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# **Himawari Reception Plans & Guam L/X Band Antenna**

**2014 GOES-R/JPSS OCONUS Interchange Meeting  
31 July, 2014  
Bill Ward  
ESSD Chief, Pacific Region Headquarters**



# Initial Himawari Support within NOAA



- Initial Himawari data delivery and processing development is being funded with Sandy Supplement and comes with a number of Congressionally monitored caveats (see notes).
- NOAA is leveraging this development for support (to extent possible) real-time users of Western Pacific Imagery and products.
- Initial capabilities include:
  - HimawariCast at Guam, Hawaii and relay to AK
  - Full resolution imagery (subset) to AR, PR, NCEP
  - AMVs, Cloud Mask, Cloud Height, Cloud Type (modification of GOES-R algorithms)



# JMA & HOPE

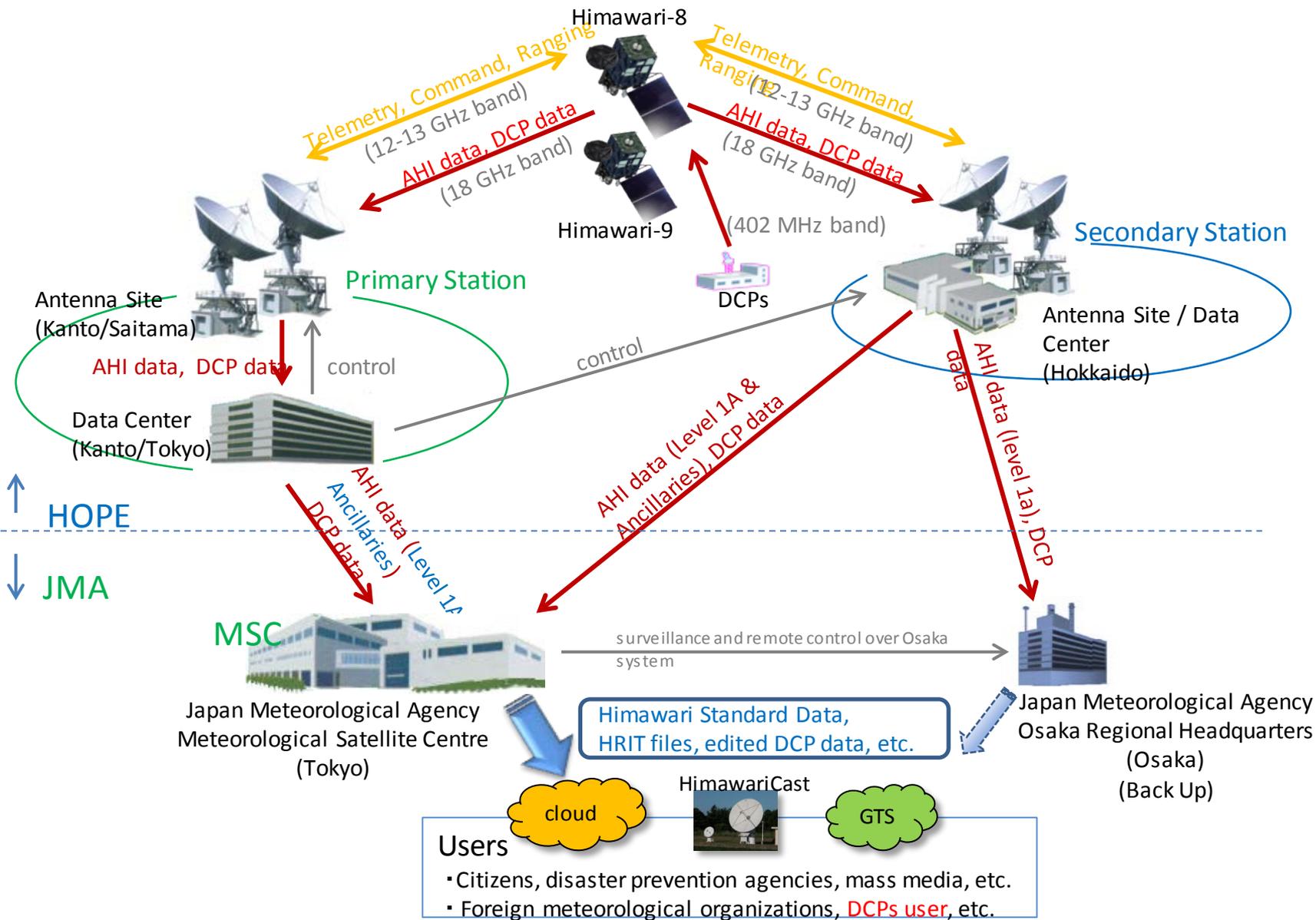
(Takashi Mori, Takuya Miyakawa, Ryo Yoshida, NOAA-JMA meeting 7-2-2014)



