

A detailed illustration of the Himawari-8 geostationary meteorological satellite in orbit. The satellite is shown from a perspective that highlights its large, rectangular solar panel arrays extended outwards. It features a central body with various instruments, including a large, circular, multi-faceted antenna structure. The satellite is positioned against the backdrop of the Earth's curved horizon, showing cloud patterns and landmasses. The background is a deep black space filled with numerous small, distant stars.

**Japanese
New Generation Geostationary
Meteorological Satellites
Himawari-8/9**

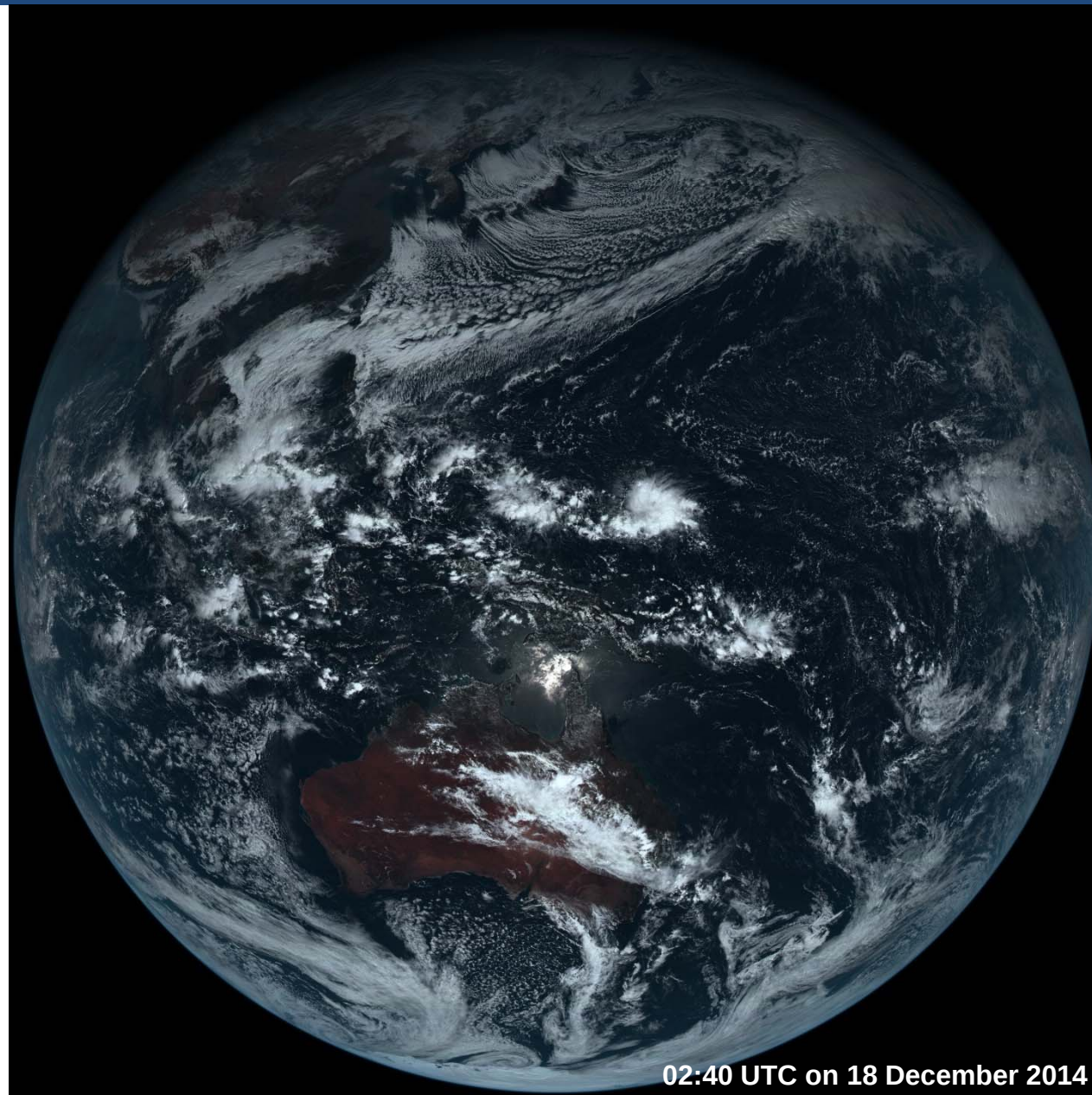
**Kotaro BESSHO
Meteorological Satellite Center (MSC)
Japan Meteorological Agency (JMA)**

Dawn of a “New Era”



Himawari-8 was successfully launched using H-IIA Launch Vehicle # 25 on 7 October 2014 from the Tanegashima Space Center in Kagoshima, Japan

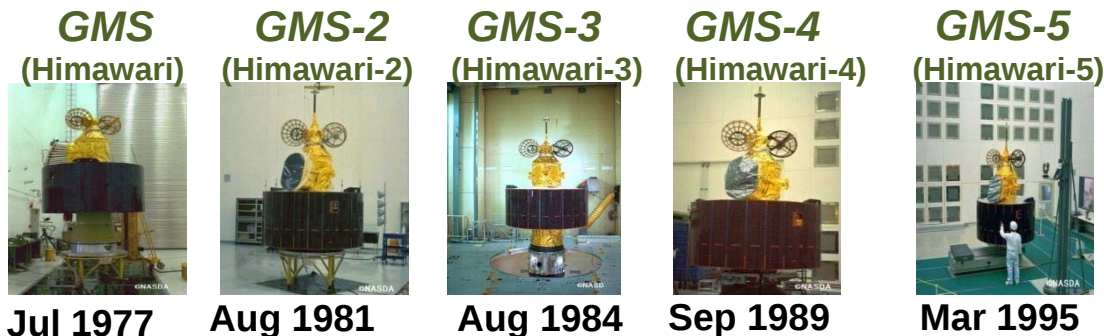
First Shot of Himawari-8



02:40 UTC on 18 December 2014

History of Japanese Geostationary Meteorological Satellites “Himawari”

GMS (Geostational Meteorological Satellite)



One of the tri-Ranging Station for GMS was operated by Australian Bureau of Meteorology

(GOES-9)
Back-up operation of GMS-5 with GOES-9 by NOAA/NESDIS May 2003 - June 2005

MTSAT (Multi-functional Transport SATellite)

MTSAT-1R **MTSAT-2**
(Himawari-6) (Himawari-7)

