Current Status and Future Plan of Japanese Meteorological Satellite Program

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1. History and Current Status

History of Himawari series

GMS (Geostationary Meteorological Satellite)

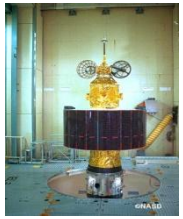
nicknamed "**Himawari**"

Satellite	Observation period
GMS	1977~1981
GMS-2	1981~1984
GMS-3	1984~1989
GMS-4	1989~1995
GMS-5	1995~2003
GOES-9 *	2003~2005 *
MTSAT-1R	2005~2010
MTSAT-2	2010~(2015)

Jul 1977 Aug 1981 Aug 1984 Sep 1989 Mar 1995 May 2003 Feb 2005 Feb 2006 July 2010

Launch Date

GMS-2
Himawari-2



GMS-3
Himawari-3

GMS-4
Himawari-4

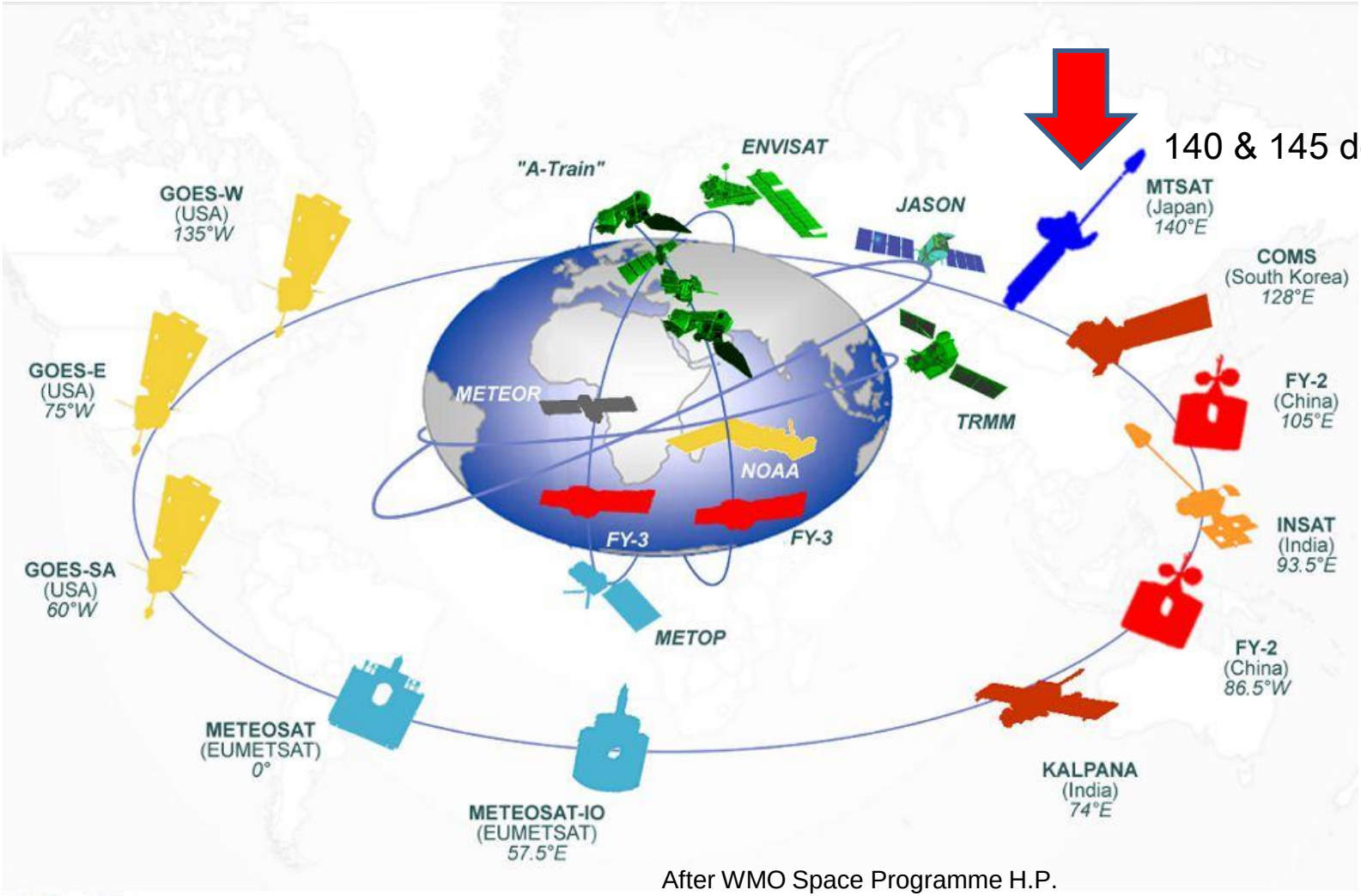
GMS-5
Himawari-5

(* GOES-9)

MTSAT (Multi-functional Transport SATellite)