- Himawari-8/9 satellites and ground equipment are operated by a special purpose company (SPC) named:
  - HOPE: “Himawari Operation Enterprise Corporation”
    - Receives data from Advanced Himawari Imager (AHI) and Data Collection Platform (DCP) and transmits to JMA.
  - JMA MSC:
    - Processes those data and disseminates products to users.

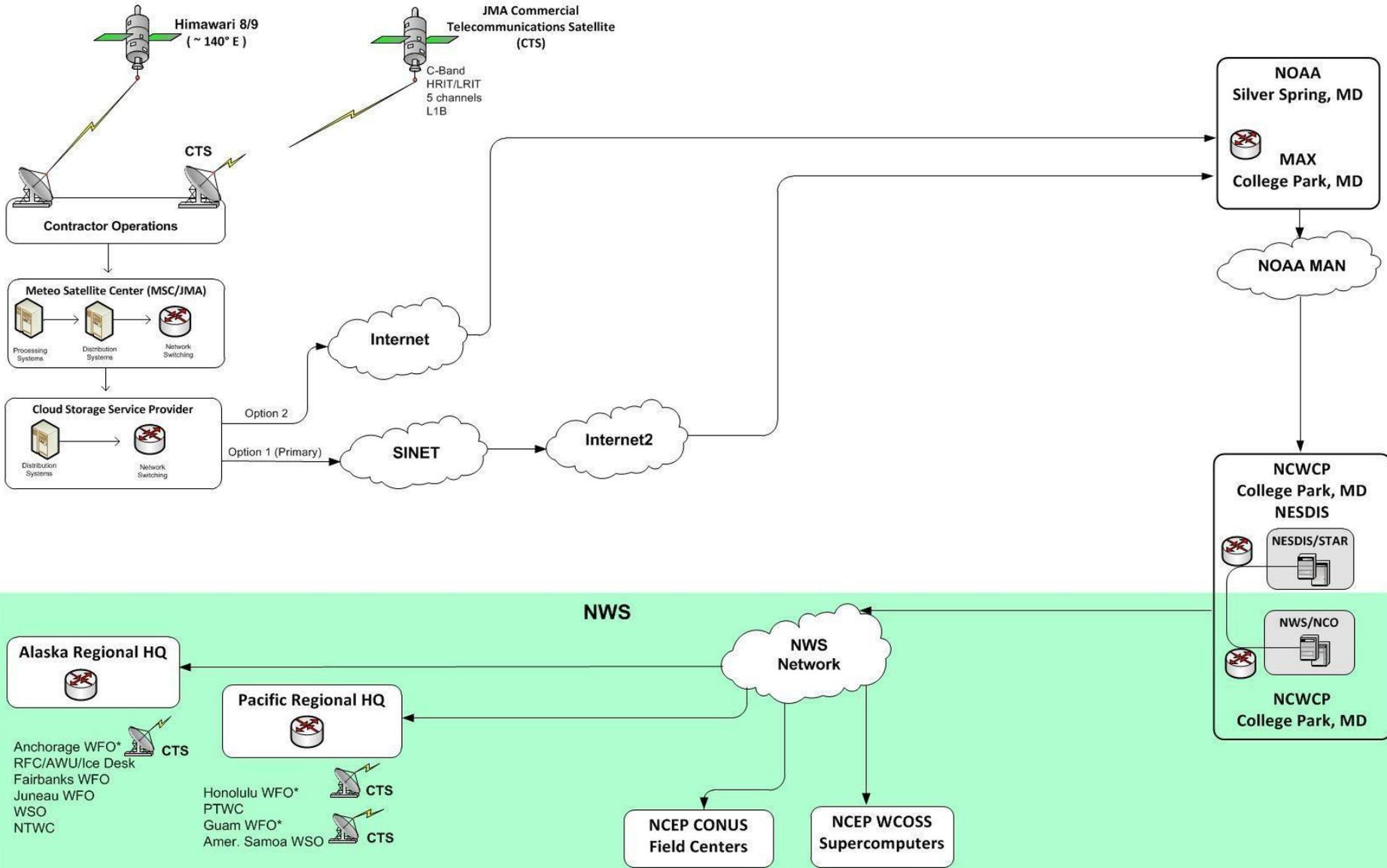
# Himawari Ground System

(Takashi Mori, Takuya Miyakawa, Ryo Yoshida, NOAA-JMA meeting 7-2-2014)