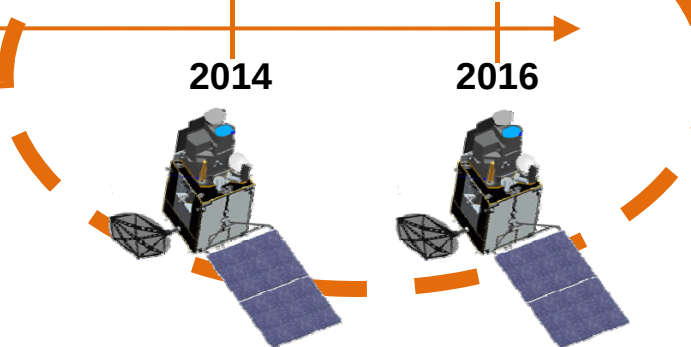


Feb 2005 Feb 2006

Himawari
Himawari-8 Himawari-9

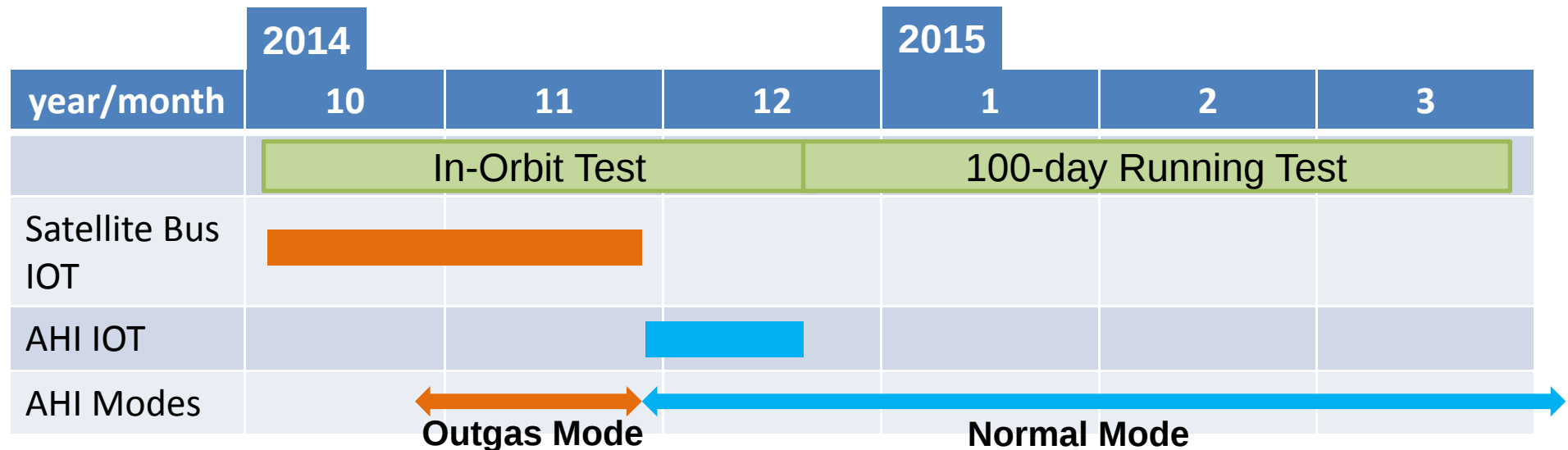
2014

2016



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 –
Himawari-8	Launch in 2014
Himawari-9	Launch in 2016

Himawari-8/9 Schedule toward Operation



(AHI: Advanced Himawari Imager)

- **The first shot was taken on 18 December 2014.**
- **100-day Running Test for satellite mission has been commenced after AHI IOT.**
- **An Experimental Operation will be commenced in April 2015.**
- **Full Operation will be commenced in mid-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.**

Revolution of Advanced Himawari Imager

Upgrade of

➤ Number of bands

➤ Spatial resolutions

➤ Temporal resolutions

MTSAT -> **Himawari-8/9**

5 -> **16**

VIS: 1 km -> **0.5 or 1.0 km**

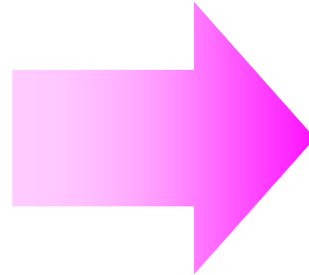
IR: 4.0 km -> **2.0 km**

30/60 min -> **10 min**

(Total data size: **50 times!!**)



