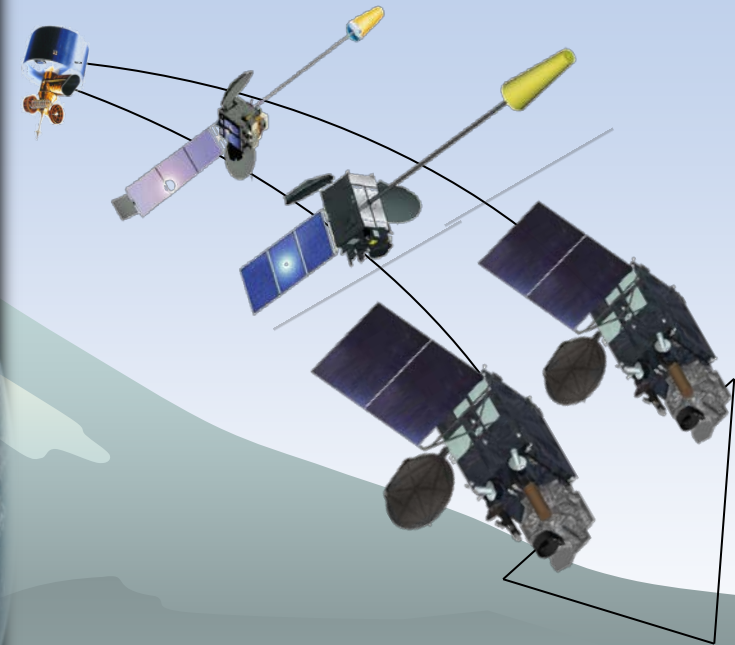
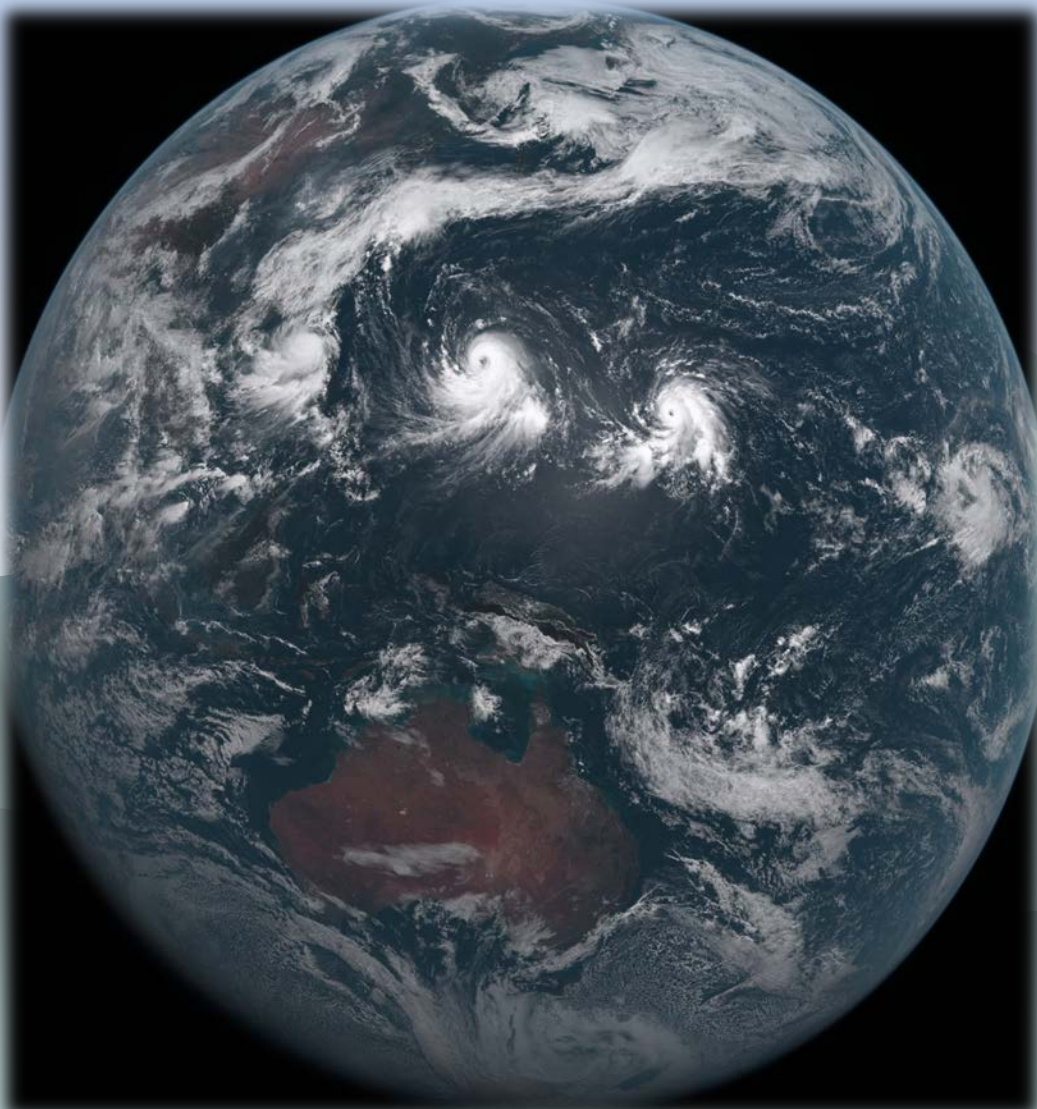


Overview of Japanese new generation geostationary meteorological satellites, Himawari -8/-9



Hitomi MIYAMOTO

Meteorological
Satellite Center, JMA
AOMSUC-6
10 November, 2015

First Operational Image of Himawari-8 (02UTC, 7 July, 2015)

Overview of Japanese new generation geostationary meteorological satellites

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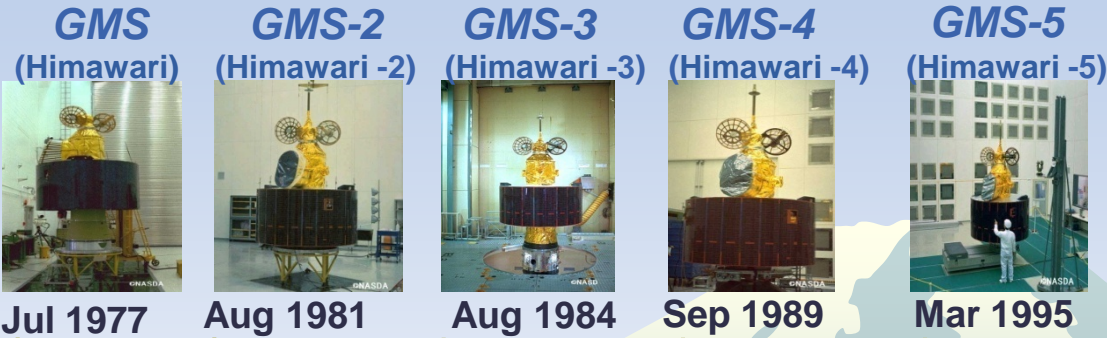
- ✓ **History**

