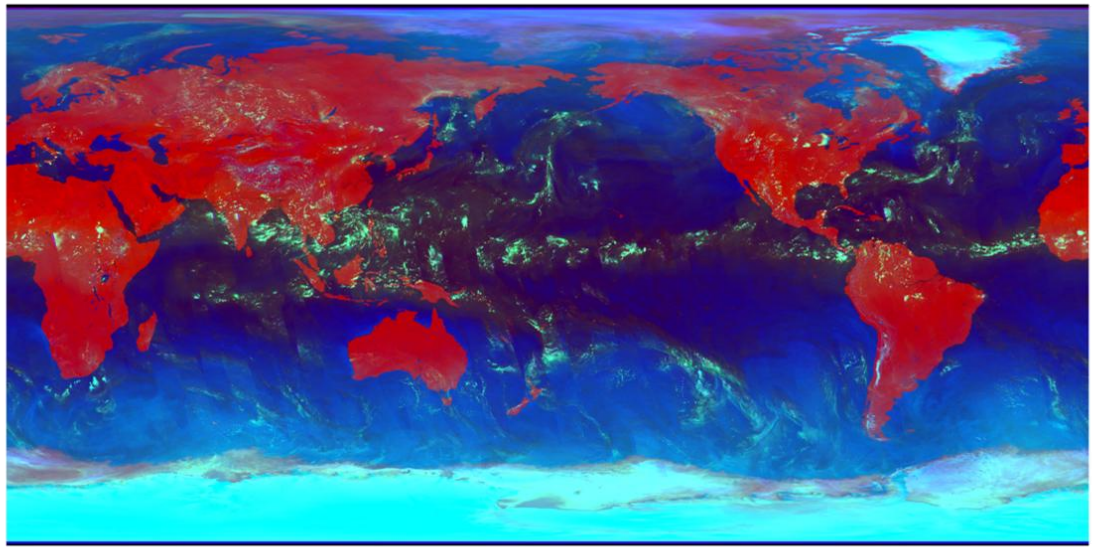
Completed on 1 July

3-month after the launch

12-month after the launch

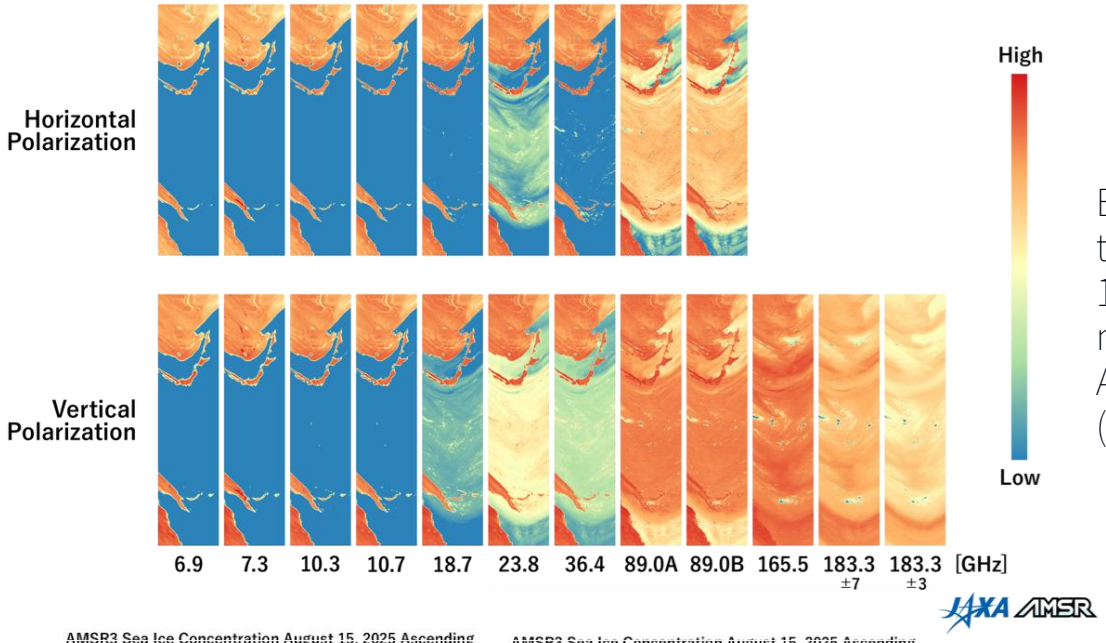
7-year after the launch

Early Observation Results of AMSR3 released on 5th Sep 2025



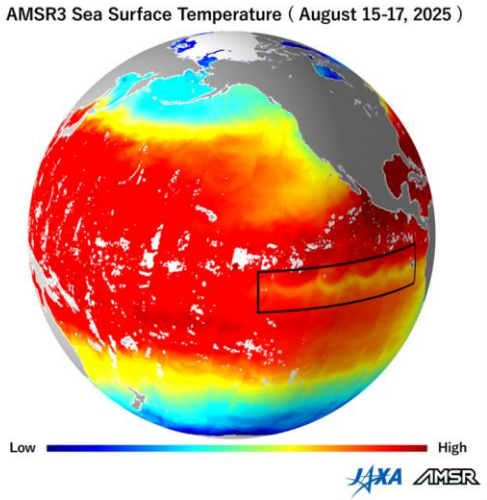