B/W TV



HD TV

16 Bands of 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

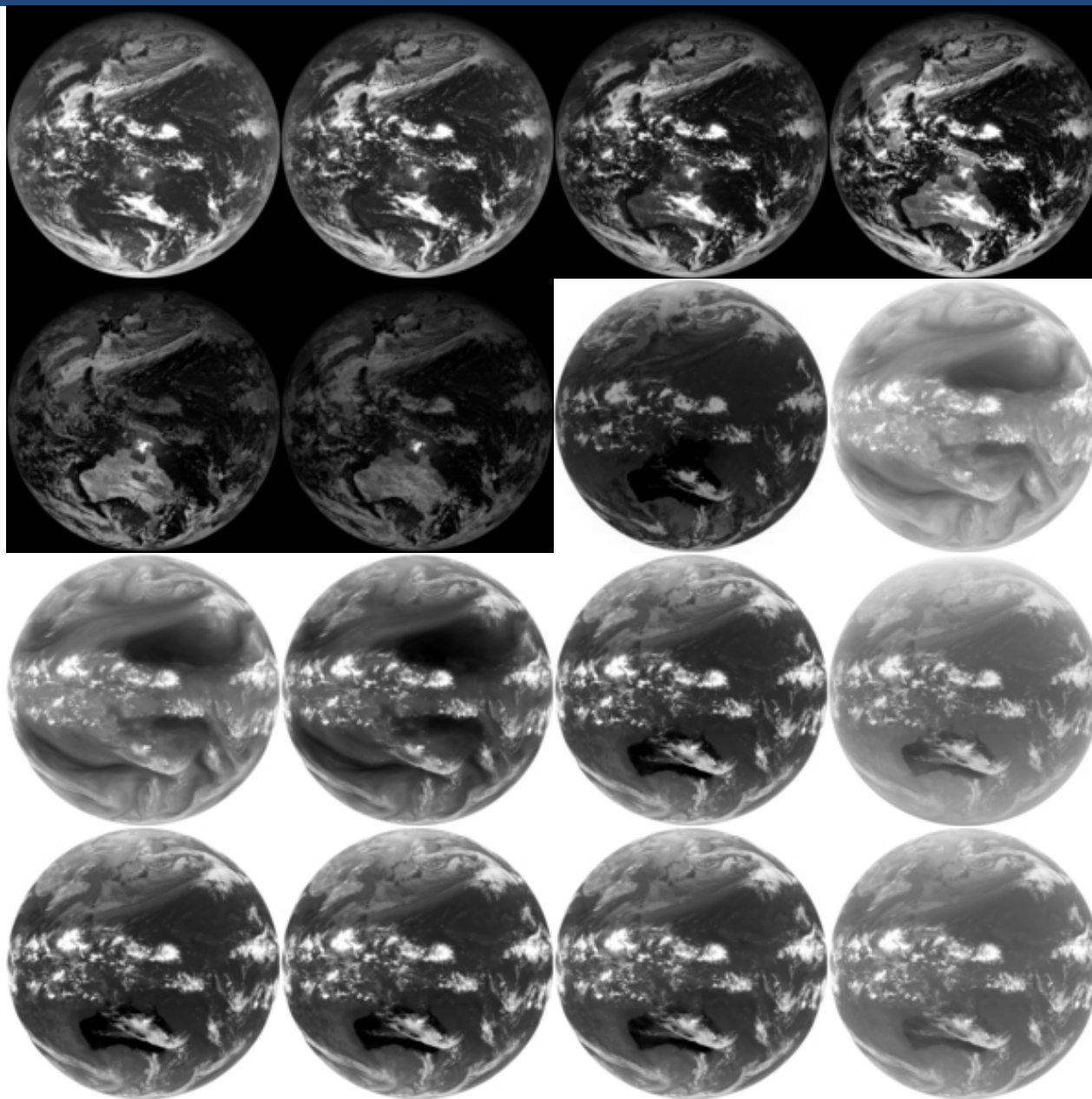
Atmospheric
Windows

CO₂

Products and Applications

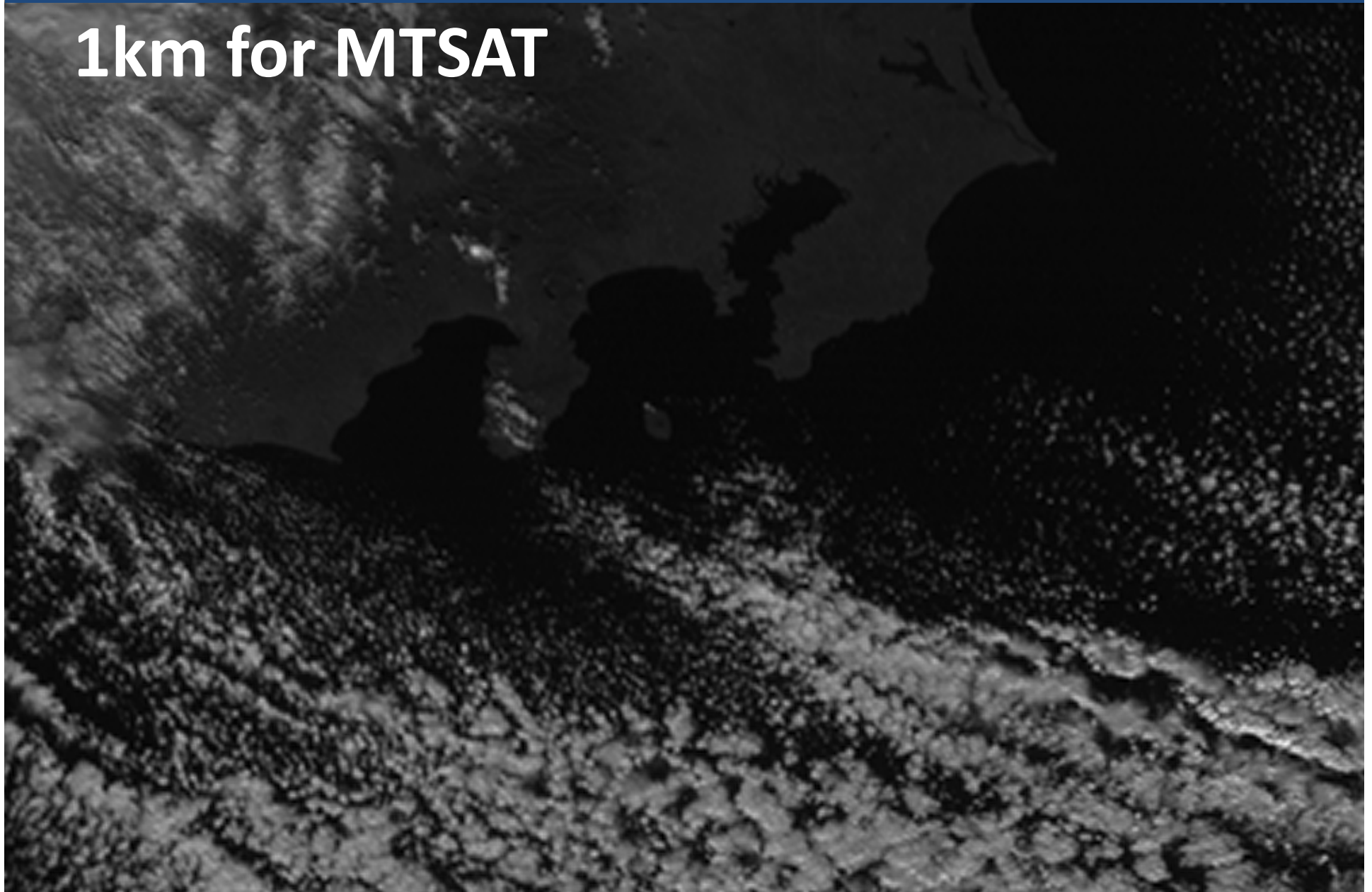
- Volcanic Ash
- Global Instability Index
- Nowcasting
- Typhoon Analysis
- Atmospheric Motion Vector
- Clear Sky Radiance
- Sea Surface Temperature
- Yellow Sands
- Snow and Ice Coverage

16 Bands of AHI



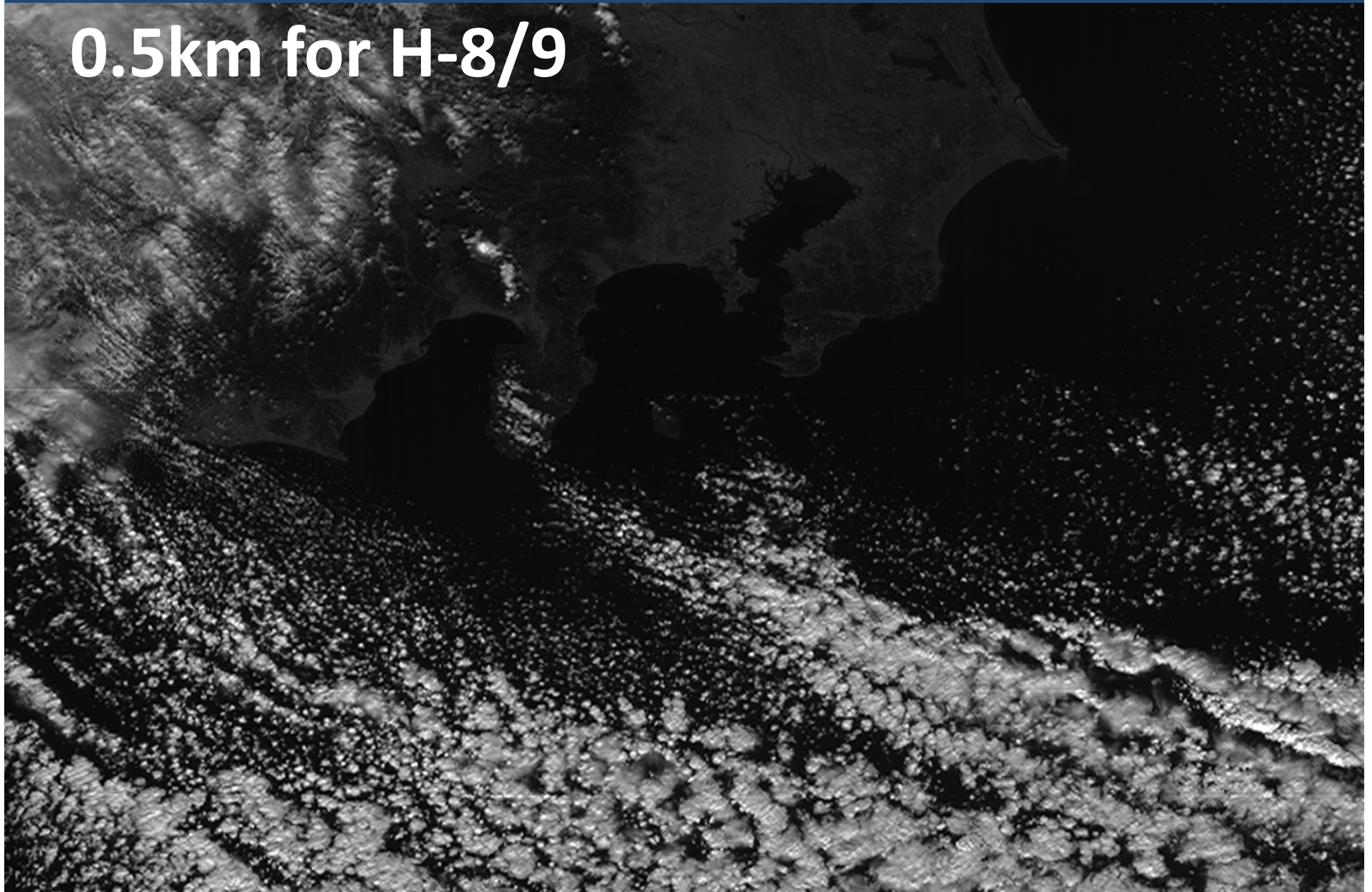
VIS image difference of spatial resolution