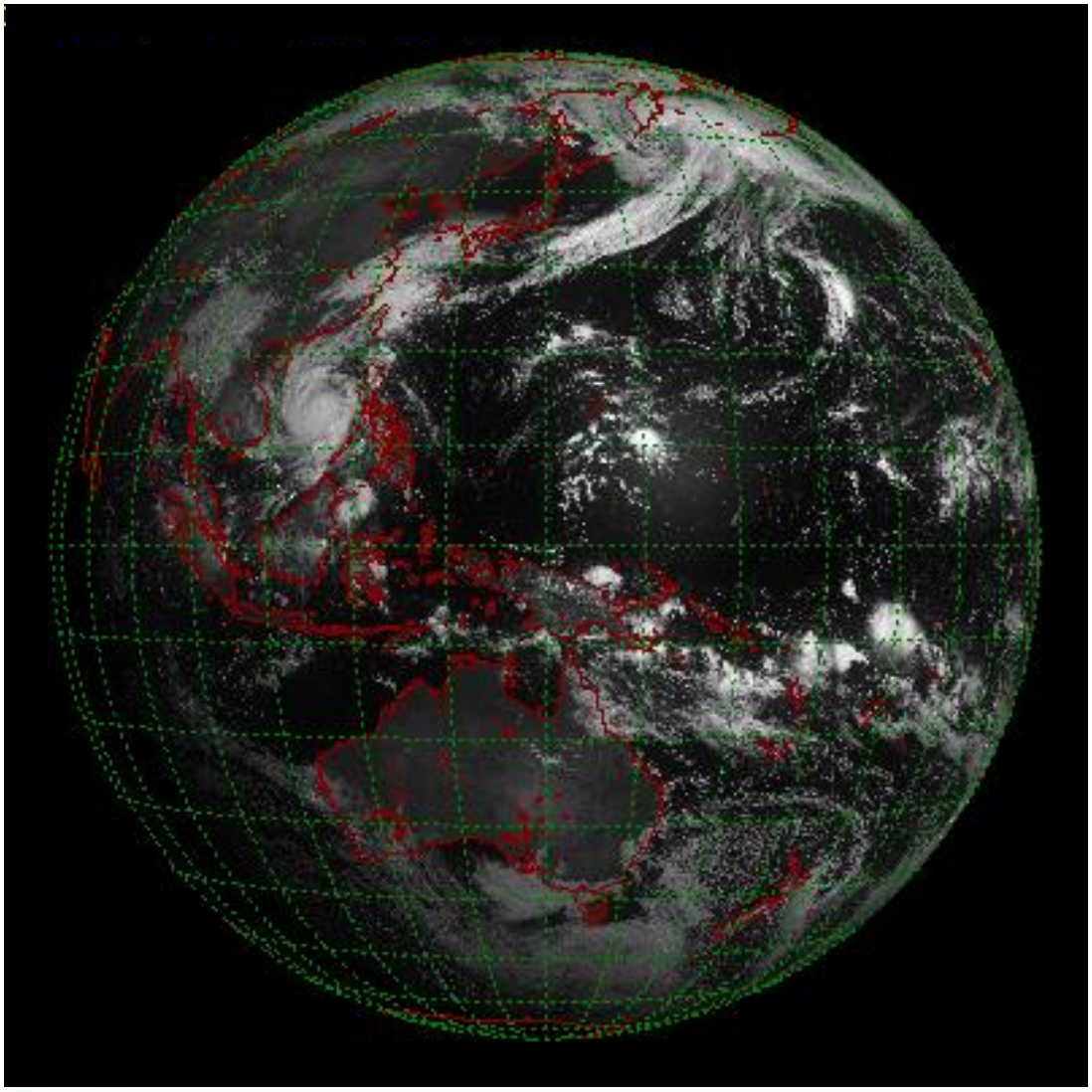
* Back-up operation of GMS-5 with GOES-9 by NOAA/NESDIS had been carried out from May 22, 2003 to June 28, 2005.

Operational Meteorological Satellites



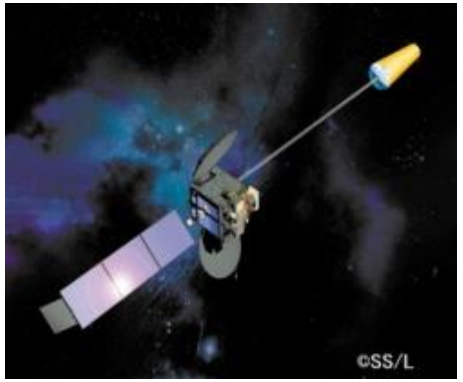
After WMO Space Programme H.P.
(http://www.wmo.int/pages/prog/sat/globalplanning_en.php)

View from MTSAT

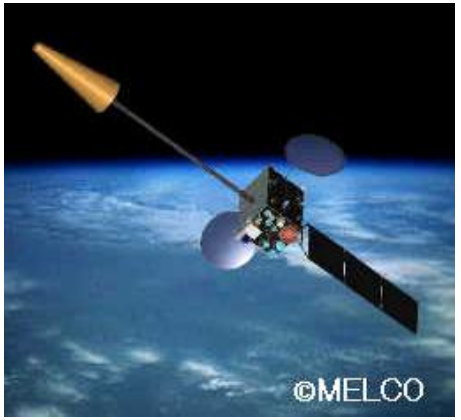


Status of MTSAT-1R/-2 (Himawari-6/-7)

- **MTSAT-1R (Himawari-6)**
  - Launch Date: 26 February 2005　18:25 (JST)
  - Launcher: H-IIA No.7
  - Imager: Raytheon
  - GEO orbit: 140°E
  - Status: **Imaging operation standby, direct broadcast and DCS operations**