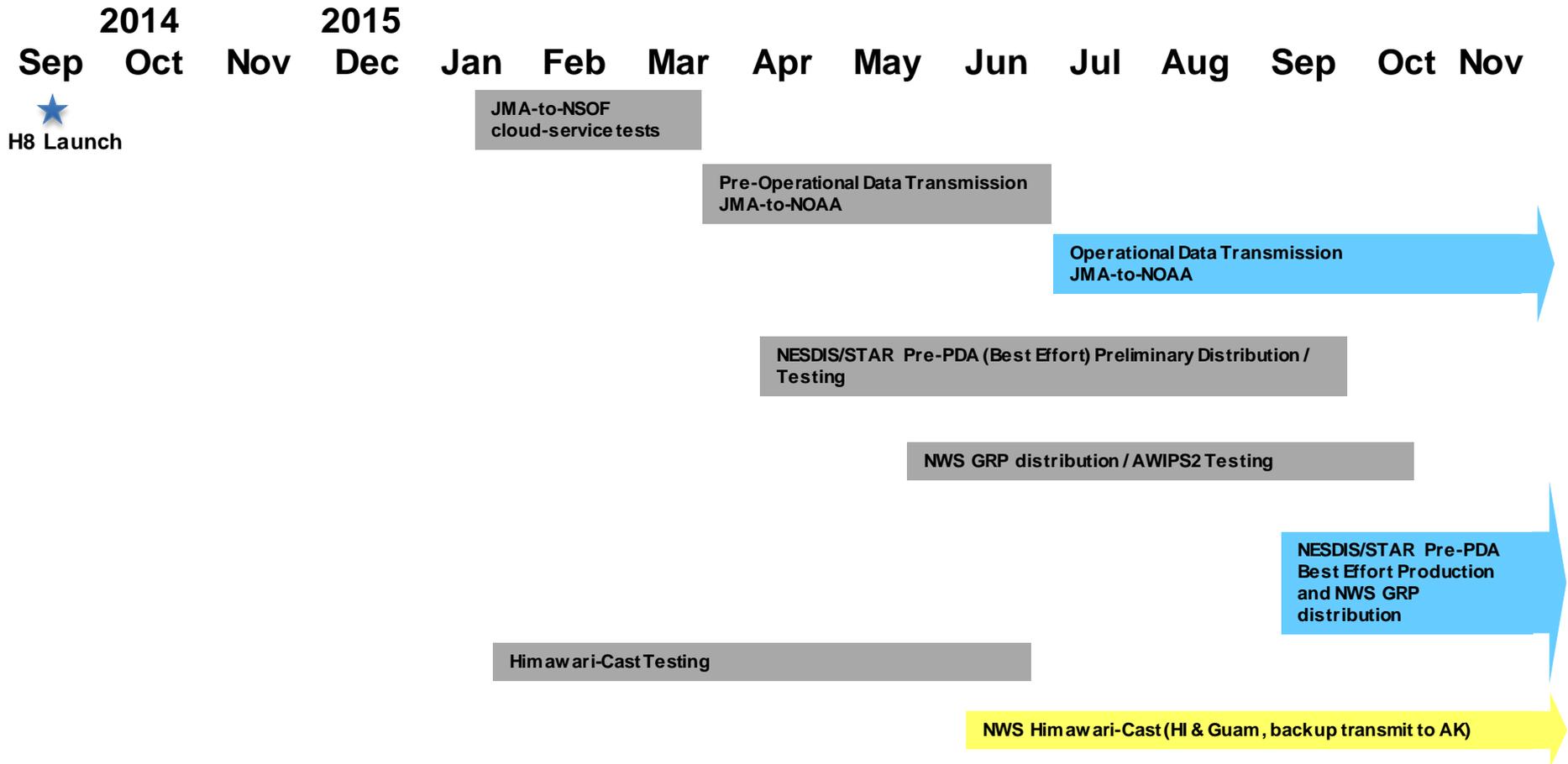




# Himawari Data Flow into NWS: 2015 (Pre-PDA Era)



# Tentative Data Delivery Timelines





# NWS Off-CONUS Product Distribution Priorities



Product	Resolution (Km)	Pri 1	Pri 2	Pri 3	Pri 4	Pri 5
AHI Ch1, 0.43-0.48um	1		X			
AHI Ch2, 0.50-0.52um	1		X			
AHI Ch3, 0.63-0.66 um	0.5	X				
AHI Ch4, 0.85-0.87 um	1				X	
AHI Ch5, 1.60-1.62 um	2				X	
AHI Ch6, 2.25-2.27 um	2				X	
AHI Ch7, 3.74-3.96 um	2	X				
AHI Ch8, 6.06-6.43 um	2			X		
AHI Ch9, 6.89-7.01 um	2	X				
AHI Ch10, 7.26-7.43 um	2			X		
AHI Ch11, 8.44-8.76 um	2			X		
AHI Ch12, 9.54-9.72 um	2				X	
AHI Ch13, 10.3-10.6 um	2				X	
AHI Ch14, 11.1-11.3 um	2	X				
AHI Ch15, 12.2-12.5 um	2				X	
AHI Ch16, 13.2-13.4 um	2				X	
NESDIS/StAR-derived AMVs	38 km / 7.5km*					X
NESDIS/StAR-derived Cloud Height	10 km					X
NESDIS/StAR-derived Cloud Phase	2 km					X

