



Status of Next Generation Japanese Geostationary Meteorological Satellites Himawari-8/9 and their Products



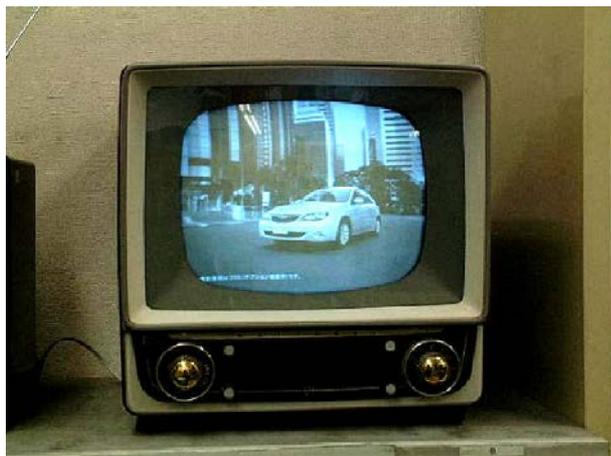
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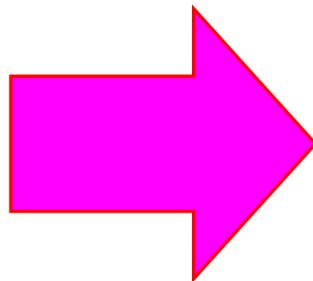
What will Himawari-8/9 bring to us?

Upgrade of number of channels

Upgrade of spatial and temporal resolutions



B/W TV



HD TV

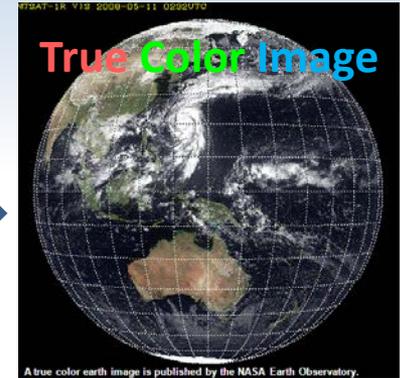
Specification of Himawari-8/9 Imager (AHI)

MTSAT-1R/2

	Band	Wavelength [μm]	Spatial Resolution
VIS	1	0.46	1Km
	2	0.51	1Km
	3	0.64	0.5Km
	4	0.86	1Km
	5	1.6	2Km
	6	2.3	2Km
IR4	7	3.9	2Km
IR3	8	6.2	2Km
	9	7.0	2Km
	10	7.3	2Km
	11	8.6	2Km
	12	9.6	2Km
IR1	13	10.4	2Km
	14	11.2	2Km
IR2	15	12.3	2Km
	16	13.3	2Km