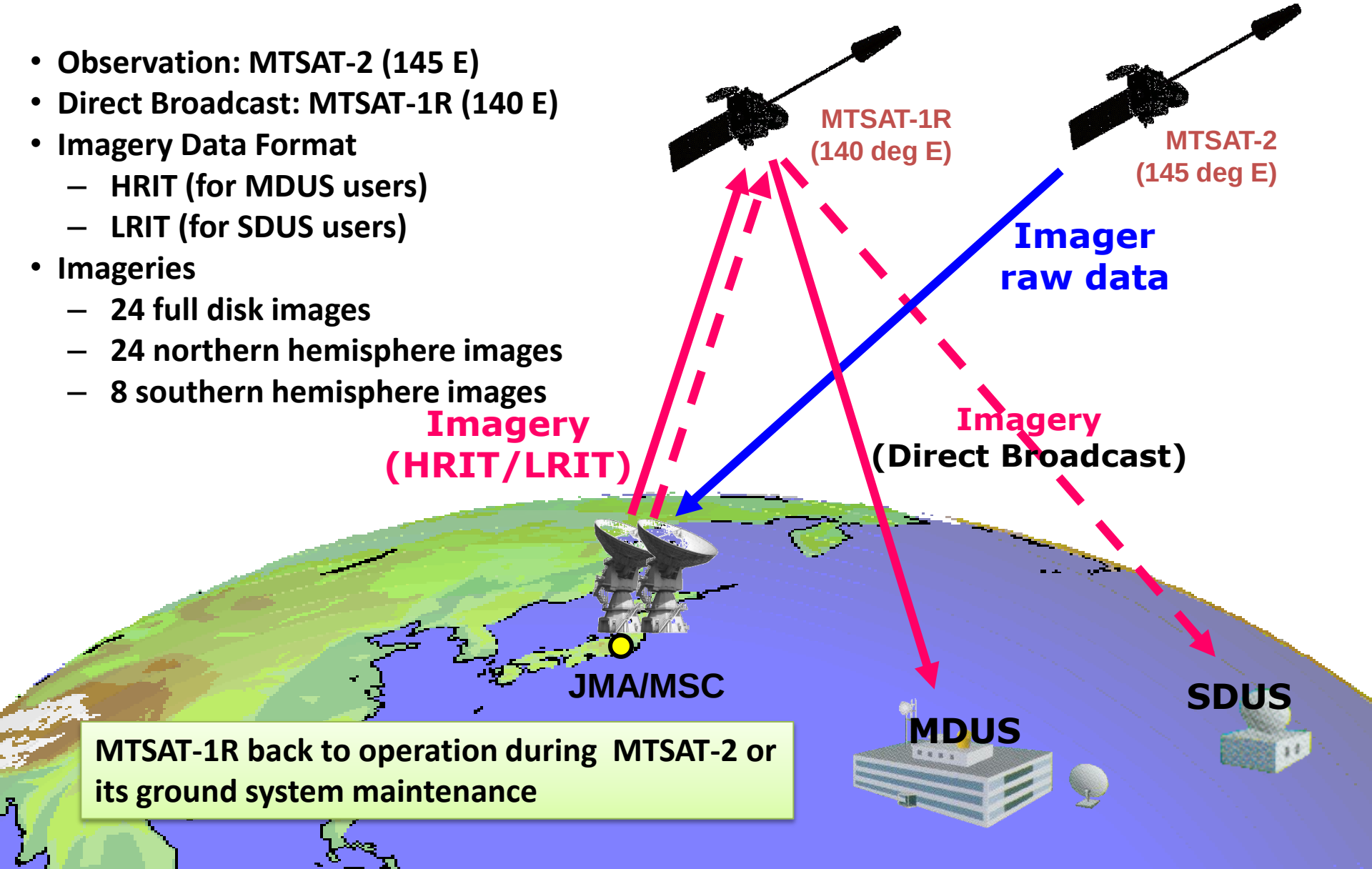


- **MTSAT-2 (Himawari-7)**
  - Launch Date: 18 February 2006　15:27 (JST)
  - Launcher: H-IIA No.9
  - Imager: ITT
  - GEO orbit: 145°E
  - Status: **Imaging operation since 03 UTC, 1 July 2010**



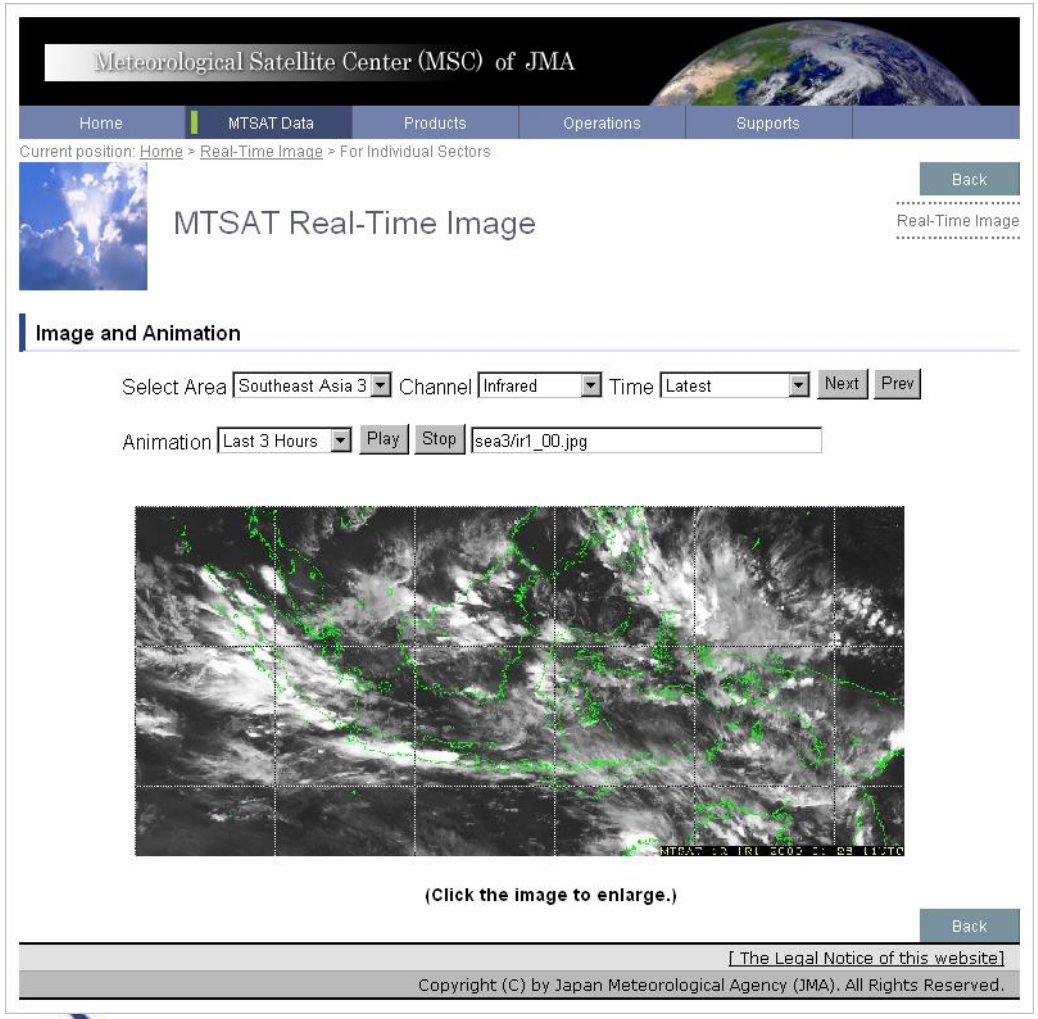
Observation/Direct Broadcast Configurations by MTSAT-1R/-2 after July 2010