1km for MTSAT

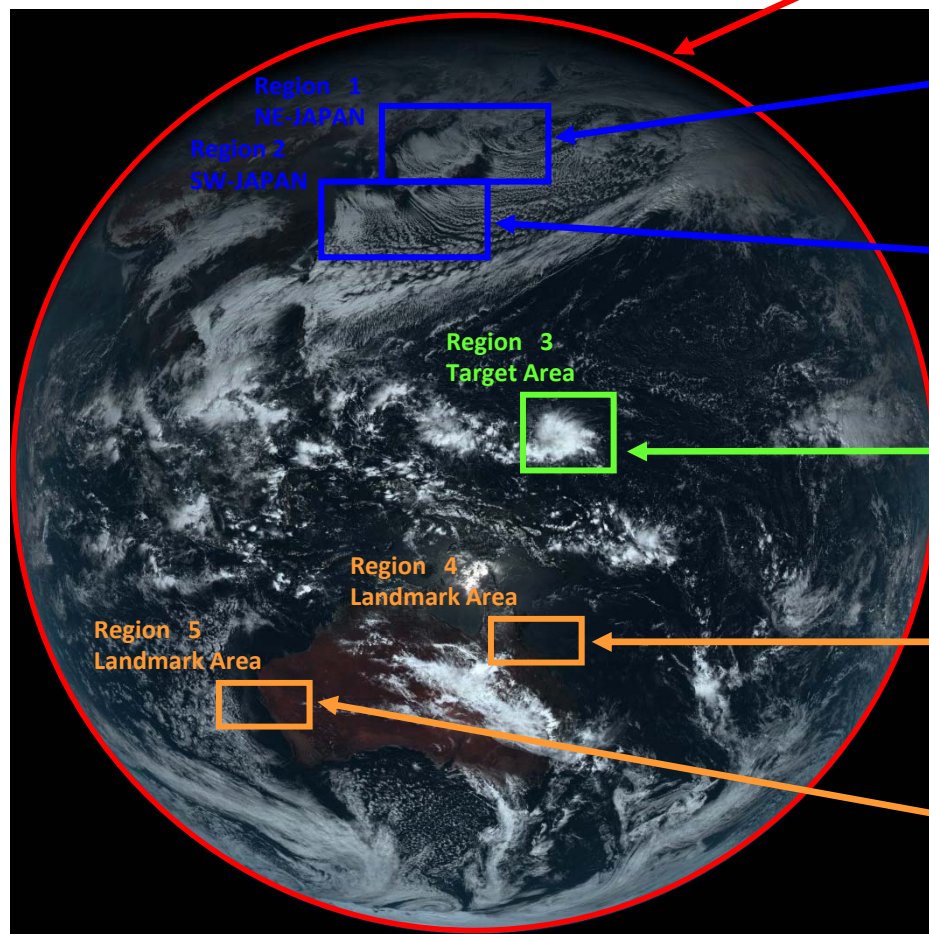


VIS image difference of spatial resolution

0.5km for H-8/9



AHI Observation Areas and Frequencies



Full disk

Interval : **10 minutes** (6 times per hour)

Region 1 JAPAN (North-East)

Interval : **2.5 minutes** (4 times in 10 min)

Dimension : EW x NS: 2000 x 1000 km

Region 2 JAPAN (South-West)

Interval : **2.5 minutes** (4 times in 10 min)

Dimension : EW x NS: 2000 x 1000 km

Region 3 Target Area

Interval : **2.5 minutes** (4 times in 10 min)

Dimension : EW x NS: 1000 x 1000 km

Region 4 Landmark Area

Interval : **30 seconds** (20 times in 10 min)

Dimension : EW x NS: 1000 x 500 km

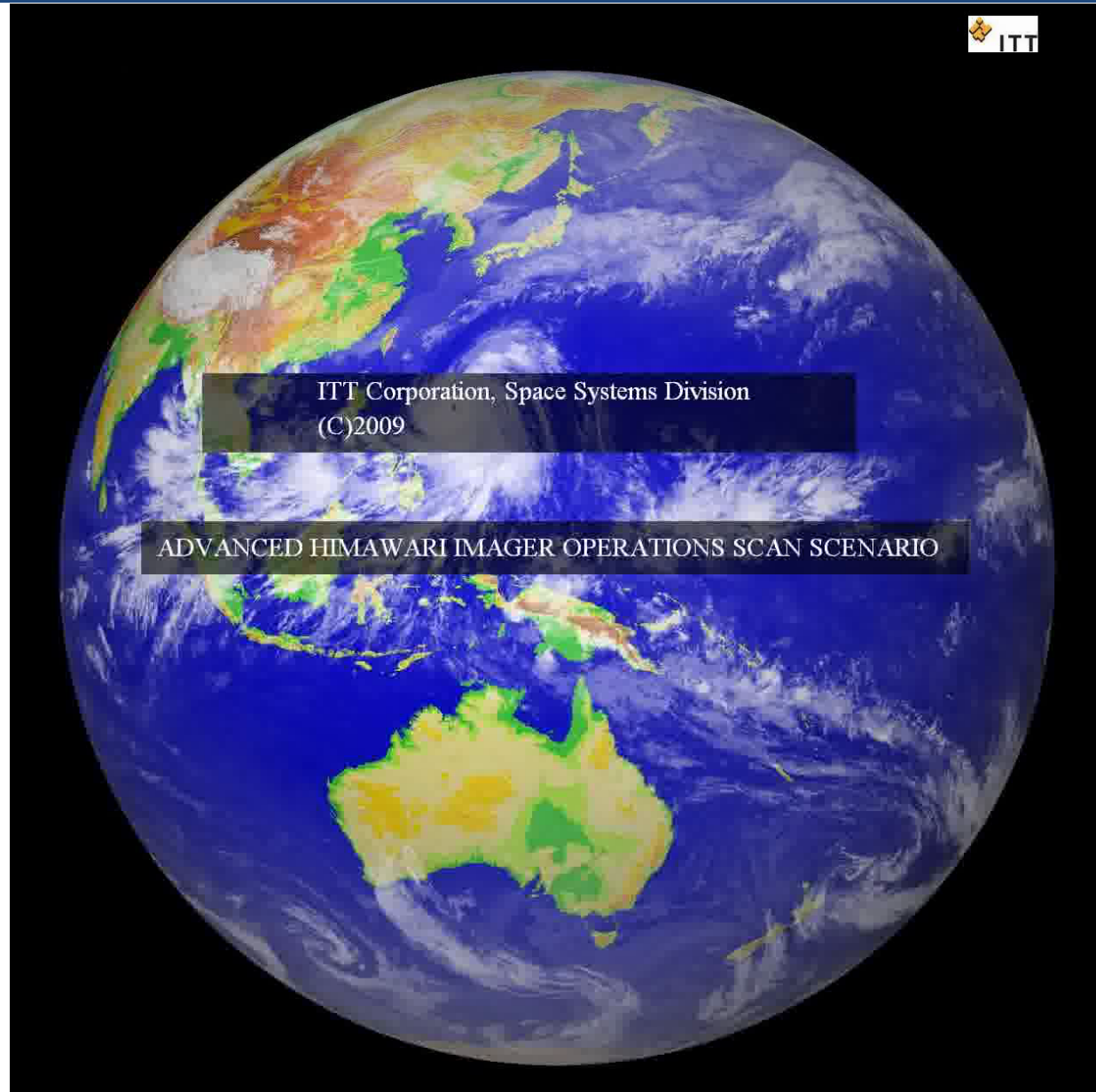
Region 5 Landmark Area

Interval : **30 seconds** (20 times in 10 min)

