GCOM-W/AMSR2 Status

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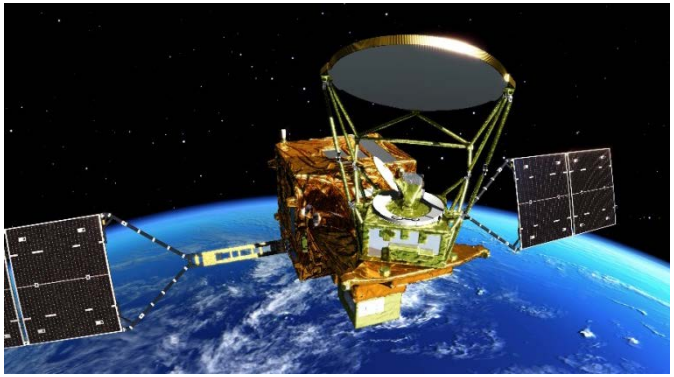
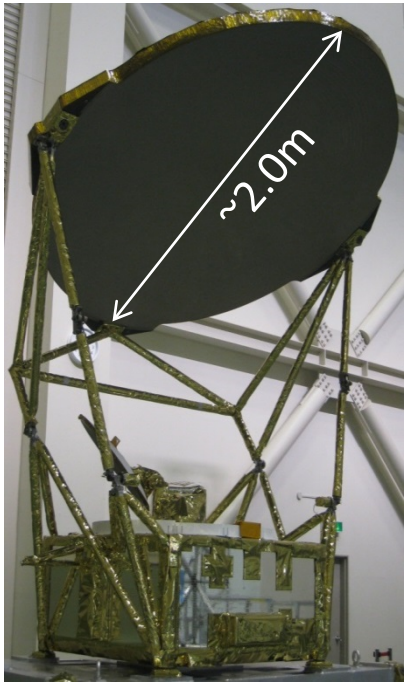
Overview of GCOM-W satellite and Advanced Scanning Microwave Radiometer 2 (AMSR2)





AMSR2 Sensor Unit

- ✓Launched on May 18, 2012
- ✓Successor of Aqua/AMSR-E (launched in May 2002), providing continuous data for climate studies and operational applications
- ✓AMSR2 is a multi-polarization and multi-frequency microwave imager with conical scanning at 40 rpm
- ✓Swath width is ~1600km@700km altitude
- ✓Observes water-related geophysical parameters
- ✓High spatial resolution with 2m diameter antenna
- ✓Improvement of on-board calibration target has resulted reduction of annual TB variation due to calibration and improvement of TB stability

Freq. [GHz]	Temp. res.	Beam width (-3dB) (res. at surface)
6.925/7.3	< 0.34 K	1.8° (35km x 62km)
10.65	< 0.70 K	1.2° (24km x 42km)
18.7	< 0.70 K	0.65° (14km x 22km)
23.8	< 0.60 K	0.75° (15km x 26km)
36.5	< 0.70 K	0.35° (7km x 12km)
89.0 A/B	< 1.20 K	0.15° (3km x 5km)

Recent Events

- 15 Feb. 2017: AMSR2 L2 Ver.3 Data Release Review
- 1 Mar. 2017: Release of AMSR2 L2 Ver.3 (SST, SSW, SIC, SMC)
- 28 Apr. 2017: Domestic symposium on GCOM-W outcomes and perspectives to the follow-on mission
- 17 May 2017: Completion of designed mission life (5-year)
- 26 May 2017: GCOM-W Nominal Mission Completion Review
- 11 Oct. 2017: GCOM-W & GPM/DPR Science & Policy Review by external committee
- 26 Oct. 2017: GCOM-W & GPM/DPR Project Completion Review (Management Review)
- Dec? 2017: Transition to Post-mission phase

