



ESCAP/WMO

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## TYPHOON COMMITTEE NEWSLETTER

### Thirty Sixth Session of the Typhoon Committee



Delegates to the thirty-sixth session of the Typhoon Committee at Hotel Armada, Petaling Jaya, Malaysia (15 to 20 December 2003).

Senior weather officials from Asia-Pacific countries continued efforts to achieve development goals set by the ESCAP/WMO Typhoon Committee to mitigate the adverse effects of tropical cyclones in the Asia-Pacific region.

More than 70 experts from national weather agencies of members of TC, namely, China, Hong Kong, Japan, Macao, Malaysia, the Philippines, Singapore, South Korea, Thailand and the United States, convened at the thirty-sixth session of TC, held in Petaling Jaya, Malaysia, from 15 to 20 December 2003.

The annual session, hosted by the Government of Malaysia, was also attended by representatives of the World Meteorological Organization (WMO), Economic and Social Commission in Asia and the Pacific (ESCAP), Typhoon Committee Secretariat (TCS), and observers from

the Commission on Atmospheric Sciences (CAS), Asian Disaster Reduction Center (ADRC), Asian Disaster Preparedness Center (ADPC), the Russian Federation, and Department of Roshydromet.

Speaking at the session's opening, Malaysian Meteorological Service Director-General Chow Kok Kee noted that the membership of the Committee had increased and many new activities were carried out to enhance the capacity of the members in addressing the wide spectrum of issues related to tropical storms, disaster prevention and preparedness. He added that the Committee demonstrated the pragmatic cooperation among its members most of which took part actively in the programs and activities that were organized by the Typhoon Committee Secretariat.

ESCAP Representative Le-Huu Ti said at the meeting that tropical cyclones and

water-related disasters continued to cause adverse socio-economic impacts in many countries in Asia-Pacific region in recent years even as he called for greater efforts to improve disaster preparedness of the public for a better living with risk for a safer world in the 21st century, as stipulated in the Johannesburg Plan of Implementation (JPOI) of the World Summit on Sustainable Development (WSSD), held in September 2002.

Ti also noted the continued increase in support from the Ministry of Land, Infrastructure and Transport (MLIT) and Infrastructure Development Institute (IDI) of Japan in the implementation of the new RCIPI of TC, and also the plan of the Ministry of Construction and Transportation (MOCT) of South Korea to start a new program that would support these common endeavors.

Eisa H. Al-Majed, representative of WMO, reported that the World Meteorological Congress in May 2003 established a new WMO major program on natural disaster prevention and mitigation aimed at enhancing international cooperation in the field of natural disaster activities.

Al-Majed encouraged the members to facilitate the transfer of the latest forecasting techniques, and to develop and organize training courses, even as he assured the participants that WMO would continue to assist NMHSs in their development plans through, among others, resource mobilization for the implementation of regional projects and programs.

The session, after discussing the report of the Interim Working Group (IWG) on the Regional Cooperation Program Implementation Plan (RCPIP), established the Working Group on the Review of the Operations and Structure of the Typhoon



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Director-General Chow Kok Kee of the Malaysian Meteorological Service (MMS) welcomes the session participants.

Committee (WG ROSTY). The WG ROSTY was tasked to conduct further study of the options and proposals of IWG related to the operations and structure of TC, and to submit detailed proposals at the next session of TC. The options and proposals of IWG were:

- changes to the methodology and implementation of new technologies which may lead to efficiencies of TC, TC coordinator and the TCS;
- new framework of priorities for activities of TC;
- new reporting formats for the five components of RCPIP of TC together with the mechanisms aimed at improving the implementation of RCPIP;
- Collaborative activities among the five components of RCPIP;
- mobilization of resources to achieve the goals and objectives of TC; and
- updates to the Statute of TC, and Rules and Procedures of TC.

Under the options for collaborative activities, the Committee agreed that the three components (meteorology, hydrology, and DPP) should hold their corresponding pre-sessions a day before the start of the 37th session, to be followed by a plenary pre-session for the three components interaction. The Committee requested the

WG ROSTY to submit specific results and action-oriented themes for the 37th session of TC.

On resource mobilization, the Committee appointed a rapporteur from the Japan Meteorological Agency (JMA) to prepare a synthesis report based on the responses of the members to a questionnaire, and to submit the report to WG ROSTY for the development of one or two project proposals on implementing resource mobilization.

The Committee requested its members, TCS and all the working groups to update the RCPIP. It also endorsed a new format of the country report with only three main components to be applied at its next session.