Dimension : EW x NS: 1000 x 500 km

Schematic Observation Sequence

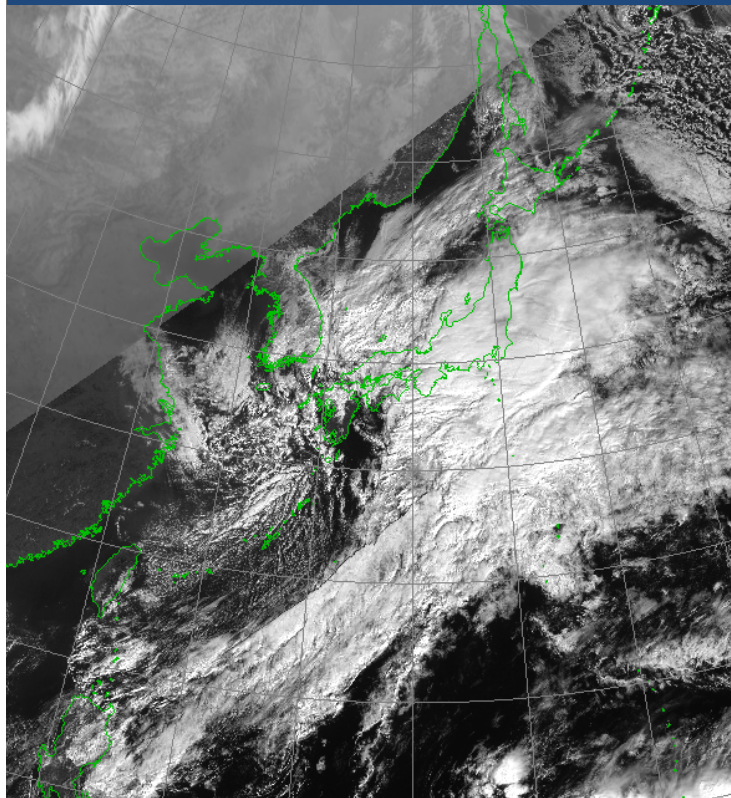
Timeline in 10 minutes



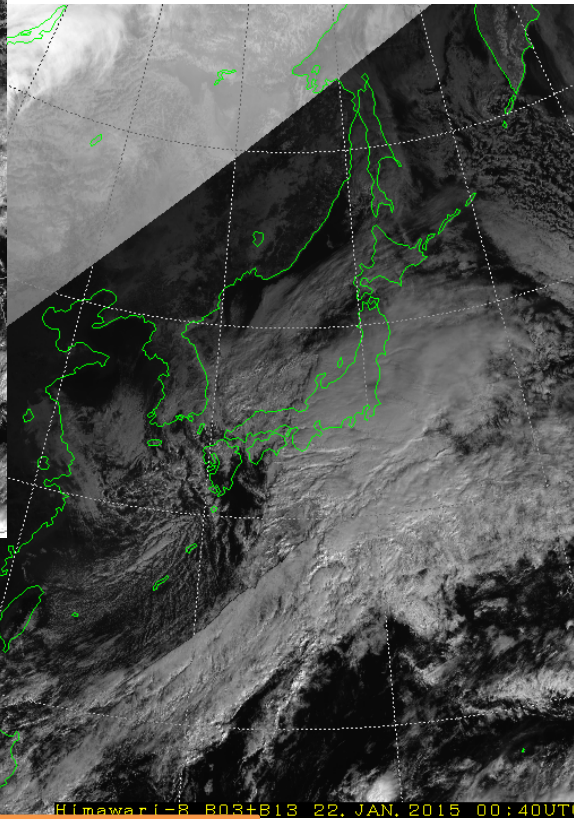
Comparison of several observation intervals

00-07 UTC 22nd January 2015

Visible band (Infrared band in night)

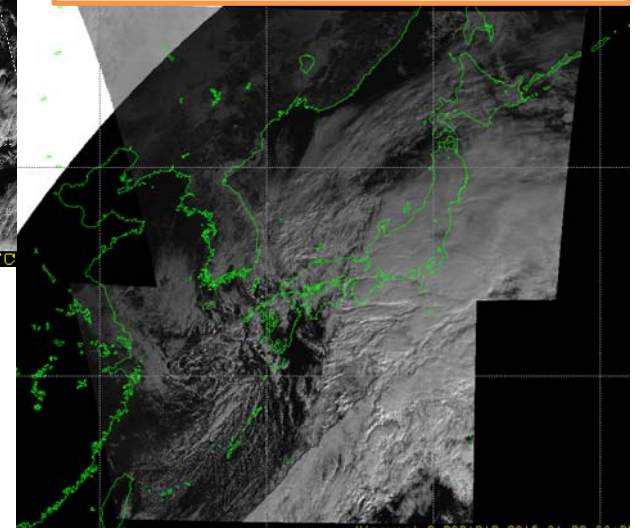


MTSAT Full Disk observation
Every 30 minutes



H-8 Full Disk observation
Every 10 minutes

H-8 Japan Area observation
Every 2.5 minutes



AMVs (Current)