GCOM-W1 Data Providing Service: https://gcom-w1.jaxa.jp/auth.html

AMSR2 Standard Products and Accuracy

Product		Coverage	Resolution	Release Accuracy	Standard Accuracy	Target Accuracy	Validation Result
Brightness Temperature		Global	5-50km	±1.5K	±1.5K	±1.0K (bias) ±0.3K(random)	< 1.4 K
GEO	Total Precipitable Water	Global Ocean	15km	±3.5 kg/m^2	±3.5 kg/m^2	±2.0 kg/m^2	1.5 kg/m^2
	Cloud Liquid Water	Global Ocean	15km	±0.10 kg/m^2	±0.05 kg/m^2	±0.02 kg/m^2	0.04 kg/m^2
	Precipitation	Global (except high latitude)	15km	Ocean ±50 % Land ±120 %	Ocean ±50 % Land ±120 %	Ocean ±20 % Land ±80 %	Ocean 48% Land 86%
	Sea Surface Temperature	Global Ocean	50km	±0.8 ºC	±0.5 ºC	±0.2 ºC (zonal mean)	0.5 ºC < 0.2 ºC (zonal)
	Sea Surface Wind Speed	Global Ocean	15km	±1.5 m/s	±1.0 m/s	±1.0 m/s	1.0 m/s
	Sea Ice Concentration	Ocean in high latitude	15km	±10 %	±10 %	±5%	9 %
	Snow Depth	Land	30km	±20 cm	±20 cm	±10 cm	18 cm
	Soil Moisture	Land	50km	±10 %	±10 %	±5 %	4 %

Ver.3 updates in March 2017, reprocessing completed in July 2017.

AMSR2 Research Products and Accuracy

Products	Area	Resolution	Target accuracy	Accuracy
All-weather sea surface wind speed	Ocean	60 km	± 7 m/s for strong wind (>17m/s)	4.43 m/s
High-resolution (10-GHz) SST	Ocean	30 km	± 0.8 °C	0.55 ° C
Soil moisture and vegetation water content based on the land data assimilation	Africa, Australia (at first stage)	25 km	soil moisture: ± 8% vegetation water: ± 1 kg/m^2	Under evaluation
Land surface temperature	Land	15 km	forest area: ± 3 °C nondense vegetation: ± 4°C	3.93-5.00 K
Vegetation water content	Land	10 km	± 1 kg/m^2	0.84-1.42 kg/m^2
High resolution sea ice concentration	Ocean in high latitude	5 km	± 15 %	16-22 %
Thin ice detection	Okhotsk sea (at first stage)	15 km	± 80 %	Under evaluation
Sea ice moving vector	Ocean in high latitude	50 km	2 components: 3 cm/s	Under evaluation

