

TENTATIVE PLANS FOR FOLLOW-ON SATELLITES TO MTSAT-2

In response to CGMS Permanent Action 1 and Action 35.06, 35.24 and 35.30

This paper reports on tentative plans for follow-on satellites to MTSAT-2.

JMA plans to launch a follow-on satellite to MTSAT-2 in summer in 2014, and plans to start operation in 2015, when MTSAT-2 is scheduled to complete its operation.

The follow-on satellite is tentatively planned to carry an imager comparable to the Advanced Baseline Imager (ABI) or the Flexible Combined Imager (FCI). To deal with the huge amounts of data to be obtained with the follow-on satellite, JMA plans to provide all observation data via the Internet.

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1 INTRODUCTION

The Japan Meteorological Agency (JMA) has been operating the GMS series and MTSAT series at 140 degrees East covering East Asia and the Western Pacific since 1977 and contributing to the WMO's World Weather Watch (WWW) Programme. Currently, MTSAT-1R is operational, while MTSAT-2 is on standby in orbit. MTSAT-2, which will take over the meteorological mission of MTSAT-1R in 2010, is scheduled to complete its operation around 2015 (see JMA-WP-02 for the status of MTSAT-1R and -2).

JMA plans to launch a follow-on satellite to MTSAT-2 (referred to below as *the follow-on*) by 2015 at the latest, and preferably in 2014. To ensure a robust satellite observation system, JMA intends to launch a second follow-on for in-orbit standby in 2016. JMA will continue to operate the follow-on at 140 degrees East covering East Asia and the Western Pacific as the GMS and MTSAT series.

2 OVERVIEW OF THE FOLLOW-ON

Observation mission

JMA has selected and defined the functions and specifications of the follow-on observation missions primarily based on user requirements for satellite data and products. To meet these requirements, the follow-on should carry an imager with capability comparable to the GOES-R/ABI or the MTG/FCI with the following functions:

- Multi-channel capacity (around 16 channels)
- High spatial resolution (0.5 km for visible and 2 km for infrared)
- Fast imaging (within 10 minutes for Full Disk)
- Rapid scanning with flexible area selection and scheduling

The draft specifications of the follow-on imager are summarized in Table 1.

JMA decided that the first follow-on and the second will not carry a hyper-spectral sounder because of difficulty in manufacturing in time for launch in 2014. However, JMA will continue discussion with JAXA in regard to the feasibility of cooperation on the development of a hyper-spectral sounder for future geostationary satellites.

JMA plans to use frequency band such as 18 GHz band instead of the current 1.6 GHz frequency band, since the current 1.6 GHz frequency band is insufficient for the follow-on's large amount of data and it is difficult to obtain additional band width.

Table 1 Draft specifications of the imager on board the follow-on

Imaging Channels		
	Spatial resolution	Number of observational bands
VIS (<0.7 micron)	0.5 km	3
NIR (0.7-3 micron)	2 km	3
IR (>3 micron)	2 km	10
Observation		
Imaging Rate	< 10 min	(Full Disk)
Scan Capability	Full Disk: normal operation Area: definable schedule and location	
Lifetime of meteorological mission		
	7 years	7 years of in-orbit operation out of a 14-year in-orbit period

Communication mission

The follow-on's observation data may need several tens of Mbps as a communication link.

After studying different dissemination method, JMA plans to provide follow-on's all imagery data via the Internet instead of direct broadcasting. (see CGMS-35 JMA-WP-07 for data dissemination by the Follow-on Satellites to MTSAT).

JMA will continue the Data Collection System (DCS) service in the follow-on with fundamentally the same specifications as those of the MTSAT series.

Data compression

The volume of the data from MTSAT-1R is about 200 MB per one observation. The compression technique applied to the current direct broadcast (HRIT/LRIT) is JPEG, which is specified under the ISO standard 10918 'Digital compression and coding of continuous-tone still images', and supports both lossy and lossless compression. JPEG compression is only applied to imagery data, and other data is not compressed. JPEG modes used in HRIT/LRIT are as follows:

- Sequential mode
- Non-interleaved mode
- Non-hierarchical mode

A full-disk data volume of the follow-on will be about 3 GB when it is not compressed. The JPEG compression rate, which is about 50 percent in the case of current HRIT, would be insufficient to compress the data from the follow-on. One of promising methods for providing observation data is JPEG 2000 that has further higher compression rate than that of current JPEG.

JMA will continue studying on advanced lossless compression techniques for efficient data dissemination.

3 SATELLITE OPERATION PLAN

The tentative schedule for the follow-on satellites is shown in Figure 1.

Figure 1 Tentative Schedule for Follow-on Satellites to the MTSAT Series