11-01-01 0600 UTC MTSAT-1R

2012-06-19-01UTC MTSAT-2 AMV

QI>0.85

Yellow : IR1-low

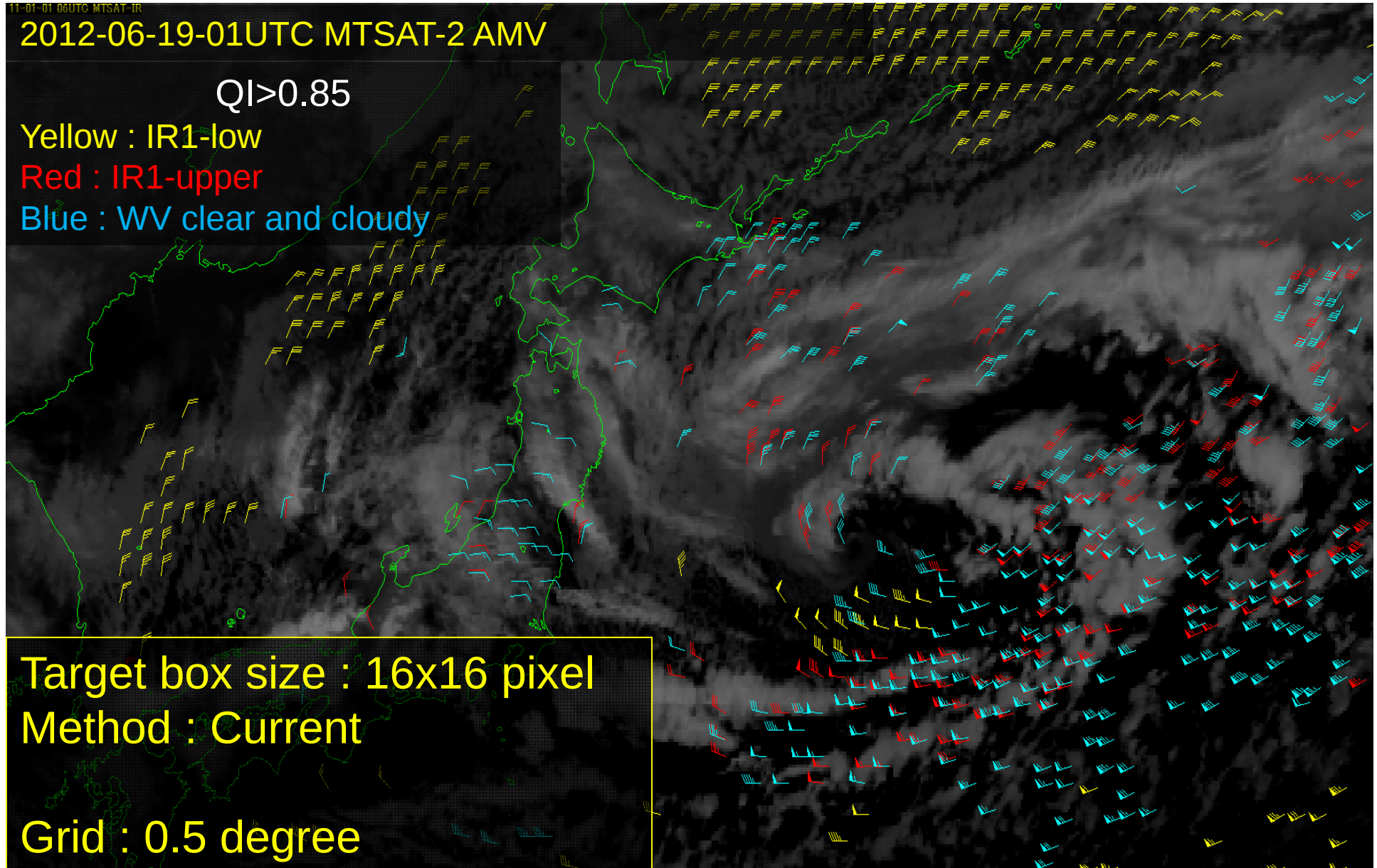
Red : IR1-upper

Blue : WV clear and cloudy

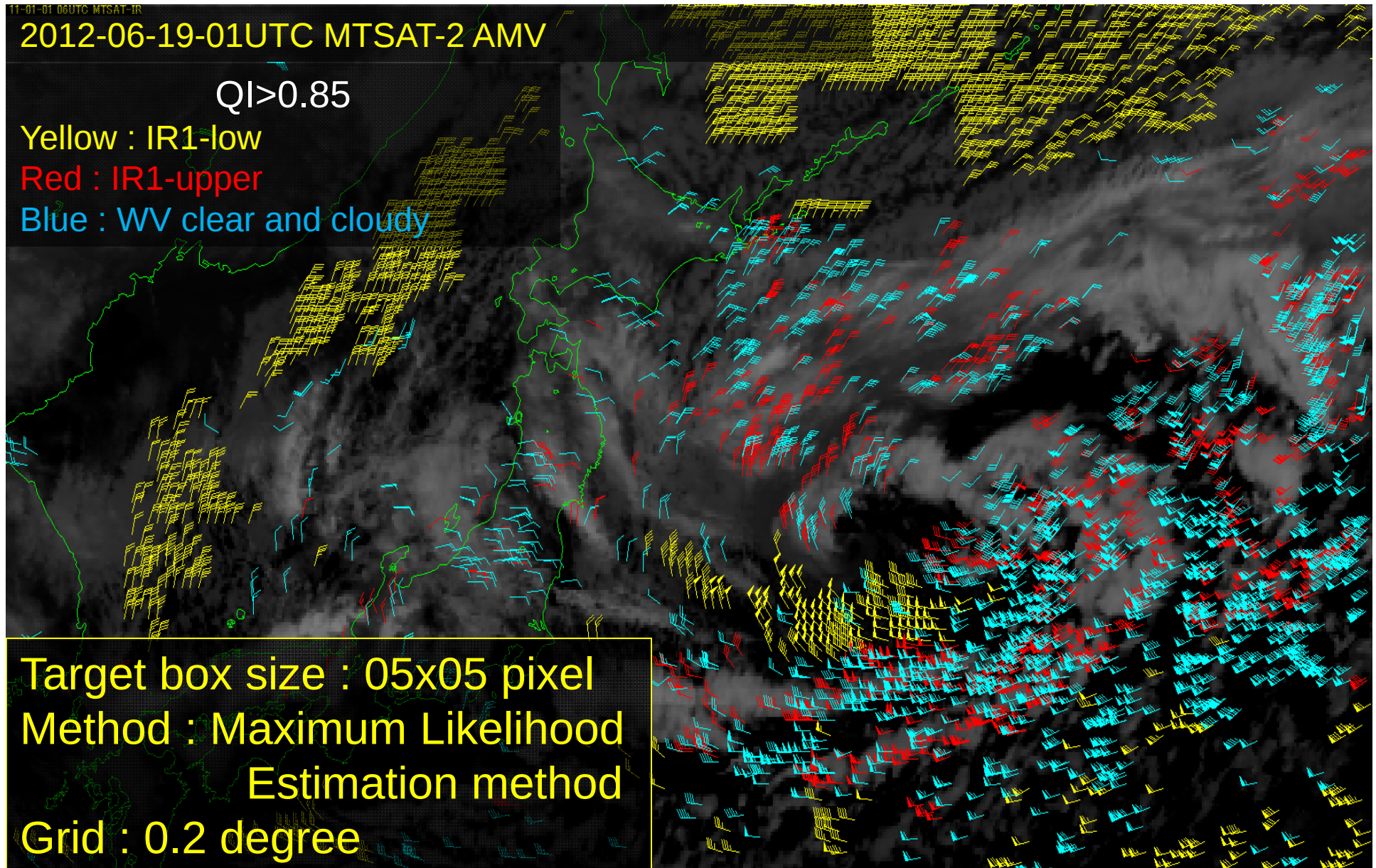
Target box size : 16x16 pixel

Method : Current

Grid : 0.5 degree

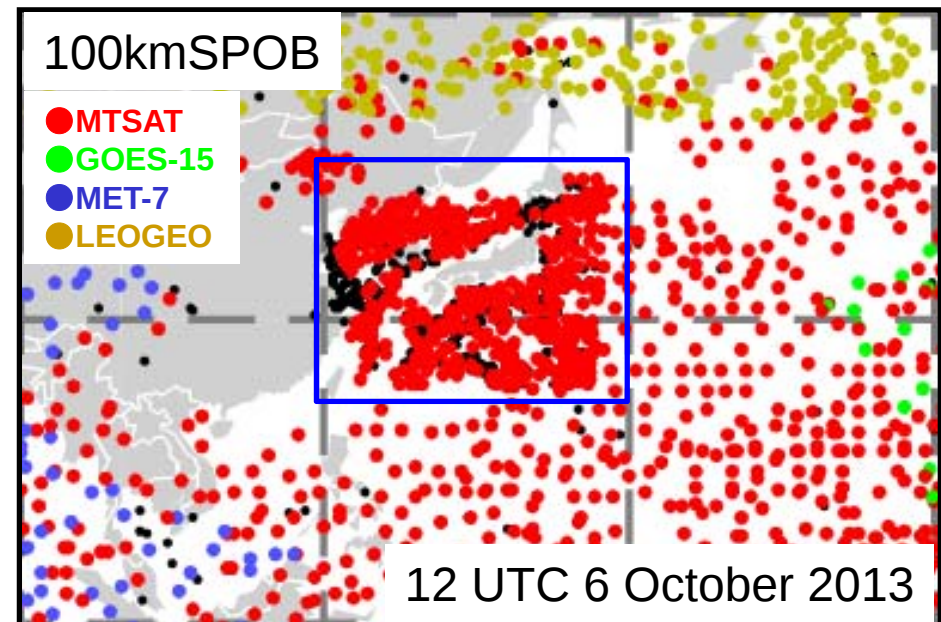
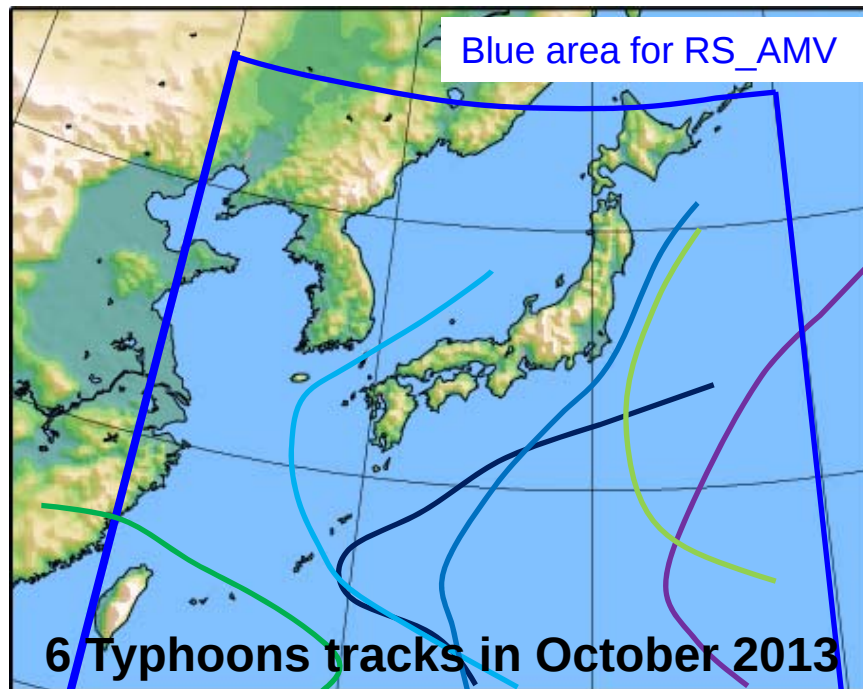


