JMA and JAXA

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1:JMA, 2:JAXA

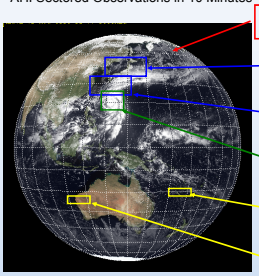
JMA

Current Status
- **MTSAT-2** (Himawari-7)
  - Status: Imaging operation at 145E since 03 UTC, 1 July 2010
  - Launch Date: 18 February 2006
- MTSAT-1R (Himawari-6)
  - Status: Imaging operation standby at 140E, direct broadcast and DCS operations
  - Launch Date: 26 February 2005

Future Plans
- **Himawari -8 and -9** satellites
  - Plan to launch in 2014 and 2016, and start operation in 2015 and 2022
- **AHI** (Advanced Himawari Imager)
  - Increase channels, spatial resolution and measurement frequency
- => improve current products and create new products
  - AMV, CSR, CGI, SST, now casting,,,
  - Volcanic ash detection and height, and Instability Index
- Ground stations
  - Two redundant stations for mitigation of rain attenuation
  - Satellite control, imagery and DCP data correction.
  - Ka-band : imagery and DCP data downlink
  - Ku-band : telemetry and command operations
- Dissemination of the imagery data
  - Use internet. The feasibility of other methods is being investigated

*AMV : Atmospheric Motion Vector
*CSR : Clear Sky Radiance
*CGI : Cloud Grid Information
*SST : Sea surface Temperature
*DCS : Data Collection System
*DCP : Data Collection Platforms

AHI Sectored Observations in 10 Minutes



Full disk
Interval : 10 minutes (6 times per hour), 23 swath

Region 1 JAPAN (North-East)
Interval : 2.5 minutes (4 times in 10minutes)
EW x NS: 2000 x 1000 km, 2 swath

Region 2 JAPAN (South-West)
Interval : 2.5 minutes (4 times in 10minutes)
EW x NS: 2000 x 1000 km, 2 swath

Region 3 Typhoon
Interval : 2.5 minutes (4 times in 10minutes)
EW x NS: 1000 x 1000 km, 2 swath

Region 4 Land mark
Interval : 0.5 minutes (20 times in 10minutes)
EW x NS: 1000 x 500 km, 1 swath

Region 5 Land mark
Interval : 0.5 minutes (20 times in 10minutes)
EW x NS: 1000 x 500 km, 1 swath

AHI Channel Set

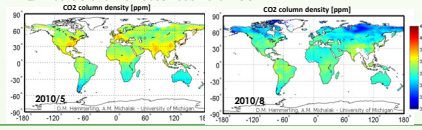
Band	Central Wavelength [μm]	Spatial Resolution
1	0.43 - 0.48	1Km
2	0.50 - 0.52	1Km
3	0.63 - 0.66	0.5Km
4	0.85 - 0.87	1Km
5	1.60 - 1.62	2Km
6	2.25 - 2.27	2Km
7	3.74 - 3.96	2Km
8	6.06 - 6.43	2Km
9	6.89 - 7.01	2Km
10	7.26 - 7.43	2Km
11	8.44 - 8.76	2Km
12	9.54 - 9.72	2Km
13	10.3 - 10.6	2Km
14	11.1- 11.3	2Km
15	12.2 - 12.5	2Km
16	13.2 - 13.4	2Km

JAXA

GOSAT (Green house gases Observing SATellite)

Mission Target
- Observe CO2 and CH4 column density
  - Spatial scale : 100-1000km
  - Relative accuracy : 1% for CO2 (4ppmv in 3 months average; target 1ppmV) and 2% for CH4.
  - During the Kyoto Protocol's first commitment period (2008 to 2012).
- Reduce sub-continental scale CO2 annual flux estimation errors by half
  - 0.54 GtC/yr→0.27 GtC/yr

GOSAT2
- The development of GOSAT follow-on is being discussed by MOE, NIES and JAXA
- Continue and extend GHG observation
  - Improve precision and resolution
    - Reduce the footprint size: from 10.5km to 3 or 4km
    - Increase the numbers of FOV : from one to five
    - Improve precision : 4 ppm to 0.5 ppm
  - Additional approach to GOSAT observation
    - Distinguish the anthropogenic greenhouse gas from natural one
    - Add CO and NO2 observation channels