- ✓ **Outline of Himawari -8/-9**

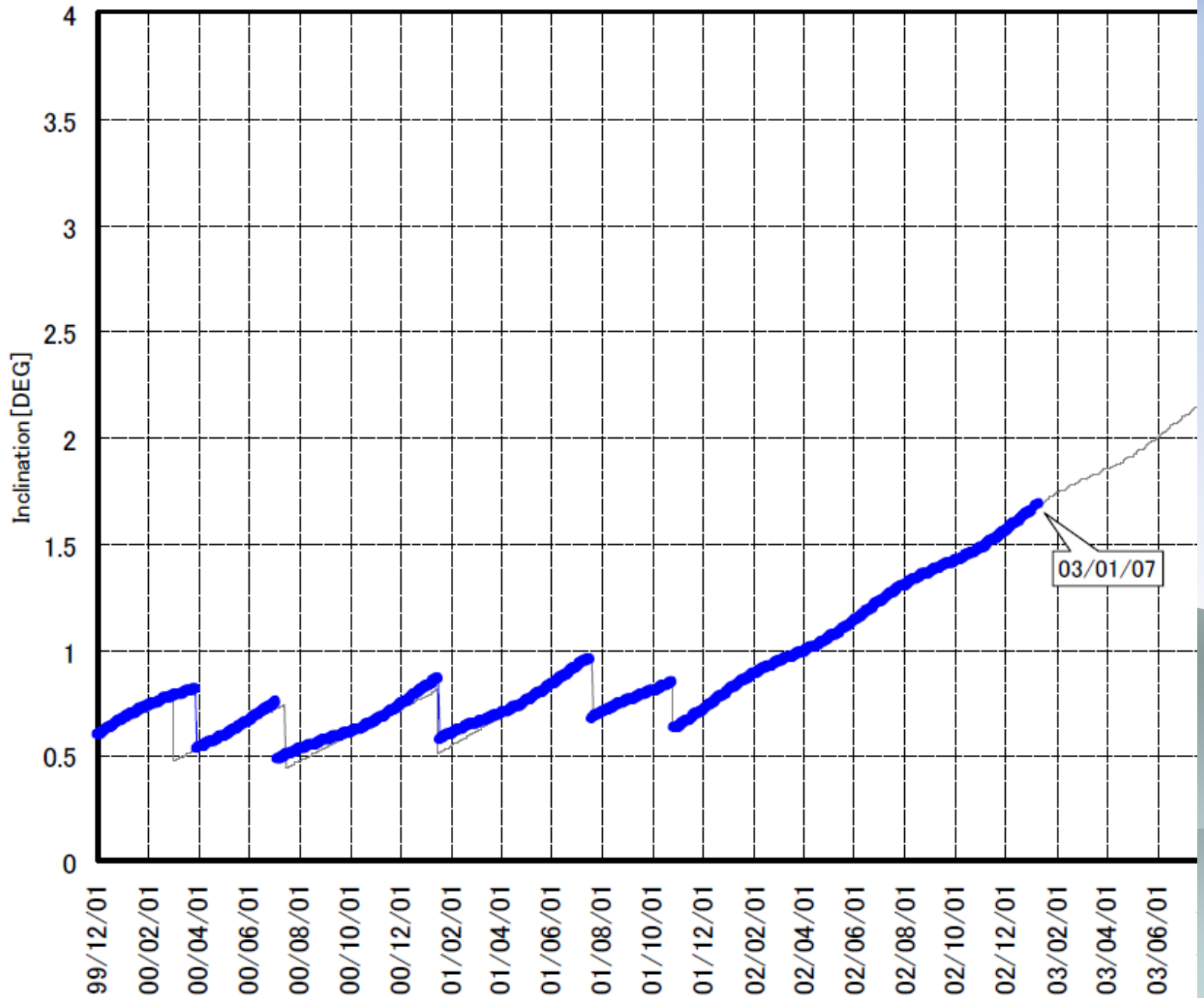
- ✓ **Himawari ground system**

History of Japanese GMS series

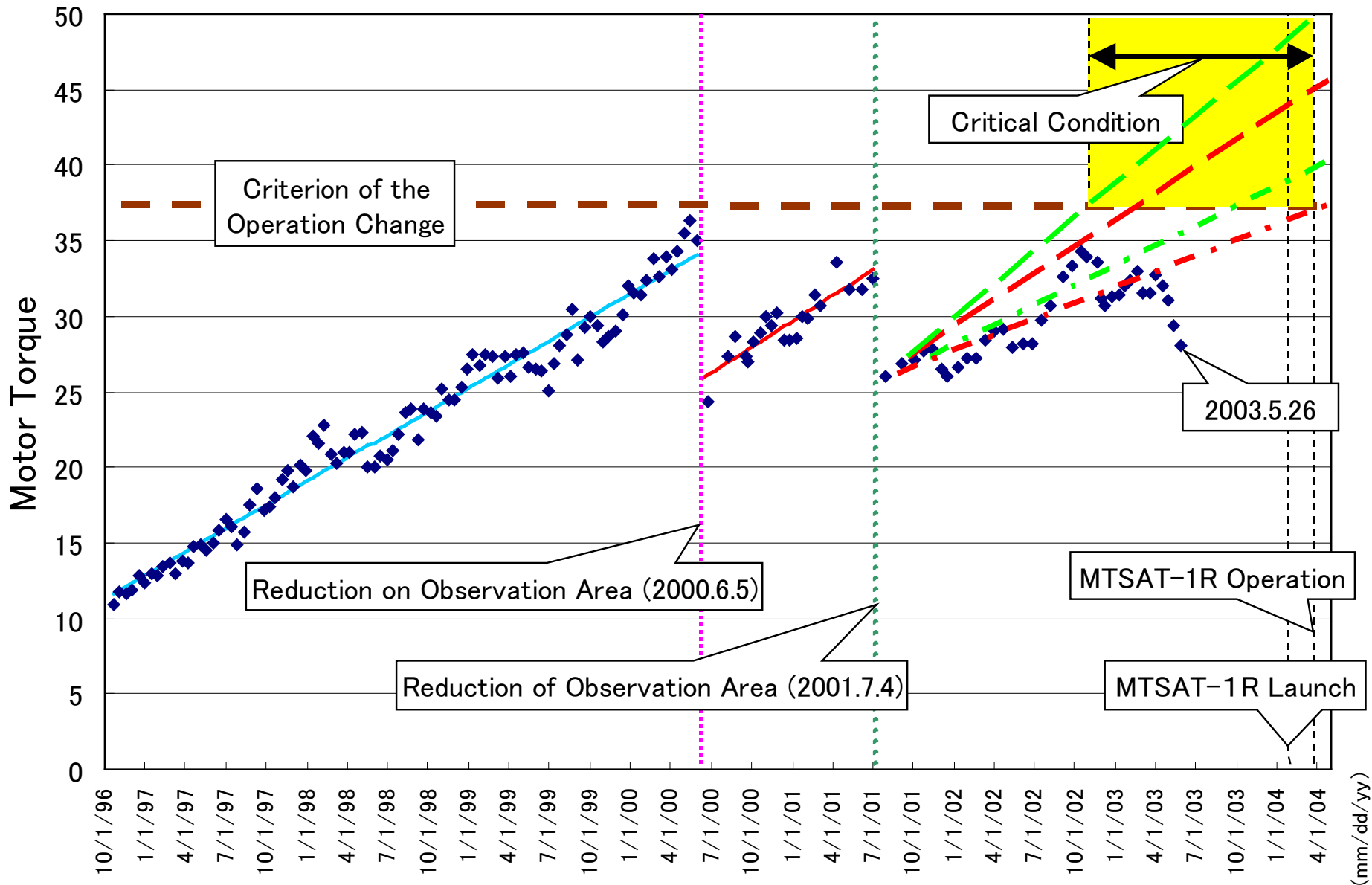
GMS (Geostationary Meteorological Satellite)



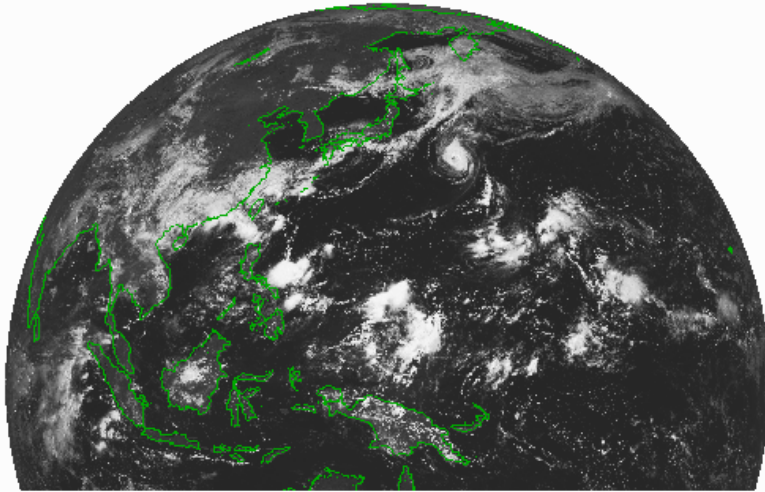
Satellite	Observation period
GMS	1977 – 1981
GMS-2	1981 – 1984
GMS-3	1984 – 1989
GMS-4	1989 – 1995
GMS-5	1995 – 2003
GOES-9	2003 – 2005
MTSAT-1R	2005 – 2010
MTSAT-2	2010 – 2015
Himawari-8	2015 –
Himawari-9	Launch in 2016



