

Current status and plans of direct-readout LEO satellite data processing in NMSC/KMA

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Abstract

National Meteorological Satellite Center(NMSC)/Korea Meteorological Administration(KMA) is processing various direct-readout Low-Earth-Orbit(LEO) satellite data such as Advanced TIROS Operational Vertical Sounder(ATOVS), Infrared Atmospheric Sounding Interferometer(IASI), Advanced Technology Microwave Sounder(ATMS) and Cross-track Infrared Spectrometer(CrIS) radiance data for NWP data assimilation and weather analysis. Currently, NMSC is operating ATOVS and AVHRR Pre-processing Package(AAPP), Community Satellite Processing Package(CSPP) and International ATOVS Processing Package(IAPP) for direct readout data processing. KMA has provided the direct-readout ATOVS since 2009, IASI since 2017, ATMS and CrIS level 1C data of Suomi-NPP(NPOESS Preparatory Project) satellite via GTS for Direct Broadcast Network(DBNet) activity since 2018, and is working on processing the direct-readout ATMS and CrIS data of NOAA-20 satellite which will be shared via GTS too. In this paper, we describe the current status and future plans of KMA's direct-readout LEO satellite data processing to support NWP assimilation including the quality check activities.

The status of satellite data reception of NMSC

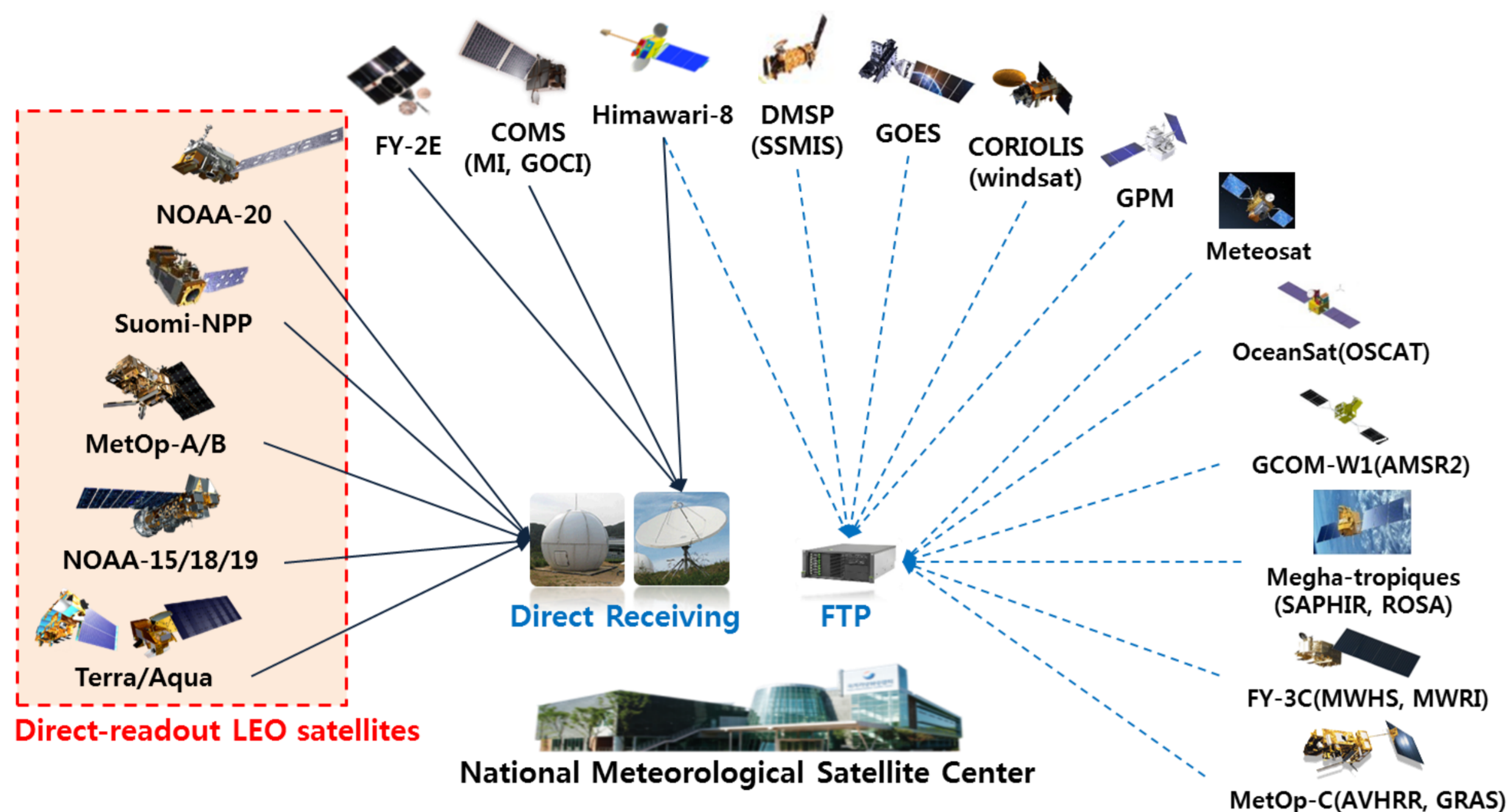


Figure 1. The status of satellite data reception of NMSC

- GEO Satellites : COMS, GK-2A, Himawari-8, FY-2E
- LEO Satellites : Terra/Aqua, NOAA-15/18/19/20, MetOp-A/B, S-NPP, DMSP, CORIOLIS, GCOM-W1 etc.

