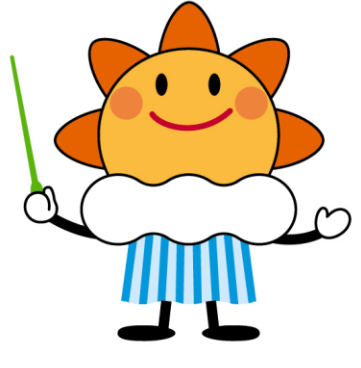


Current Status and Future Plan on direct readout activity in MSC/JMA



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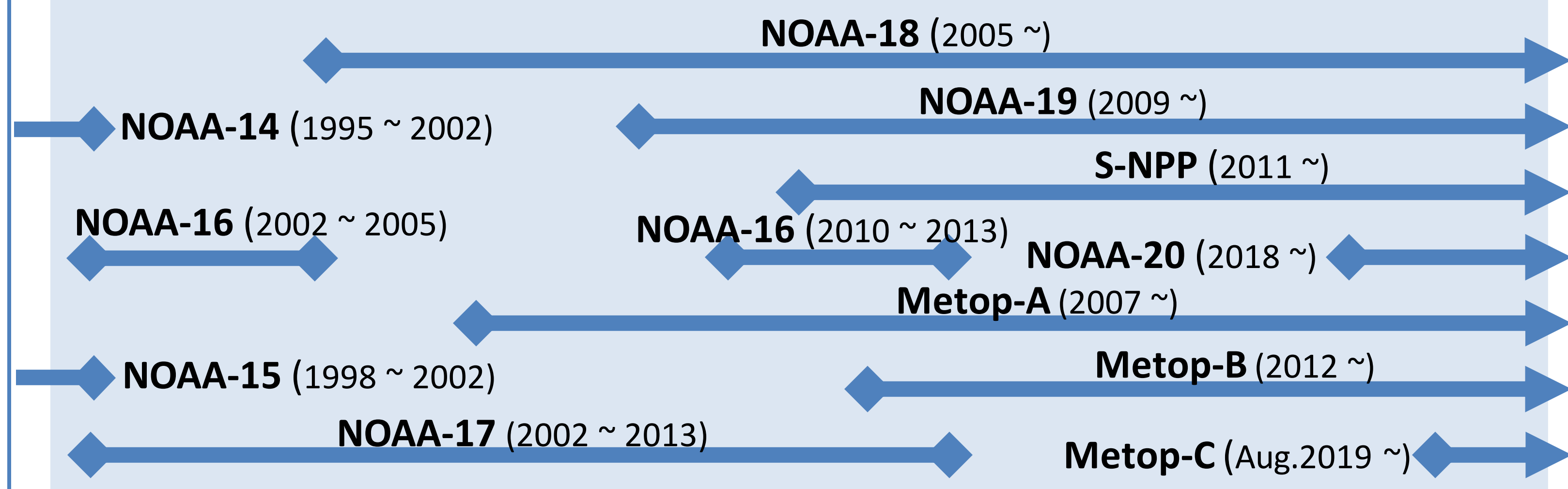
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1. History of Direct Readout (DR) activity in MSC/JMA

- JMA has been receiving low earth orbit satellite data for many years for early detection of extreme weather events such as typhoon and heavy precipitation. In recent years, Himawari-8/9 - a new generation of Japanese geostationary meteorological satellites - play a significant role to monitor such severe weather phenomena due to its high temporal resolution.
- However, DR activity is still important with regard to near real time relay of satellite data. Products from DR activities bring large benefit to numerical weather prediction due to their good timeliness as we know well.
- Currently, JMA is receiving direct broadcast data from NOAA-18, 19, 20, S-NPP, Metop-A, B, C satellites, and providing each of Level 1 product to NWP users around the world.