GOSAT Characteristics

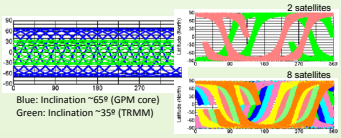
Launch	Jan 23, 2009 (by H2A-15 rocket)	
Orbit	Sun synchronous orbit 3 days revisit Local time 13:00 +/- 15min (12:47 Mar 17)	
Mission Life	5 years	
Mission Instruments	Thermal And Near infrared Spectrometer for carbon Observation (TANSO)	
	Fourier Transform Spectrometer (FTS)	Cloud and Aerosol Imager (CAI)
Swath	790km (Nominal: 5 points cross track)	750-1000km
Resolution	10.5km	0.5-1.5km
Spectral Coverage	B1: 0.75-0.78 um B2: 1.56-1.72 um B3: 1.92-2.08 um B4: 5.5-14.3 um B1-3 polarization bands	B1: 0.38 um B2: 0.67 um B3: 0.87 um B4: 1.62 um
Spectral Resolution	0.2 cm^{-1}	20nm

* MOE : Ministry Of the Environmental Japan
* NIES : National Institute for Environmental Studies

DPR on GPM (Global Precipitation Mission)

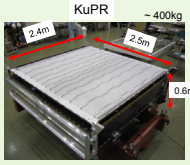
- GPM = follow-on mission of the TRMM
  - Frequent precipitation measurement
  - Expected Partners : JAXA, NASA, NOAA, EUMETSAT, CNES-ISRO and others
- Core Observatory
  - DPR (Dual-frequency Precipitation Radar)
    - KuPR (13.6 GHz) and KaPR (35.5 GHz)
    - Highly sensitive precipitation measurement
    - Calibration for constellation radiometers
  - GMI (Microwave Imager)
    - JAXA & NICT responsible for DPR and H2A launcher, NASA for Spacecraft bus and GMI
- Constellation Satellites
  - MW-radiometers installed on each satellite

3-hourly global rainfall map

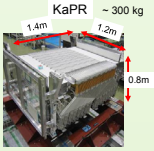


Blue: Inclination ~65º (GPM core)
Green: Inclination ~35º (TRMM)

KuPR ~ 400kg



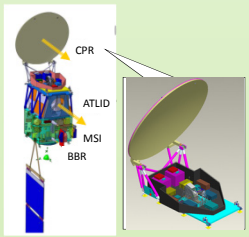
KaPR ~ 300 kg



*NICT : National Institute of Information and Communications Technology

CPR on EarthCARE

- EarthCARE : ESA Earth Explorer Core Mission
  - Objective : global observations of clouds, aerosols and radiation
  - 4 instruments : CPR, Atmospheric Lidar (ATLID), Multi Spectral Imager (MSI) and Broad Band Radiometer (BBR)
- CPR (Cloud Profiling Radar)
  - Joint Development of JAXA and NICT
  - High sensitivity and Doppler measurement
  - Current Status
    - CPR-Engineering Model with component Structure Model went through Thermal Vacuum /Balance Test and first antenna pattern measurement with Large Near Field Measurement system (NFM), and is going to mechanical test series at Tsukuba Space Center (TKSC), JAXA.
    - Quasi Optical Feeder (QOF) and Transmitter Receiver Subsystem (TRS) are about to ship and will be integrated at NEC TOSHIBA Space Systems, Ltd. by next spring.



CPR Characteristics

Center frequency	94.05 GHz
Pulse width	3.3 micro second (equivalent to 500m vertical resolution)
Beam width	0.095 deg
Polarization	Circular
Transmit power	> 1.5 kW (Klystron spec.)
Height range	-0.5 ~ 20 km
Resolution	500 m (100 m sample); Vertical, 500m integration; Horizontal
Sensitivity*	-35 ~ +21 dBZ
Radiometric accuracy*	< 2.7 dB
Doppler measurement	Pulse Pair Method
Doppler range*	-10 ~ +10 m/s
Doppler accuracy*	< 1 m/s
Pulse repetition frequency	Variable; 6100~7500 Hz
Pointing accuracy	< 0.015 degree

*; at 10 km integration and 387 km orbit height

AMSR-E and AMSR2

AMSR-E on Aqua

- AMSR-E is now in survival mode.
  - Observation was halted and started run-down at 06:51 UTC on 4 Oct. 2011. Its rotation stopped at around 07:26 UTC.
  - Direction of the main reflector is unknown.
  - Heater control works normally.
  - HK data have been output from the sensor and the sensor conditions are monitored continuously.
- JAXA prepared a recovery plan with engineers and NASA
  - Observation without rotation (finished)
  - Trial run-up to 4 rpm (1/10 of nominal mode)
  - Further discussion for cross-calibration with AMSR2