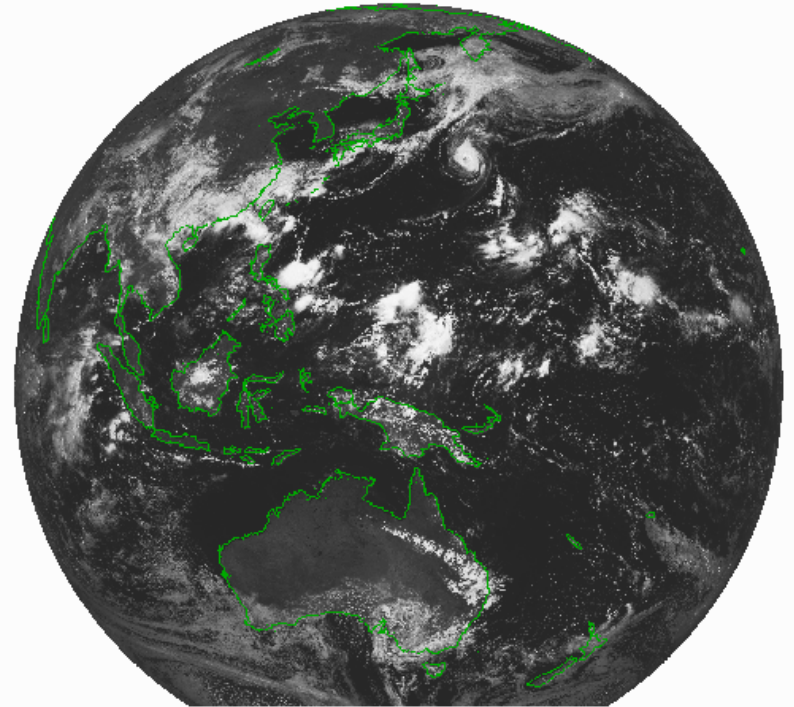
GMS-5 Operation Condition (Scan Mirror Torque at Southernend)



The observation of GMS-5 after July 4, 2001



Area of hourly observation
(Just southward from the equator)



Area of 3-hourly observation
Reduction Area : South of S49
(About 600km southward from Australia)

History of Japanese GMS series

GMS (Geostational Meteorological Satellite)

GMS
(Himawari)



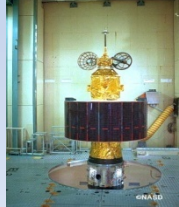
Jul 1977

GMS-2
(Himawari -2)



Aug 1981

GMS-3
(Himawari -3)



Aug 1984

GMS-4
(Himawari -4)

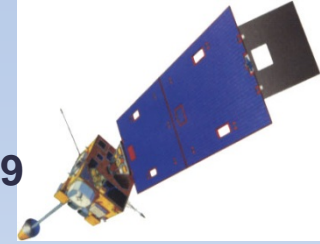


Sep 1989

GMS-5
(Himawari -5)



Mar 1995

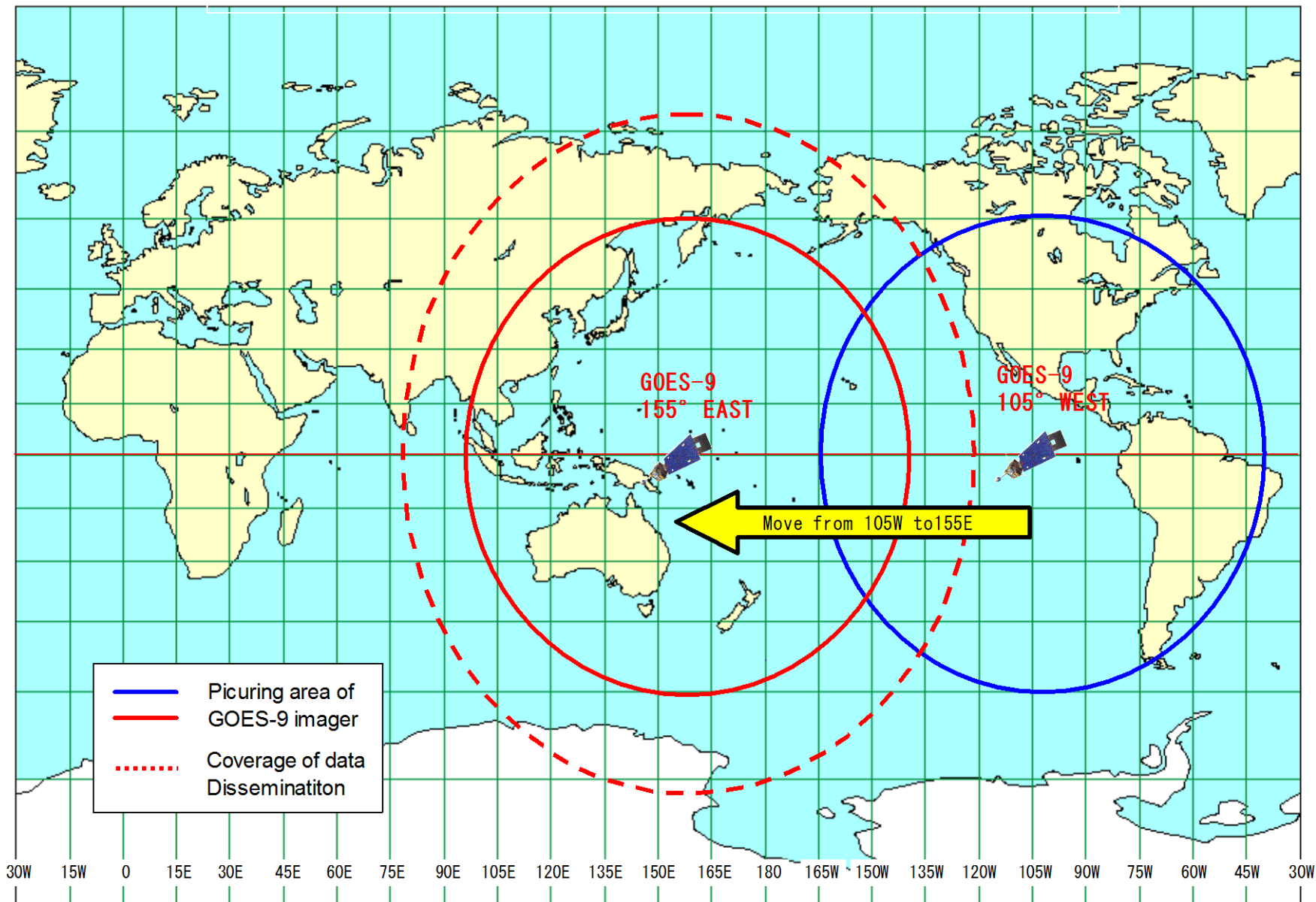


GOES-9

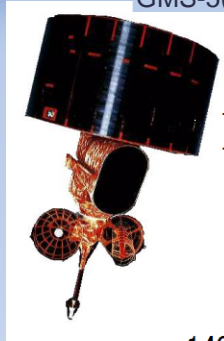
Back-up operation of
GMS-5 with GOES-9 by
NOAA/NESDIS
2003.5.22 – 2005.6.28