The Committee reorganized the Working Group on Hydrology (WGH) which will oversee the planning and promotion of cooperation among the members in carrying out the hydrological component of RCPIP. The participants were urged to implement the Typhoon Research Coordination Group (TRCG) action plan in the promotion of research activities, such as:

- to continue the roving seminars under the visiting lecturer program in order to promote research and development, and to

strengthen capacity building on tropical cyclone forecasting and other two components (hydrology and DPP);

- to continue the TRCG fellowship scheme; and
- to plan a regional workshop in 2005 to stimulate joint collaboration among the meteorology, hydrology and DPP components.

At the meeting, the Committee was informed by JMA on the start of the joint operation of GMS-5/GOES-9 in May 2003 in collaboration with NOAA/NESDIS. JMA added that the NMHSs of members could now retrieve satellite imagery either by receiving WEFAX from GMS-5 or by direct reception of GOES GVAR data. China also informed the Committee that its new satellite, FY-2C, was set to be launched in 2004.

The Committee noted the report of the working group on a Unified North-West Pacific Tropical Cyclone Best Track Data Set and approved the plan to produce a data set named Expanded Best Track

Workshop on Implementation of the Hydrological Component of the New RCPIP and requested TCS, in cooperation with the Ministry of Construction and Transportation (MOCT) of South Korea, to organize a 4-day workshop for TC hydrologists on Living with Risk: Dealing with Typhoon-related Disasters as Part of Integrated Water Resource Management, to be held in Seoul in 2004. In preparation for the workshop, the Committee agreed to:

- request Japan and South Korea to provide the services of experts to prepare for the organization of the workshop, including holding a preparatory task force meeting in South Korea at an early stage, to facilitate the exchange of experiences and to prepare program for follow-up action taking into account the priority accorded in the RCPIP;
- request TCS, with assistance from ESCAP and Japan, to encourage all focal points for the hydrological component



WMO, MMS, ESCAP and TCS top officials

Data Set for the Western North Pacific and the South China Sea (EBT). The members will produce the EBT in cooperation with the RSMC Tokyo-Typhoon Center which in turn will submit a yearly progress report (on EBT) to the Committee.

The Committee also noted the report of the pre-session meeting of hydrologists which included the recommendations of the

and DPP and meteorological resource persons to prepare for the workshop;

- request ESCAP to assist TCS and South Korea in preparing the technical program of the workshop;
- allocate one day of the 4-day workshop to discuss detailed proposal on follow-up actions; and extend, if possible, the workshop by one day, without financial requirements from TCTF,



for the participants' field work for the preparation exercise on flood hazard.

The Committee urged TCS and the members to join the International Flood Network (IFNET). The IFNET Secretariat was requested to provide the members with related information on developments of its projects on the Global Flood Alert System (GFAS).

ESCAP joined the WMO in supporting the Initiative of Japan in the establishment of the International Flood Network (IFNET), which was formally launched in August 2003 during the World Water Week held in Stockholm. ESCAP expects that cooperation, through the IFNET, would

Germany), and Partnership on Disaster Reduction in Southeast Asia and the International Flood Network (IFNET), in cooperation with WMO on its initiative on GFAS.

With respect to the 3rd World Water Forum, financial resources were provided by



Philippine and Malaysian representatives

order to maximize the use of its resources.

The Committee thanked the Korea International Cooperation Agency (KOICA) for the Training Workshop on Weather Forecasting for Operational Meteorologists in Seoul in April/May 2003. The next KOICA workshop will be held in April or May 2004.

The Committee also noted the important contribution of the National Research Institute for Earth Science and Disaster Prevention (NIED) of Japan for the development of prediction method of flood runoff and inundation combined by the scaling and probability theory, which has been very effective for ungauged basins.

The Committee also gave its support to the attendance of TC experts at the 2nd Regional Technical Conference on Tropical Cyclones, Storm Surges and Floods, and the International Conference on Storms, to be held in Brisbane, Australia, from 1 to 9 July 2004.

The Philippine representative informed the session that apart from hosting TCS, it would also provide the services of an expert on Information and Communication Technology (ICT) at TCS, and contribute to the Typhoon Committee Trust Fund (TCTF) annually.

The next session of the TC will take place in Shanghai, China in mid-November 2004.

Preparedness (DPP) activities among the Meteorological, Hydrological and DPP components.

The Asian Disaster Reduction Center (ADRC) circulated an updated list of Internet websites which the members of TC can access for information on meteorology, hydrology and DPP, even as it invited the members to provide additional information.

The Committee encouraged the WGH to interact with other international organizations and forums working on water-related disasters, including ADRC and the Asian Disaster Preparedness Center (ADPC).