Similar to ABI for GOES-R

RGB band Composited



0.51 μm (Band 2) instead of ABI's 1.38 μm

Water vapor

SO₂
O₃

Atmospheric Windows

CO₂

Products and Applications

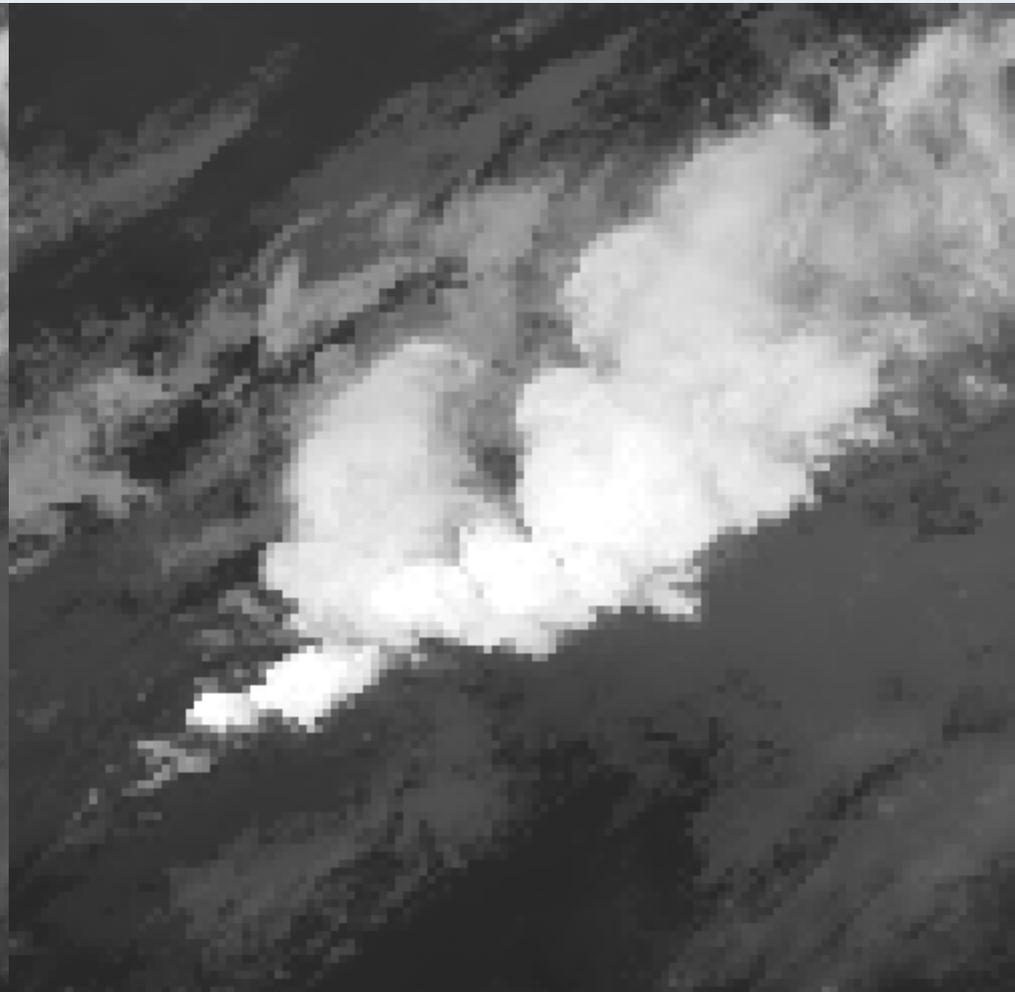
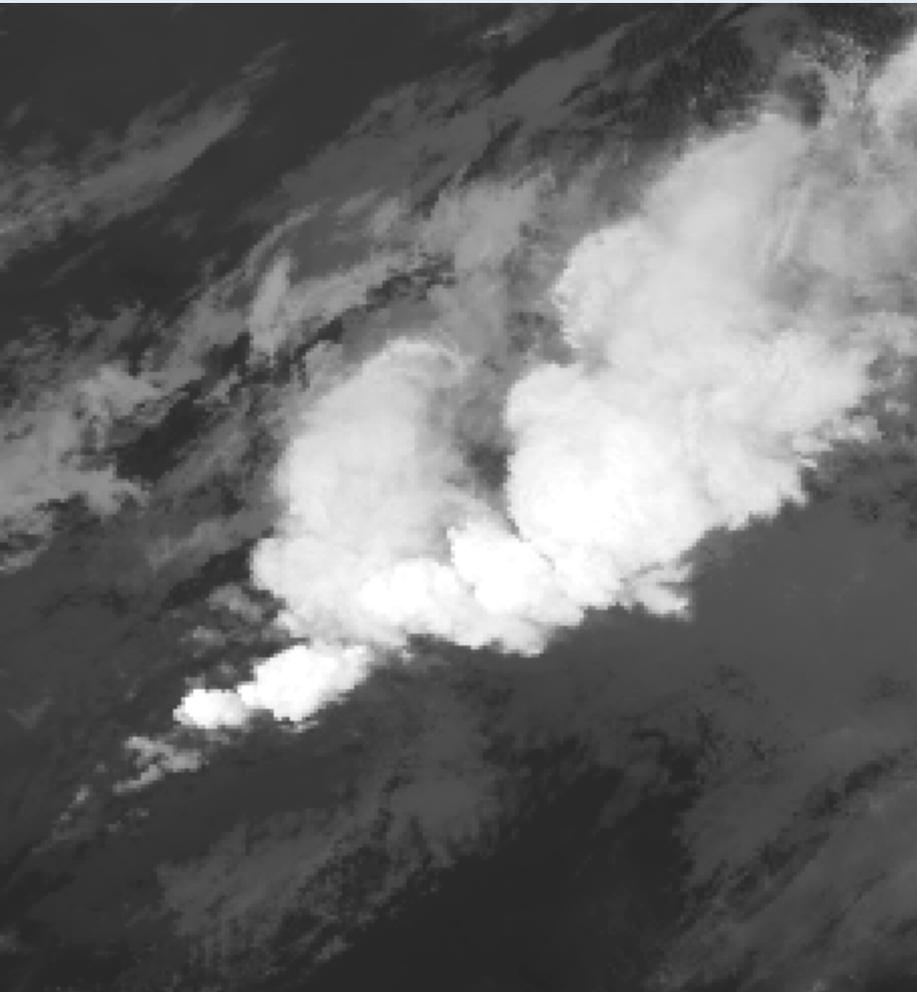
- Volcanic Ash
- Global Instability Index
- Nowcasting
- Typhoon Analysis
- Atmospheric Motion Vector
- Clear Sky Radiance
- Sea Surface Temperature
- Yellow Sands
- Snow and Ice Coverage



