Present Status of AMSR3

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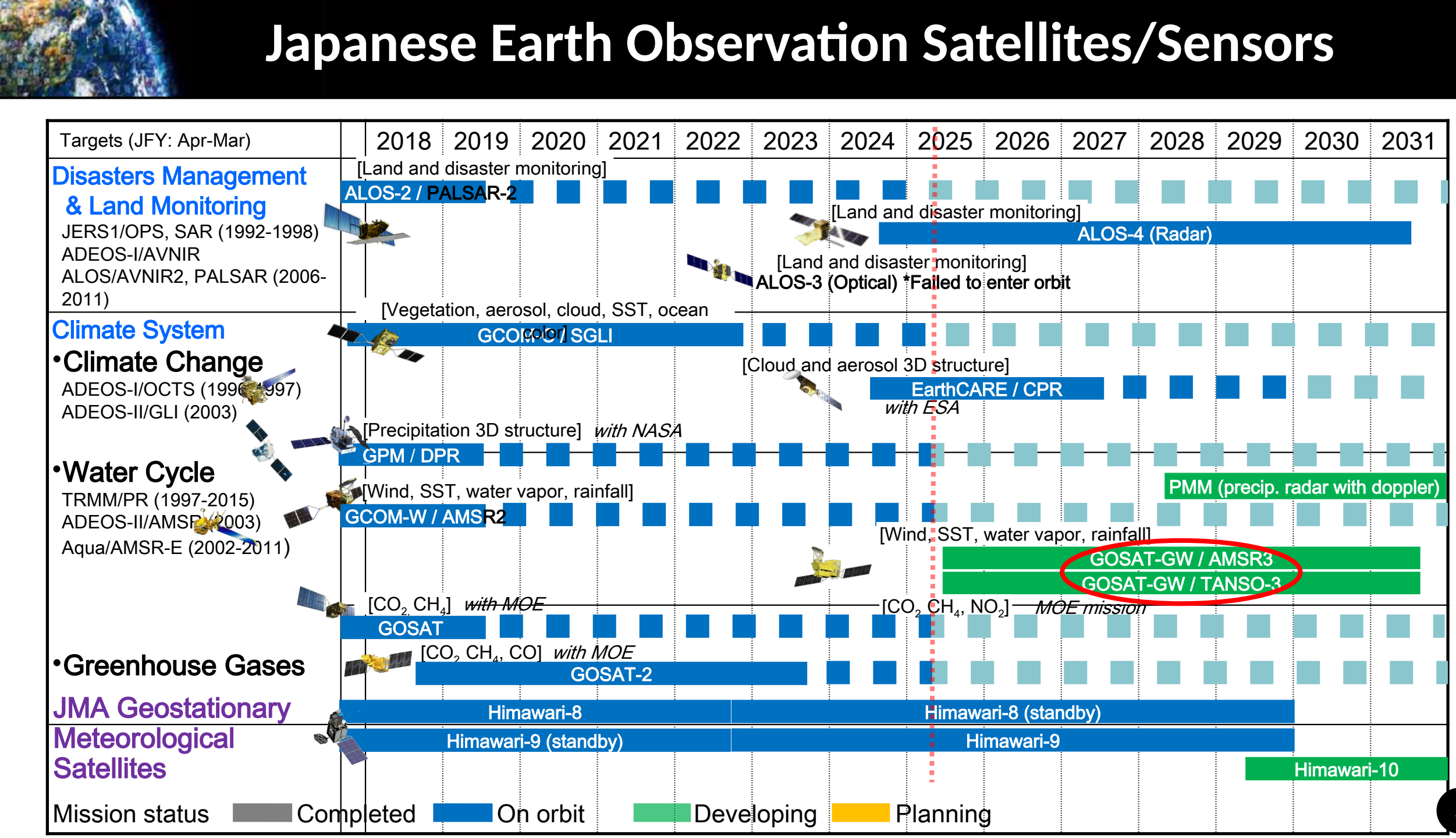
Headline

JAXA decided to launch AMSR3 on June 24, 2025 (JST) !!!

