

CGMS-XXXII JMA-WP-02

Prepared by JMA

Agenda Item: B.2

Discussed in Plenary

## **Status of Geostationary Meteorological Satellites**

This document reports on the status of GMS-5 and the backup of GMS-5 with GOES-9.

## Status of Geostationary Meteorological Satellites

### 1. Introduction

Geostationary Meteorological Satellite-5 (GMS-5) has been operated at 140 E above the equator on the geostationary orbit since 21 June 1995 far beyond its designed lifetime of five years. Due to the degradation that took place in the Visible and Infrared Spin Scan Radiometer (VISSR) aboard GMS-5, the backup of GMS-5 with the Geostationary Operational Environmental Satellite-9 (GOES-9) in cooperation with NOAA/NESDIS started on 22 May 2003 and then GOES-9 took over the earth observations over the western Pacific. However, both the data collection function and the WEFAX signal relay functions of GMS-5 are continuously maintained. This working paper reports the status of the GMS-5 operation and the backup of GMS-5 with GOES-9.

### 2. Current Status of GMS-5 operation

#### 2.1 Remaining Propellant and Spacecraft Control

Attachment-1 and 2 show the amount of the remaining propellant and the orbital inclination of GMS-5 respectively. As of 22 March 2004, the amount of the remaining propellant is about 7.94kg, and it is not enough to keep the spacecraft at its nominal geostationary position until the commencement of the operation of MTSAT-1R, the successor to GMS-5. In order to save the propellant, the north-south station keeping maneuvers, which consume considerable amount of propellant, have not been conducted since 23 October 2001. The east-west station keeping maneuvers, spin rate control and attitude control are conducted periodically. The history of GMS-5 maneuvers and eclipse operation is as follows.

#### Summary of Maneuvers (between June-2003 and March-2004)

East-West station Keeping maneuver	5 June-2003, 28 July-2003, 25 September-2003, 27 November-2003, 22 January-2004, 22 March-2004
Spin rate control	7 July-2003, 21 October-2003, 17 February-2004
Attitude control	7 July-2003

#### Eclipse Operation (between June-2003 and March-2004)

Earth eclipse	from 25 August-2003 to 10 October-2003, from 19 February-2004 to NOW
---------------	---

#### 2.2 Orbital Inclination

The orbital inclination of GMS-5 is increasing continuously due to the suspension of the north-south station keeping maneuvers mentioned above. As of 25 March 2004, the orbital inclination is around 2.72 degrees.

### 2.3 Solar Array Panel Power

Attachment-3 shows the solar array panel power of GMS-5. It was observed that the power decreased by about 1.5 percent due to the large-scale solar flares that occurred from 29 October to 3 November 2003. However, the power of the solar array panel is still in sufficient level with some margin over the operational minimum requirement. The power is forecasted to be 277 W at the boreal summer solstice of 2004. It is expected that the power will remain in sufficient level for the operation of GMS-5 for the next few years, provided that no other excessive scale solar flare damaging the solar array panel occurs.

### 2.4 USB communication system

The degradation of the Unified S-Band (USB) transponder (primary) onboard GMS-5 has been found since September 2003.

### 2.5 Other instruments

As of 31 March 2004, all the instruments onboard GMS-5 other than VISSR and the USB transponder are satisfactorily functioning.

## 3. Status of backup observation by GOES-9

JMA has operationally utilized the image data observed by GOES-9 operated at 155 E above the equator by NOAA/NESDIS as the backup of GMS-5 over the west Pacific region since 22 May 2003. The Meteorological Satellite Center (MSC) of JMA receives the GVAR data disseminated via GOES-9, and makes from the data the WEFAX pictures, the S-VISSR data and extracted-products such as atmospheric motion vectors. The S-VISSR data broadcasting from GMS-5 is suspended during the backup of GMS-5 with GOES-9. Instead of the direct broadcast from the satellite, the S-VISSR data are disseminated through the Internet to the National Meteorological and Hydrological Services (NMHS) registered to JMA as a backup dissemination service. The backup of GMS-5 with GOES-9 will be continued until the commencement of the operation of MTSAT-1R. The status of dissemination of the WEFAX pictures and the S-VISSR data is as follows.