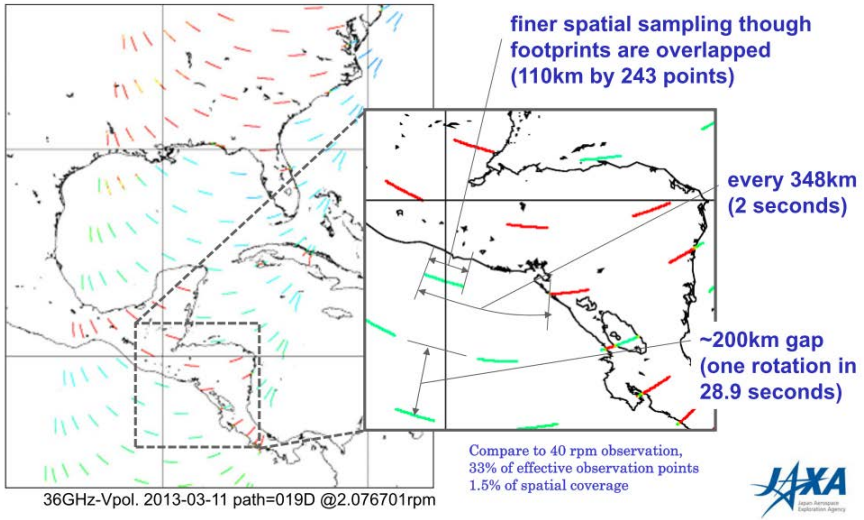
Released to public

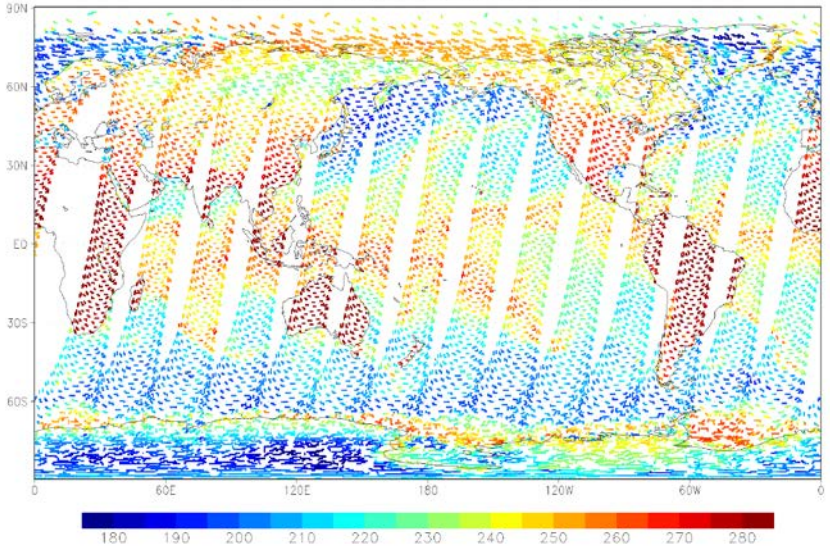
Research Product: http://suzaku.eorc.jaxa.jp/GCOM_W/research/resdist_j.html

Cross-calibration for L1 Ver.2 (1/3)

- Cross-calibration to calculate coefficients to translate AMSR2 Tb to AMSR-E equivalent Tb, since some AMSR2 L2 algorithms are optimized to AMSR-E Tb.
- AMSR-E made observation in slow rotation (2rpm) mode from Dec. 2012 to Dec. 2015 in the same observation conditions to AMSR2 (observation time, incident angle)
- Procedure

1. Match-up AMSR-E and AMSR2 Tbs at same location
2. Calculate linear expression to transfer AMSR2 Tb to AMSR-E equivalent Tb by making scatter plots for Asc. and Dsc. orbits.

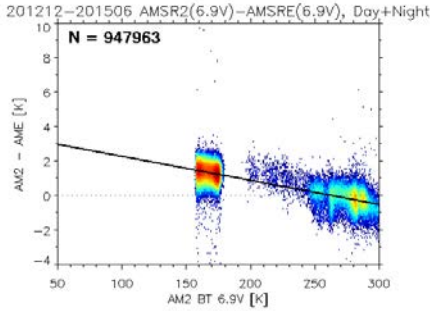




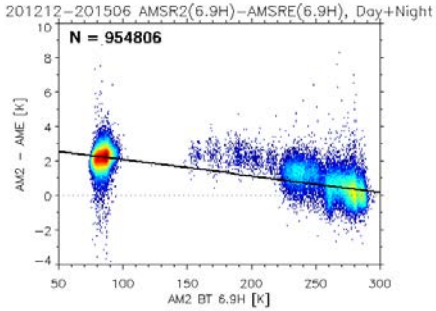
Cross-calibration for L1 Ver.2 (2/3)

Scatter plots of (AMSR2 Tb - AMSR-E (L1S) Tb) VS (AMSR-E (L1S) Tb)
From 1 Dec. 2012 to 30 Sep. 2015, Asc.+ Dsc. orbits

