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

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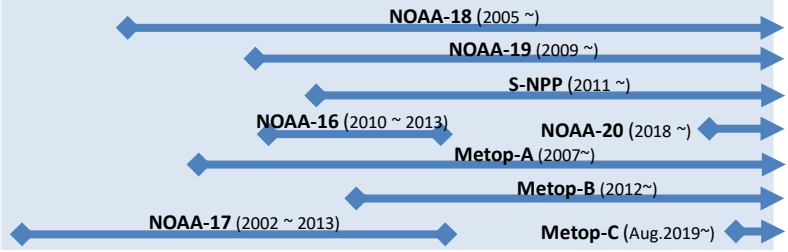
1. History of Direct Readout (DR) activity in MSC/JMA

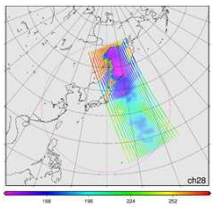
- JMA has been receiving low earth orbit satellite data for many years for early detection of extreme weather events such as typhoon and heavy precipitation. In recent years, Himawari-8/9 play an significant role to monitor such severe weather phenomena due to its high temporal resolution.
- However, 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 its 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 its Level 1 product (Metop-C in development) to NWP users around the world.

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



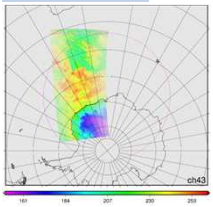
2. Specifications of Direct Readout Stations

Kiyose station



- Operator: JMA
- Location: 35.78N, 139.53E
- 1 antenna
  - Diameter: d3.6m
  - 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

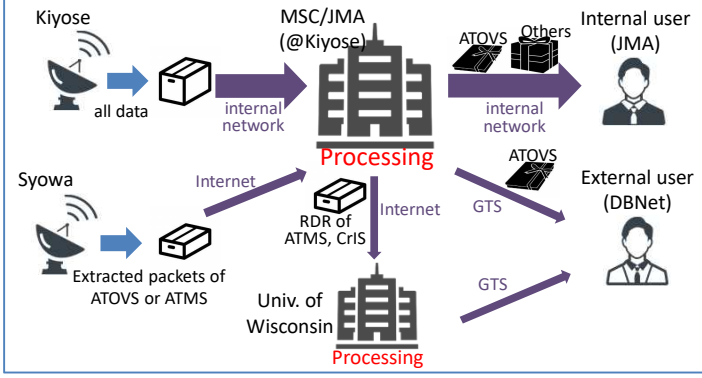
Syowa station



- Operator: National Institute of Polar Research
- Location: 69.00S, 39.58E
- 2 antennas (for L/S-bands and X-band)
  - Diameter: d2.0m for L/S-bands, d3.5m 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 ATOVS, infrared hyperspectral sounder and imager. Data from Syowa include only ATOVS.
- 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 also provided to University of Wisconsin via Internet.



4. Processing System and Products

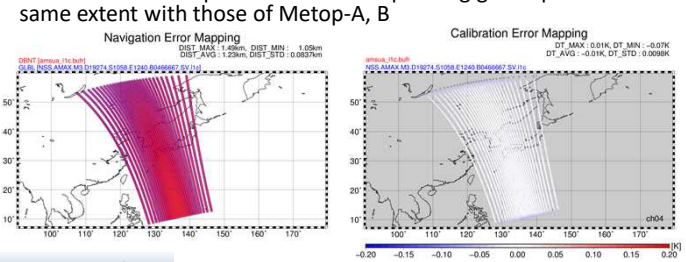
- ATOVS products of NOAA-18,19 and Metop-A,B have been provided to DBNet regularly. IASI, ATMS and CrIS products will be provided as soon as they are ready (however, RDR data of ATMS and CrIS are provided to DBNet via University of Wisconsin)
- We began to provide NOAA-20 products in December 2018.
- We are now preparing to process and provide Metop-C products.

Station	Satellite	Sensor	Collect	Process	Provision for DBNet
Kiyose	NOAA-18/19	ATOVS	✓	✓	✓
	S-NPP, NOAA-20	ATMS	✓	✓	In a few months
		CrIS	✓	✓	In a few months
	Metop-A/B	ATOVS	✓	✓	✓
		IASI	✓	✓	In a few months
	Metop-C	ATOVS	✓	In a few months	In a few months
		IASI	✓	In a few months	In a few months
Syowa	NOAA-18/19	ATOVS	✓	✓	✓
	S-NPP, NOAA-20	ATMS	✓	✓	In a few months
	Metop-B	ATOVS	✓	✓	✓
	Metop-C	ATOVS	✓	In a few months	In a few months

5. Current development and Future plan

Metop-C products

- Every time new satellite launched, JMA has added its products and enhanced kinds of DR products. Of course, we have a plan to process and provide Metop-C product.
- We have been developing processing system for Metop-C since receiving its data at Kiyose and Syowa stations. We will produce and disseminate Metop-C products in a few months.
- Its differences compared with a corresponding global product is same extent with those of Metop-A, B

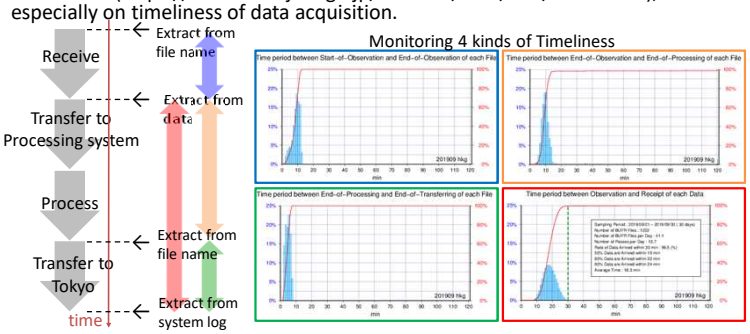


FY-3C, D products

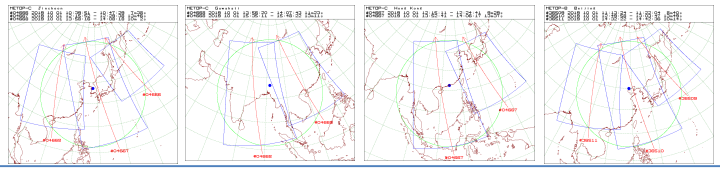
- In addition, we have had plans to receive and process FY-3 satellites for many years.
- However, there are two difficulties for regular operation, namely
  - Additional modules are required for our facilities.
  - Processing software provided by CMA is not released with source code. It can't met our operational policy.

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/rars/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, receiving times, orbit paths in the first half of 2020.



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