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Improvement of CAL Systems in JMA

This document describes the present status and plans for the improvement of the CAL systems in JMA and the utilization of the Satellite Animation and Interactive Diagnosis (SATAID) for training, electronic publications and operational use.

No action is required on this subject.

Improvement of CAL Systems in JMA

1. Introduction

The Meteorological Satellite Center (MSC) of JMA has been developing and improving the Computer Aided Learning (CAL) systems since 1994, aiming at providing the environment for practical and interactive training with a personal computer in satellite meteorology and its applications.

The CAL systems are composed of the hardware system and the software system including the resources for training and development. The software system provides the various functions and materials for satellite image analyses, e.g. displaying and animating satellite images, overlaying the surface and upper-air observation data and the products of Numerical Weather Prediction (NWP), displaying and speaking out the explanations on case studies.

This document describes the present status and plans for the improvement of the CAL systems in JMA and the utilization of the Satellite Animation and Interactive Diagnosis (SATAID) for training, electronic publications and operational use.

2. Improvement of SATAID Software

The set of the MSC-CAL display program and the resources including the teaching materials was named the Satellite Animation and Interactive Diagnosis (SATAID).

The SATAID software is being improved to add a lot of new functions. The new major functions of the SATAID software are:

(1) displaying NWP products even if no satellite image exists;
(2) displaying the differential images of the infrared split window channels;
(3) displaying trajectories calculated with NWP products for the estimation of air parcel movement;
(4) editing article files in which the explanation for case study is described.

Figure 1 shows an example of the trajectory display function.

3. Utilization of SATAID Software

3.1 Training

From 14 August to 16 December 2000, eight staff members of NMHS in Asia-pacific and the other countries participated in the Japan International Cooperation Agency (JICA) group training course in meteorology held at JMA Headquarters, the Meteorological Research Institute (MRI), the Meteorological College, MSC and so on. MSC took a part of the training course in satellite meteorology for 12 days and provided the classes of lectures and practice of neph-analysis and tropical cyclone analysis using SATAID.

The SATAID software is designed to work on IBM-PC compatible personal computers with Microsoft Windows operating system (ver. Windows3.1 or later), taking into account the users' handling, in particular, the use in developing countries. SATAID is distributed to the participants of the training course in CD-ROM in response to the demand to study further in their countries. It is useful not only to help in-depth understanding of the participants but also to reduce a time for the preparations of teaching materials.

In 2001, a class, "Introduction of Satellite Imagery Analysis Software SATAID" was added in the training course in order to use it effectively in their countries, in particular, how to customize the software for the data of meteorological satellites except for GMS.

In addition, SATAID is also used in international training seminars such as Asia Pacific Satellite Application Training Seminar (APSATS) and the training for forecasters of domestic meteorological field offices held at the Meteorological College every year.

3.2 Electronic Publications

The SATAID software is included in the various electronic publications in CD-ROM issued by JMA as a browser for the meteorological data and products including GMS imagery, since it is useful to display satellite images and the mass of the software is small, i.e. less than 1 MB.

In January 1996, the "Monthly Report of Meteorological Satellite Center" was changed to the CD-ROM based publication and its contents were expanded as shown in the Consolidated Report of CGMS Activities (p.82, 9th Edition, Version 1, 21 March 2001).

From 1998, the "Nephanalysis Case Study Reports" is annually issued as a CD-ROM based publication (Japanese only). It is a self-learning material with which meteorologists of the domestic meteorological field offices can learn remarkable meteorological phenomena by themselves. In addition, its special edition for turbulence in aeronautical meteorology was published in 2000.

The SATAID software is also included in the CD-ROM, the "Annual Report on Activities of the RSMC Tokyo-Typhoon Center" (the 1998 edition and later) with the database of all tropical cyclones generated in the western North Pacific and their satellite images.

3.3 Operational Use

In 1997, the SATAID software was introduced to the internal training classes of nephanalysis for JMA staff members as the beginning of use. The usefulness of the SATAID software was proved not only for the training but also for the operational use of monitoring and analyses of meteorological data including satellite imagery through the training activities conducted by MSC.

The LRIT dissemination will start at the commencement of MTSAT-1R operation and the NWP products will be disseminated by LRIT. JMA will provide the SATAID software for LRIT to NMHS in order to utilize the data and products of MTSAT LRIT.

JMA conducted the training of typhoon analysis for the Korea Meteorological Administration (KMA) in February and June 2001 respectively. KMA is preparing for starting

operational typhoon analysis to determine the position and intensity of typhoon with the Dvorak method using SATAID.

4. SATAID for Virtual Laboratory

In October 2000, CGMS-XXVIII agreed with the formation of the CGMS International Satellite Data Utilization and Training Focus Group within the Virtual Laboratory (VL) Framework. JMA agreed to provide SATAID to the Virtual Resource Library (VRL) at the first session of the Focus Group held at the EUMETSAT Headquarters from 16 to 18 May 2001.