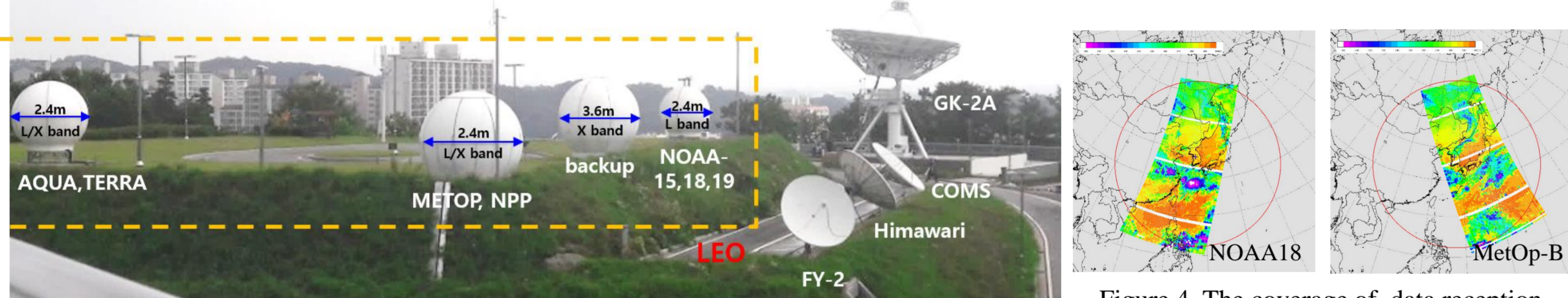


Figure 2. Direct-readout satellite antennas of NMSC

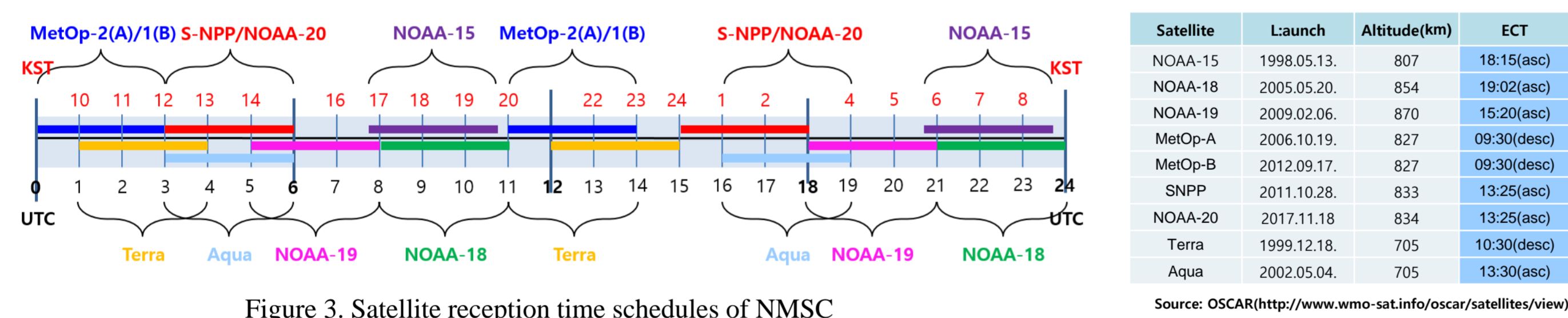


Figure 3. Satellite reception time schedules of NMSC

Satellite	Launch	Altitude(km)	ECT
NOAA-15	1998.05.13	807	18:15(asc)
NOAA-18	2005.05.20	854	19:02(asc)
NOAA-19	2009.02.06	870	15:20(desc)
MetOp-A	2006.10.19	827	09:30(desc)
SNPP	2011.10.28	833	13:25(asc)
NOAA-20	2017.11.18	834	13:25(asc)
Terra	1999.12.18	705	10:30(desc)
Aqua	2002.05.04	705	13:30(desc)

Figure 4. The coverage of data reception (Jincheon site)

Data processing packages operated by NMSC

- Operation status of data processing packages for direct-readout data processing in NMSC
- AAPP: Version 8.3(Installation: '19. 3. 8.) * The latest V8.4 will be installed soon.
 - CSPP: SDR Version 3.1.3(Installation: '19. 10. 21.)

Realtime data distribution via GTS for DBNet

- ATOVS (since 2009), MetOp-A/B IASI (since 2017) and S-NPP ATMS & CrIS (since 2018)