- Observation: MTSAT-2 (145 E)
- Direct Broadcast: MTSAT-1R (140 E)
- Imagery Data Format
  - HRIT (for MDUS users)
  - LRIT (for SDUS users)
- Imageries
  - 24 full disk images
  - 24 northern hemisphere images
  - 8 southern hemisphere images



MTSAT-1R back to operation during MTSAT-2 or its ground system maintenance

Real-time Imagery Service through MSCWeb



On 23 January 2008, JMA started providing the **compact JPEG imagery** via the **Internet** to National Meteorological and Hydrological Services (NMHSs) in order to ensure easier access to MTSAT imagery for many users in public.

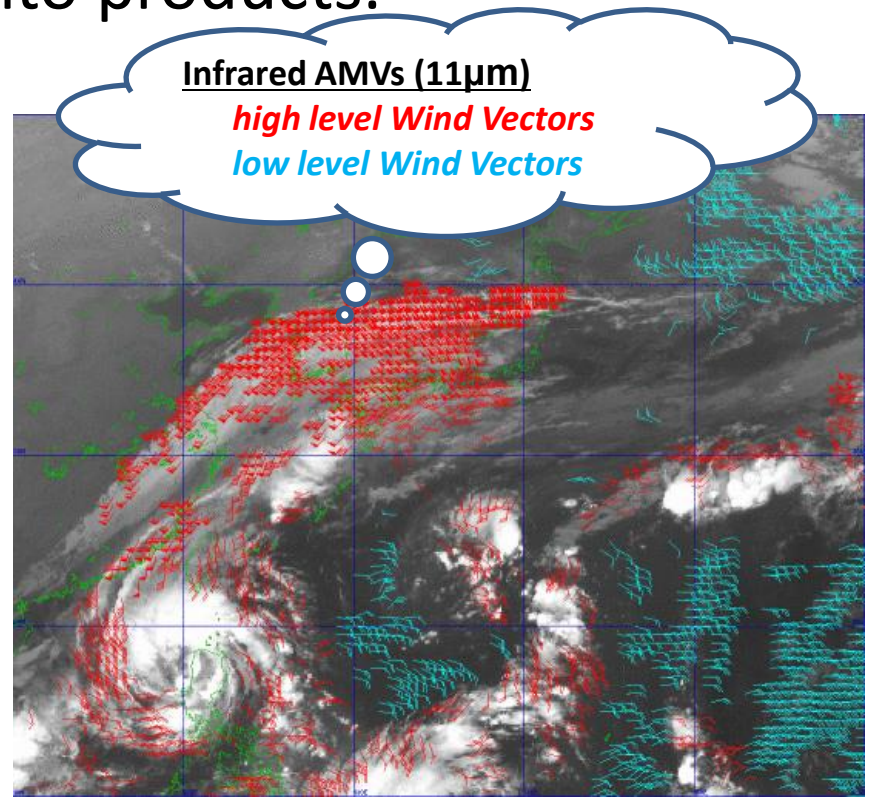
- Real-time Imageries
  - Australia
  - Central Asia
  - New Zealand
  - Pacific Island
  - Southeast Asia

http://mscweb.kishou.go.jp/sat_dat/img/reg/sat_img.htm

Data processing and Application

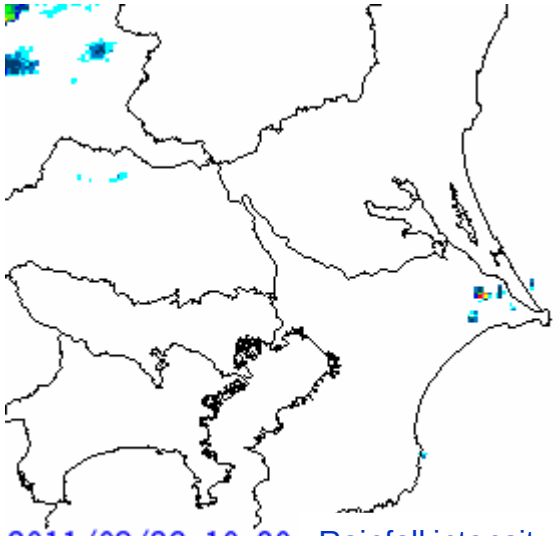
- JMA's Meteorological Satellite Center (MSC) processes the MTSAT data into products.

- The routine products are Atmospheric Motion Vector (AMV), Clear Sky Radiance (CSR), Cloud Information, Sea Surface Temperature, Aerosol and Snow/Ice.