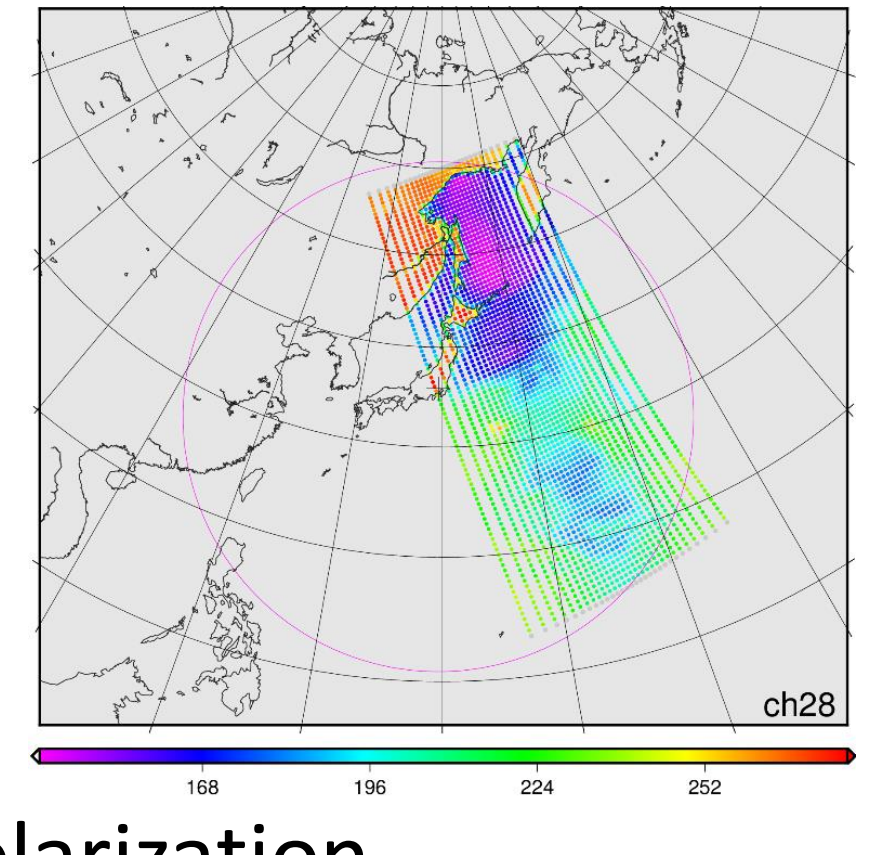
The History of direct readout of low earth orbit satellites at JMA for last 20 years.



2. Specifications of Direct Readout Stations

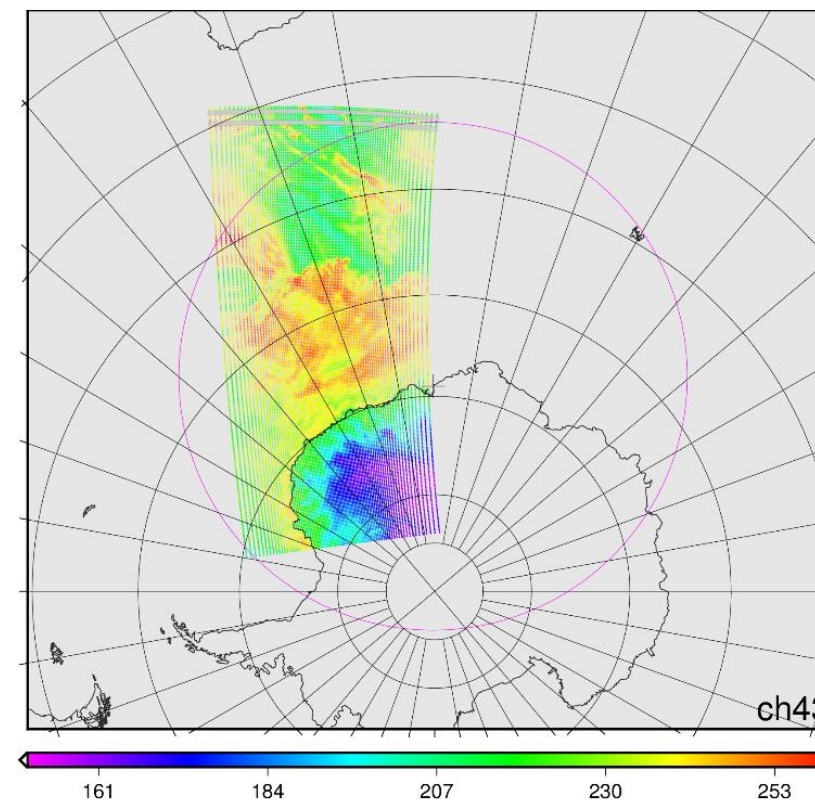
Kiyose station

- Operator: JMA
- Location: 35.78N, 139.53E
- 1 antenna
 - Diameter: 3.6m
 - Program tracking for L-band
 - Conical scan tracking for X-band
 - Receivable only right-hand circular polarization
- Target satellites and its receiving priority:
 - NOAA-19 > NOAA-18 > Metop-A > Metop-B > NPP > NOAA-20 > Metop-C



