IMPLEMENTATION OF SATELLITE IMAGERY INFORMATION SYSTEM FOR KOREAN METEROLOGICAL ADMINISTRATION AND ITS MEANINGS

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ABSTRACT: We aim to archive all the satellite images that had been scattered into Satellite Imagery Information System with setting naming rules and metadata. More than one million of scenes were collected, rectified into error-free status with metadata . Converting various formats into HDF format after considering GEOTIFF and HDF. Intranet and Internet System had been development to allow all the images to be searched and downloaded with less effort. These system will expand the usage of meteorological satellite images for expert groups and the public outside of KMA.

KEY WORDS: Meteorological Satellite Imagery, archiving and search, HDF

1. INTRODUCTION

1.1 Background

Meteorological Satellite data have been collected and reserved for weather forecasting, but systematic management with archiving all the images in the past have not been introduced. In spite of requirement for satellite images in time for research purposed, it was not easy to obtain the exact images in time. Also the information of satellite is not limited to general cloud map but applied to various thematic maps.

Images taken in a static orbit such asMTSAT-1R and FY-2C and Meteosat-5 have been received and NOAA images in polar orbit, as well. During monsoon seasons and frequent typhoon upcoming satellite imagery were drawn public interest and decision makers or disaster managers.

1.

1.2 Study Purpose

We aim to develop an archiving system with full database for metadata for each image, raw data sets, thumbnail images, and related data to expand the usage of meteorological satellite data.

1.3 Methods

As HDF format was decided as a standard format, we converted raw data from TDF format, which depends on specific software to HDF format. In 2006, satellite images of forty-five terabytes were collected from various devices such as DLT and hard drive in many places, even in other institutes and rectified. Error removal process for image had been set up and preceded with advices of retired meteorological experts. A web-based system for management of satellite images and

2. ARCHIVING PROCESS

2.1 Material

We archived more than 1.05 million sheets of satellite imagery taken polar orbit and Earth Observation Satellite like MODIS from Aqua and Terra.

2.2 The rectifying step

All the errors are checked out and rectified by both naked eyed inspection and shell programming for systematic errors.

2.3 The reproducing stage

All the raw data were drawn from the DLT and hard disks and the size of each satelliteimage were recorded. Missing lists were made and recollected from producing agencies and other receiving centers in domestic and abroad.

2.4 The cloud data producing

Rectified data were processes for estimating amounts of clouds for satellite images with static orbits such as GMS-5, GOES-9 and MTSAT-1R

contents	procedure	amounts
Data archiving for Polar-orbit data and rectification	• NOAA, FY1, Terra, Aqua images	1,050,607
	• Rectification with quality control	1,050,607
Reproducing missing data	• Recollection of raw data • Binary file reproducing	14,371
Analyzing images For Clouds information	• GMS-5, GOES-9, MTSAT-1R • Compensation and analyzing images for cloud cover	80,575
Conversion data	• Selection of standard format • Converting raw images Into the standard format	184,337

2.5 The format conversion and saving

All the raw imaged in TDF format were converted into HDF and saved under the new naming rules and with metadata, which were set in technical note.

2. SELECTION OF STANDARD FORMAT FOR KMA

To expand the usage of satellite images from this archiving center, we investigate the format used by the other organizations to provide satellite images.

National Geographic Information Institute holds not only aerial photographs but also satellite images, which have been taken since 1966. All the scanned images can be provided to uses on the request in the format of tiff and jpg. Internal format of NIX (National Image eXchange) is preferred as it is a standard for framework data for Korean Government. Korean Aerospace Research Institute and Korea Aerospace Industry ltd. are in charge of distribution of KOMPSAT images; they provide the images in the format of HDF in principle but convert the images into TIFF on the request of users.
Korean Ocean Research and Development Institute (KORDI) have all the images in the form of HDF and provide in both HDF and TIFF.

