

Analysis and Use of Meteorological Satellite Images

First Edition



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Meteorological Satellite Center

Japan Meteorological Agency

GMS First Imagery

The Geostationary Meteorological Satellite (GMS), whose Japanese name is *Himawari*, was launched on board the rocket of the National Aeronautics and Space Administration (NASA) on July 14, 1977. The picture on the cover is the first imagery taken by GMS (visible image taken at 03UTC on September 8, 1977).

The imagery captured the typhoon, T7709, which was moving northward over the ocean south of Okinawa. This typhoon was called Okinoerabu Typhoon in Japan and the minimum atmospheric pressure was recorded 905 hPa at 00UTC on September 8, 1977.

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Note: This publication is an English translation of “KISYOU EISEI GAZOU NO KAISEKI TO RIYOU” (Meteorological Satellite Center, March 2000).

Foreword

More than 20 years have passed since the Geostationary Meteorological Satellite (GMS), called Himawari in Japanese was launched on July 14, 1977. The GMS has been providing the necessary information for the activities of natural disaster prevention and the meteorological services not only in and around Japan but also in Southeast Asia and the western Pacific countries. In use of meteorological satellite imagery for the operations of weather forecasting and warnings, the techniques are indispensable to interpret the image and extract the important information on meteorological phenomena. The Meteorological Satellite Center (MSC) has carried out the nephanalysis on a routine basis and made effort to maintain, improve and publicize the nephanalysis techniques based on such experiences.

In Japan, a few technical textbooks on nephanalysis were published: as the first of all, "Use of Meteorological Satellite Data for Forecasting and Analysis" (Japan Meteorological Agency, 1976), which is a Japanese translation of ESSA TECHNICAL REPORT NES51 "Application of Meteorological Satellite Data in Analysis and Forecasting" (Anderson et al., 1974); "Nephanalysis and Its Utilization by Geostationary Meteorological Satellite" (Meteorological Satellite Center, 1981), which describes the use of GMS images; and "Operational Manual for Forecasting, Use of Meteorological Satellite Data for Forecasting" (Forecast Department of JMA, 1984). These technical publications have been effectively used as a guidebook on nephanalysis since the commencement of the GMS operations.

The current GMS-5 satellite was launched in 1995 and new imagery has been used since the onboard sensor of GMS-5 was improved in addition to a visible channel (0.55-0.9 μm) to have the new channels: a water vapor channel (6.5-7.0 μm), and Infrared 1 (10.5-11.5 μm); and Infrared 2 (11.5-12.5 μm) channels which are a conventional infrared sensor (10.5-12.5 μm) divided into two.

The Multifunctional Transport Satellite (MTSAT), as a successor to the GMS-5, will also have a new channel in 3.5-4.0 μm band. Along with the stored knowledge of nephanalysis, a new guidebook that describes how to interpret and use satellite images was urged to publish with the new techniques on the satellite image analysis corresponding to the addition of the new channels.

The publication, "Analysis and Use of Meteorological Satellite Images" has just been issued by the staff members of Analysis Division of MSC through the preparation for several years. This publication is based on the effort of the previous publications but refreshed to provide new imagery and the latest knowledge and to be used as a reference book for satellite image analysis. This publication was initially intended for the use in the Analysis Division, to improve satellite image analysis techniques, but the authors would be pleased if it can contribute to the use of satellite images in the weather forecasting operations at the meteorological and hydrological services.

Finally, I appreciate the efforts of the staff members of the Analysis Division who dedicated to compiling this publication and hope that this publication will promote the better understanding in satellite meteorology as well as the use of meteorological satellite imagery.

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