Japanese Earth Observation Satellites/Sensors



History of JAXA's Microwave Radiometers

1987

MSR

2002-2011

AMSR

AMSR-E

2012-present

Succeed AMSR-E observation

AMSR2

2025-

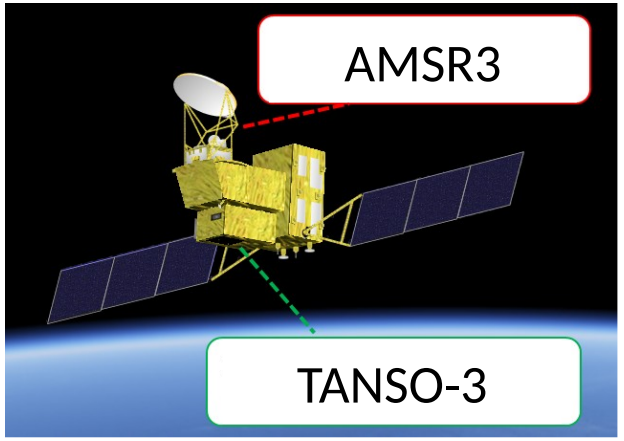
Continue & improve AMSR-E/AMSR2 observation

AMSR3

Sensor	MOS-1/MSR	ADEOS-II/AMSR	Aqua/AMSR-E	GCOM-W/AMSR2	GOSAT-GW/AMSR3
Coverage	Direct receive only	Global			
Swath	317km	1600km	1450km	1617km	> 1530km
Frequencies (GHz)	2 (23,31)	9 (6.9,10,18,23, 36,50,52,89)	6 (6.9,10,18,23,36, 89)	6 (6.9/7.3,10.65,18,23,36, 89)	8 (6.9/7.3,**10.25**/10.65,18,23, 36,89,**166**,**183**)
Polarization	Mixed V and H	V and H	V and H	V and H	V and H (166/183 are V only)
Antenna Size	0.5m	2.0m	1.6m	2.0m	2.0m
Spatial Res.	23km@31GHz	8x14km@36GHz	8x14km@36GHz	7x12km@36GHz	7kmx11km@36GHz

Overview of GOSAT-GW (Global Observation SATellite for Greenhouse gases and Water cycle)

AMSR3: Advanced Microwave Scanning Radiometer 3, conical scanning passive microwave radiometer succeeding GCOM-W/ AMSR2



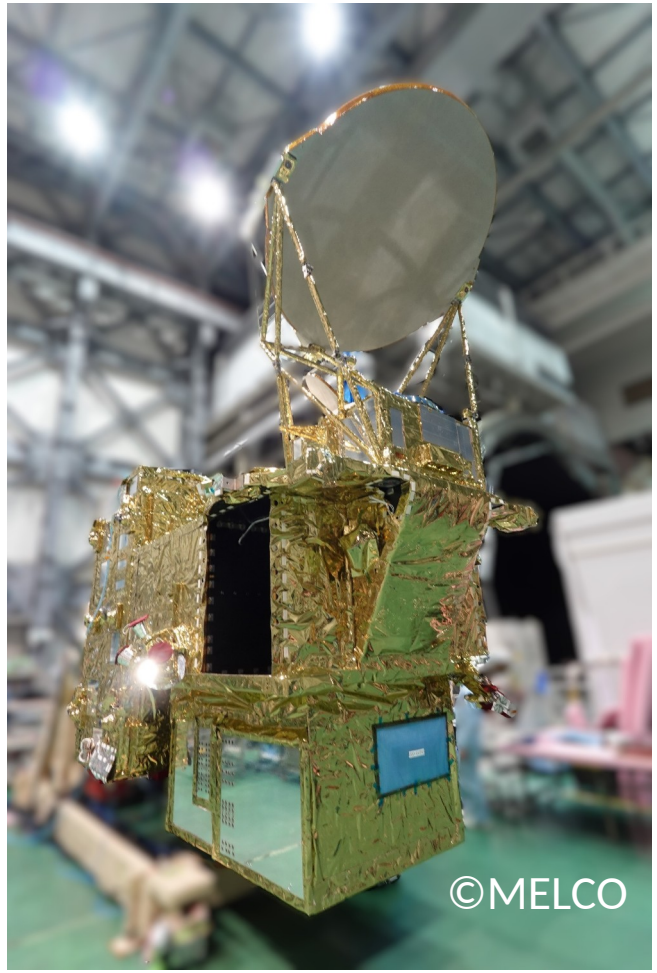
TANSO-3: Total Anthropogenic and Natural emissions mapping SpectrOmeter-3, grating imaging spectrometer replacing the Fourier transform spectroscopy used in GOSAT-2/TANSO-FTS-2