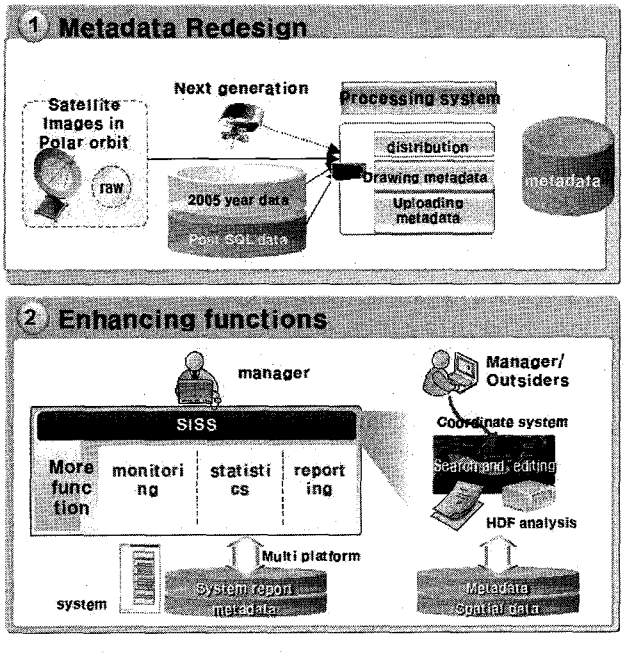
Before the archiving process at this year of 2006, most raw images were saved in the format of TDF, which are developed by TerraScan, the most popular software.
We interviewed inner group of meteorological science atmospheric science in depth and outer general groups who may be potential user of meteorological satellite images. The former preferred HDF format, as it is easy to manipulate them with software like IDL and the metadata of images can be saved together. GEOTIFF format are not familiar to them, although one of the standard formats of satellite images in International Standard and Open Geospatial Consortium is GEOTIFF.

The latter group showed preference of GEOTIFF, as interoperability of images and software availability for GEOTIFF format exceed HDF. Another reason is that it is easy to overlap with the other geographic information for further analyses.

We made a decision of HDF as standard format for the raw images in KMA. The first reason is the frequent receiving of meteorological satellite images. Forty-eight images for a satellite are received; it is necessary for the conversion process from TDF to HDF and from HDF and TIFF. It does not seem that KMA has enough budget for the maintenance of the process in near future.

The second reason is that we could not fine the best method to save the extra metadata for angle of observation for each pixel in the format of GEOTIFF. That means HDF is good for reserve all the metadata within the format. The last reason is the archiving process will have to continue in the format of least effort to change shell programs, which had been developed for the images in HDF and TDF.

To overcome the shortcomings of HDF format, we will give a tip for shareware to users who prefer GEOTIFF format.



3. MEANINGS OF THIS IMPLEMENTATION

The efficient storage and management of meteorological satellite images is the first stage for system implementation for inner groups of KMA and for service

implementation for outer groups, further users of satellite imagery.

Archiving of data in the past tends to be set a record for future utilization. Here we have to start to think how to utilize the archived images for further analyses and better services. Most steps of image archiving are focused to gather all the images, not to produce meaningful images by applying various algorithms and logics. Only cloud data have been drawn from the archived images at this time.

After this system is open to public and experts groups who want to have an access to satellite images, it is possible to download all the data with metadata and raw data in more popular format than before. More various algorithms can be applied to satellite images by providing data.

Interactive systems with public will cause much burden on the officers who is in charge of data distribution. Here we have developed semi automatic procedure to give a notice to public request by compressing data with metadata and viewing thumbnail images. NASA and European Space Agency have developed similar systems, but there is no online service for data providing at all.

4. CONCLUSIONS

Satellite images of high temporal resolution need to distribute timely and a full set of metadata.Distributed storage and management for meteorological satellite images hindered satellite image analysts from searching and using them for the further research.

Satellite Imagery Information System will enable managers of the meteorological satellite images to monitor the current stage from receiving to providing them beyond the organization.

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