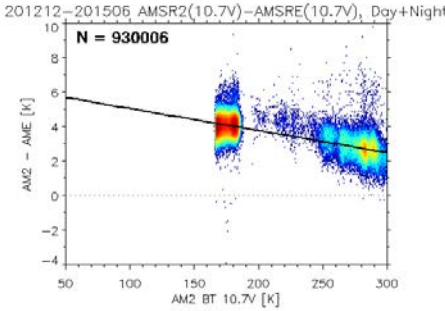
06V



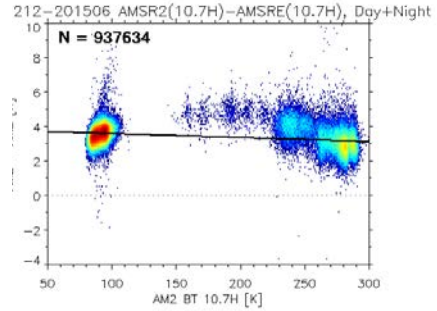
06H



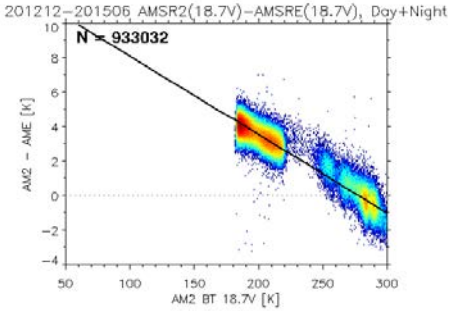
10V



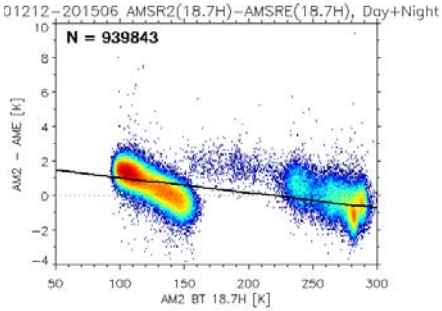
10H



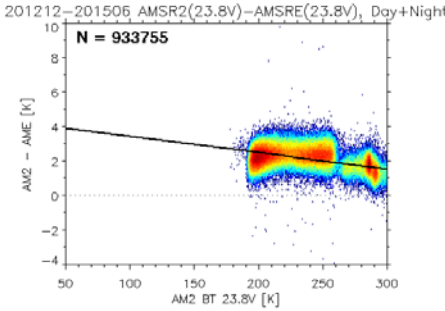
18V



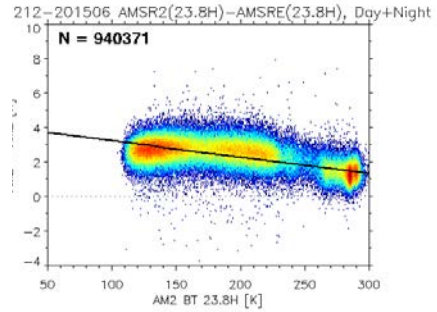
18H



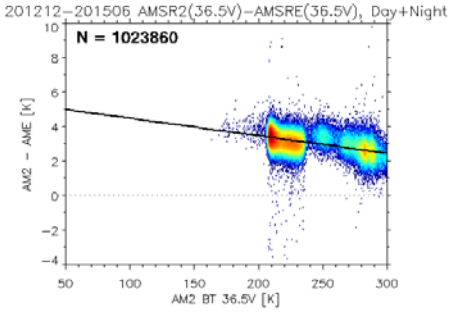
23V



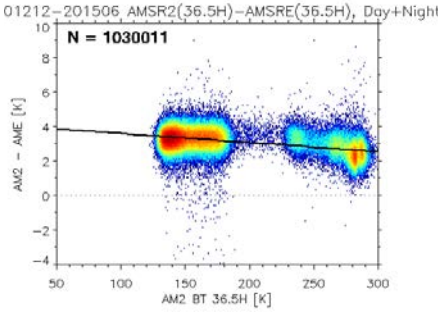
23H



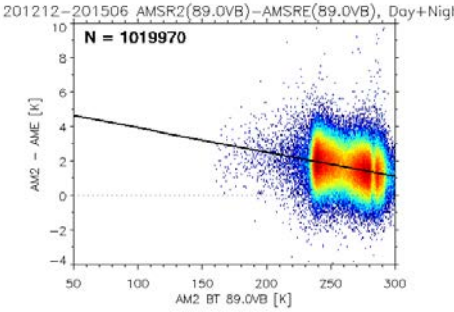
36V



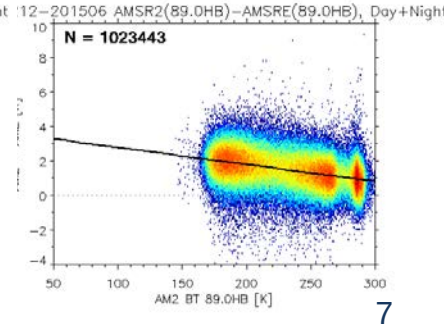
36H



89VB



89HB



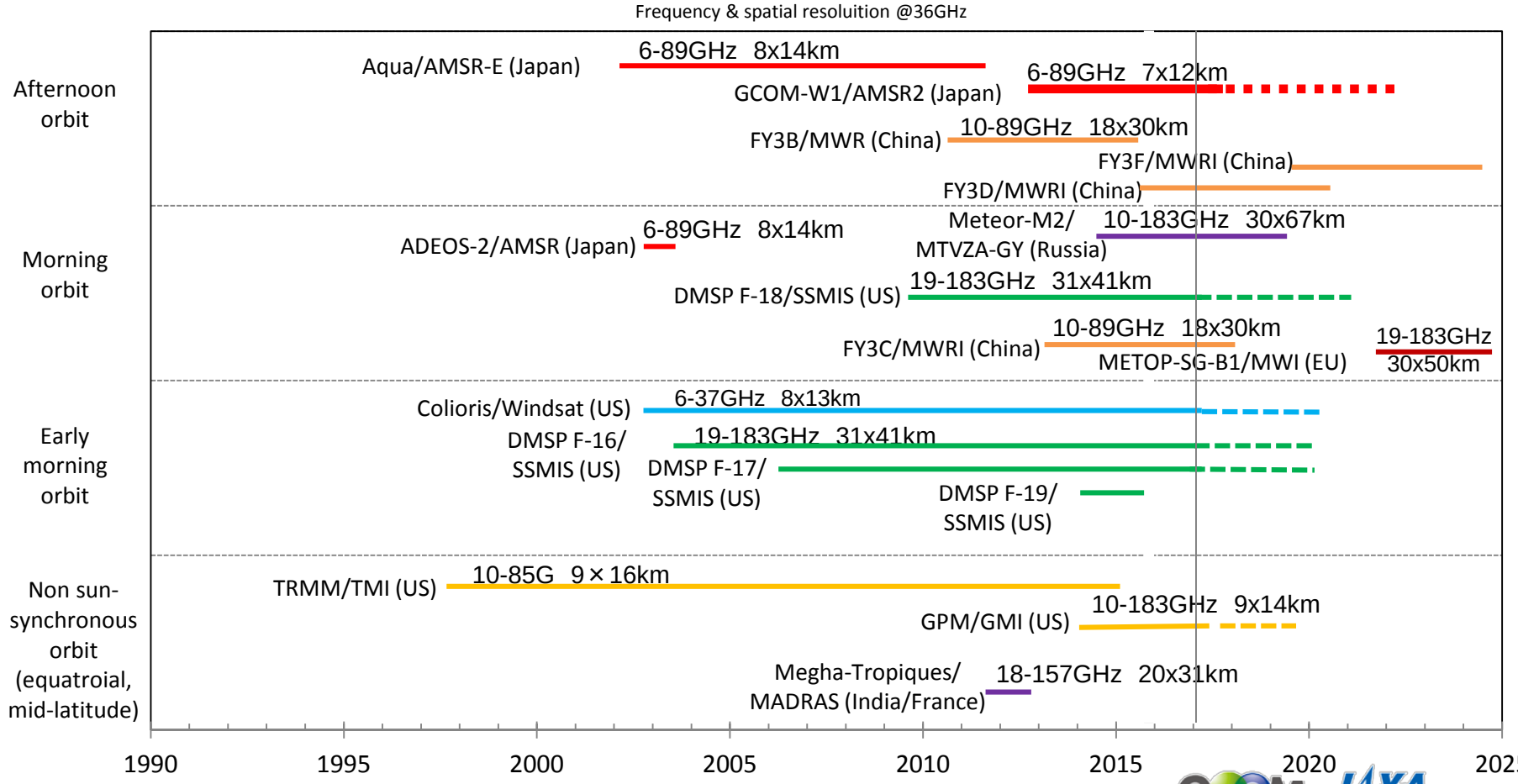
Cross-calibration for L1 Ver.2 (3/3)

- Intercalibration coefficients (slope and intercept) provided below are those of lines passing through two O-C values over ocean and rainforest (no physical meaning for straight-line approximation). Calibration differences at typical Tbs are shown based on the coefficients.