Brightness temperature of 18.7, 89.0, 165.5 GHz V pol. by AMSR3 (Aug. 15-17, 2025)

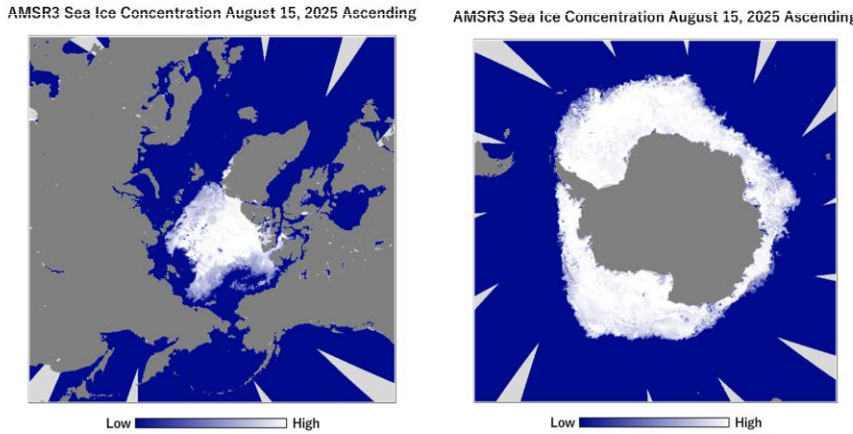
* https://global.jaxa.jp/press/2025/09/20250905-1_e.html



Brightness temperature of 11 ch measured by AMSR3. (Aug. 16, 2025)