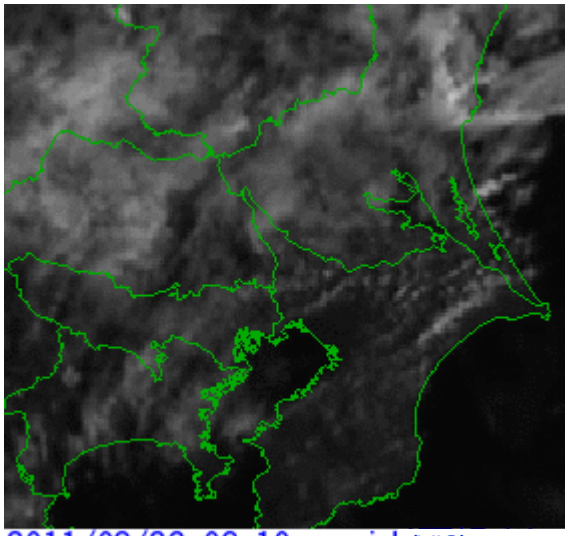


An Example of Wind Vectors

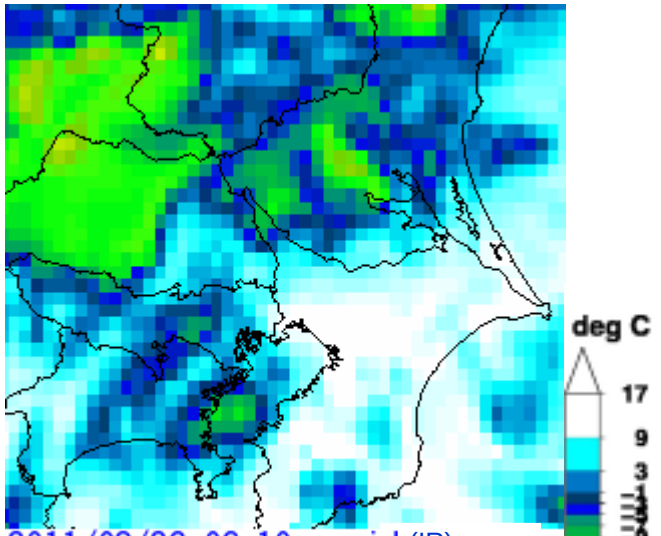
High-frequent Observation



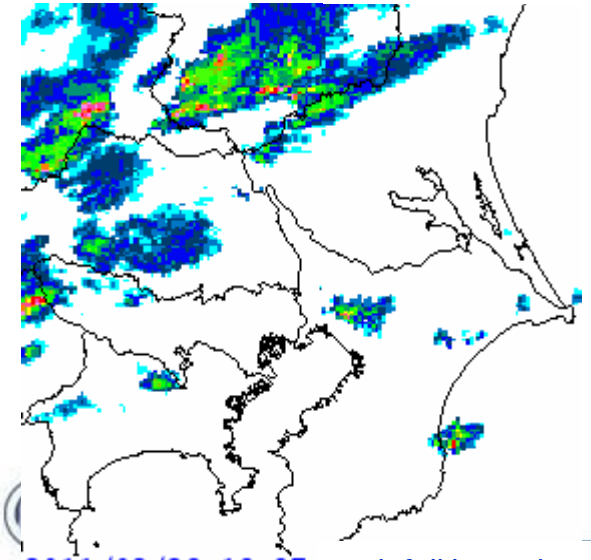
2011/08/26 10:30 Rainfall intensity



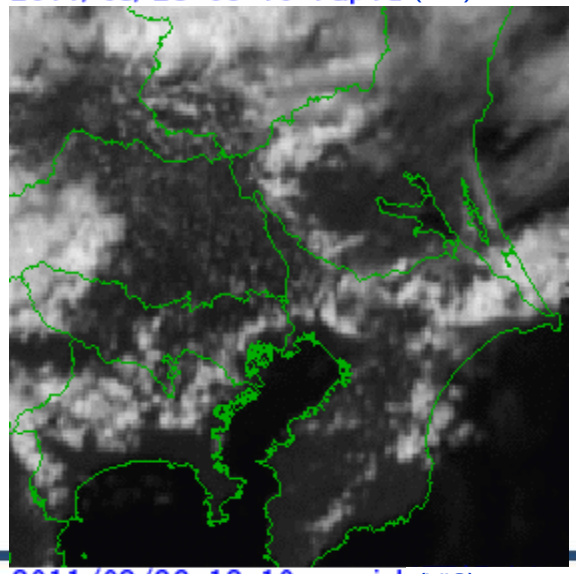
2011/08/26 09:10 rapid (VIS)



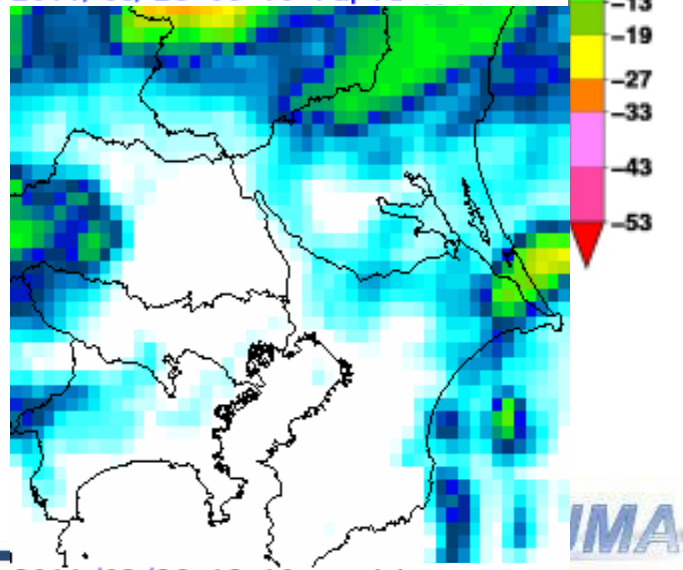
2011/08/26 09:10 rapid (IR)



2011/08/26 13:35 Rainfall intensity



2011/08/26 12:10 rapid (VIS)



2011/08/26 12:10 rapid (IR)