IR image difference of spatial resolution

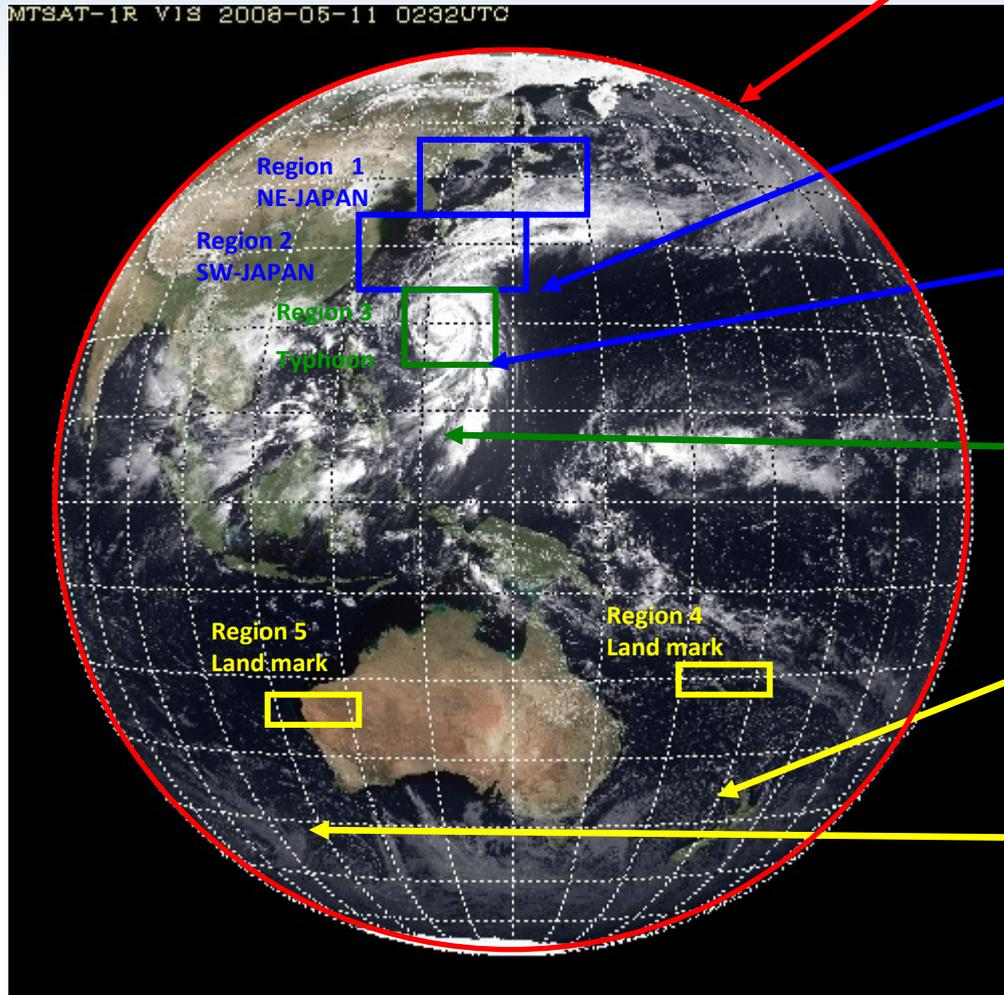
2km for H-8/9

4km for MTSAT



AHI will scan all sectors within 10 minutes

MTSAT-1R VIS 2008-05-11 0232UTC



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

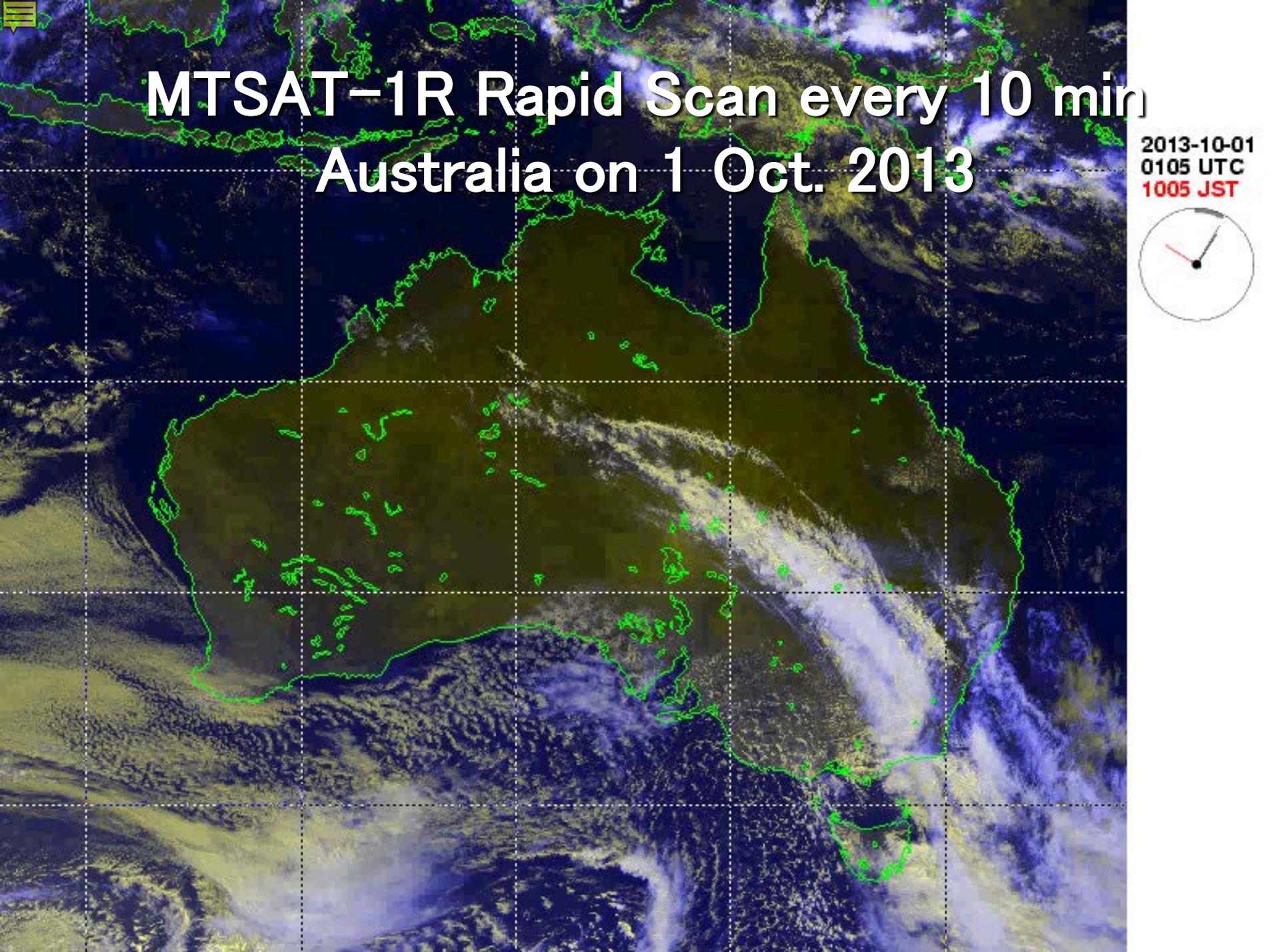
Interval : **0.5 minutes** (20 times in 10minutes)
Dimension : EW x NS: 1000 x 500 km
1 swath