AMVs (Prototype)



Rapid Scan AMVs for NWP

JMA/MSR specially produced RS-AMVs from the MTSAT-1R images with the intervals of 10 minutes for 24 hours from 2 to 18 October 2013.

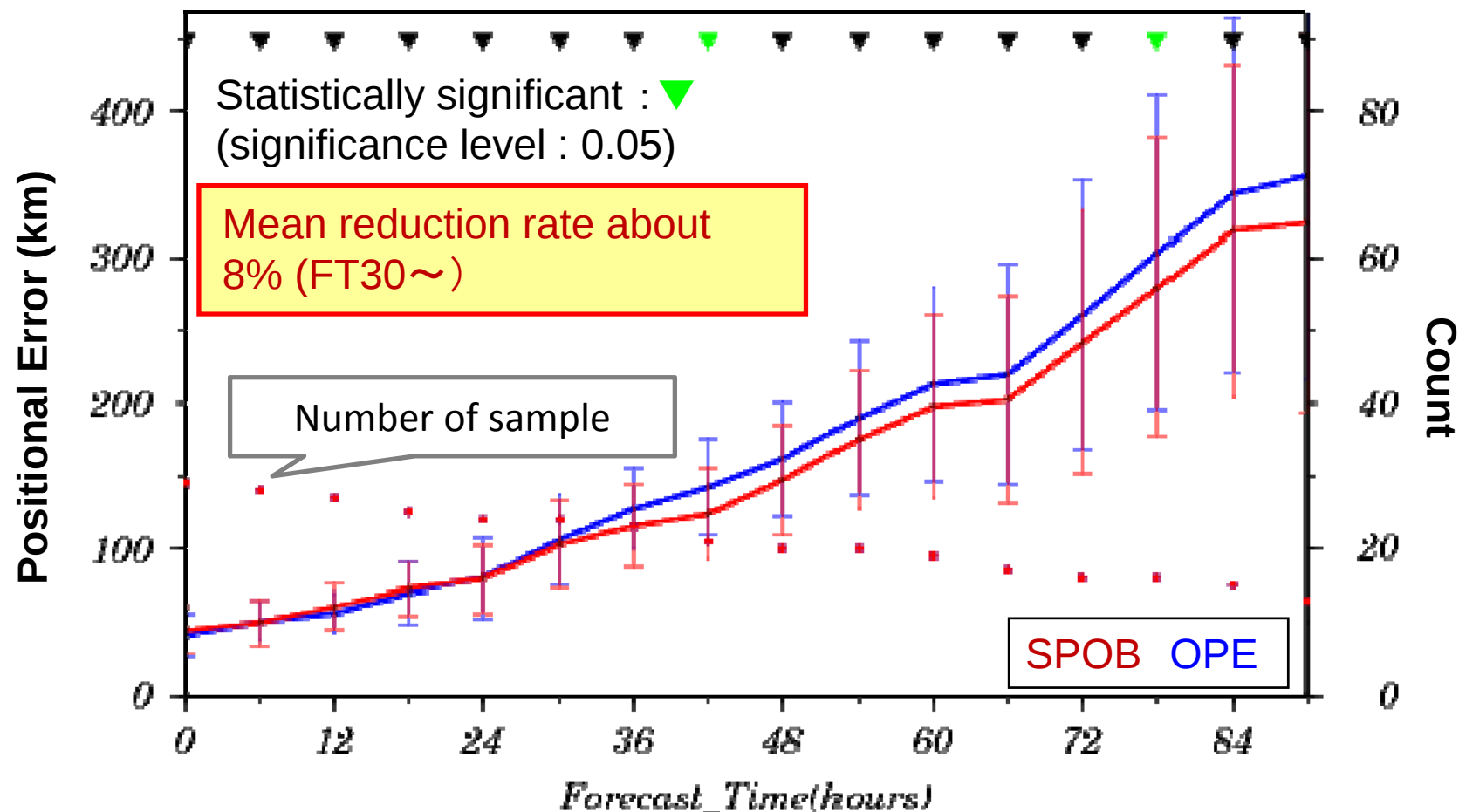


Super-observation procedure (SPOB)

Average of AMVs (RS-AMVs) directions and speeds with 100 km intervals in hourly time window and the 200 km thinning of OPE-AMVs in 6 hour time window