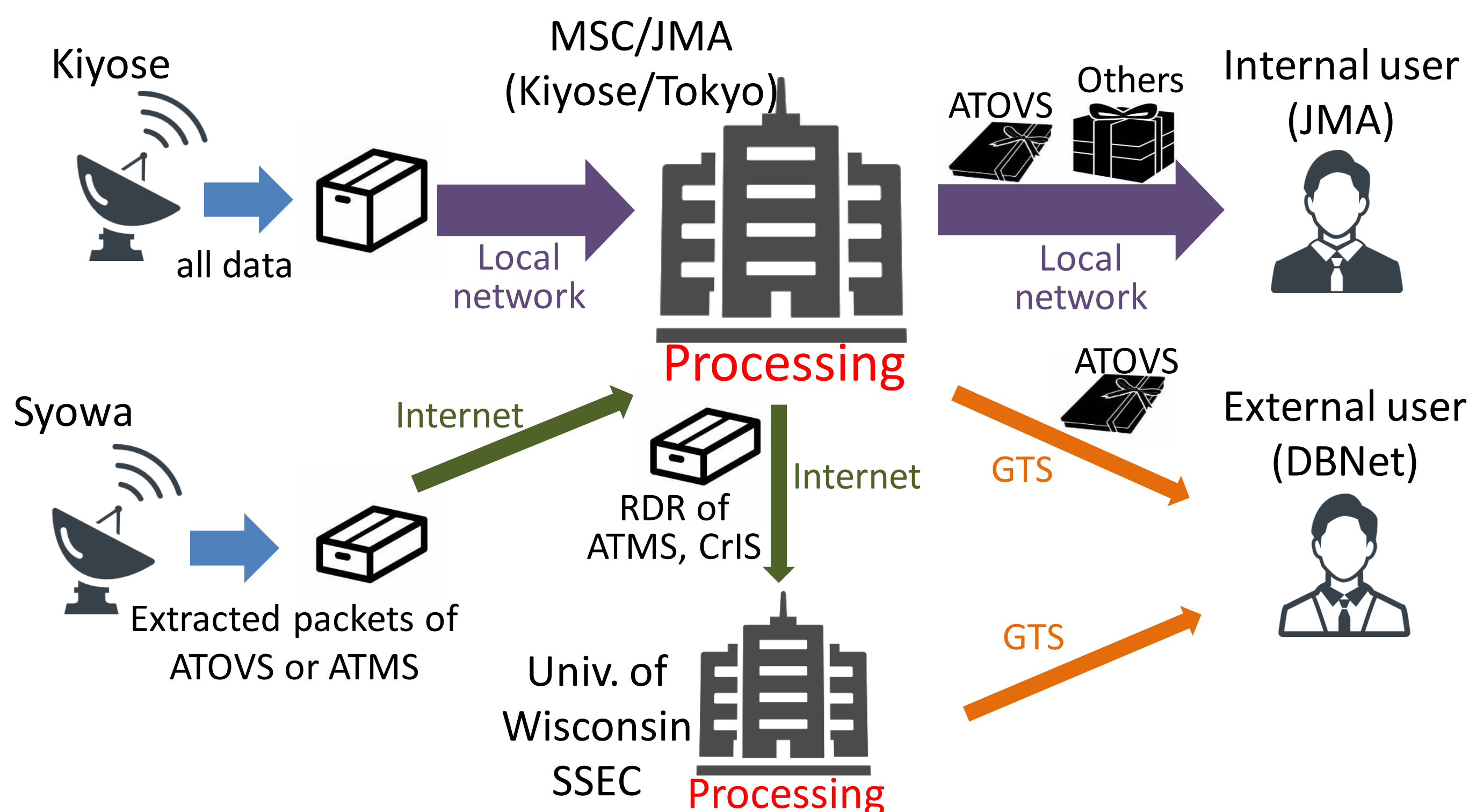
Syowa station

- Operator: National Institute of Polar Research (NIPR)
- Location: 69.00S, 39.58E
- 2 antennas (for L/S-bands and X-band)
 - Diameter: 1.2m for L/S-bands, 2.4m for X-band
- Target satellites and its receiving priority:
 - DMSP > NOAA-18/19 > Metop-A/B/C for L/S-bands
 - S-NPP > NOAA-20 > Aqua > Terra for X-band



3. Collection, Processing and Distribution

- The DR data received at both Kiyose/Syowa stations are processed at MSC. Data from Kiyose include microwave sounder, infrared hyperspectral sounder and imager. Data from Syowa include only microwave sounder.
- Level 1 data are distributed to DBNet via GTS as well as JMA's NWP center via internal network. RDR (raw data record) of ATMS and CrIS produced at MSC are provided to SSEC, then Level1 data are made and distributed by SSEC.