\* IR-WV / Vis

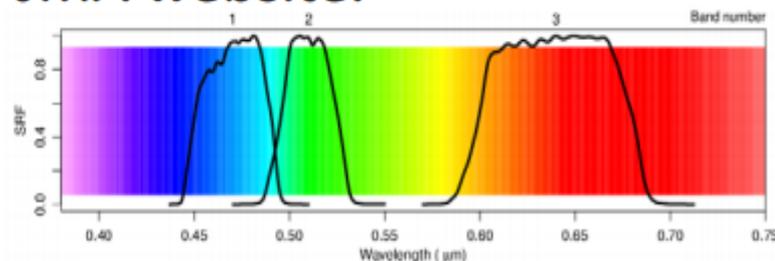
## Channels of the Advanced Himawari Imager (AHI) to be carried by Himawari-8/9

Channel	Central Wavelength [ $\mu\text{m}$ ]	Spatial Resolution	
X 1	0.43 – 0.48	1 km	RGB Composited True Color Image
2	0.50 – 0.52	1 km	
X 3	0.63 – 0.66	0.5 km	
X 4	0.85 – 0.87	1 km	ABI: 1.3 $\mu\text{m}$
X 5	1.60 – 1.62	2 km	
X 6	2.25 – 2.27	2 km	
X 7	3.74 – 3.96	2 km	
X 8	6.06 – 6.43	2 km	Water Vapor
X 9	6.89 – 7.01	2 km	
X 10	7.26 – 7.43	2 km	
X 11	8.44 – 8.76	2 km	SO <sub>2</sub>
X 12	9.54 – 9.72	2 km	O <sub>3</sub>
X 13	10.3 – 10.6	2 km	Atmospheric Windows
X 14	11.1–11.3	2 km	
X 15	12.2 – 12.5	2 km	
X 16	13.2 – 13.4	2 km	CO <sub>2</sub>

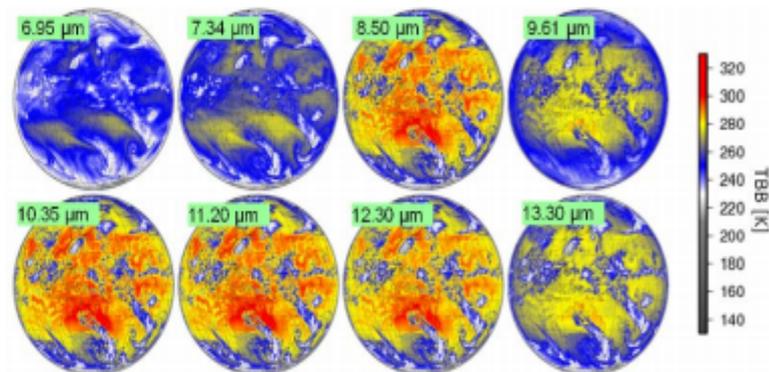
X: Channels of ABI

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

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.