Satellite	Observation period
GMS	1977 – 1981
GMS-2	1981 – 1984
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GOES-9	2003 – 2005
MTSAT-1R	2005 – 2010
MTSAT-2	2010 – 2015
Himawari-8	2015 –
Himawari-9	Launch in 2016

The movement of GOES-9



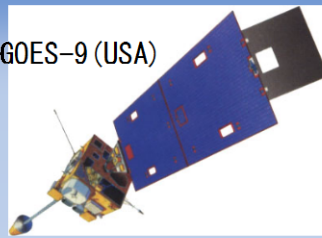
GMS-5(Japan)



Telecommunication
function of GMS-5

140E

GOES-9 (USA)



155E

Conceptual figure of
data relay from GOES-9
via GMS-5 to SDUS users
during the back-up of
GMS-5 with GOES-9

WEFAX
broadcast
service
for users

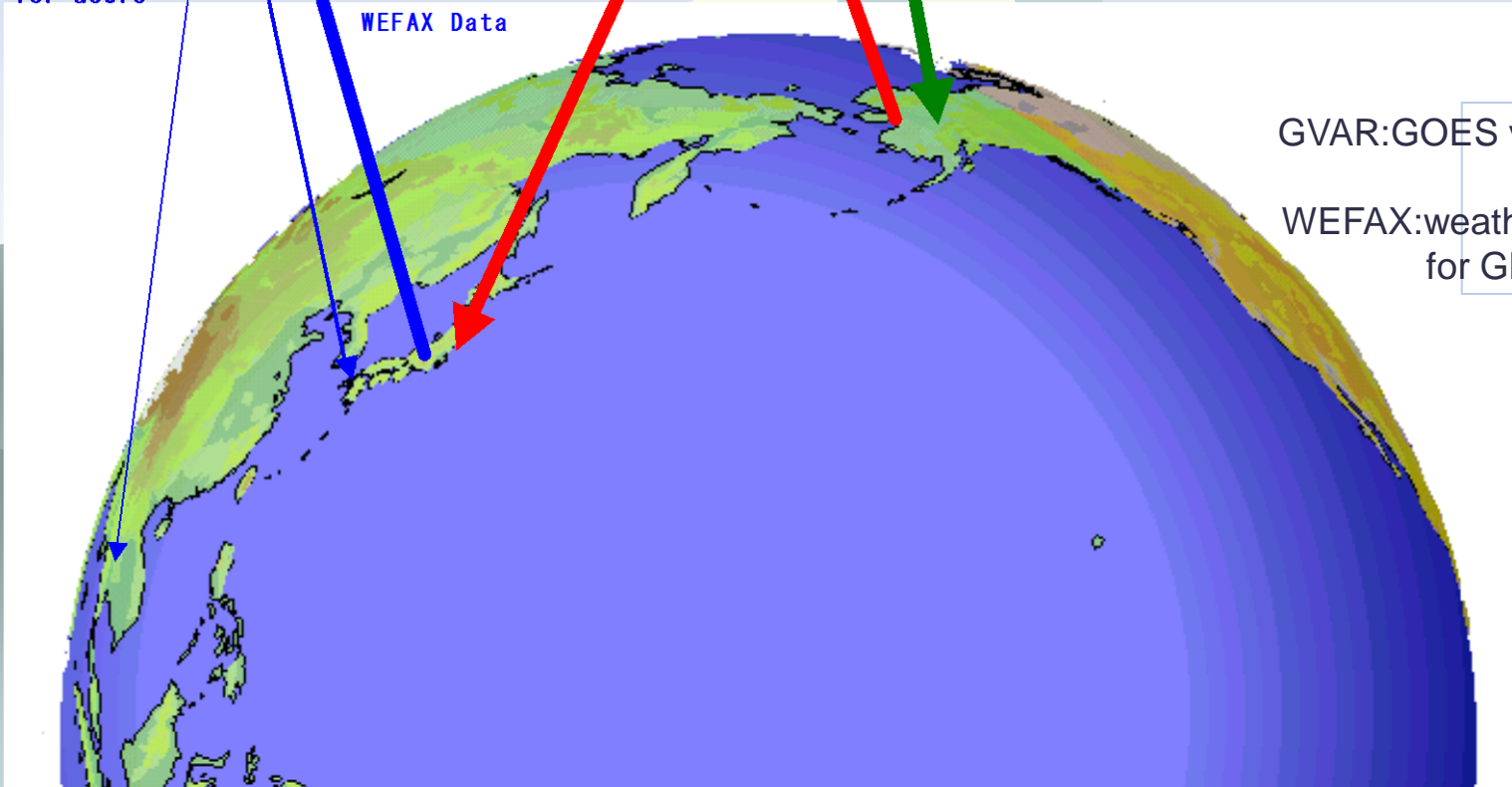
WEFAX Data

GVAR Data

Earth image
Data

GVAR:GOES variable data format

WEFAX:weather facsimile
for GMS-5 users



History of Japanese GMS series

GMS (Geostational Meteorological Satellite)

GMS
(Himawari)



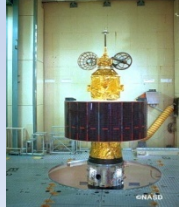
Jul 1977

GMS-2
(Himawari -2)



Aug 1981

GMS-3
(Himawari -3)



Aug 1984

GMS-4
(Himawari -4)

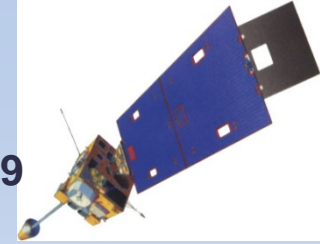


Sep 1989

GMS-5
(Himawari -5)



Mar 1995

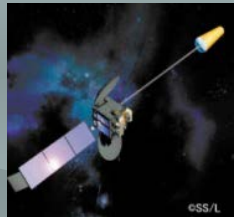


GOES-9

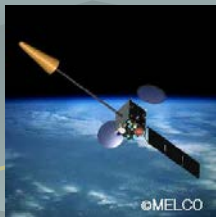
Back-up operation of
GMS-5 with GOES-9 by
NOAA/NESDIS
2003.5.22 – 2005.6.28

MTSAT (Multi-functional Transport SATellite)

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



Feb 2005

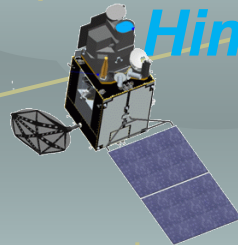


Feb 2006

(Himawari -8)

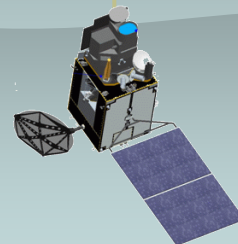
Himawari

(Himawari -9)



Oct 2014

2016



Satellite	Observation period
GMS	1977 – 1981
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Overview of Japanese new generation geostationary meteorological satellites