4. Processing System and Products

- ATOVS products of NOAA-18,19 and Metop-A,B,C have been provided to DBNet regularly.
- IASI, ATMS and CrIS products will be provided as soon as they are ready (however, RDR data of ATMS and CrIS are provided to DBNet via University of Wisconsin)

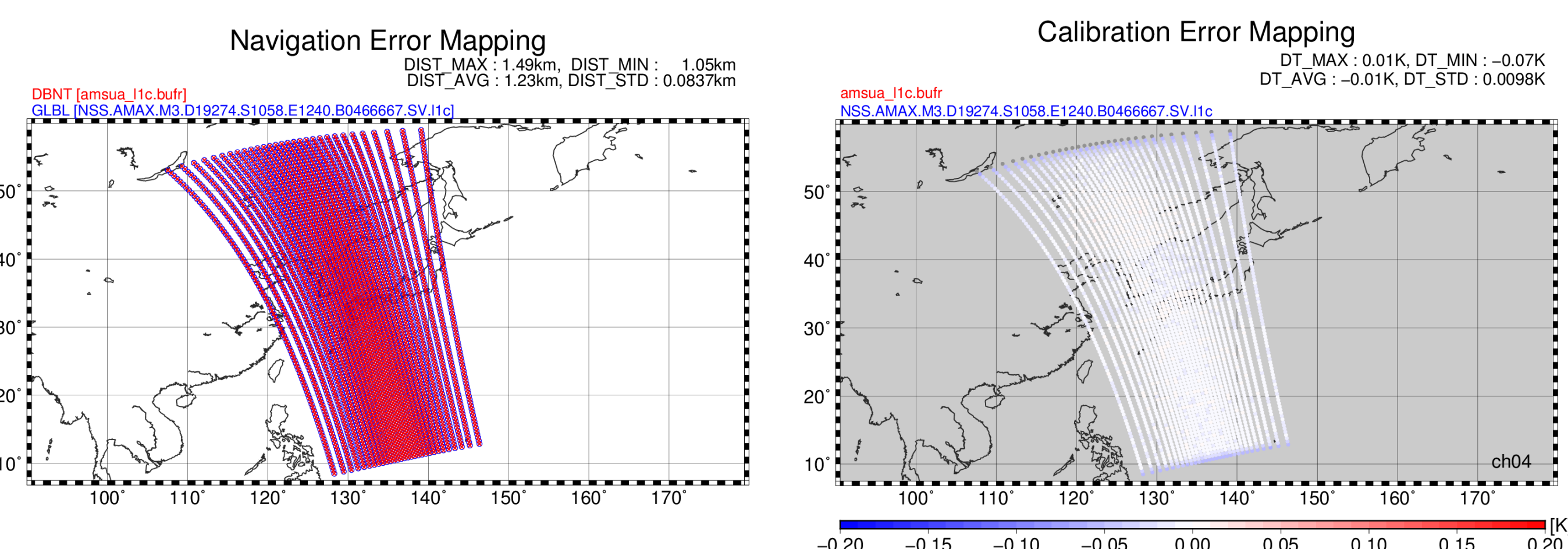
Station	Satellite	Sensor	Collect	Process	Provision for DBNet
Kiyose	NOAA-18/19	ATOVS	✓	✓	✓
	S-NPP, NOAA-20	ATMS	✓	✓	✓ (via DBRTN)
		CrIS	✓	✓	✓ (via DBRTN)
	Metop-A/B/C	ATOVS	✓	✓	✓
Syowa	NOAA-18/19	ATOVS	✓	✓	✓
	S-NPP, NOAA-20	ATMS	✓	✓	✓ (via DBRTN)
	Metop-B/C	ATOVS	✓	✓	✓

Note: DBRTN - NOAA Direct-Broadcast Real-time Network

5. Current development and Plan

Metop-C products

- As new satellites are launched, JMA has added its products and enhanced kinds of DR products.
- We have developed processing system for Metop-C data received at Kiyose and Syowa stations. We started to disseminate ATOVS products of Metop-C in June 2021.
- Its differences compared with a corresponding global product is less than 0.1K in calibration error and about 1km in navigation error, which is the same extent with those of Metop-A, B.