バンド Band		中心波長 Central wavelength (μm)
1	可視 VIS	0.46
2		0.51
3		0.64
4	近赤外 NIR	0.86
5		1.6
6		2.3
7	赤外 IR	3.9
8		6.2
9		7.0
10		7.3
11		8.6
12		9.6
13		10.4
14		11.2
15		12.3
16		13.3

Future GOES imager (ABI) band	Wavelength range (μm)	Central wavelength (μm)	Nominal subsatellite IGFOV (km)	Sample use	Heritage instrument(s)
1	0.45–0.49	0.47	1	Daytime aerosol over land, coastal water mapping	MODIS
2	0.59–0.69	0.64	0.5	Daytime clouds fog, insolation, winds	Current GOES imager/sounder
3	0.846–0.885	0.865	1	Daytime vegetation/burn scar and aerosol over water, winds	VIIRS, spectrally modified AVHRR
4	1.371–1.386	1.378	2	Daytime cirrus cloud	VIIRS, MODIS
5	1.58–1.64	1.61	1	Daytime cloud-top phase and particle size, snow	VIIRS, spectrally modified AVHRR
6	2.225–2.275	2.25	2	Daytime land/cloud properties, particle size, vegetation, snow	VIIRS, similar to MODIS
7	3.80–4.00	3.90	2	Surface and cloud, fog at night, fire, winds	Current GOES imager
8	5.77–6.6	6.19	2	High-level atmospheric water vapor, winds, rainfall	Current GOES imager
9	6.75–7.15	6.95	2	Midlevel atmospheric water vapor, winds, rainfall	Current GOES sounder
10	7.24–7.44	7.34	2	Lower-level water vapor, winds, and SO <sub>2</sub>	Spectrally modified current GOES sounder
11	8.3–8.7	8.5	2	Total water for stability, cloud phase, dust, SO <sub>2</sub> rainfall	MAS
12	9.42–9.8	9.61	2	Total ozone, turbulence, and winds	Spectrally modified current sounder
13	10.1–10.6	10.35	2	Surface and cloud	MAS
14	10.8–11.6	11.2	2	Imagery, SST, clouds, rainfall	Current GOES sounder
15	11.8–12.8	12.3	2	Total water, ash, and SST	Current GOES sounder
16	13.0–13.6	13.3	2	Air temperature, cloud heights and amounts	Current GOES sounder/GOES-12+ imager



# HIMAWARI CTS BROADCAST



- JMA plans to produce HRIT files (VIS, IR1, IR2, IR3, IR4) and disseminate them via a communication satellite (HimawariCast).

MTSAT 1R & 2R CHANNELS	JMA PROPOSED HIMAWARI CTS CHANNELS	NOAA SUGGESTED CTS CHANNELS
VIS --- 0.55 – 0.80	AHI band 3: VIS	AHI band 3: VIS
IR1 --- 10.3 – 11.3	AHI band 7: IR4	AHI band 7: IR4
IR2 --- 11.5 – 12.5	AHI band 8: IR3	AHI band 9: IR3
IR3 --- 6.5 – 7.0	AHI band 13: IR1	AHI band 14: IR1
IR4 --- 3.5 – 4.0	AHI band 15: IR2	AHI band 15: IR2