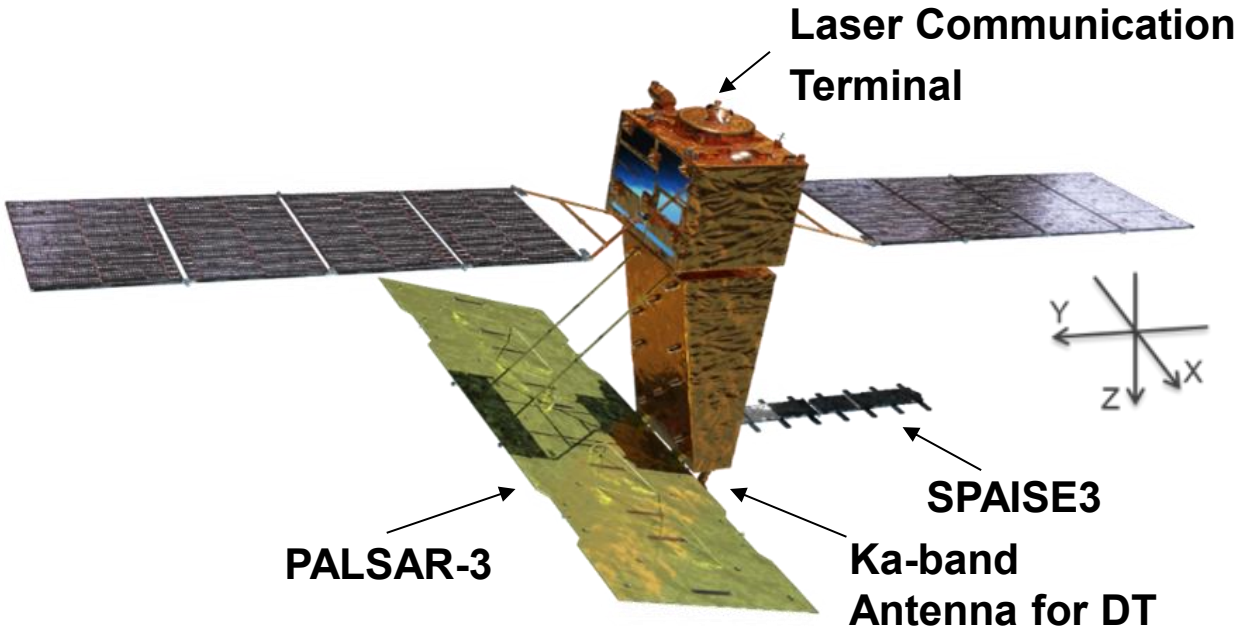
Sea Surface temperature (SST) derived by AMSR3. (Aug. 15-17, 2025)





Sea Ice distribution in north pole (left) and south pole (right) derived from AMSR3. (Aug. 15, 2025)

ALOS-4 Overview



Same orbit as ALOS-2
↓
Enable analysis combining data from ALOS-2 and ALOS-4

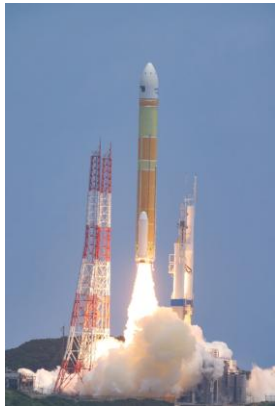
Designed Life Time		7 years
Mission Instruments		PALSAR-3, SPAISE3
Size (X, Y, Z)		10.0m×20.0m×6.4m
Satellite Mass		Approx. 3,000 kg
Electricity	**Solar Array**	Approx. 7,200 W
	Battery	380 Ah
Data Recorder		Approx. 1 Tbyte
Data Transmission		Direct Trans. by Ka-band 3.6 Gbps
		Via. Laser Utilizing Communication System (LUCAS) by 1.8 Gbps
Orbit	**Type**	Sun-synchronous
	Altitude	628 km
	LSDN	12:00
	Revisit Cycle	14 days
	Inclination	97.9 deg.

SPAISE3：SPace based Automatic Identification System Experiment 3
PALSAR-3：Phased Array type L-band Synthetic Aperture Radar-3

ALOS-4 Operation Status

- Launched by H3 Launch Vehicle flight No. 3 on *July 1, 2024*.
- The Initial Functional Verification operation was completed on October 18, 2024, and the satellite moved to the Initial Calibration and Validation (ICV) operation.
- The ICV operation was scheduled to three months, but it was decided to continue until the end of March 2025 because it took more time than expected to adjust the image quality for the world's first on-orbit demonstration of digital beam forming (DBF).
- The ICV was completed on *March 31, 2025*, and the Nominal Observation operation started from *April 1, 2025*. The data distribution was started from July 2025.