Frequency [GHz] (H/V)	Ascending		Descending		Ascending + Descending	
	Slope	Intercept	Slope	Intercept	Slope	Intercept
6.9 (V)	-0.01395	3.75442	-0.01357	3.52119	-0.0139	3.67421
6.9 (H)	-0.00966	3.10936	-0.00906	2.94066	-0.0094	3.03663
10.65 (V)	-0.01267	6.44474	-0.01255	6.11618	-0.01289	6.34775
10.65 (H)	-0.00189	3.85311	-0.00227	3.69259	-0.00221	3.79624
18.7 (V)	-0.04571	12.77339	-0.04435	12.27115	-0.04524	12.57562
18.7 (H)	-0.00735	1.90245	-0.00925	1.78223	-0.00858	1.89574
23.8 (V	-0.01179	4.86124	-0.00745	3.97509	-0.00957	4.40435
23.8 (H)	-0.00927	4.29221	-0.0093	3.99323	-0.00947	4.1871
36.5 (V)	-0.01107	5.66375	-0.00928	5.31924	-0.01019	5.49799
36.5 (H)	-0.00568	4.24643	-0.00534	4.08753	-0.00561	4.19181
89 (B) (V)	-0.01597	5.86118	-0.0113	4.57687	-0.01403	5.32379
89 (B) (H)	-0.01134	4.0913	-0.00807	3.36449	-0.0098	3.75174