Region 5 Land mark

Interval : **0.5 minutes** (20 times in 10minutes)
Dimension : EW x NS: 1000 x 500 km
1 swath

MTSAT-1R Rapid Scan every 10 min Australia on 1 Oct. 2013

2013-10-01
0105 UTC
1005 JST



Development of products of Himawari-8/9 AHI

Higher resolution

Spatial:

1km -> 0.5km for a VIS channel

4min for a full disk scan

Temporal:

1 hr -> 10 min for a full disk scan

2.5min for limited areas

Increased observation channels

VIS: 1 -> 3 bands

IR: 1 -> 2 bands

WV: 1 -> 2 bands

Weather Satellite Revolution

toward

Examples of expected new/enhanced products

- Cloud Products
- Atmospheric Motion Vectors (AMVs)
- Aerosol (Dust) / Volcanic Ash

the New Era

of

Severe weather

monitoring/ nowcasting

Numerical prediction

Climate change

monitoring

Yellow sand/ dust storm

Volcano eruption

Ash area detection

Solar energy monitoring

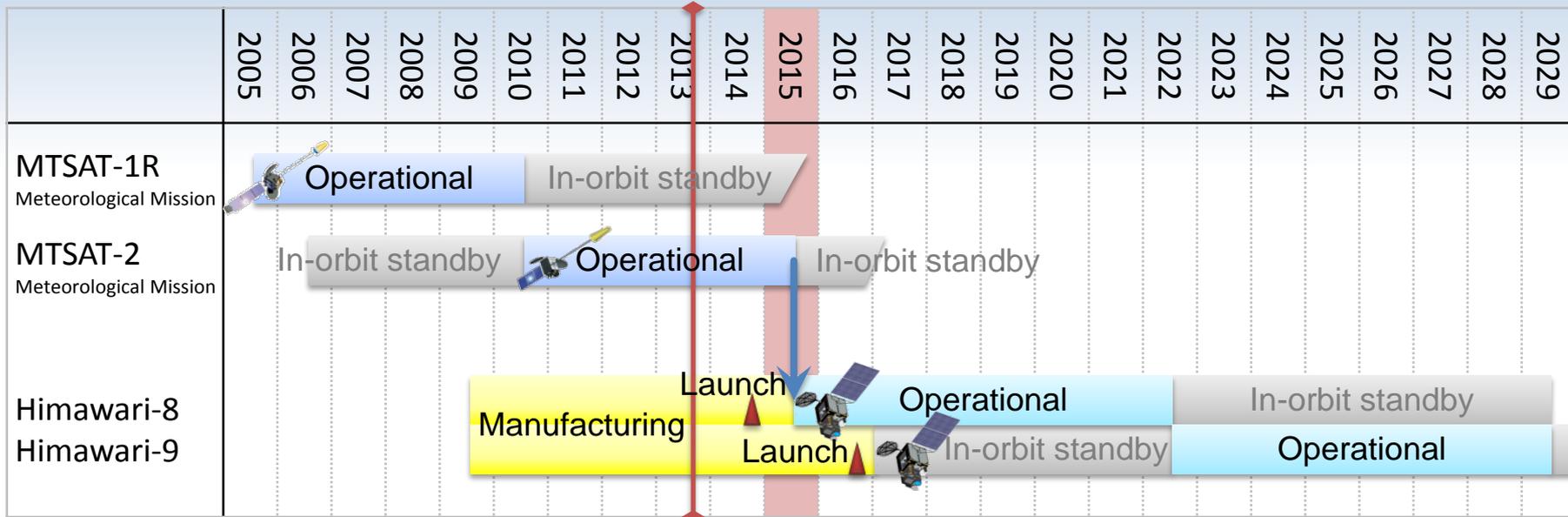
Mesoscale Satellite Meteorology

International Cooperation for developments of Cloud Product, AMV and Volcanic ash products

- **Nov. 2012** Look Up Table (LUT) and software for Volcanic Ash retrieval was provided from EUMETSAT.
- **Jan. 2013** JMA invited scientists from EUMETSAT and UK Met Office.
Dr. Hans-Joachim Lutz (EUMETSAT)
Dr. Régis Borde (EUMETSAT)
Dr. Peter Francis (UK Met Office)
- **Feb. 2013** JMA invited scientist from NOAA/NESDIS
Dr. Andrew Heidinger (NOAA/NESDIS)
Dr. Mike Pavolonis (NOAA/NESDIS)
- **April-May 2013** JMA/MSC scientist visited EUMETSAT for the development of OCA and AMV.