WEFAX Dissemination Performance

	PLANS	OUTPUTS	PERFORMANCE
September-2003	2220	2219	99.9%
October-2003	2402	2382	99.2%
November-2003	2520	2518	99.9%
December-2003	2604	2578	99.0%

\*PLANS – Number of routine WEFAX dissemination.

\*OUTPUTS – Number of WEFAX dissemination.

\*PERFORMANCE – OUTPUTS / PLANS

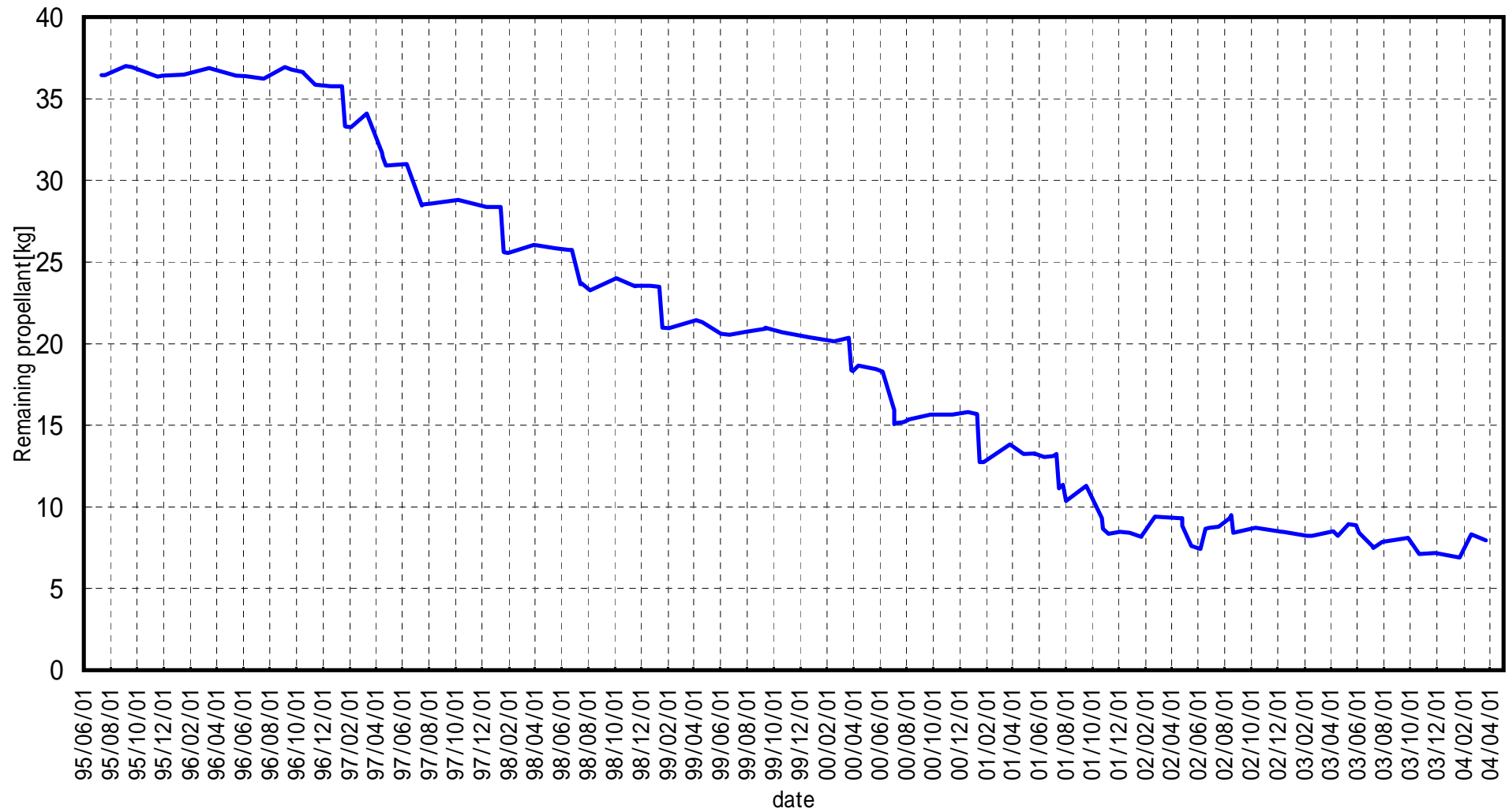
## S-VISSR Dissemination Performance

	PLANS	OUTPUTS	PERFORMANCE
September-2003	630	628	99.7%
October-2003	683	681	99.7%
November-2003	720	719	99.9%
December-2003	744	739	99.3%