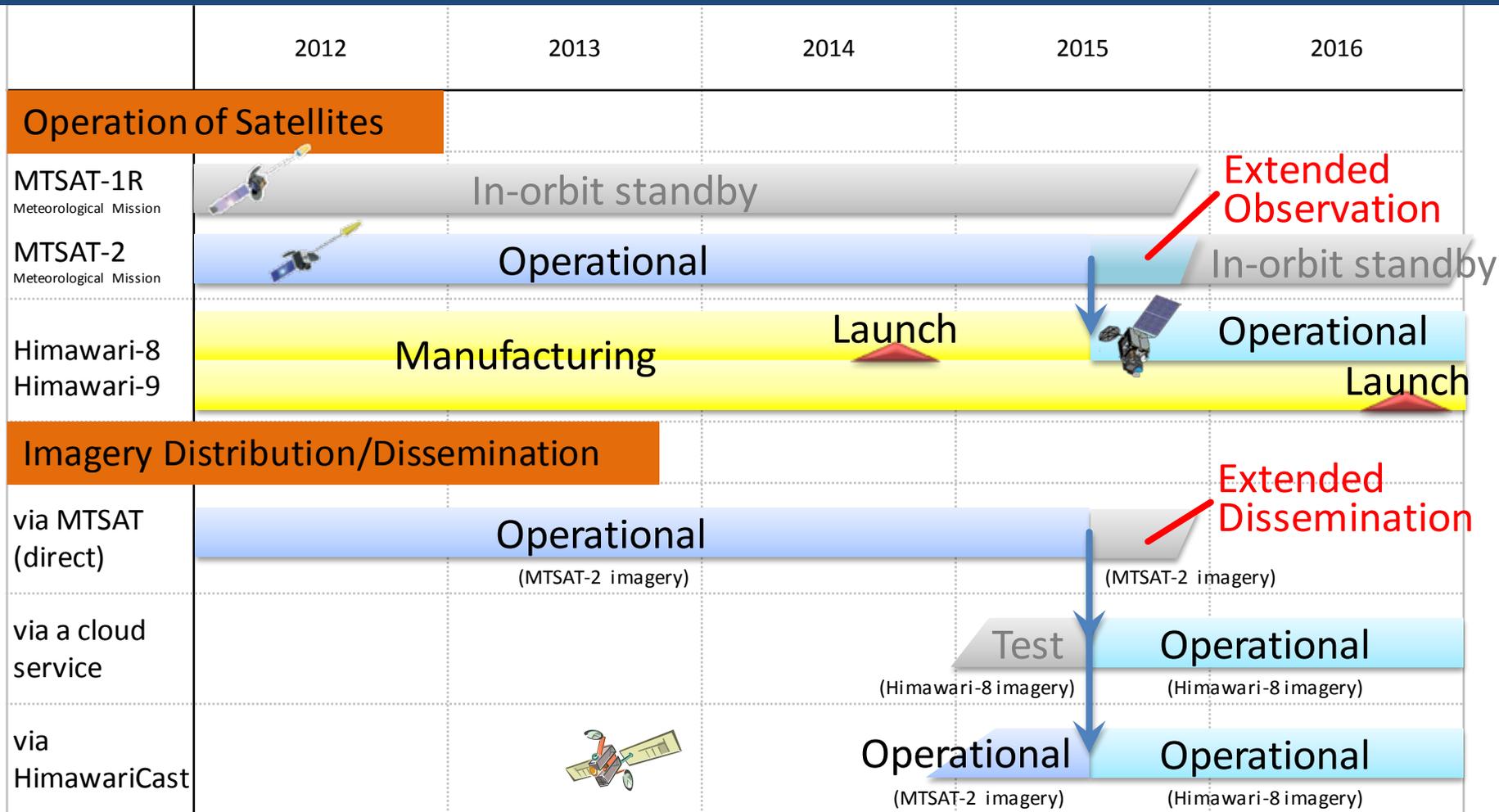
- NESDIS and NWS users, including representatives of Alaska and Pacific regions, have expressed the view that, in their opinion, a slightly different set would be closer to the current MTSAT bands we are now using and would more closely meet their needs.



# AWIPS-2 H8 Display

- Format Imagery and Derived Products per GOES-R PUG and SCMI ICD so that AWIPS-II functionality prepared for GOES-R can be reused.
- Initial capability for ABI SCMI developed and tested against 14.2.1
- Target incorporation of “Himawari Package” for Operational Release 14.4.1
  - Code Check-In: December 2014
  - Deployment: June 2015
- Approach
  - Define TOWR-G Threads for mission activities that incorporate AHI data
  - Develop and test as part of GOES-R readiness activity
    - Continuous Integration on NAPO platform (internet accessible)
      - Using Vlab/Ken Sperow approach
    - Realtime simulated input via RaFTR-CIMSS-SIM
    - Periodic Structured Tests by Raytheon on NHDA (next one in October 2014)
  - Initial capability for operational use via ATAN to appropriate facilities
- Need to establish working group (coordination – Eric Guillot)

# Schedule of Distribution/Dissemination



- The cloud service will start its test operation in March, 2015.
- Before then, it may be possible to do a delivery test between NESDIS and the cloud. It would be also useful to find out the best settings for the cloud.