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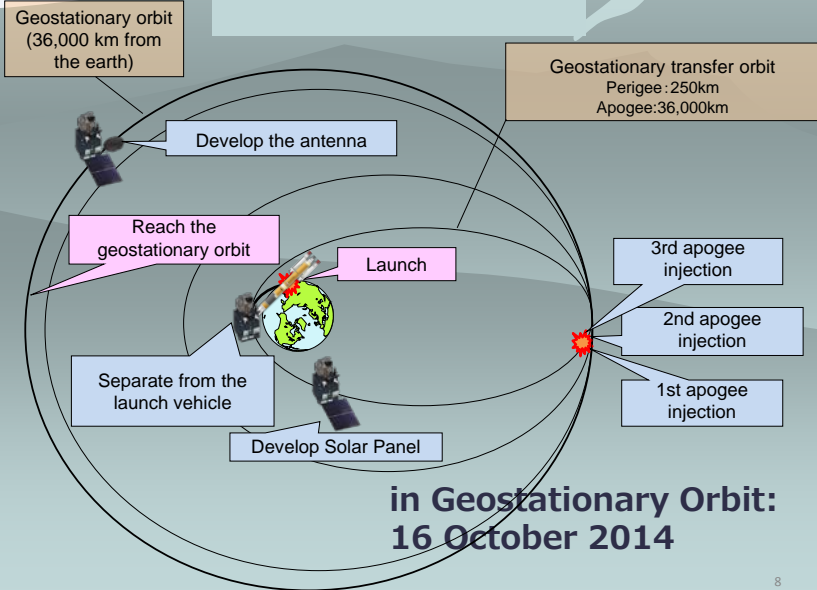
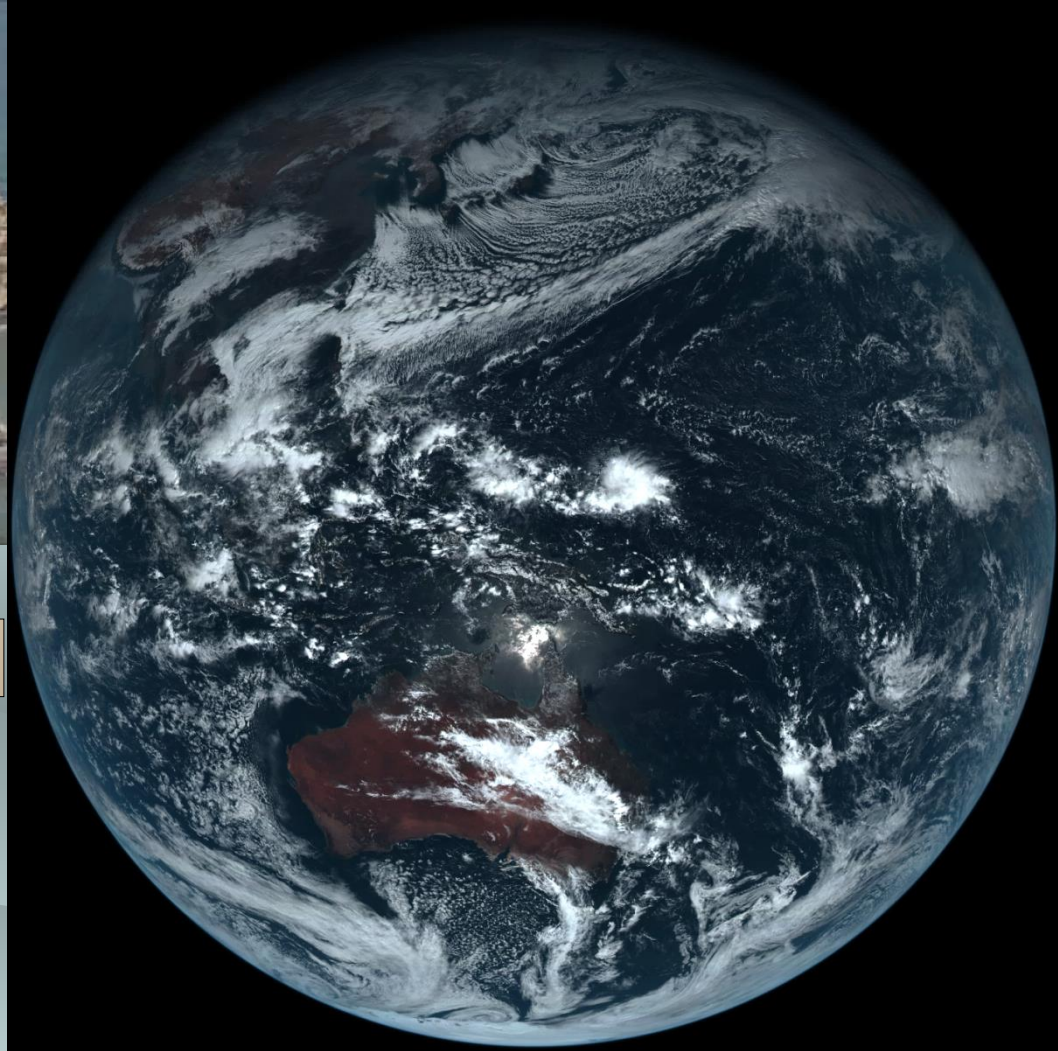
- ✓ **History**

- ✓ **Outline of Himawari -8/-9**

- ✓ **Himawari ground system**

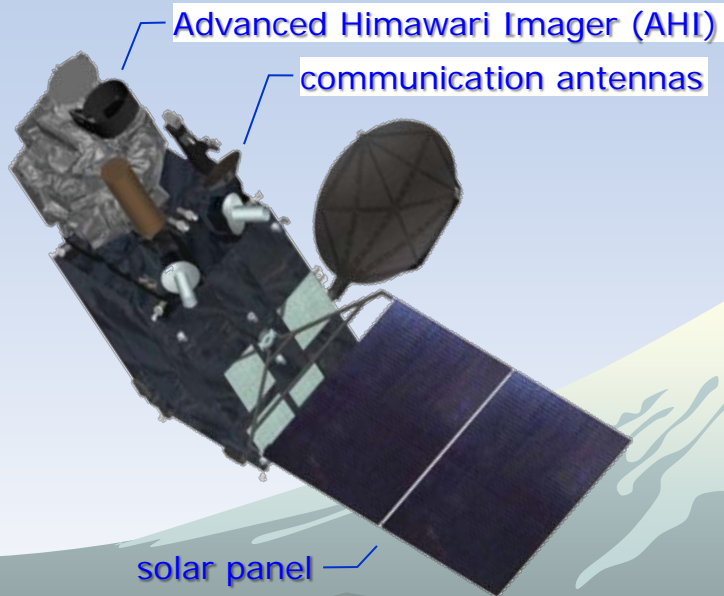
Himawari-8: JMA's New-Generation Geostationary Meteorological Satellite

Launch: 7 October 2014
by H-IIA Launch Vehicle No.25



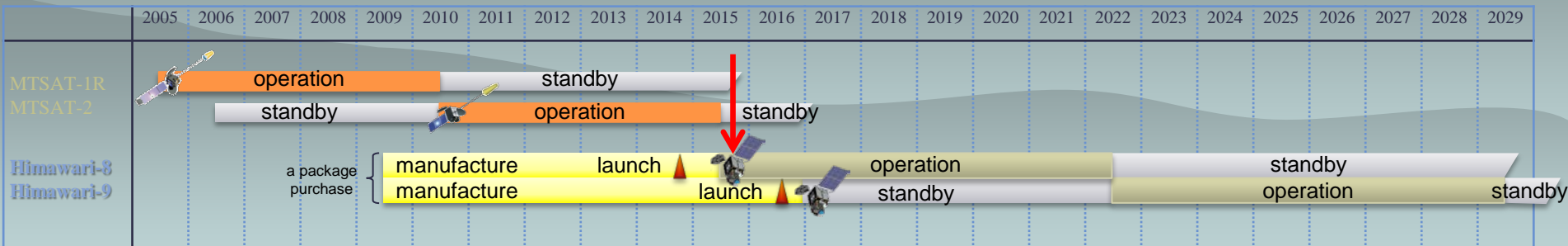
First Image: 18 December 2014

Outline of Himawari-8/9



Geostationary position	Around 140.7° E
Attitude control	3-axis attitude-controlled geostationary satellite
Communication	1) Raw observation data transmission Ka-band, 18.1 - 18.4 GHz (downlink)
	2) DCS International channel 402.0 - 402.1 MHz (uplink) Domestic channel 402.1 - 402.4 MHz (uplink) Transmission to ground segments Ka-band, 18.1 - 18.4 GHz (downlink)
	3) Telemetry and command Ku-band, 12.2 - 12.75 GHz (downlink) 13.75 - 14.5 GHz (uplink)

Himawari-8 began operation on 7 July 2015, replacing the previous MTSAT-2 operational satellite