ALOS-4



H3F3 launch

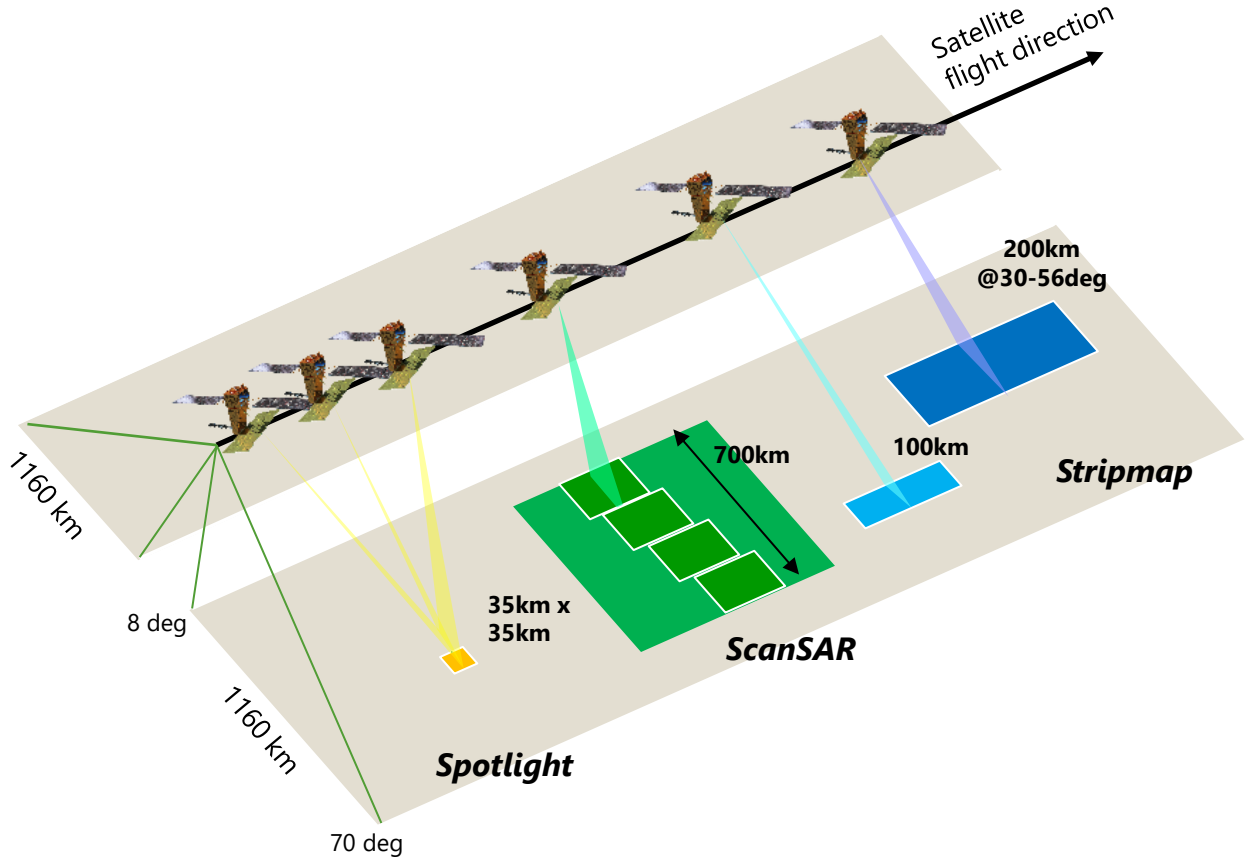
July-Sep. 2024	Oct.-Dec. 2024	Jan.-March 2025	April 2025~
Initial Functional Verification	**Initial Cal/Val (ICV) operation**		**Nominal Observation operation**
▲Launch On July 1st 2024			▲Start of provision of PALSAR-3 standard product ▲Start of the Basic Observation Scenario (BOS) and emergency observation

ALOS-4 PALSAR-3 Overview

■ Expansion of Observation Swath and Improvement of Observation Frequency

– New technologies such as Digital Beamforming (DBF) enable observation of a 200 km swath in high resolution 3 m mode (50 km swath in ALOS-2) and observation of the entire Japan about 20 times a year (approx. 4 times in ALOS-2).