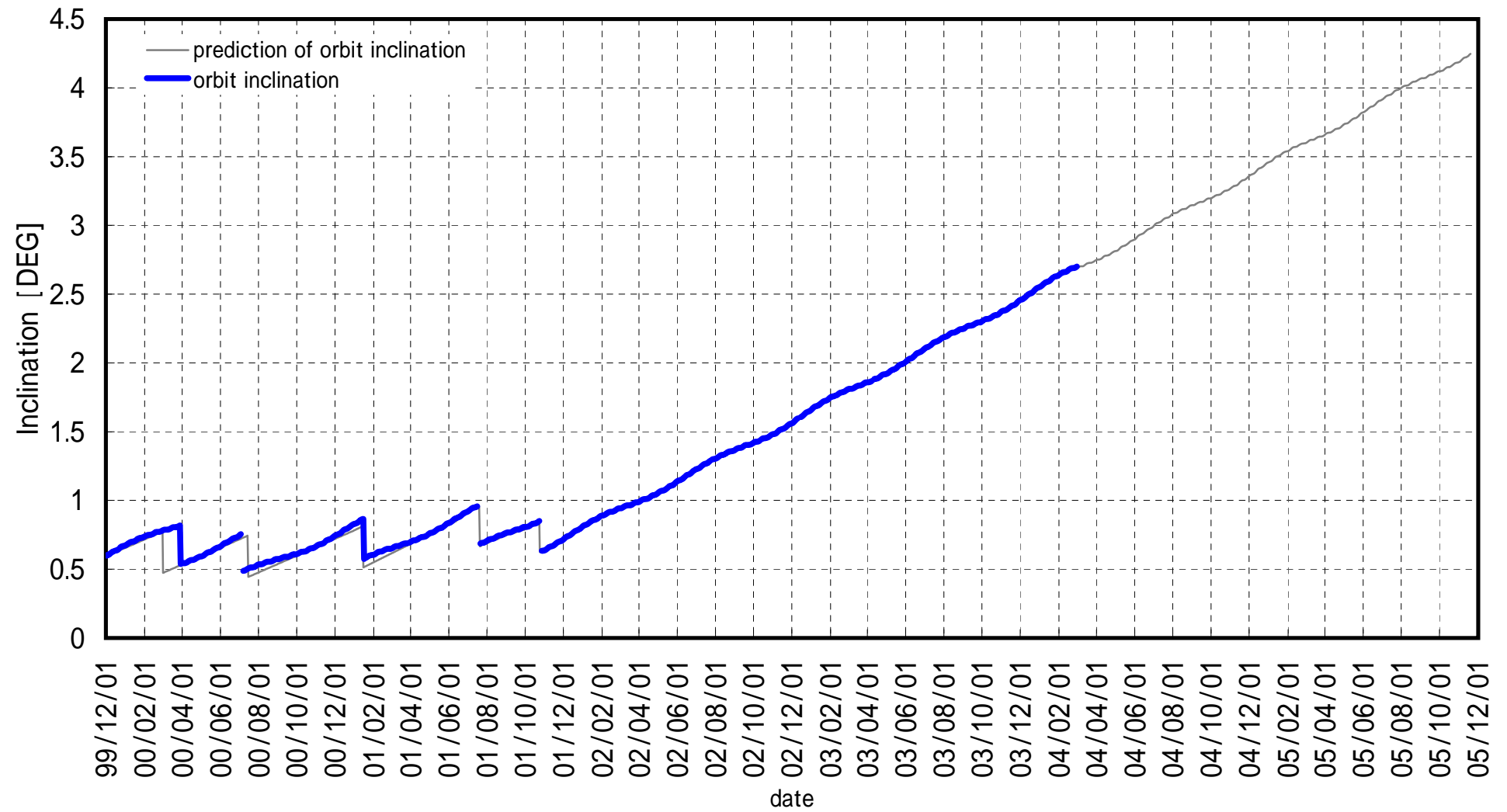
\*PLANS – Number of GOES-9 routine full disk observation

\*OUTPUTS – Number of S-VISSR dissemination.