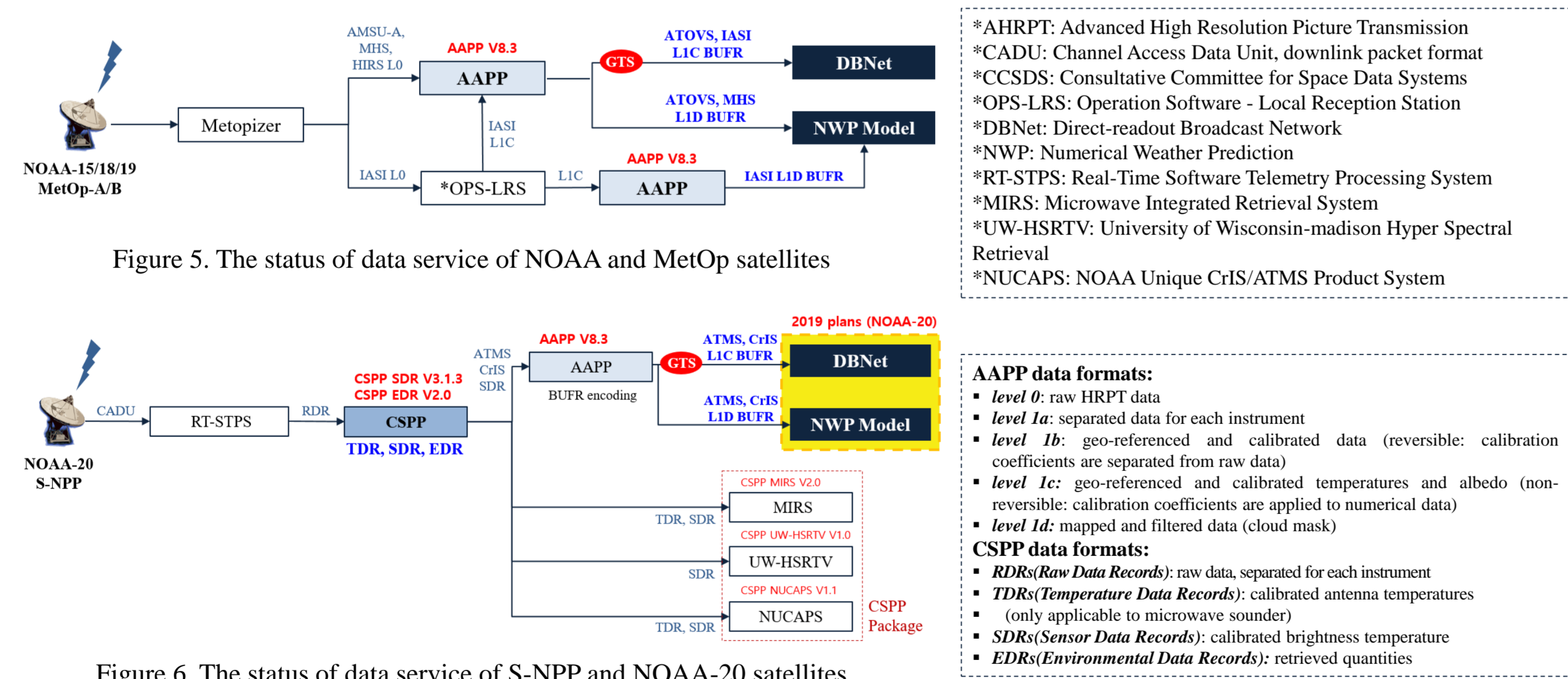


Figure 5. The status of data service of NOAA and MetOp satellites

DBNet Activities

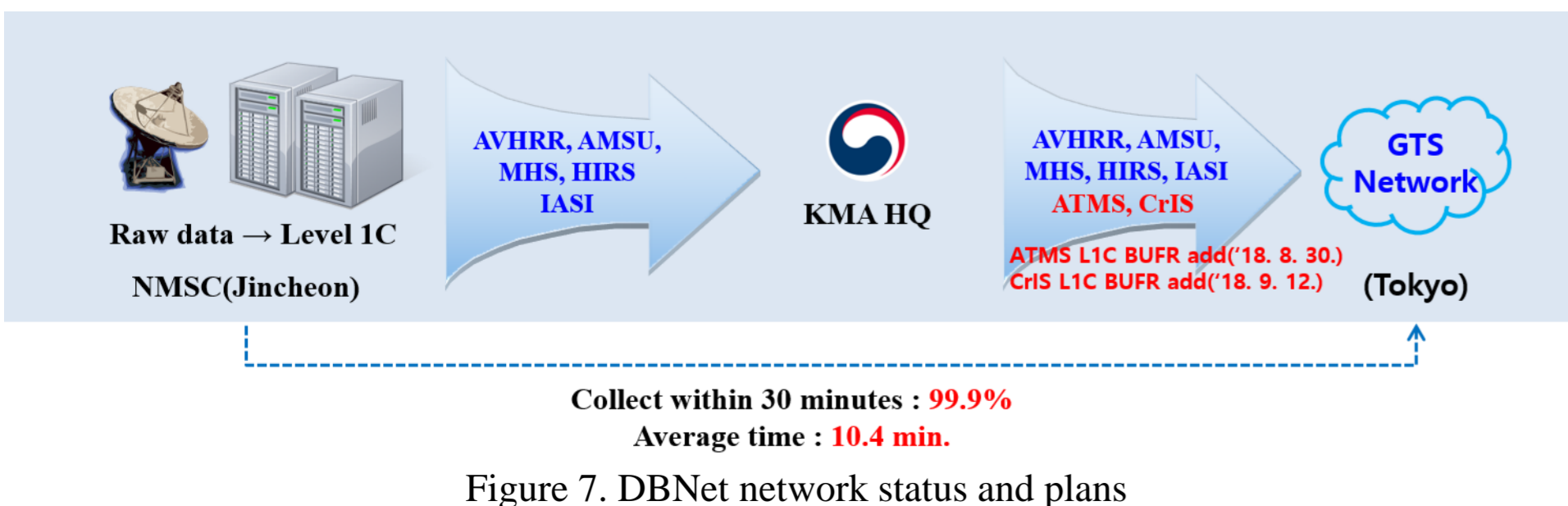


Figure 7. DBNet network status and plans

- KMA DBNet data is being stably distributed on GTS within 30 minutes, the average time of it is 10.4 minutes

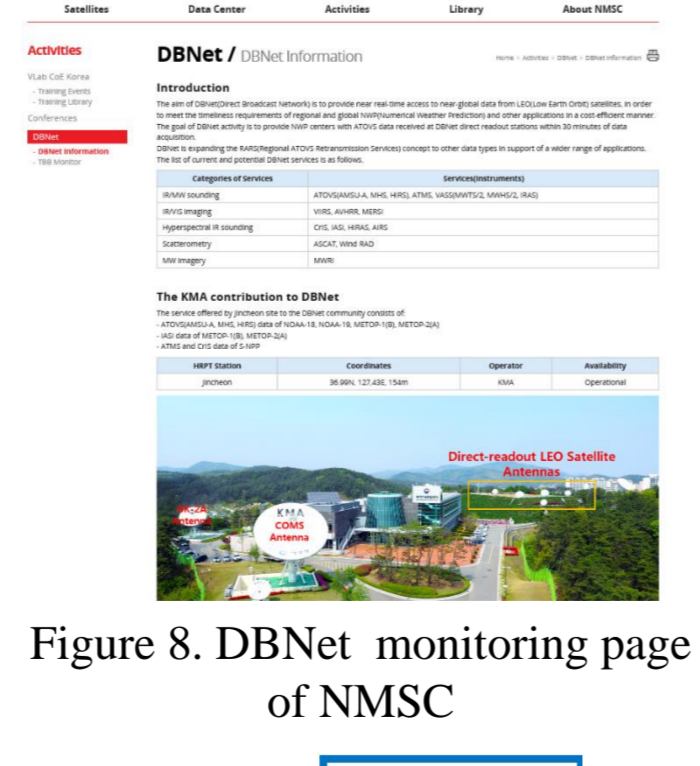


Figure 8. DBNet monitoring page of NMSC

Quality verification of direct-readout NOAA-20 satellite data

► KMA's direct-readout NOAA-20 ATMS/CrIS L1D are compatible with global data(Metoffice)

- Data: NOAA-20 ATMS/CrIS L1D BUFR data
- Analysis method: To compare NMSC direct-readout data with MetOffice global data
 - Geolocation differences of each pixels
 - Brightness temperature differences of each pixels
- Verification criteria : distance difference within 5km / brightness temperature values within $\pm 0.1-0.2K$