JMA is improving SATAID to be capable of the use in VL as well as the preparation of the materials for VRL. SATAID is improved to have compatibility between the GMS VISSR data and the other data considering the use in VL. JMA prepared the NWP data format converter from GRIB to SATAID and the GMS imagery data format converter from RAMSDIS to SATAID. JMA will prepare additional software in order to convert the other satellite data from RAMSDIS format to SATAID format since the RAMSDIS format is to be the common satellite data format in VL.

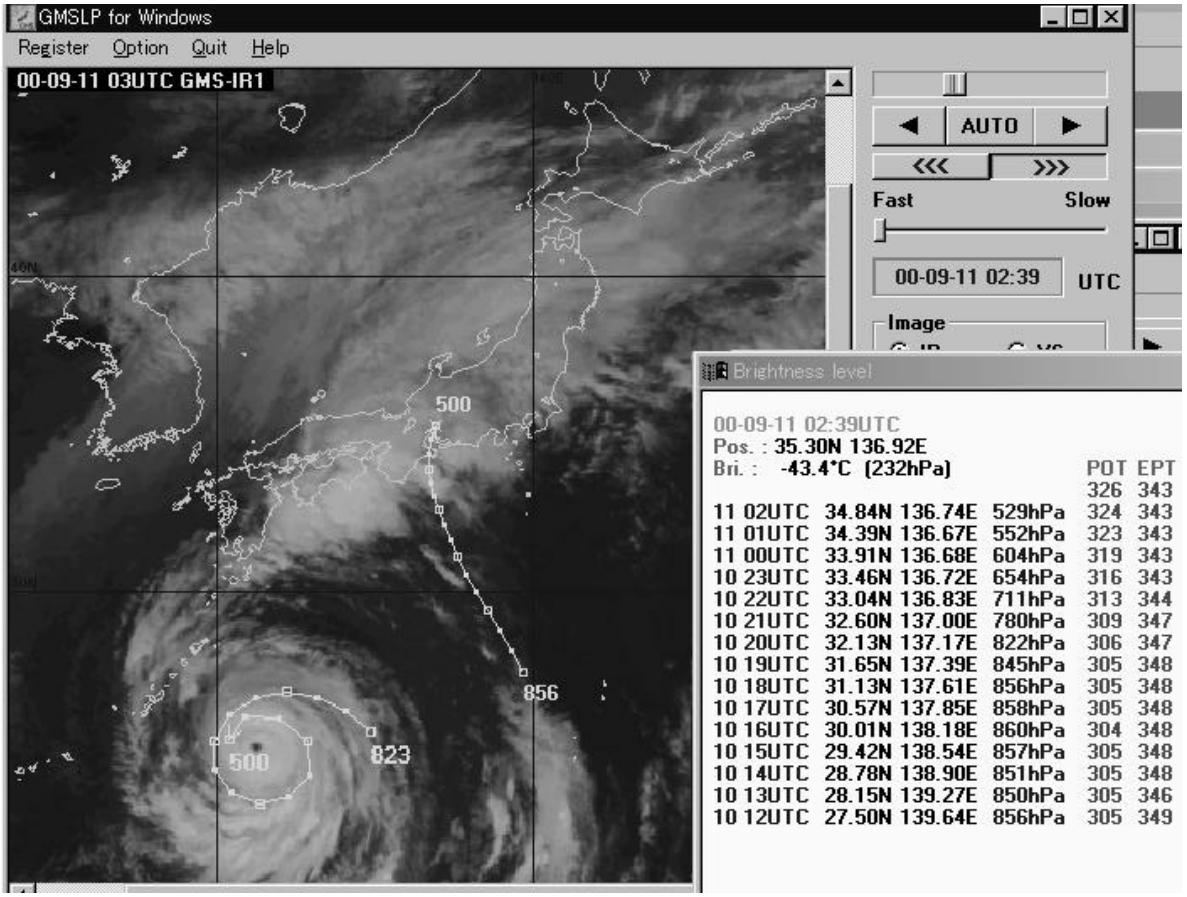

Fig.1 Air parcel movements using trajectory display function

The SATAID software has the various functions which are useful for understanding atmospheric condition such as rotation, convergence, up draft, down draft and so on. The movement of air parcel estimated from the wind field of NWP can be displayed on satellite image using the trajectory display function.

This figure shows the GMS IR imagery around Japanese Islands taken at 03UTC on 11 September 2001 with two trajectories, while a typhoon, Saomai (T0014) was approaching to Japan. The trajectory of right side shows the track of air parcel movement from south to north accompanied with the altitudes (hPa) of NWP at the start point over the Pacific Ocean and the end point above the Japanese Islands.

The text window shows a list of NWP data of date and time, latitude, longitude, altitude of air parcel, Potential Temperature (POT) and Equivalent Potential Temperature (EPT) along the trajectory as well as the brightness temperature and cloud top height at the end point. The NWP data are interpolated with the 3-hour interval predictions at the initial time of 12 UTC on 10 September.

It is found that the air parcel was going up at almost uniform EPT and there was a cloud area in which the NWP had predicted the increase of POT indicating the diabatic process. Tokai Heavy Rain was caused in the cloud area.