– Wide-area mode (25 m resolution) enables observation of 700 km width (standard 350 km for ALOS-2)



Observation swath width

Modes	ALOS-4	ALOS-2
Stripmap (res. 3/6/10 m)	100-200 km	30-70 km
ScanSAR (res. 25 m*)	700 km	350-490 km
Spotlight (res. 1 x 3 m)	35km ×35km	25km ×25km

∗ Single look

PALSAR-3 Calibration Status

■ Progress of calibration and validation of each observation mode and beam as of July 2025

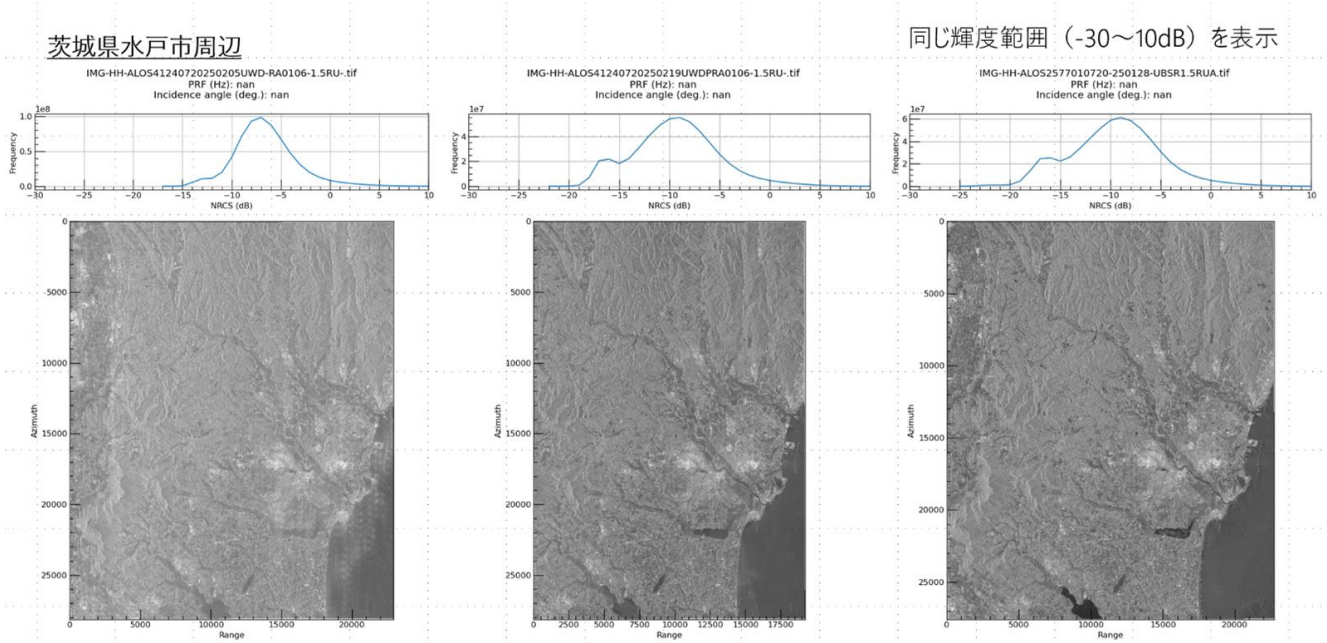
Calibration plan	Beam code	Observation mode	Purpose	Status
Initinal cal./val. phase	SBD	Spotlight	Emergency/individual observation	Completed
	UWD01～03	Stripmap 3 m/200 km swath	Basic observation, emergency/individual observation	Completed
	HBQ06, 08	Stripmap 6 m/100 km swath (full-polarimetry)		
	FWD01	Stripmap 10 m/200 km swath		
	XBD02	ScanSAR		
Regular observation phase	UBD01～05, UBD14～23	Stripmap 3 m/100 km swath	Emergency/individual observation	On-going
	UBQ05～09	Stripmap 3 m/100 km swath (full-polarimetry)	Same as above	On-going
	HBQ05, 07, 09	Stripmap 6 m/100 km swath (full-polarimetry)	Same as above	On-going
	FWD02～03	Stripmap 10 m/200 km swath	Same as above	Completed
	XBD01, 03	ScanSAR	Same as above	On-going
	FWD01	Stripmap 10 m/200 km swath (ionospheric correction on-board)	Basic observation, emergency/individual observation	Pending (operational constraints)
No calibration plan	Others	Others	No plan for use	N/A