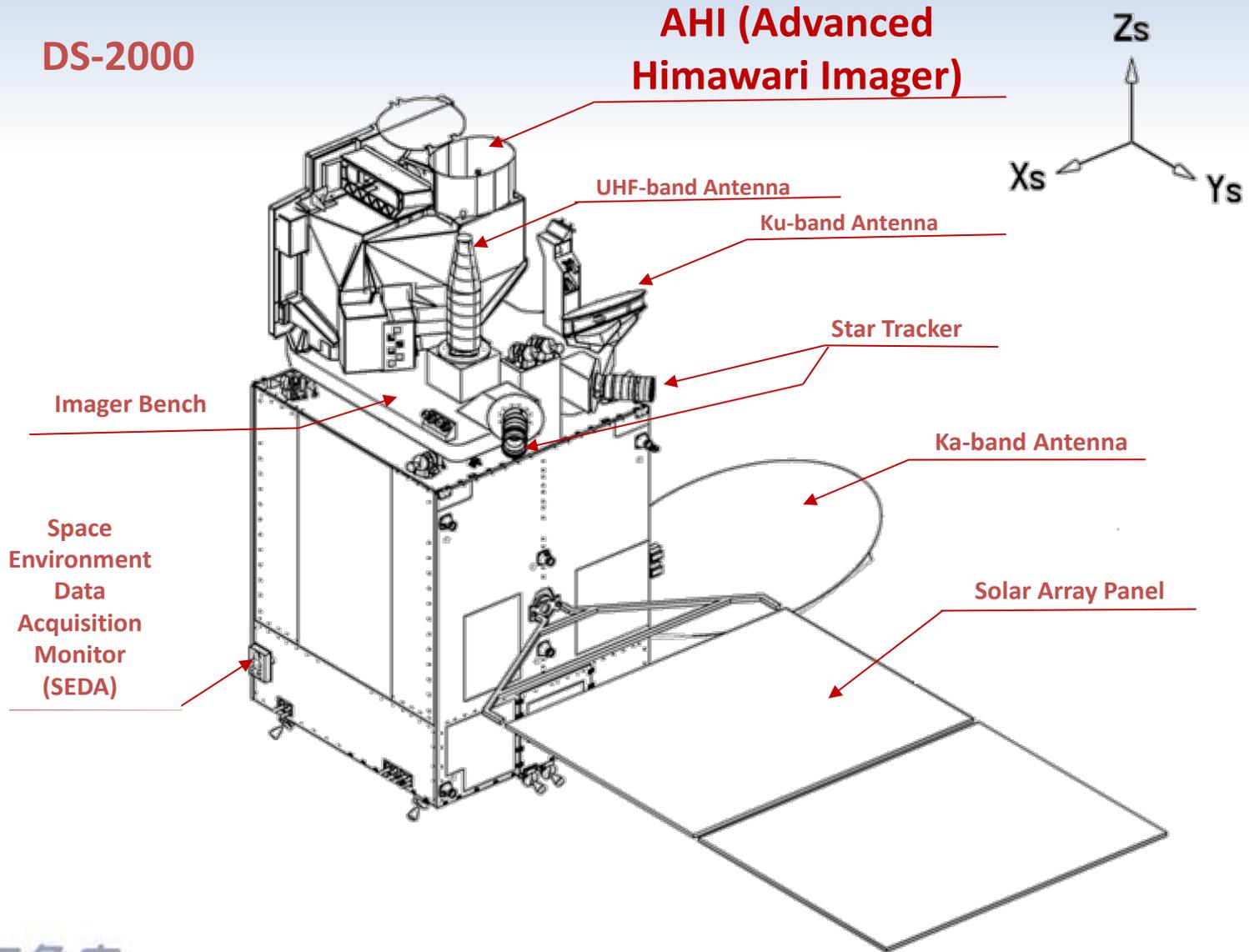
**We greatly appreciate kind cooperation of
NOAA/NESDIS and EUMETSAT.**