**Parallel Dissemination**  
 for users' smooth transitions

# **NWS Network Project**

## **for Flowing Himawari Data to NWS Field Offices**

**The NWS network project for flowing Himawari imagery to NWS field offices will be managed out of the NOAA Integrated Dissemination Program's Ground Readiness Project.**

**Project Objective: To upgrade NWS networks needed to flow Himawari imagery and other Level 2 products to NWS field offices. Primary focus on higher priority products**

**Start Date: March 2014**

**Target Completion Date for Top Priority Offices: August 2015**

# Himawari Products

## Planned Utilization at NOAA/NWS

NWS Centers and Field Offices	BUFR-Format Radiances	OCONUS AHI Imagery <sup>2</sup>	BUFR AMVs (from GTS)	Other H-8/-9 L2 Products
NCEP Supercomputers (WCOSS)	 1			
NCEP Field Centers (e.g., NHC, AWC)				TBD
Alaska Region (Anchorage - Regional HQ, WFOs, RFCs, WSOs)				TBD
Pacific Region (Regional HQ, WFOs, WSO, and others)				TBD

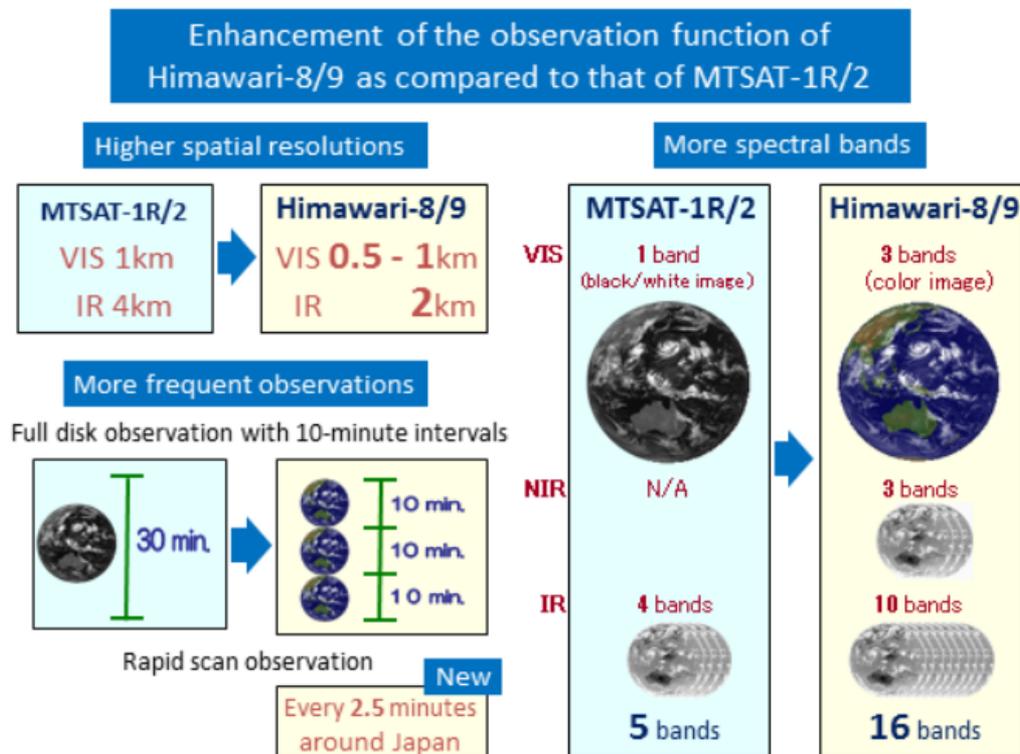
### Notes

1. AHI radiances - 16 spectral channels (Level 1b).
2. Further details of priorities of Off-CONUS imagery on next slide.

# Himawari 8/9

## Overview of Satellite Observations

The functions and specifications are notably improved from those of the on-board imager of MTSAT, and enable better nowcasting, improved numerical weather prediction accuracy and enhanced environmental monitoring.