New Generation Satellites

HIMAWARI – 8 / - 9

Improved spatial resolution

MTSAT-1R/2

VIS 1 km
IR 4 km

Himawari-8/9

VIS 0.5/1 km
IR 2 km

More frequent observation



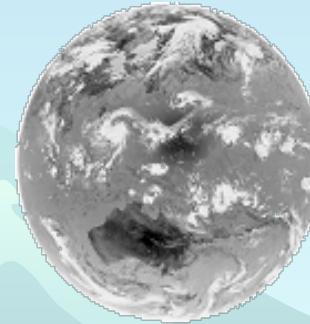
More flexible regional observation

Special
observation

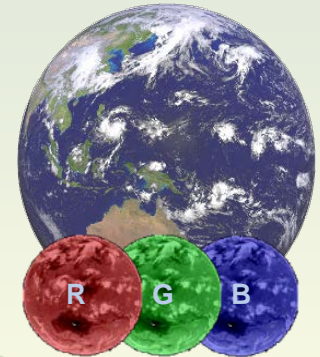
Target area obs.
every 2.5 minutes

More spectral bands

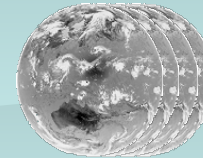
VIS 1 band



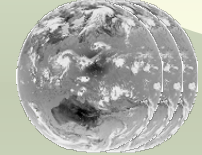
VIS 3 bands



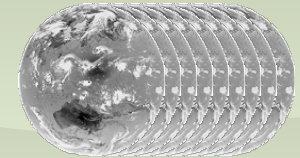
IR 4 bands



NIR 3 bands



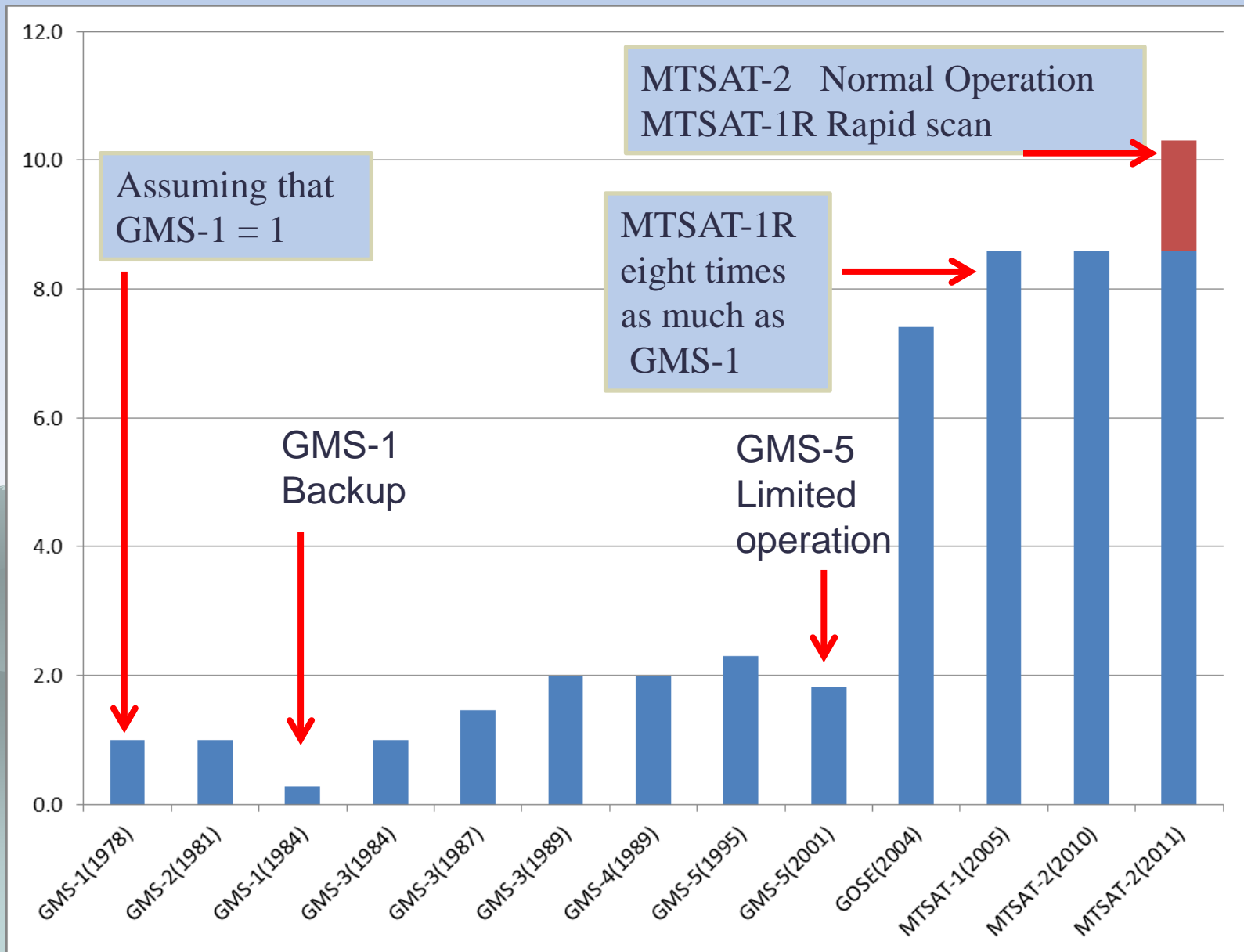
IR 10 bands



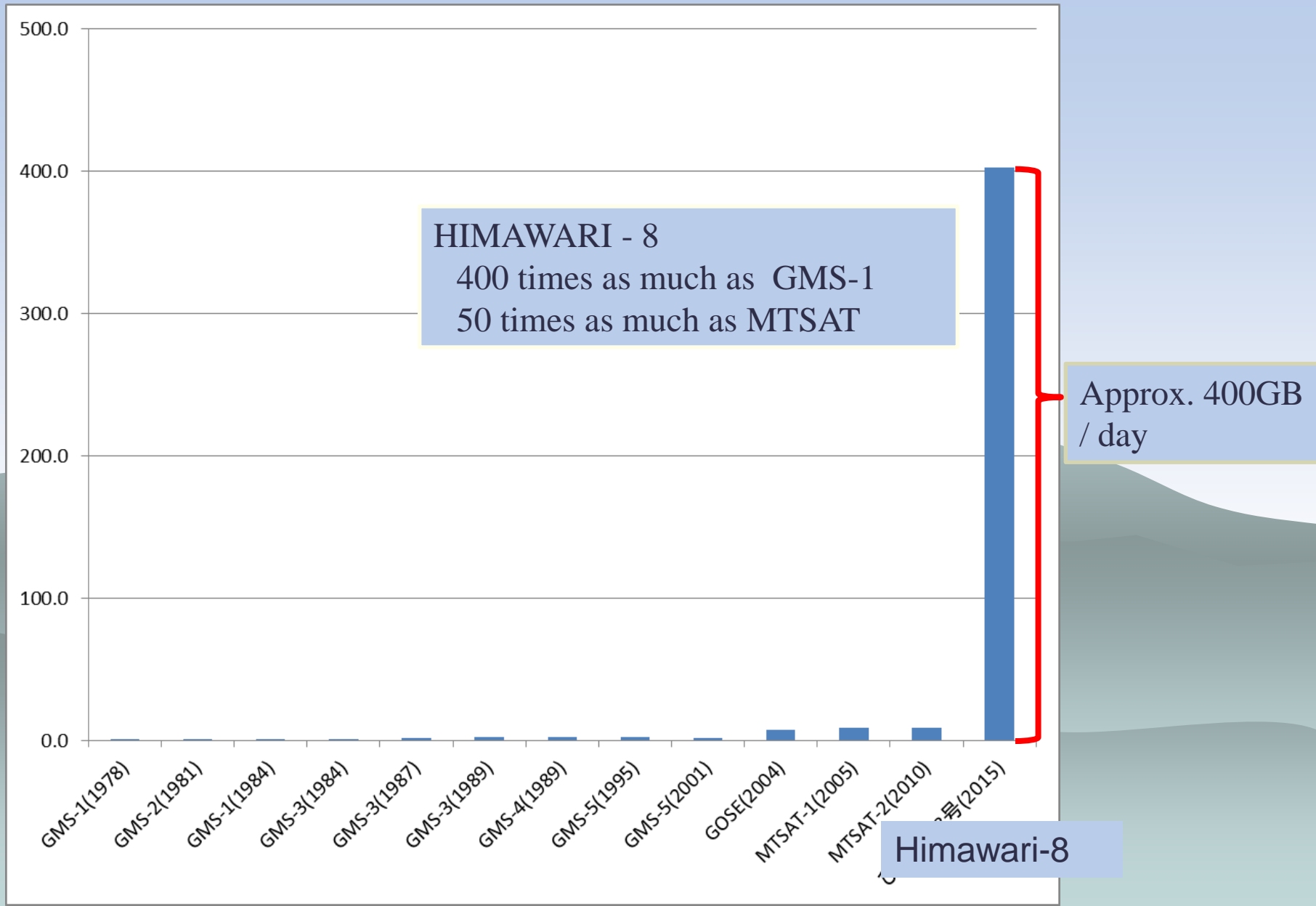
5 bands

16 bands

Changes of data volume of HIMAWARI Series



Changes of data volume of HIMAWARI Series



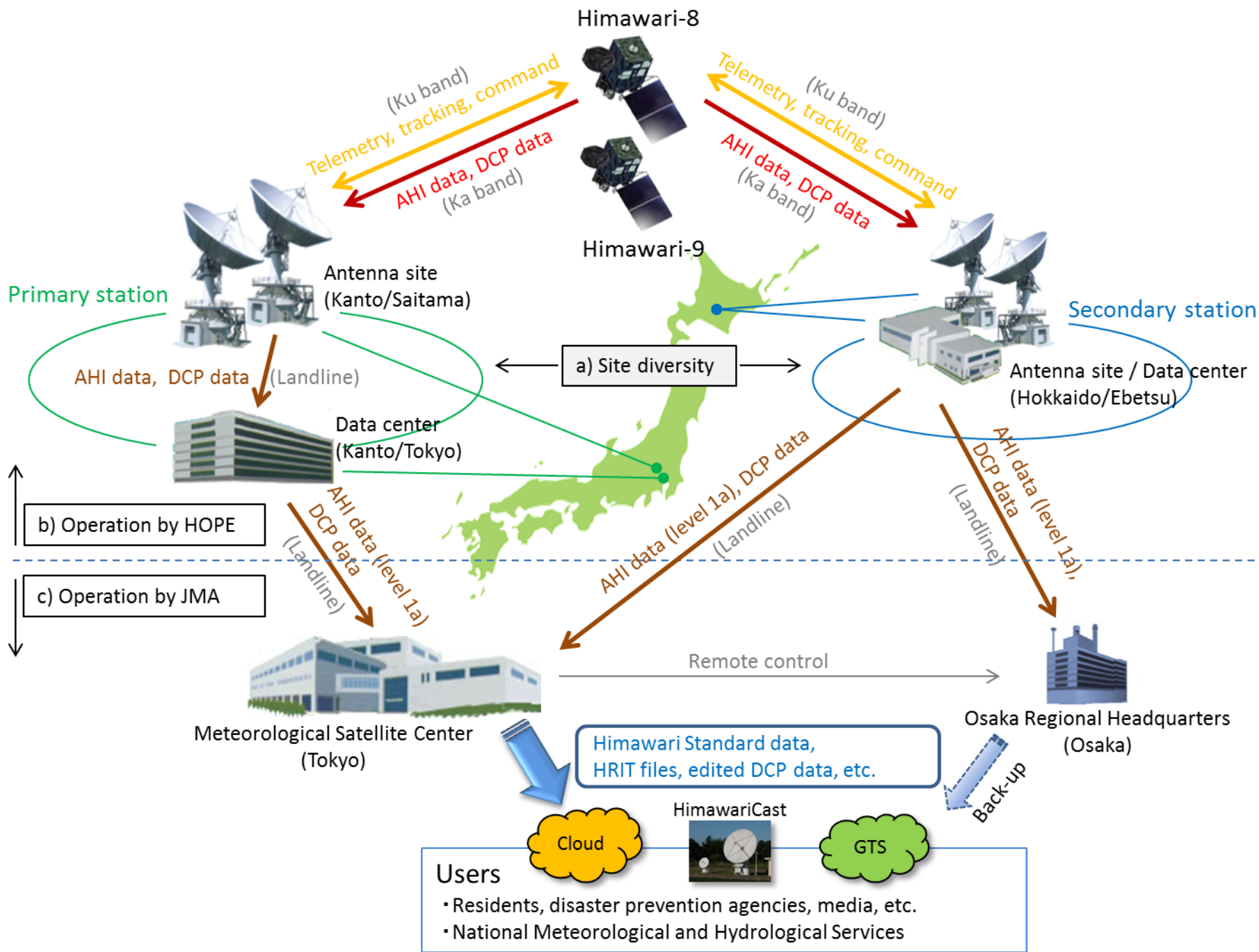
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- ✓ **Himawari ground system**



Two Ways of Himawari-8/9 Imagery Dissemination/Distribution

HimawariCast via Communication Satellite