* https://www.eorc.jaxa.jp/ALOS/en/alos-4/a4_calval_e.htm

PALSAR-3 Initial Cal/Val Operation Results

■ Azimuth ambiguity (false images) in some areas

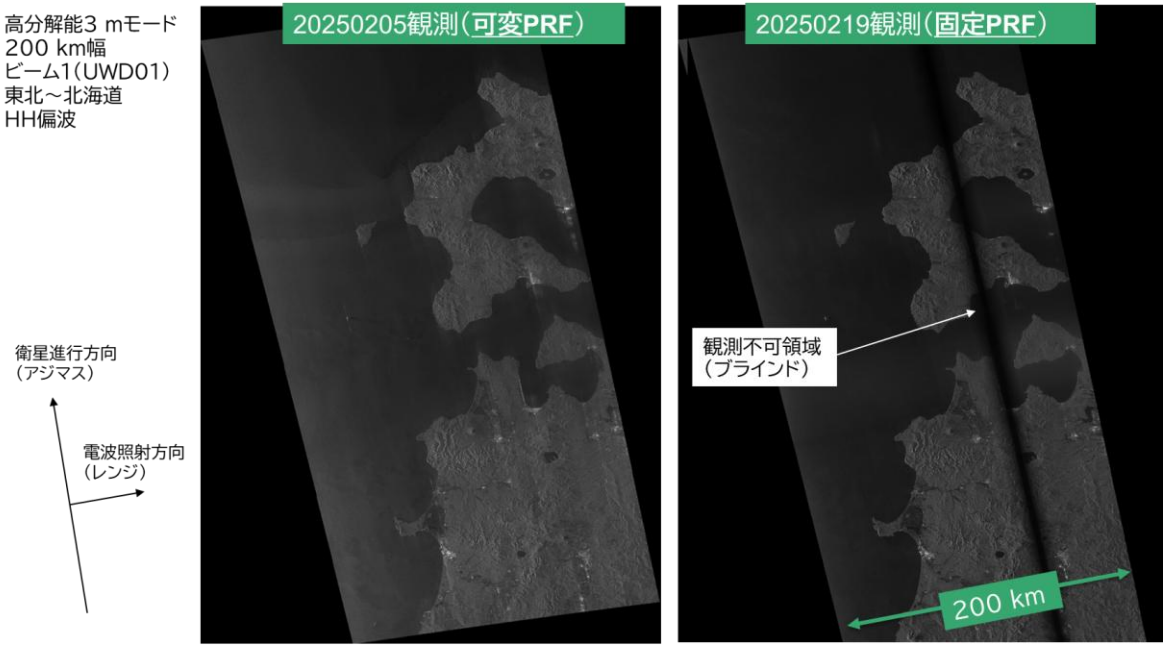
- In the DBF-SAR technology, which will be newly developed in ALOS-4, it has been confirmed that many false images occur in the satellite flight direction (*i.e.,* azimuth direction) in some areas when operating with the "**Variable PRF** (pulse repetition frequency)" setting, a function to create seamless images. Image quality adjustment is necessary continuously and is scheduled to be taken care of during FY2025.
- To avoid the influence of this phenomenon, the "**Fixed PRF**" setting may be used in some cases. In this case, an unobservable area (called *"blind"*) of approx. 10-20 % will occur in the observation width, but the image quality is equivalent to ALOS-2.