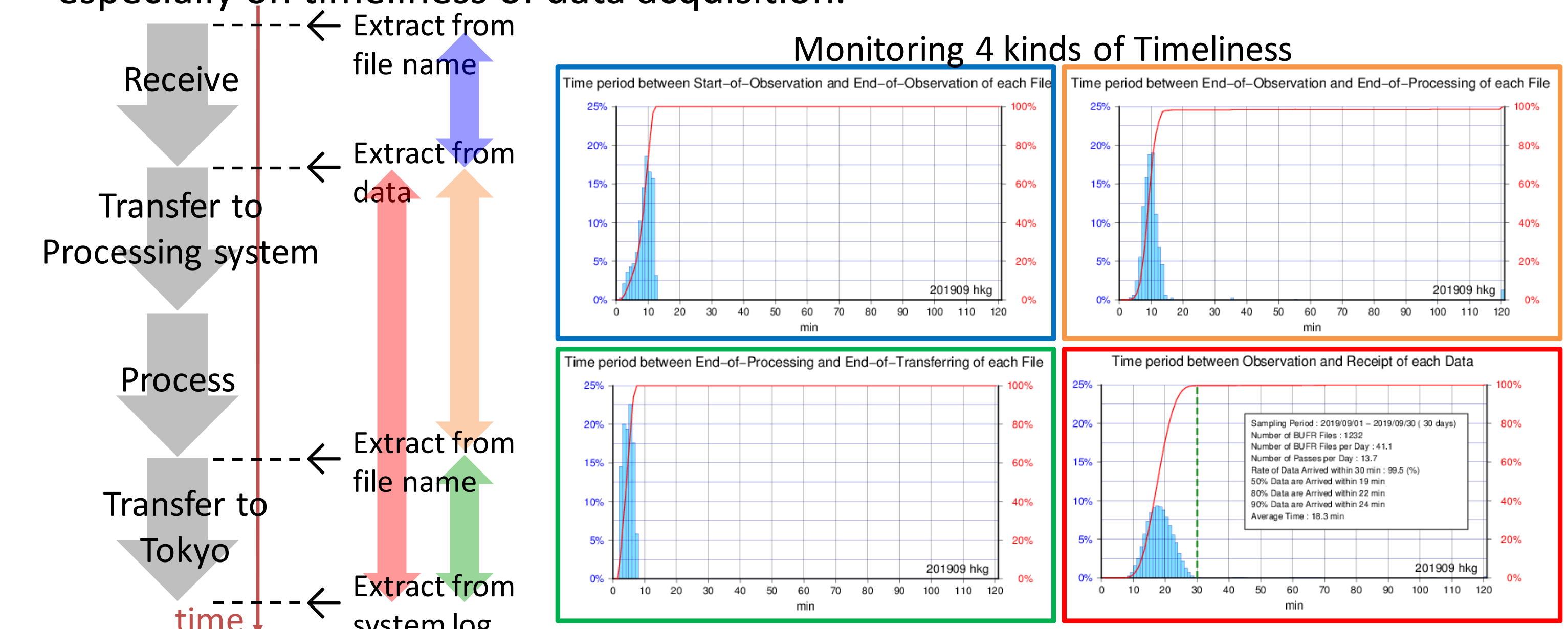


Metop-SG and JPSS-2

- We have plans to receive and process Metop-SG and JPSS-2 satellites.
- JMA aims to start to receive in half a year or a year after each launch and is now estimating the necessary cost for additional implementation of software and hardware to current equipment.
- NIPR also has plans to receive DR data of Metop-SG and JPSS-2 at Syowa station.

6. DBNet Asia-Pacific RARS monitoring

- JMA plays an important role in DBNet as sub-regional network coordinator on Asia-Pacific RARS, which is responsible for coordination and management of activity of DBNet stations in the area.
- JMA also performs monitoring activities of DR products produced by the stations in this area (<https://www.data.jma.go.jp/mscweb/data/DBNet/index.html>), especially on timeliness of data acquisition.



- JMA plans to enrich information on stations A-P RARS in its web, such as kind of product, orbit paths, navigation difference time series in the second half of 2021.