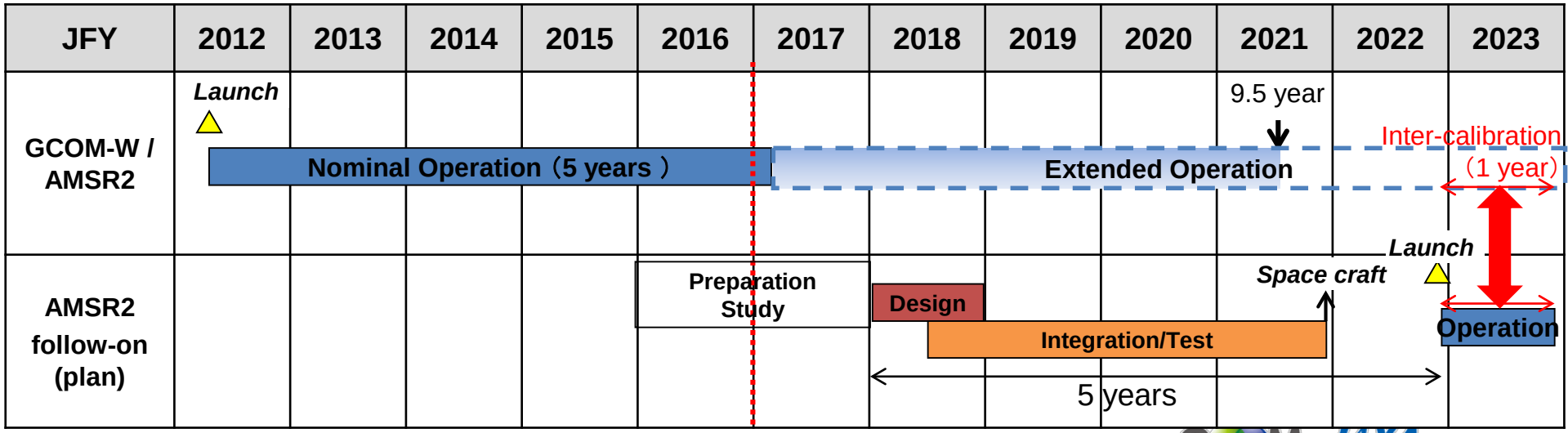
Schedule of Passive Microwave Imagers

- DMSP-20 was canceled, but no future mission at present in US.
- AMSR2 is the only high-resolution microwave imager in the afternoon orbit.
- AMSR2 will be the only instrument that observe global SST and sea ice concentration with high-resolution. (Windsat operates more than 14 years exceeding 3-year designed mission life)



AMSR2 Follow-on Mission Status

- Continuity is the highest priority of users
  - Observation operation will be continued as long as it can survive.
  - There is a high risk of gap between AMSR2 and the follow-on, even though development of AMSR2 follow-on will start from JFY2018.
- The Roadmap for the Japanese Basic Plan on Space Policy, revised on Dec. 2016, stipulates that the government should research the hosted payload capability of AMSR2's successor sensor with GOSAT-3, the development of which will be initiated in JFY2018.
- In light of the revision of the Roadmap for the Basic Plan, the government approved a budget for JAXA's research on the hosted payload capability of AMSR2 f/o sensor for JFY2017.
- Budget for research of AMSR2 f/o was included in the governmental budget request for JFY2018.



Summary

- GCOM-W successfully achieved designed mission life of 5 years in May 2017.
- JAXA had the Nominal Mission Completion Review on May 26, 2017 to evaluate GCOM-W mission success and its outcomes.
- Currently, we are preparing for the Project Completion Review (management review) on Oct. 26, 2017, in order to confirm “officially” the post-mission transition
- Highest priority from users is gap-less transition from AMSR2 to follow-on mission in order to continue operational applications and keep long-term data for climate studies
  - In JFY2017, research on possible payload capability of AMSR2 follow-on onto GOSAT-3 is conducted.
  - Budget for research of AMSR2’s successor sensor was included in the governmental budget request for JFY2018.