ALOS-4通常観測UWD0106
ALOS41240720250205UWD-RA0106
"Variable PRF"
Feb. 5, 2025

ALOS-4固定PRF観測UWD0106
ALOS41240720250219UWDPRA0106
"Fixed PRF"
Feb. 19, 2025

ALOS-2通常観測U2-6
ALOS2577010720-250128
ALOS-2 PALSAR-2
Jan. 28, 2025

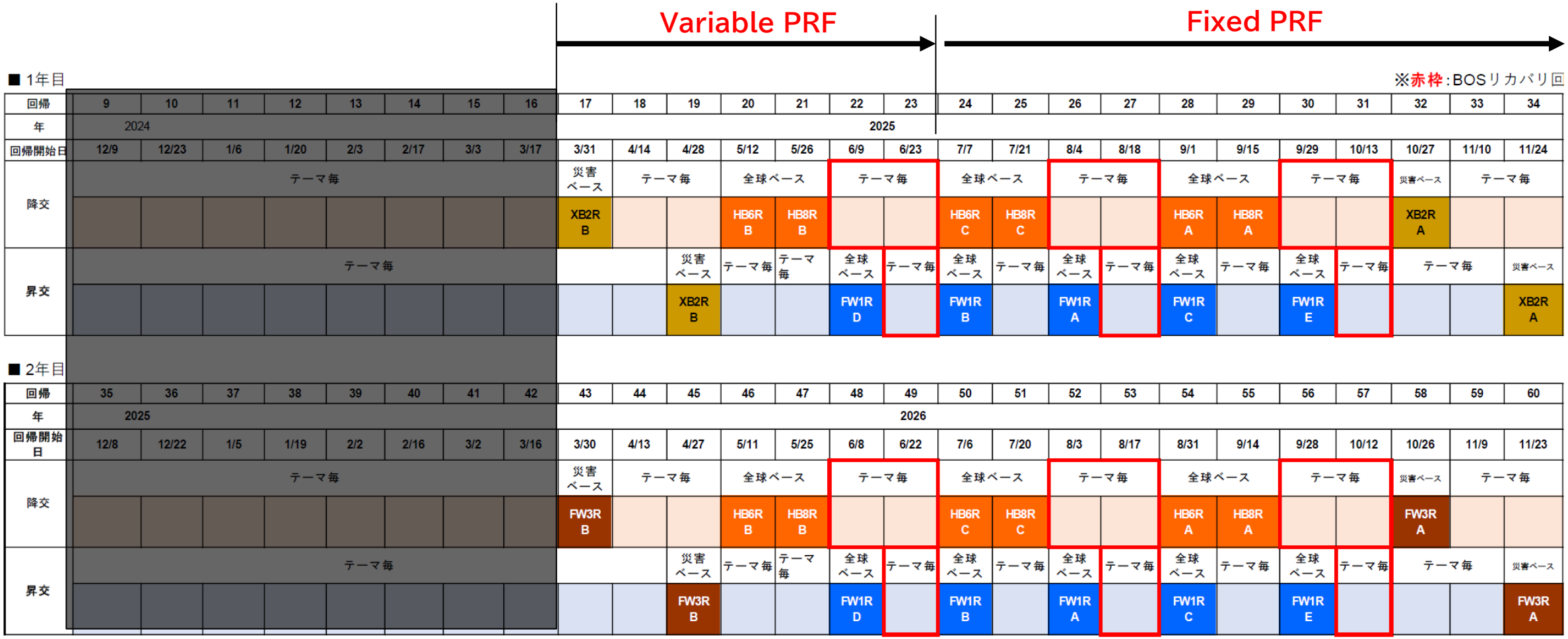