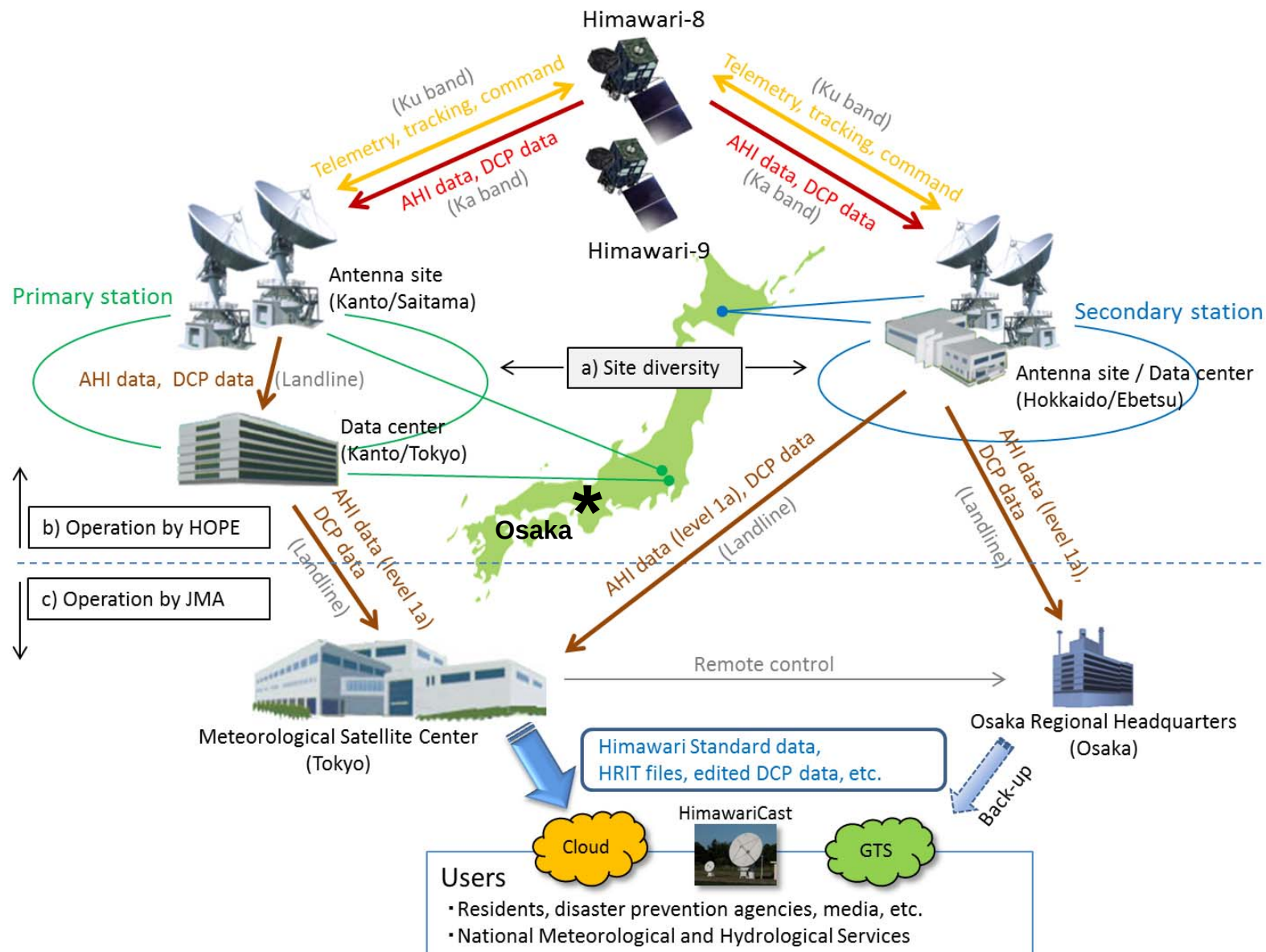
Rapid Scan AMVs for NWP

Average of typhoon positional errors

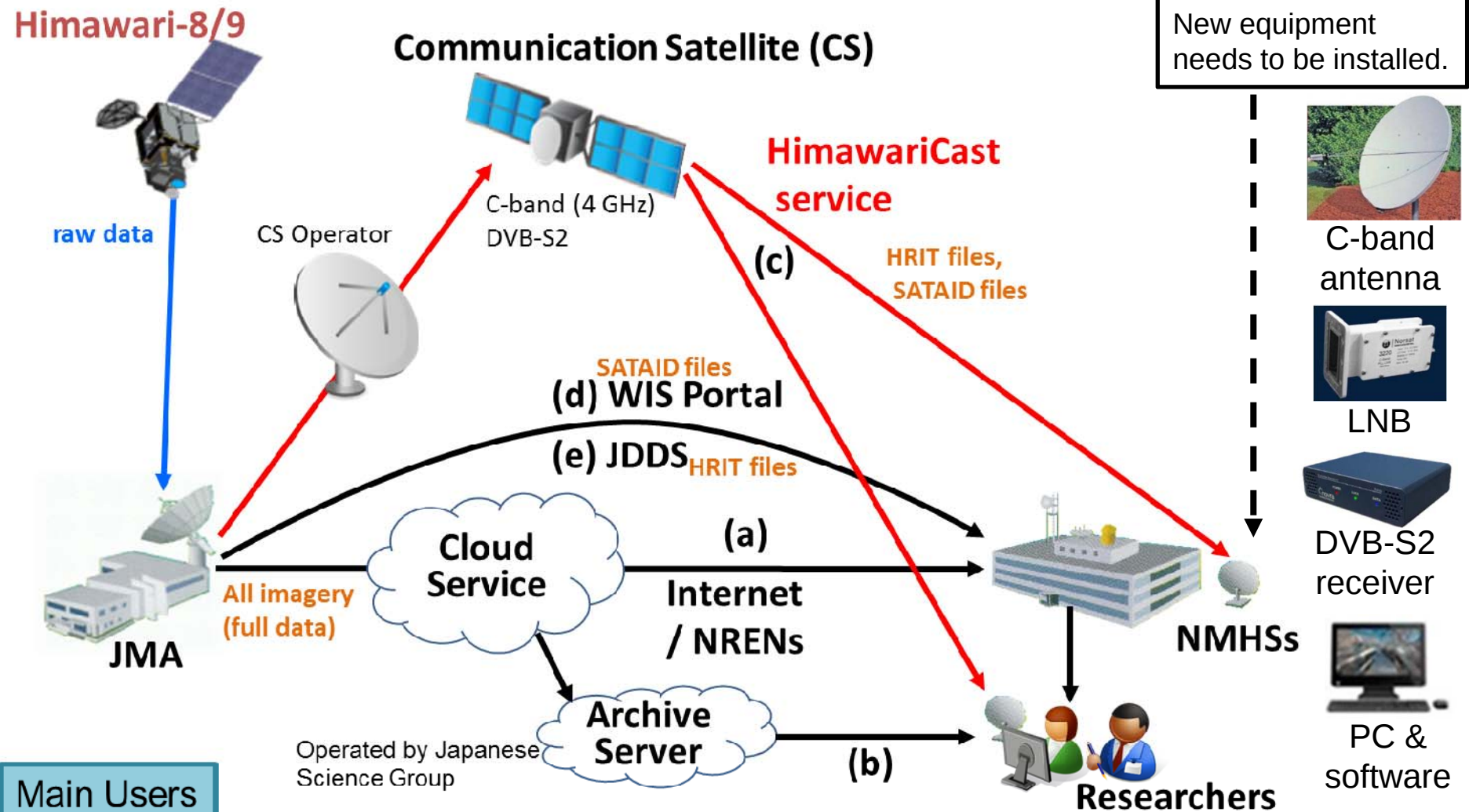


High spatial resolution AMVs from Himawari-8/9 will contribute to Improvement of NWP Model Forecast

Himawari-8/9 ground segment and operations



Himawari-8/9: Data Distribution/Dissemination



- (a) **Cloud Service:** **NMHSs (1 agency / nation)**
- (b) **Archive Server:** **Universities and Researchers**
- (c) **HimawariCast:** **Every users**
- (d) **WIS Portal and (e) JDDS:** **NMHSs**

Internet Cloud Service (HimawariCloud)

Format	Area	Data size	Remarks
Himawari Standard Data (HSD)	Full disk Target area	329 GB (1 day) #3: 930 MB (10 min) #1, 2, 4: 230 MB (10 min) #5-16: 60MB (10 min)	- Full disk: every 10 minutes - Target area: every 2.5 minutes - 16 bands - Finest-spatial-resolution data
PNG	Full disk Target area	49 GB (1 day) 350 MB (10 min)	- True color image (composites of 3 visible bands) - Full disk: every 10 minutes - Target area: every 2.5 minutes - Same spatial resolution as HSD
NetCDF	Target area	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)	- Every 2.5 minutes - 16 bands - Same spatial resolution as HSD

Features

- NMHS can get data using HTTP 1.1 client such as Web browser or Wget.
- NMHS choice of data (HSD is created separately for each band, and divided into 10 segments.) i.e. 16 bands x 10 segments = 160 files / 10 minutes

Notes

- Basically one download per one country
- Account registration is required
- High speed Internet access (25 Mbps) is required to download all HSD

Archive Server: Candidates

- Following two systems volunteered to act as a server for providing all Himawari-8 data to researchers
- They have big storage device more than several peta bytes
- Voluntary and best effort service
- Details are undecided
- Further news will be uploaded in JMA/MSC website

DIAS

Data Integration and Analysis System

<http://www.editoria.u-tokyo.ac.jp/projects/dias/?locale=en>

- Managed by University of Tokyo

NICT Science Cloud

<http://sc-web.nict.go.jp/>

- Managed by National Institute of Information and Communications Technology (NICT)

Contribution to BDA

- We will provide AMV/CSR/ASR and other physical parameters every 2.5 min. and 30 sec. in Local area to Dr. Miyoshi's BDA Team as a data set for DA every 30 sec. for Local area forecast.
- We will also be able to provide AMV/CSR/ASR and other physical parameters every 10 min. in Full Disk area as a data set for DA every 10 min for Global forecast.

> Who want ?

Thank you!