Transition of Operational Satellites



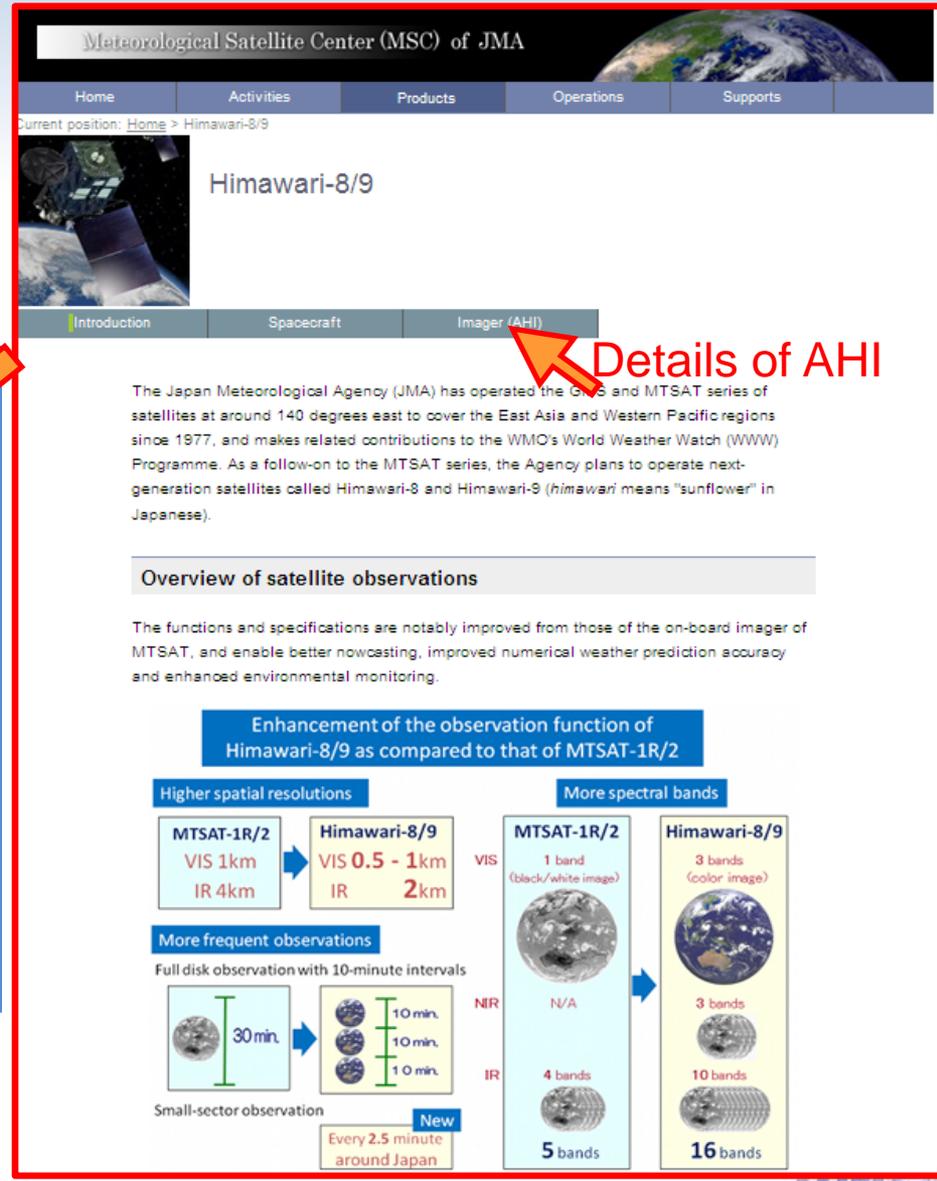
- JMA plans to launch **Himawari-8** in **2014** and begin its operation in **2015**.
- The launch of **Himawari-9** for in-orbit standby is scheduled in **2016**.
- **Himawari-8/9** will be in operation around **140 degrees East** covering the East Asia and Western Pacific regions for 15 years.

Appearance of Himawari-8/9



MSC Web Page for Himawari-8/9 Information

MSC website top page
<http://mscweb.kishou.go.jp/>

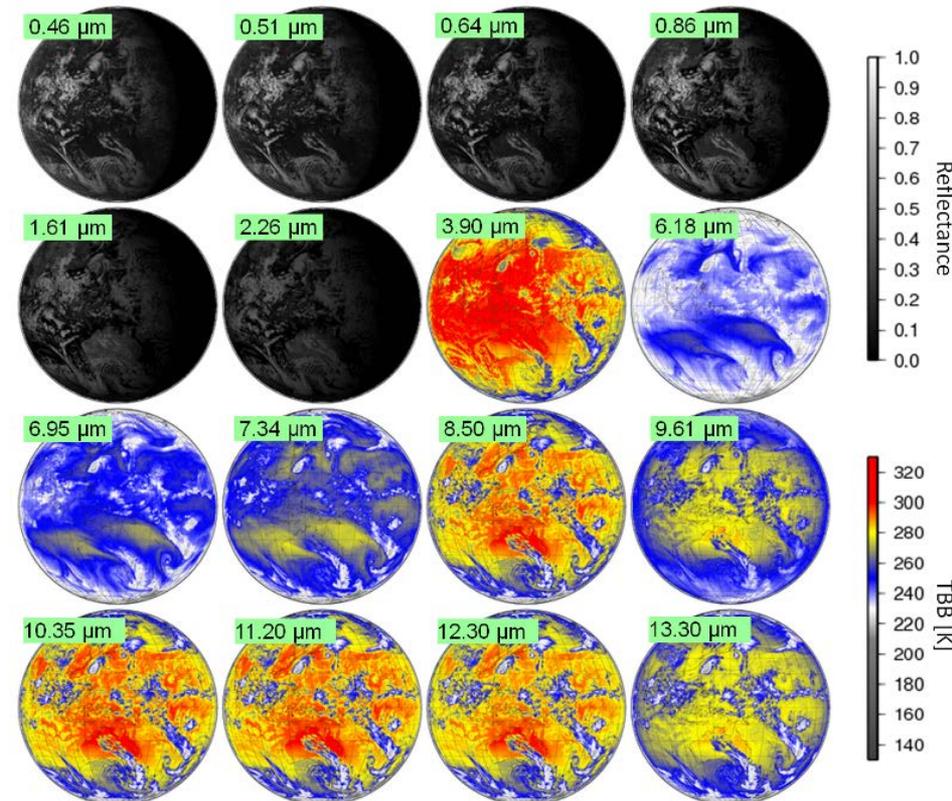
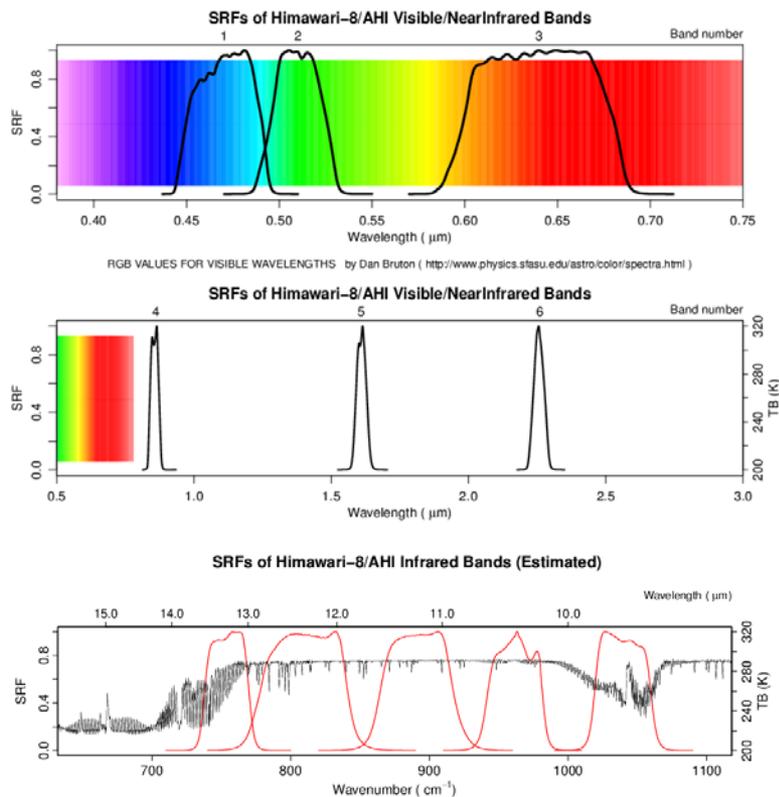