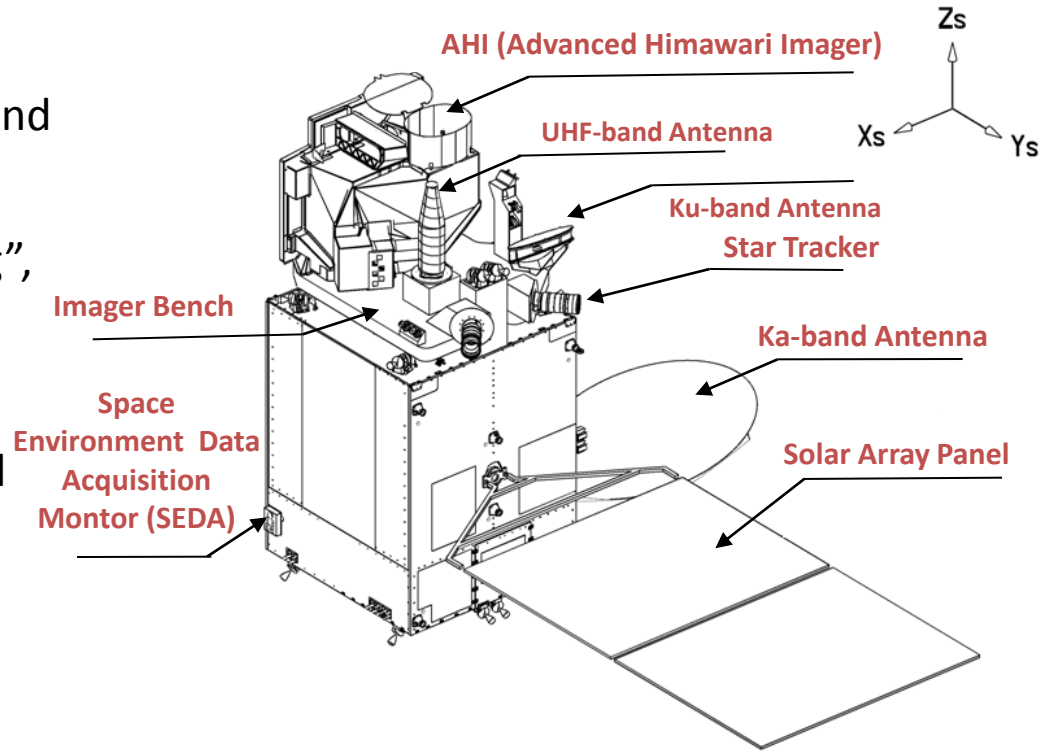
Other Activities

- GSICS
- SCOPE-CM
- ADDE Server for Training
- SWFDP in South-East Asia
- DCPC of WIS
- DCS
- Cooperation with EUMETSAT and NOAA

2. Future Plan

Mission of Himawari -8/-9

- To sustain and improve the satellite observation for disaster prevention and weather forecast.
- To enrich capabilities for “Nowcasting”, particularly for the detection and prediction of severe weather.
- To improve the accuracy of Numerical Weather Prediction.
- To enhance climate and environment monitoring.



Sketch of Himawari 8/9

Imager of Himawari -8/-9

Advanced Himawari Imager (AHI)

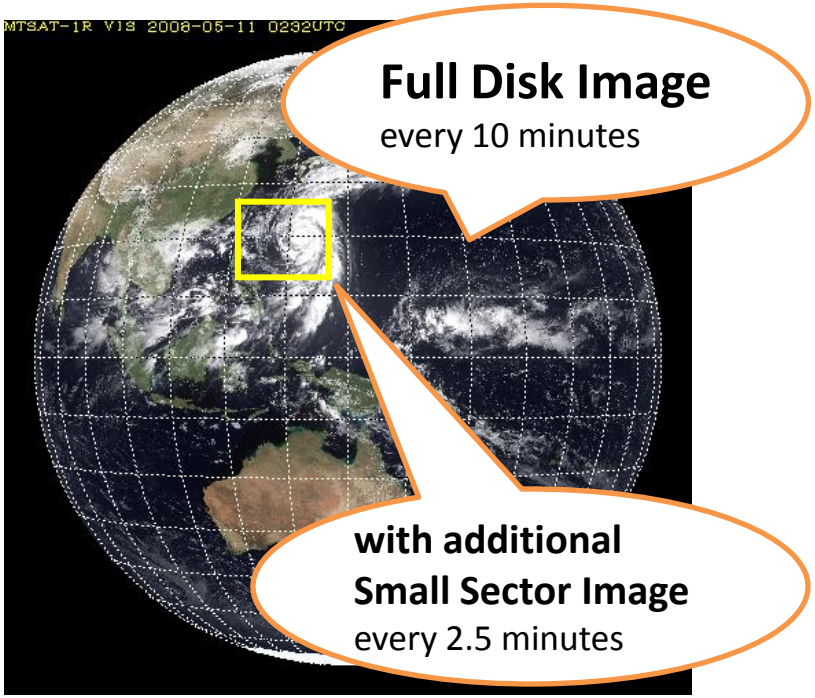
Band	Central Wavelength [μm]	Spatial Resolution
1	0.43 - 0.48	1Km
2	0.50 - 0.52	1Km
● 3	0.63 - 0.66	0.5Km
● 4	0.85 - 0.87	1Km
● 5	1.60 - 1.62	2Km
6	2.25 - 2.27	2Km
● 7	3.74 - 3.96	2Km
● 8	6.06 - 6.43	2Km
9	6.89 - 7.01	2Km
● 10	7.26 - 7.43	2Km
● 11	8.44 - 8.76	2Km
● 12	9.54 - 9.72	2Km
● 13	10.3 - 10.6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