- GOSAT-GW will carry two instruments, **AMSR3** & **TANSO-3**
  - **AMSR3**, developed by JAXA, will succeed AMSR series observations adding new high-frequency channels for solid precipitation retrievals and water vapor analysis in NWP.
  - **TANSO-3**, developed by JAXA under contract with Japanese Ministry of the Environment (MOE), will improve observation capability of greenhouse gases from GOSAT-2/TANSO-2 by choosing grating spectrometer to enable spatially detailed observation.
  - Target launch date is **June 24, 2025**
- Status of development
  - Jun. 2018 : Mission Definition Review (MDR)
  - Jul. 2018: Project Preparation Review
  - Nov. 2019: Project Readiness Review
  - Dec. 2019 : Established GOSAT-GW Project
  - Aug. 2020 : Preliminary Design Review (PDR) of AMSR3 system
  - Dec. 2020 : PDR of TANSO-3 system
  - Mar. 2021: PDR of GOSAT-GW satellite system
  - Oct. 2021: Critical Design Review (CDR) of AMSR3 system
  - Jun. 2023: CDR of GOSAT-GW satellite system
  - Mar. 2025: AMSR3 PQR
  - Apr. 2025: PQR of GOSAT-GW satellite system
  - **May 2025: Shipped to the launch site**

Satellite Specification (Compared with ref. satellites)

Name	GOSAT-GW	GCOM-W (SHIZUKU)	GOSAT-2 (IBUKI-2)
Mission instruments	TANSO-3 AMSR3	AMSR2	TANSO-FTS-2 TANSO-CAI-2
Spacecraft launch Mass	2.6 t	2 t	1.8 t
Power generation (EOL)	5.3 kW	3.9 kW	5.0 kW
Designed lifetime	7 years	5 years	5 years
Orbit type	Synchronous sub-recurrent orbit		
Altitude	666km (Same as GOSAT)	699.6km	613km
Recurrent period	3 days (Same as GOSAT)	16 days	6 days
Local Sun Time	Ascending node: 13:30±15 minutes (Same as GCOM-W)	Ascending node: 13:30±15 minutes	Descending node: 13:00±15 minutes
Launch date	June 24, 2025	May 18, 2012	October 29, 2018

GOSAT-GW/AMSR3 Sensor Specification



Feature of the GOSAT-GW satellite with AMSR3 Main Reflector deployed

AMSR3 Channel Sets

Center frequency [GHz]	Polari-zation	Band width [MHz]	NEDT (1σ)	Beam width (spatial resolution)
6.925	H/V	350	< 0.34 K	1.8°(33km x 57km)
7.3			< 0.43 K	
10.25	**H/V**	**500**	**< 0.33 K**	**1.2°(22km x 38km)**
10.65	H/V	100	< 0.70 K	1.2°(22km x 38km)
18.7	H/V	200	< 0.70 K	0.65°(12km x 21km)
23.8	H/V	400	< 0.60 K	0.75°(14km x 24km)
36.42	H/V	**840**	< 0.70 K	0.35°(6km x 11km)
89.0 A/B	H/V	3000	< 1.20 K	0.15° (3km x 5km)
165.5	**V**	**4000**	**< 1.50 K**	**AZ=0.23°/ EL=0.30° (4km x 9km)**
183.31±7	**V**	**2000×2**	**< 1.50 K**	**AZ=0.23°/ EL=0.27° (4km x 8km)**
183.31±3	**V**	**2000×2**	**< 1.50 K**	**AZ=0.23°/ EL=0.27° (4km x 8km)**