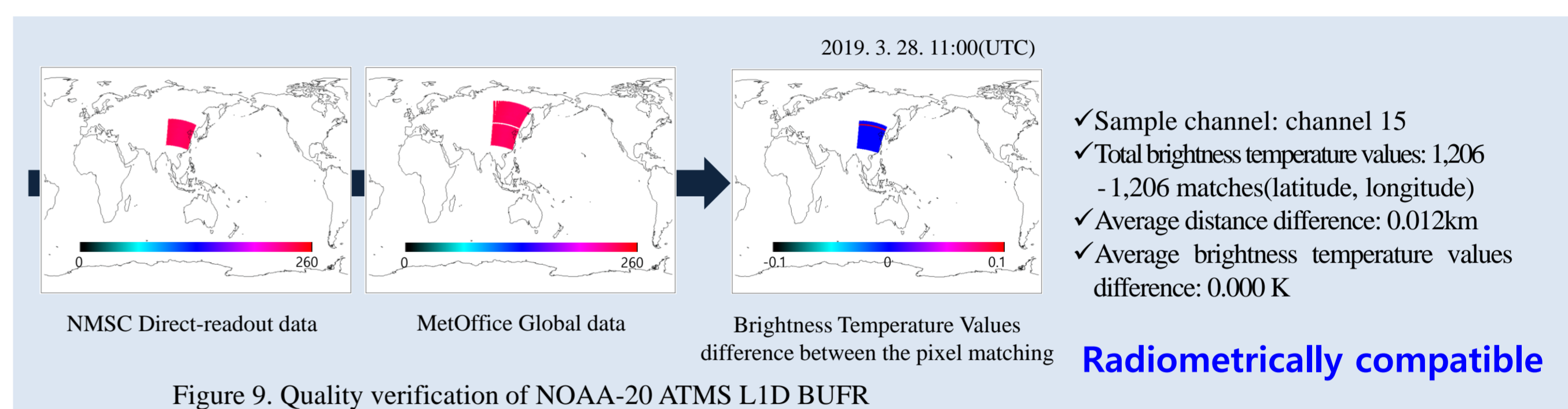


Figure 9. Quality verification of NOAA-20 ATMS L1D BUFR

Radiometrically compatible

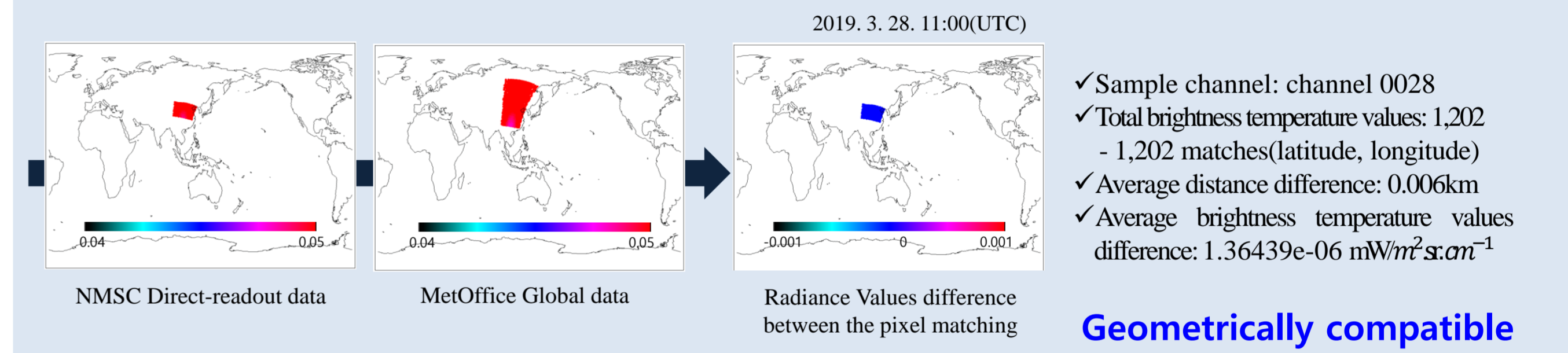
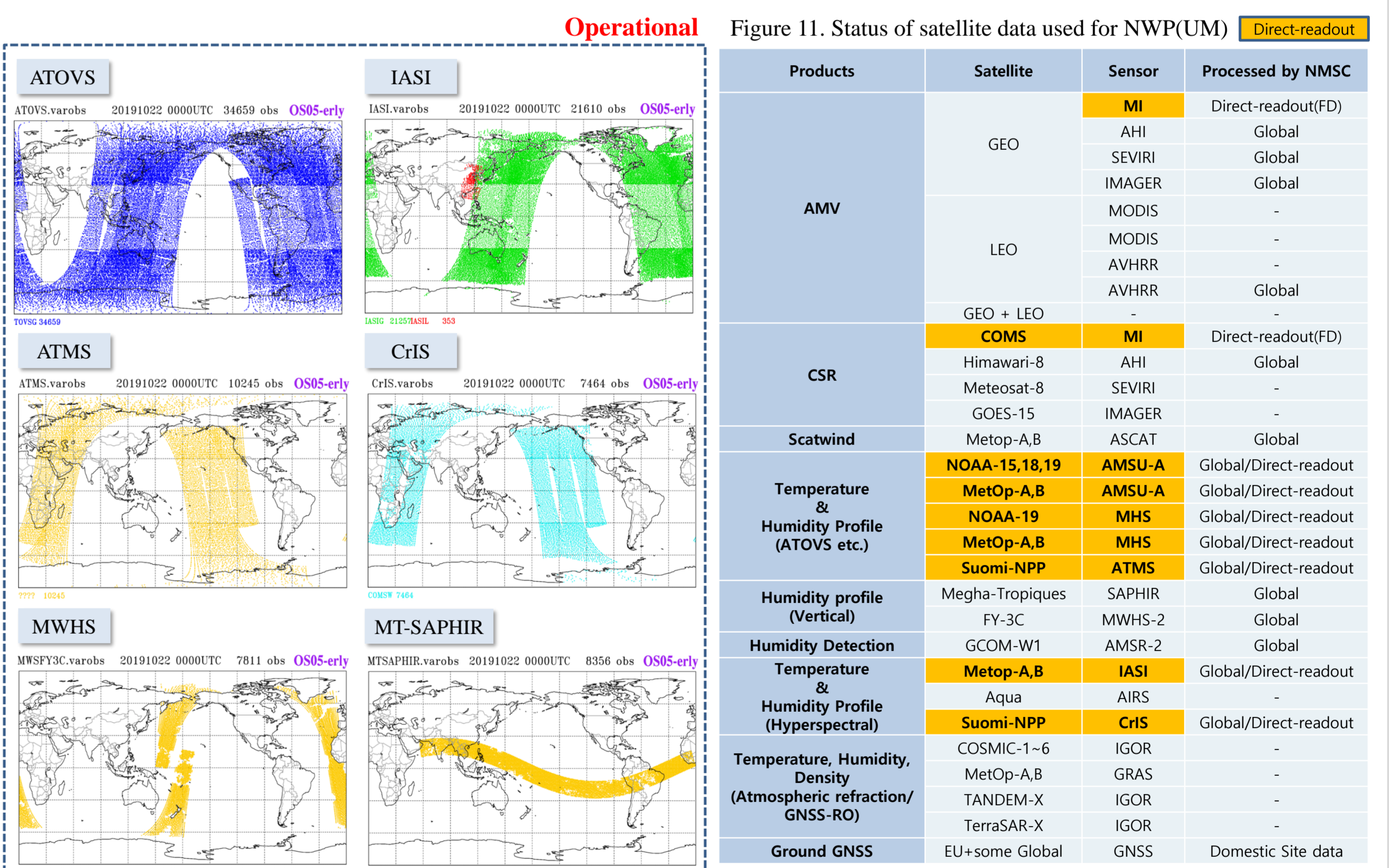


Figure 10. Quality verification of NOAA-20 CrIS L1D BUFR

Geometrically compatible

Satellite data utilization on the UM Model in KMA



Future plans

- To make the ATMS/CrIS data of NOAA-20 be DBNet-operational
- To prepare to direct-readout and process the MetOp-C ATOVS & IASI data
- To improve the ATMS/CrIS granule combining process of global Suomi-NPP(collected from EUMETCast) using AAPP
- To prepare EARS direct-readout data processing (IASI, ATMS, CrIS) for NWP assimilation

Reference

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