- Service for Everyone
- No Pass Code for Receiving
- JMA's Baseline for Imagery Dissemination
- 14 bands (1 VIS and 13 IR) every 10 minutes for Full Disk
- Spatial Resolution is same as that of MTSAT HRIT compatible

HimawariCloud via Internet Cloud

- Service for NMHSs with high-speed Internet access
- All 16 bands (3 VIS and 13 IR)
- Full Specification (temporal and spatial) of Imagery

Archived Servers

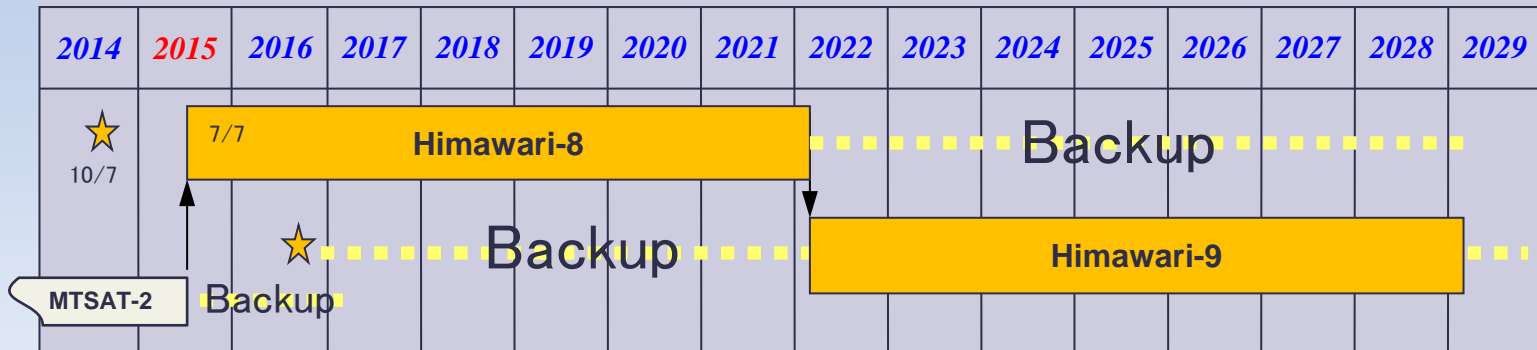
Operated by Japanese Science Group

The following Himawari Historical Data Servers are operated by Japanese Science Group on a voluntary basis for Non-Profit R&D Users

- **Chiba University Data Server**
CEReS (Center for Environmental Remote Sensing)
- **NICT (National Institute of information and Communications Technology) Science Cloud**
<http://sc-web.nict.go.jp/himawari/himawari-realtime.html>
- **University of Tokyo**
DIAS (Data Integration and Analysis System)
- **JAXA Data Server**