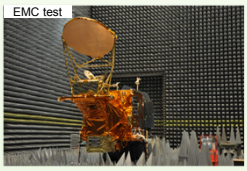
AMSR2 on GCOM-W1

- AMSR2 (Advanced Microwave Scanning Radiometer 2)
  - Deployable main reflector system with 2.0 m diameter
    - 20% finer resolution than AMSR-E with 1.6 m reflector
  - Frequency channel set is identical to that of AMSR-E except additional 7.3 GHz channel to mitigate RFI for 6.9 GHz channel
  - Calibration system improved
    - Improved thermal design, intensive sunlight shielding
- GCOM-W1 will join A-train
- GCOM-W1 was shipped to the launch site in Jan. 2012
- Launch: Early 2012 JFY (after Apr. 2012)

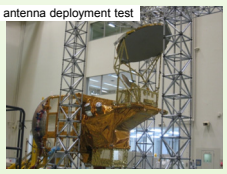
AMSR2 Channel Set

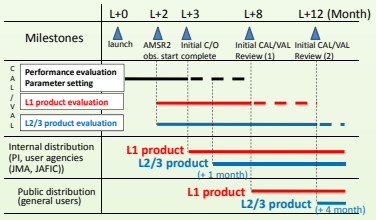
Center Freq. [GHz]	Polarization	Beam width [deg] (Ground res. [km])	Reference: Ground res of AMSR-E	NEdT [K]	Sampling interval [km]
6.925/7.3	V and H	1.8 (35 x 62)	43 x 75 km	<0.34/0.43	10
10.65		1.2 (24 x 42)	29 x 51 km	<0.70	
18.7		0.65 (14 x 22)	16 x 27 km	<0.70	
23.8		0.75 (15 x 26)	18 x 32 km	<0.60	
36.5		0.35 (7 x 12)	8 x 14 km	<0.70	
89.0		0.15 (3 x 5)	4 x 6 km	<1.20/1.40	5

EMC test



antenna deployment test

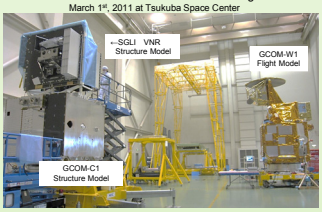




SGLI on GCOM-C1 GPM (Global Precipitation Mission)

- SGLI (Second Generation Global Imager)
  - Finer spatial resolution (250m and 500m)
  - Polarization/along-track slant view channels (P)
  - => Improve land, coastal, and aerosol observations
- SGI current status
  - The engineering model (EM) has been tested
    - System structure model test (finished)
    - System thermal balance test (finished)
    - SGLI EM test
  - The flight parts and components have been ordered
  - System CDR is scheduled in autumn this year

GCOM-C1 structure model and GCOM-W1 flight model
March 1st, 2011 at Tsukuba Space Center



250m over the Land or coastal area, and 1km over offshore

SGLI Channel Set

CH	λ VN, P, SW: nm T: μm	Δλ	L_{std} VN, P: W/m²/sr/μm T: Kelvin	L_{max}	SNR at Lstd VN, P, SW: - T: NEΔT	IFOV m
VN1	380	10	60	210	250	250
VN2	412	10	75	250	400	250
VN3	443	10	64	400	300	250
VN4	490	10	53	120	400	250
VN5	530	20	41	350	250	250
VN6	565	20	33	90	400	250
VN7	*673.5*	*20*	23	62	400	250
VN8	*673.5*	20	25	210	250	250
VN9	*763*	*12*	40	350	*1200(@ 1km)*	250
VN10	*868.5*	20	8	30	400	250
VN11	*868.5*	20	30	300	200	250
P1	*673.5*	20	25	250	250	1000
P2	*868.5*	20	30	300	250	1000
SW1	1050	20	57	248	500	1000
SW2	1380	20	8	103	150	1000
SW3	*1630*	200	3	50	57	250
SW4	2210	50	1.9	20	211	1000
T1	10.8	0.7	300	340	0.2	500/250
T2	12.0	0.7	300	340	0.2	500/250

Multi-angle obs. for 674nm and 869nm

250m-mode possibility

SGLI Characteristics

Orbit	Sun-synchronous (descending local time:10:30) Altitude: 798km, Inclination: 98.6deg
Launch Date	Jan. 2015? (HII-A)
Mission Life	5 years (3 satellites; total 13 years)
Scan	Push-broom electric scan (VNR: VN & P) Wisk-broom mechanical scan (IRS: SW & T)
Scan width	1150km cross track (VNR: VN & P) 1400km cross track (IRS: SW & T)
Digitalization	12bit
Polarization	3 polarization angles for P
Along track direction	Nadir for VN, SW and T, +45 deg and -45 deg for P
On-board calibration	VN: Solar diffuser, Internal lamp (PD), Lunar by pitch maneuvers, and dark current by masked pixels and nighttime obs. SW: Solar diffuser, Internal lamp, Lunar, and dark current by deep space window T: Black body and dark current by deep space window All: Electric calibration