Himawari-8/9: Technical Information

To support research and development of products based on **Himawari-8/9**,

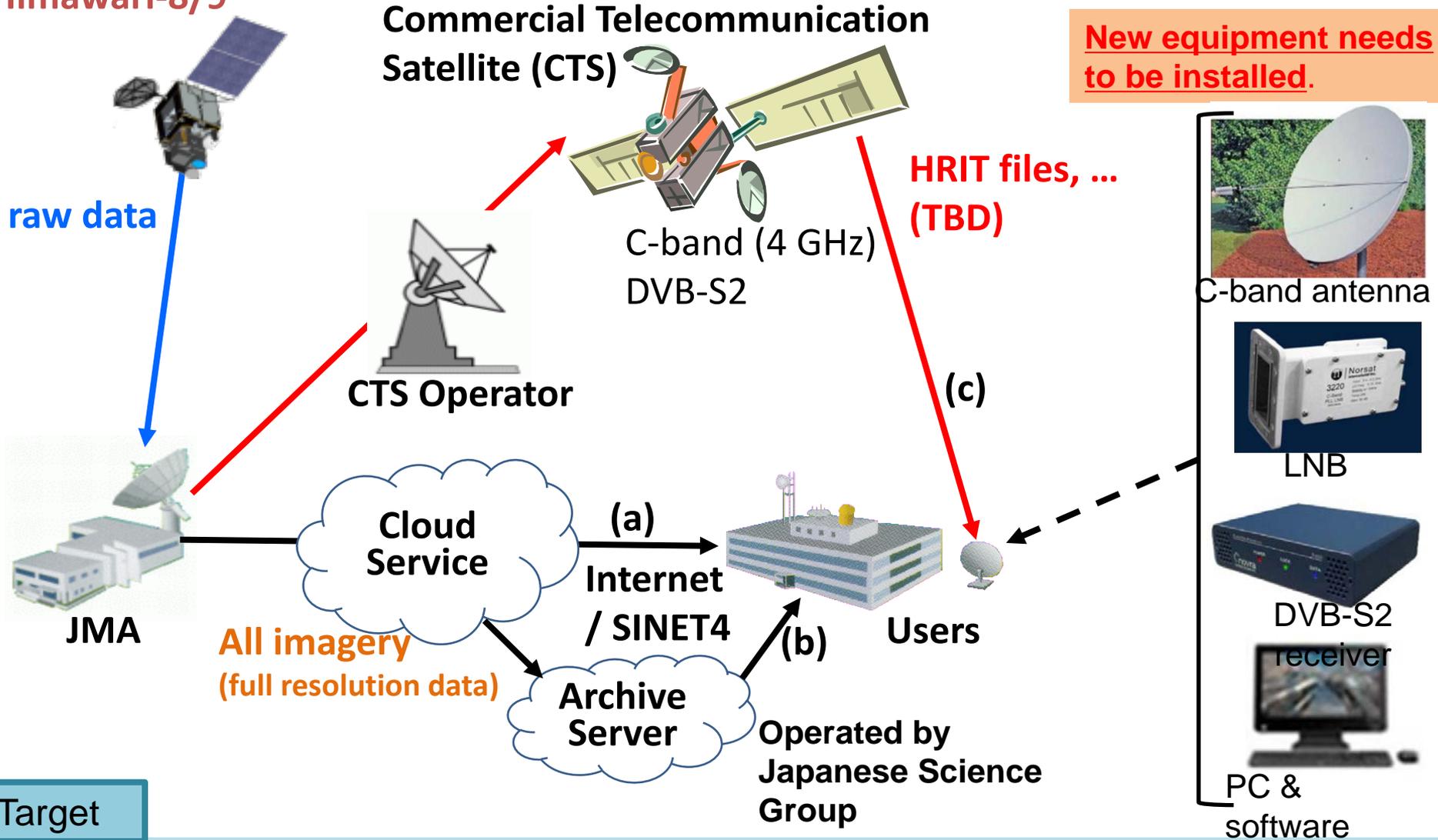
- Himawari Standard Data Format and Sample data
- Estimated Spectral Response Functions (SRFs) of **AHI** are available on JMA website.