Future Plan

Himawari-8-9



First step

To establish the robust operating system of Himawari-8/9

- Satellite data storage system (about 5PB)
- High resolution AMVs processing system
- Himawari-9 test-bed for In-Orbit-Test
- Launch and IOT of Himawari-9

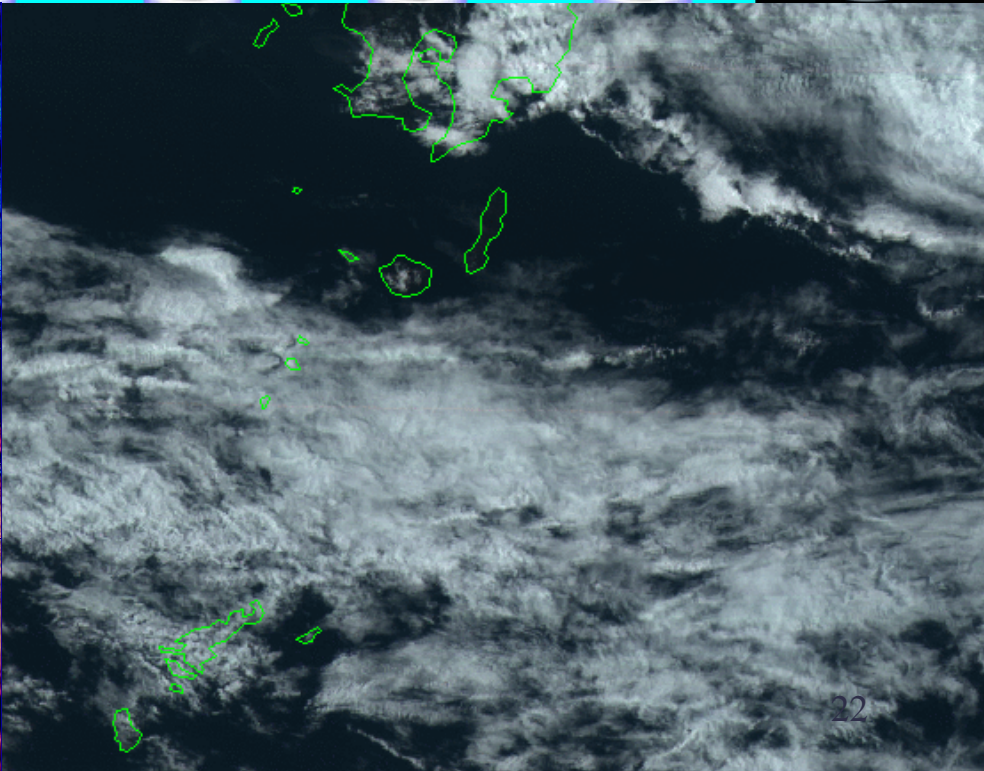
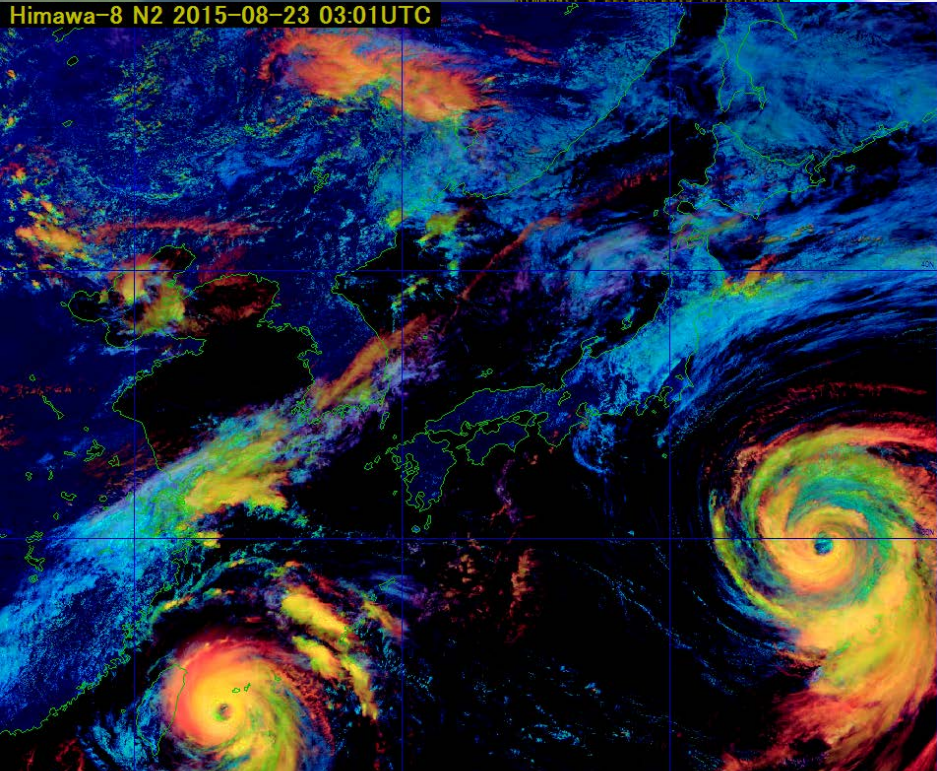
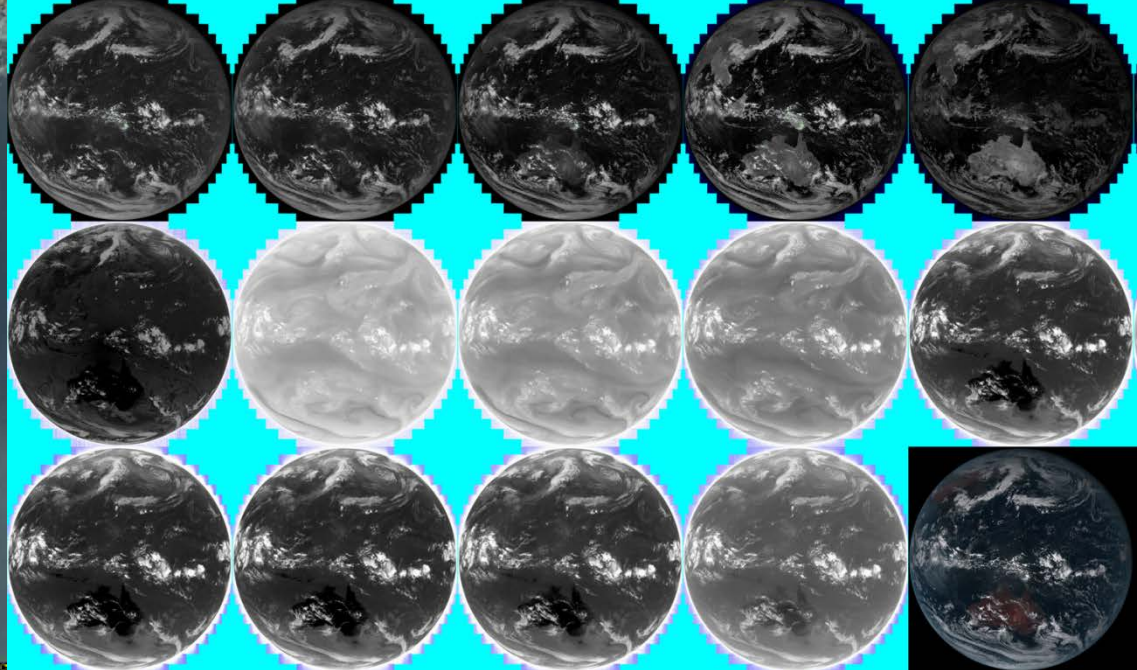
Second step

To start the Investigation for post Himawari-8/9

- Requirement, Technological capacity, Cost vs Benefit . . .

Third step

To determine the specification, To budget for next satellites . . .





***Thank you
for your attention!***