# Himawari Training Plan

- **Plans to move forward:**
- Upon request of developing this training plan the following regions and centers were contacted to provide their Himawari AHI training requirements: OPC, AWC, NHC, WPCARH and PRH
- The primary reason for contacting these locations was to discover what everyone requires, cross reference those requirements and understand the scope of the training requirements
- The NWSTC, Satellite Liaisons and OST Satellite Lead were very instrumental in lending support and direction in support of this proposal.
- *a. What exists now from the GOES-R PG? What can we use that has already been developed? Expect to get parts of the full resolution Himawari 8 data sets in the summer of 2015.*
- -COMET Modules:
- - GOES-R ABI: Next Generation Satellite Imaging
- - GOES-R: Benefits of Next Generation Environmental Monitoring
- - Multispectral Satellite Applications: RGB Products Explained
- - Pull out the guts of these modules, not use the whole thing (most
- - important points and applications)
- - Liaison/Developer Training, PPTs, Quick Guides, Leverage the use of blogs (CIMSS, CIRA, SPoRT, Liaisons)
- *b. Assess the correct training path to do the training development. Focus on the use of the 16 channel imagery, AMVs, RGBs, Temporal and Spatial improvements, channel combinations.*
- *c. Assemble training packages*
- - COMET willing to help develop training specific to Himawari using GOES-R material
- *c. Prepare the deliverables and how they will be presented*
- *d. Availability of actual Himawari 8 data test sets*

# Himawari 8/9 Training Proposal

- **Training Description:**
- The Himawari 8 geostationary satellite will be launched in the fall of 2014 and become operational by midsummer 2015. This satellite will be the first of its kind to contain 16 separate channels. In order to properly prepare forecasters
- **Associated Costs:**
- Initial training should incorporate all available training developed via COMET, the GOES-R PG sites that have developed training for similar channels for the Advanced Baseline Imager that are common with the Advanced Himawari Instrument (AHI).
- Estimated costs to pull together completed modules and develop further modules to ensure all 16 channels are covered will be \$100K.

# Himawari Training Plan

## OCONUS Data Requirements:

- 1. Highest priority Himawari/AHI CMI (CORL-supported day-night CMI) full resolution, NetCDF4, refresh 10 mins
  - - AHI ch3 0.64 um (red / vis)
  - - AHI ch7 3.9 um (shortwave ir)
  - - AHI ch9 6.9 um (water vapor)
  - - AHI ch14 11.2 um (IR window)
- 2. 2nd Priority CMI
  - - AHI ch1 0.46 um (blue)
  - - AHI ch2 0.51 um (green)
- 3. 3rd Priority CMI
  - - AHI ch8 6.19 um
  - - AHI ch10 7.34 um
  - - AHI ch12 9.61 um

# Himawari Training Plan

- 4. Highest priority derived products (these could be delivered via AWIPS DDS by subscription). Propose that these are not new/additional products but simply modification to currently planned GOES-R baseline products since GOES-R/ABI and Himawari/AHI are nearly identical. Therefore, NWS GRP needs to base estimate solely on extension of GOES-R product to areas covered by Himawari.
- - AMV's via modified GOES-R algorithm...propose this is not new/additional product but modification to currently planned GOES-R baseline
- - Volcanic Ash detection and height
- - Hurricane Intensity
- - Total Precipitable Water
- - any others, including future capabilities would be included in GOES-R ESPC processing requests

# Latest information

- Please check the following URLs for the latest information.

Leaflet (4.3MB)

[http://www.jma.go.jp/jma/kishou/books/himawari/2014\\_Himawari89.pdf](http://www.jma.go.jp/jma/kishou/books/himawari/2014_Himawari89.pdf)

or

[http://www.jma.go.jp/jma/jma-eng/satellite/news/himawari89/himawari89\\_leaflet.pdf](http://www.jma.go.jp/jma/jma-eng/satellite/news/himawari89/himawari89_leaflet.pdf)

Leaflet in JPG format (140KB)

[http://www.jma.go.jp/jma/jma-eng/satellite/news/himawari89/himawari89\\_leaflet\\_1.jpg](http://www.jma.go.jp/jma/jma-eng/satellite/news/himawari89/himawari89_leaflet_1.jpg)

For information on data distribution/dissemination plan

<http://www.jma.go.jp/jma/jma-eng/satellite/index.html>

For technical information

<http://mscweb.kishou.go.jp/himawari89/index.html>

[https://www.wmo.int/pages/prog/sat/meetings/documents/EC-65-SideEvent-UserPrep\\_Doc\\_02\\_JMA.pdf](https://www.wmo.int/pages/prog/sat/meetings/documents/EC-65-SideEvent-UserPrep_Doc_02_JMA.pdf)

# Questions & Contact Information

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