- **Simulation data** generated using a radiative transfer model are also **available** on JMA website.



Himawari-8/9: Data Distribution/Dissemination

Himawari-8/9



(a) **Cloud Service:** National Meteorological and Hydrological Services

(b) **Archive Server:** Researchers

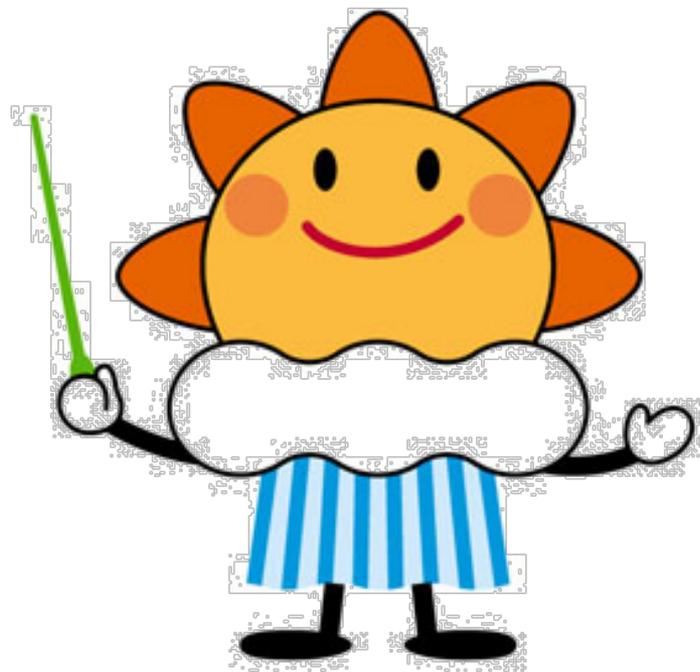
(c) **CTS:** Everyone in the East Asia and Western Pacific regions

Summary

- Himawari-8/9 will bring us Revolution, “*Mesoscale Satellite Meteorology*”.
- JMA has strong international cooperative relations for new satellites.
- Preparation of launch and operation of Himawari-8 is on going.
- We will just do it!!



Thank You.



Appendix

Imagery via the **Internet**

	Name	Interval	Channel & Resolution	Size
Full disc observation	TBD	10 min	All (16) channels #3: 0.5 km #1, 2, 4: 1 km #5-16: 2 km	329 GB (1 day) #3: 930 MB (10 min) #1, 2, 4: 230 MB (10 min) #5-16: 60MB (10 min)
	PNG	10 min	Composite (#1-3) 1 km	49 GB (1 day) 350 MB (10 min)
	HRIT (same as MTSAT)	10 min	5 channels Vis: 1 km IR: 4 km	41 GB (1 day) Vis: 230 MB, IR: 15 MB (10 min)
	LRIT (same as MTSAT)	10 min	3 channels 5 km	432 MB (1 day) each: 1 MB (10 min)
Regional observation (Typhoon)	TBD & netCDF	2.5 min	All (16) channels #3: 0.5 km #1, 2, 4: 1 km #5-16: 2 km	12 GB (1 day) #3: 8 MB (2.5 min) #1, 2, 4: 2 MB (2.5 min) #5-16: 0.5 MB (2.5 min)
Cut-out (several regions)	PNG JPEG	10 min	TBD	Not so large

Imagery via a **CTS**

	Name	Interval	Channel & Resolution	Size
Full disc observation	TBD	10 min	All (16) channels #3: 0.5 km #1, 2, 4: 1 km #5-16: 2 km	329 GB (1 day) #3: 930 MB (10 min) #1, 2, 4: 230 MB (10 min) #5-16: 60MB (10 min)
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Cut-out (several regions)	PNG JPEG	10 min	TBD	Not so large

Equipment to receive imagery via a CTS

Tentative!

Needed equipment



C-band antenna



LNB



DVB-S2



PC & software

	Required/recommended specifications	Estimated cost (US\$)
C-band antenna	Dish type with a diameter of 1.2 – 2.4 m	1,500 – 9,000
Low-noise block (LNB)	Standard-performance type	600 or less
DVB-S2* receiver	Standard-performance type such as Novra S300, Comtech EF DATA CMR-5975 or Advantech S4020	1,500 – 3,000
Software for DVB acquisition and processing	KenCast Fazzt standard software	900 or less

* DVB-S2: Digital Video Broadcasting – Satellite – Second Generation (a digital video broadcast standard)

Notes

- HRIT imagery can be displayed on a PC using a set of software modules for data processing and visualization.
- Construction of dish antenna foundations and wiring work for antenna-PC connection are required for installation of the above equipment.
- The diameter of a dish antenna depends on its geographical location and the footprint of the commercial telecommunication satellite to be used by JMA.