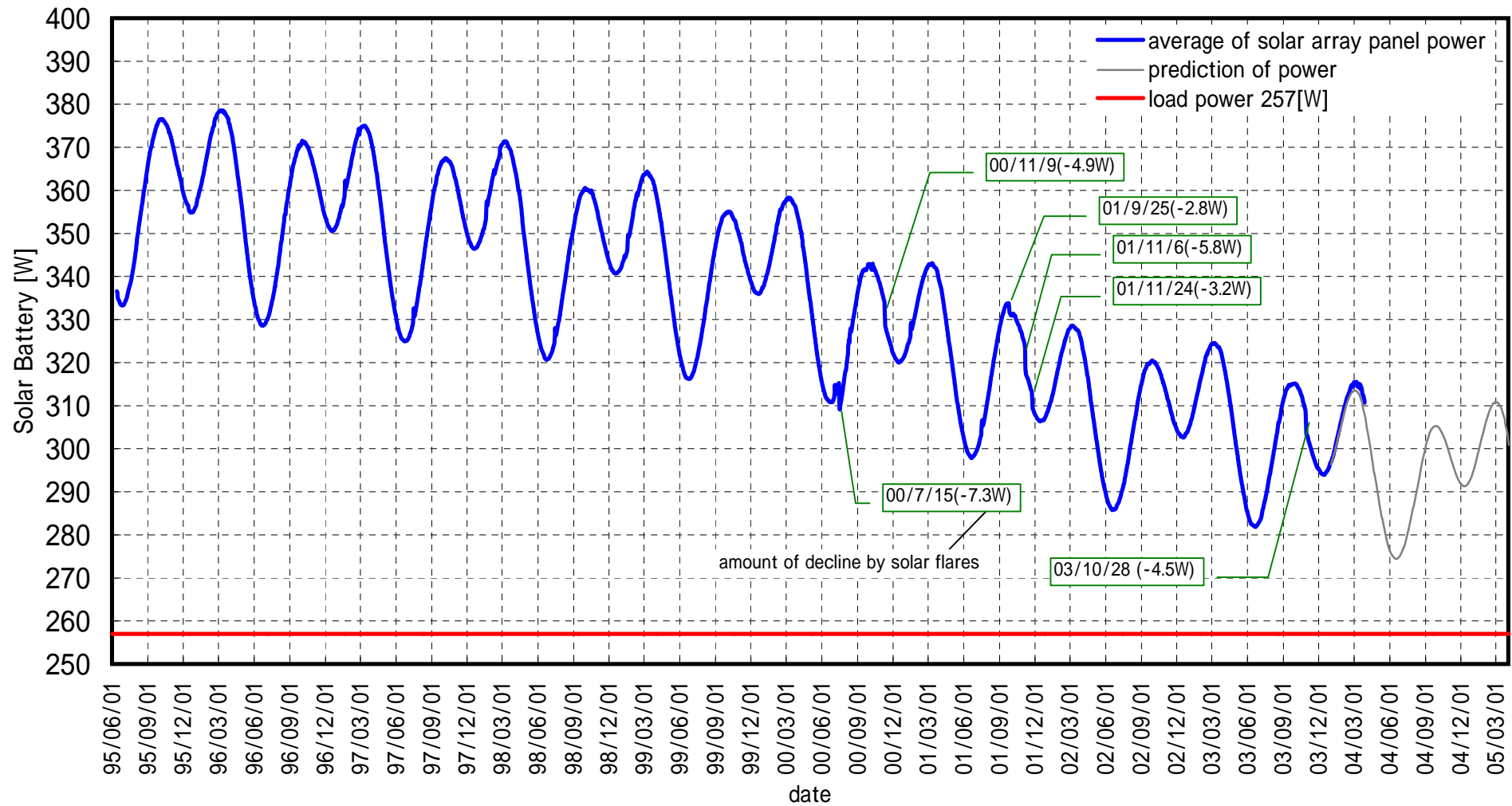
\*PERFORMANCE –  $OUTPUTS / PLANS$



**Time Sequence of Remaining Propellant onboard GMS-5**



Time Sequence of the Orbit Inclination of GMS-5



**Time Sequence of the Solar Array Panel Power of GMS-5**