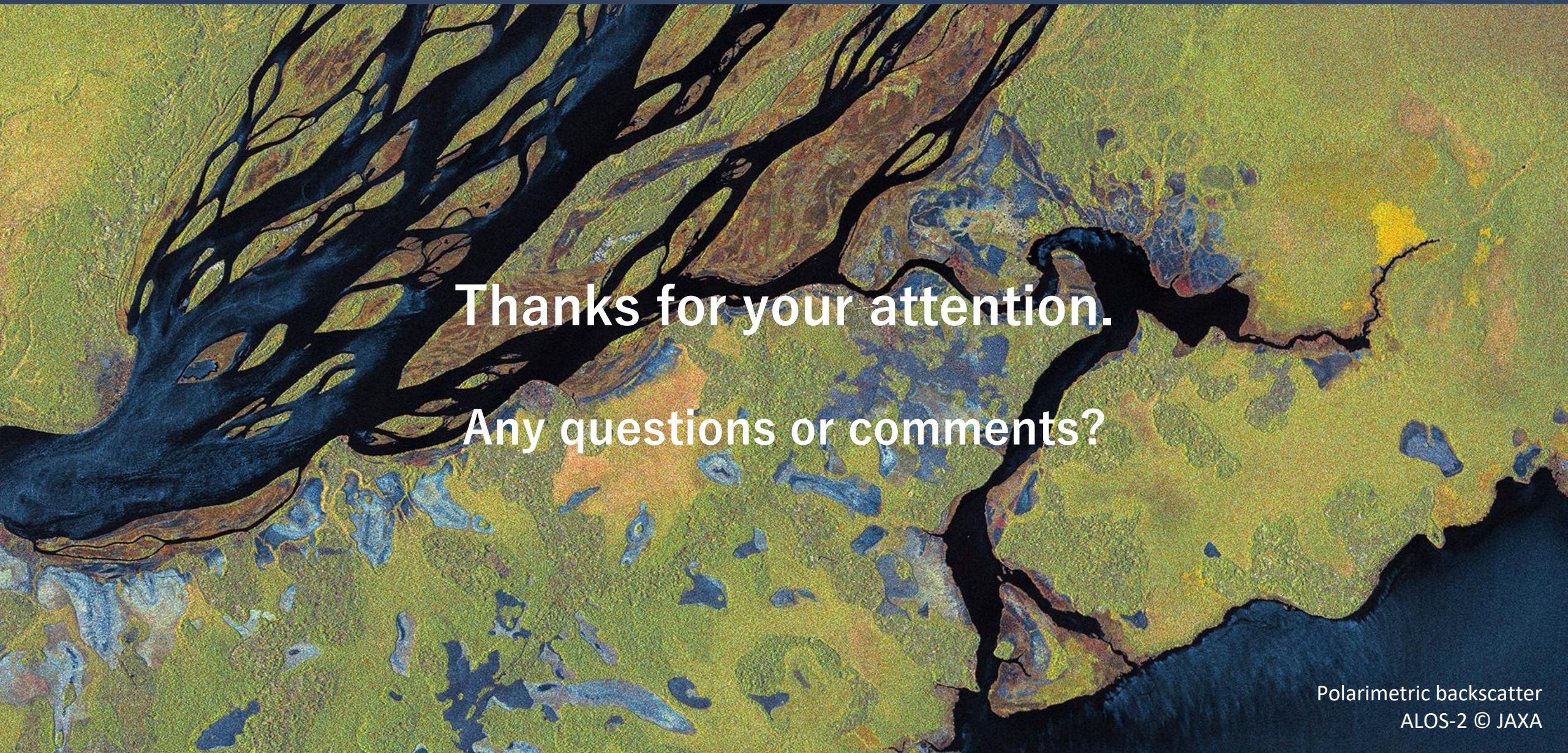
"Variable PRF"
Feb. 5, 2025

"Fixed PRF"
Feb. 19, 2025

PALSAR-3 Basic Observation Operation Plan

■ Basic Observation Scenario (BOS) in the World





Polarimetric backscatter
ALOS-2 © JAXA