RGB Composited Color Image

SO_2

O_3

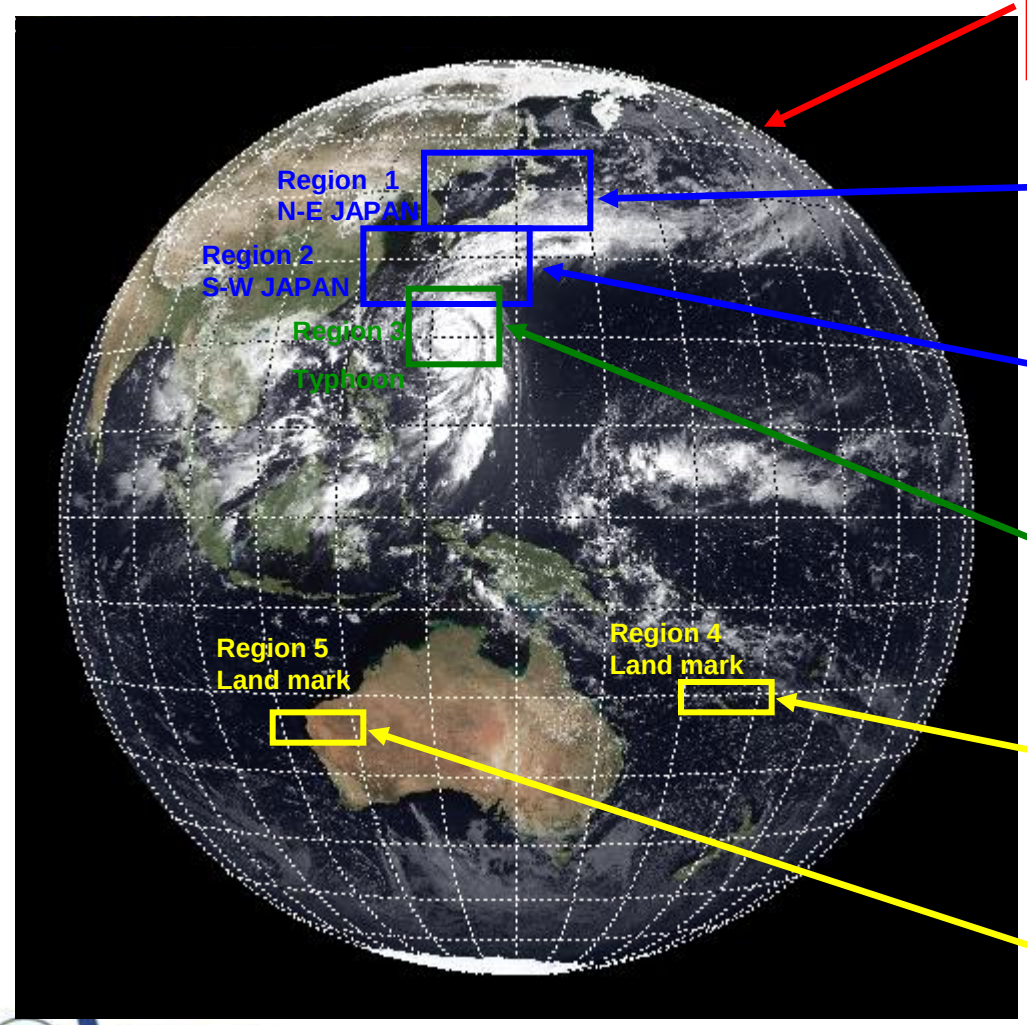
●: MSG



as of MTSAT-1R/2

Band	Central Wavelength [μm]	Spatial Resolution
1	0.55 – 0.90	1Km
2	3.50 – 4.00	4Km
3	6.50- 7.00	4Km
4	10.3 – 11.3	4Km
5	11.5 – 12.5	4Km

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)
Dimension : EW x NS: 2000 x 1000 km
2 swath

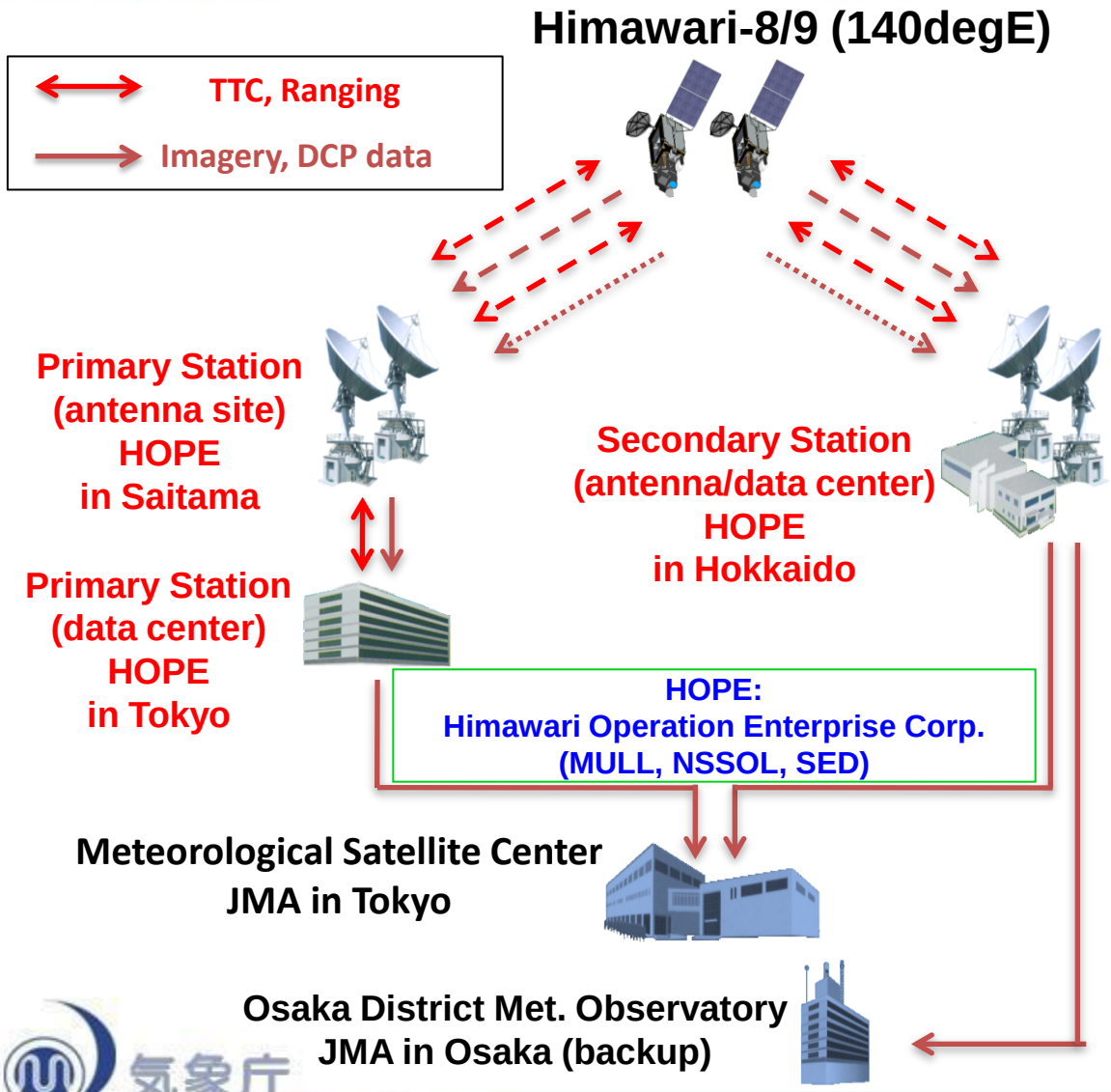
Region 2 JAPAN (South-West)
Interval : 2.5 minutes (4 times in 10minutes)
Dimension : EW x NS: 2000 x 1000 km
2 swath