Red: Changes from AMSR2 including additional CHs

Added to improve temperature resolution (NEDT) in high-resolution SST

Modified to reduce possible risks of RF interferences from the 5G communication systems

Added to get snowfall and water vapor in higher levels

① Additional **166 & 183 GHz** channels to enable monitoring of global precipitation (rain & snow) and contribute to water vapor analysis in NWP

② Additional **10.25 GHz channels with improved NEDT** to enable robust SST retrievals in higher spatial resolution

List of AMSR3 Standard Products (as of Jul. 2023)

Product	Area	Status in AMSR2
Brightness Temperature (L1B)	Global	Released (V2.2)
Resampled Brightness Temperature (L1R)	Global	Released (V2.2)
Integrated Water Vapor Content (ocean & land)	Global Ocean & Land (except vegetation/ice area)	Ocean: Released (V2.2) by H. Murata & M. Kazumori Land: Released (V1) as research product by H. Murata & M. Kazumori
Integrated Cloud Liquid Water Content	Global Ocean	Released (V2.2) by H. Murata
Precipitation (rainfall & snowfall) * to be consistent to GSMaP	Global	Rainfall: Released (V3.1) by K. Aonashi Snowfall: Under development for AMSR3 by G. Liu
Sea Surface Temperature (6GHz, 10GHz, multi-band)	Global Ocean	6GHz: Released (V4.1) by A. Shibata 10GHz & multi-band: Released (V4.1) as research product
Sea Surface Wind Speed	Global Ocean	Released (V4) by A. Shibata
All-weather Sea Surface Wind Speed	Global Ocean	Released (V3) as research product by A. Shibata
Sea Ice Concentration	High-lat. Ocean	Released (V3) by K. Cho & J. Comiso
High-resolution Sea Ice Concentration	High-lat. Ocean	Released (V1) as research product by G. Spreen
Snow Depth	Global Land	Released (V2) by R. Kelly * New version for AMSR3 was released as research product
Soil Moisture Content	Global Land	Released (V3) by H. Fujii * New version for AMSR3 was released as research product

* Sea Ice Motion Vector by K. Shimada is being considered to upgrade from research to standard product.

Concluding Remarks

- AMSR series and upcoming AMSR3
  - AMSR series has achieved **more than 20-year observations** by 6.9-89 GHz channels with 2-m antenna.
  - **AMSR3 is going to be launched on June 24, 2025.** It will have **new 166 and 183 GHz** for snowfall retrievals and water vapor analysis in NWP and contribute to produce AMSR series Climate Data Records (CDR) over 30-years.
  - Algorithms for AMSR3 geophysical products in atmosphere, ocean, land and cryosphere have been developed with **selected principal investigators** (PIs).
  - Recently **the AMSR Viewer**, an interactive web browsing tool for the AMSR series, has been updated enabling to display average, anomaly and climatology (https://www.eorc.jaxa.jp/AMSR/viewer)

- Data release plan for AMSR3
  - Data format will be **HDF5-compatible NetCDF4**, including Level 3 in EASE GRID2 in addition to Equal Lat-Lon & Polar-stereo.
  - **Near-real-time data distribution** will be available (regional data at direct receiving stations & global data with latency of 2-3 hours).
  - Products will be **released to the public one year after the launch**. **Early data access** will be available to the selected PIs by the research announcement (EORA) and partner agencies during CAL/VAL phase.

    Late proposals are welcome.