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

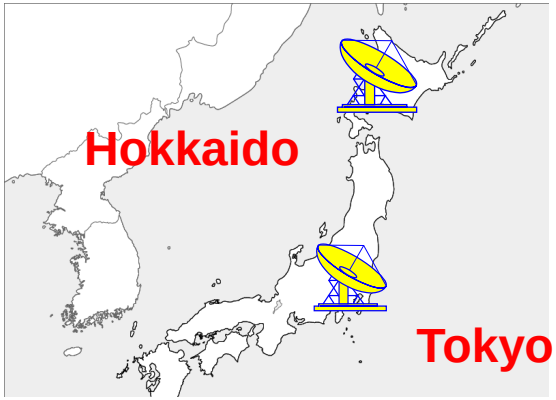
Region 4 Land mark
Interval : 0.5 minutes (20 times in 10minutes)
Dimension : EW x NS: 1000 x 500 km
1 swath

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

Himawari -8/-9 Ground Sub-system



- ✓ Satellites controlled from two ground stations
- ✓ "Site Diversity" for rain attenuation on Ka-band used for imagery and DCP data downlink
- ✓ Facilities of each station and networks equipped redundantly



HOPE (Himawari OPeration Enterprise Corp.)

Development of Products by 2015

● first priority

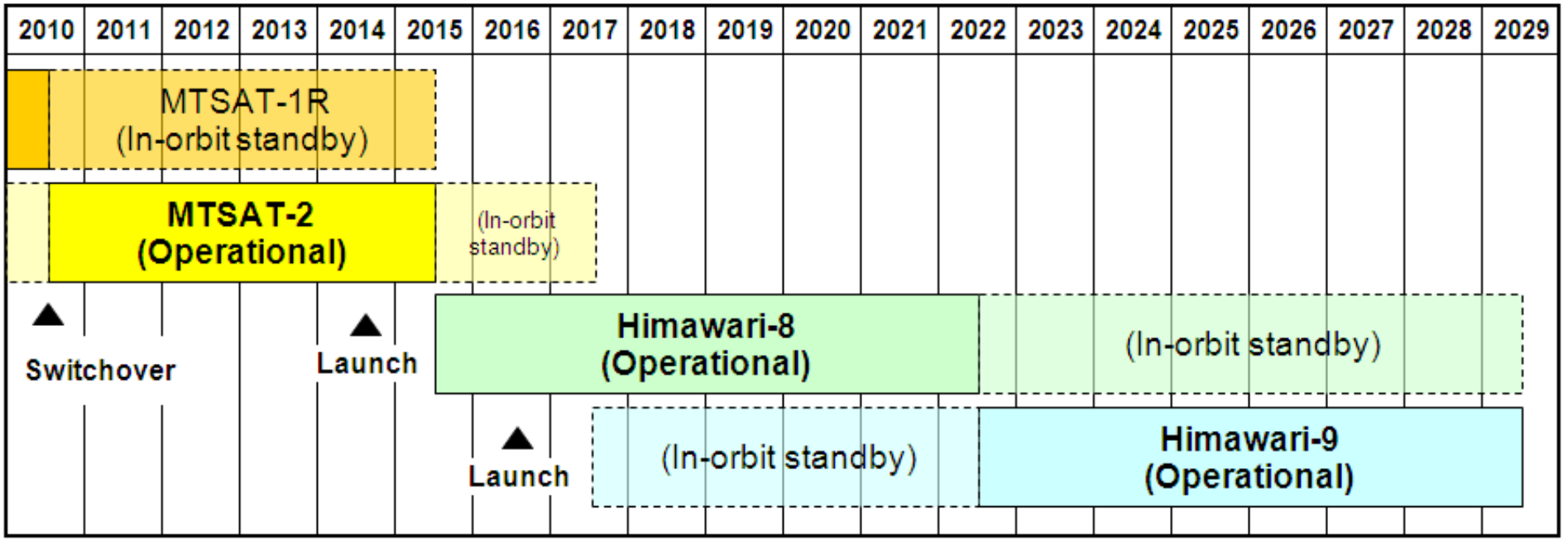
Improvements

- Nowcasting
- Typhoon Analysis
- Atmospheric Motion Vector
- Clear Sky Radiance
- Sea Surface Temperature
- Yellow Sands
- Snow and Ice Coverage

New Products

- Volcanic Ash Detection and Height etc
- Global Instability Index

Schedule



- Lifetime(Bus) : 15 years
- Lifetime(Mission) : 8 years
- Weight (Dry) : 1,300kg
- Weight (propulsion included) : 3,500kg

Summary

- JMA has been operating geostationary meteorological satellite, “Himawari” series since 1977.

- MTSATs (Himawari-6/7) have been basically in good condition, including MTSAT-1R’s high frequency observation program around Japan.

- JMA is preparing Himawari 8/9, which will be launched in 2014 and 2016, respectively and the development of products.

Thank you

For more information about us,
Please visit http://mscweb.kishou.go.jp .