Members noted the important contribution of the Micronesian Meteorologist Intern Program, and the Pacific Desk Program, conducted by the RSMC Honolulu-Hurricane Center, in the training component of TC. They reiterated the need to produce CD-ROMS in TCTF-sponsored workshops and seminars for distribution to both participating and non-participating members in



ESCAP representative Le-Huu Ti

be strengthened, especially in connection with its initiative on GFAS, as the director of the WMO Department on Hydrology and Water Resources was elected as IFNET chairman and the Secretariat, headed by the director of the Second Research Branch of the Infrastructure Development Institute-Japan as its secretary-general.

Expanded cooperation within the framework of ESCAP Work Program in support of activities of TC members continued rapidly in 2003 in relation to various international initiatives, including activities related to the Third World Water Forum (Kyoto, Japan), Second International Conference on Early Warning (Bonn,

MLIT of Japan to enhance the participation of TC in the forum with a view to increase visibility of TC's programs on hydrology, particularly flood management and disaster prevention and preparedness.

Apart from the above activities, ESCAP continued to provide advisory services, on request, in the field of water resources planning and development including hydrological network development, flood loss prevention, normally for periods from one to two weeks at any one time depending upon the terms of reference for the services.

The Committee noted the members' willingness to enhance interaction of Disaster Prevention and



WMO representative Eisa H. Al-Majed



## US hurricane center reaps Typhoon Committee 2003 disaster prevention award



Director J. C. Weyman (right) of RSMC Honolulu Hurricane Center accepts the 2003 Typhoon Committee Natural Disaster Prevention Award from TCFI Chairman R. Kintanar.

The Regional Specialized Meteorological Center (RSMC) Honolulu Hurricane Center was the recipient of the 2003 Typhoon Committee Natural Disaster Prevention Award given by the

Typhoon Committee Foundation, Inc. (TCFI). RSMC Honolulu director James Weyman received the award on behalf of the Center during the awarding ceremony held at Armada Hotel in Petaling Jaya, Malaysia, on 15 December 2003.

The annual TC award, first presented in 1989, was conceptualized with the objective of encouraging individuals and organizations to give more importance to efforts on improving tropical cyclone disaster management and prevention, particularly, in the Asia-Pacific region.

The RSMC Honolulu, US National Weather Service, was honored for its valuable contribution and distinguished efforts in the improvements to weather services and systems in operation, particularly, the system to improve tropical cyclone forecasts such as the EMWIN satellite communication system which is proving to be the most reliable method for receiving forecasts and warnings to small-island states in the Pacific Ocean region; in providing training for forecasters such as the RSMC Pacific Training Desk which focuses on capacity building in the meteorological services of the small island states; and in providing tropical cyclone products and services for the central Pacific keeping the general public and governmental agencies informed of impending severe weather and other disturbances.

## T Changes



David L. Johnson

### Johnson heads NOAA/NWS

Brigadier General (USAF) retired David L. Johnson has been appointed as the Assistant Administrator, National Oceanic and Atmospheric Administration (NOAA) for Weather Services (National Weather Service) vice Bgen. John J. Kelly, Jr. He heads the nation's weather service and is responsible for the day-to-

day management of NOAA's domestic weather and hydrology operations.

Prior to joining NOAA, Johnson served as the U.S. Air Force director of weather. He retired from the Air Force as a brigadier general, after a 30-year military career. As director of weather, he was one of ten directors at the Headquarters Air Force, Air and Space Operations, and was responsible for developing doctrine, policy, requirements and operational organizations to support Air Force and Army operations worldwide. He also served as one of NOAA's military deputies.

Notably, he organized, trained and equipped forces for the war in Afghanistan and the war in Iraq, and managed

a steady flow of accurate and focused environmental information to battlefield commanders. He was a key advisor in the development of the National Polar-orbiting Environmental Operational Satellite System (NPOESS).

Johnson's career is marked by his strong management and fiscal capabilities. During his time as director of weather, he led a massive reengineering effort that revised the organizational structure, training and operations of the 4,000-person career field. Under Johnson's steady hand, retention of weather-career airmen and officers grew to 97 percent, up from 74 percent previously.

Johnson guided the planning, programming and budgeting process implementation at the highest levels in the Air Force and in the Department of Defense. He has a world-wide perspective, having served in leadership posi-

tions on the Joint Staff with planning portfolios in Europe/NATO and Asia/Pacific. He secured funding for a new facility for the Air Force Weather Agency to house collection, analysis, modeling and career-field supervision functions.

Prior to his service as the director of weather, Johnson flew fighter, transport and special operations aircraft. He has over 3,800 flying hours including 78 combat sorties. Johnson commanded airdrop and air/land operations in Bosnia-Herzegovina and was deputy commander of the Joint Task Force for Operation Support Hope in Rwanda. He was selected for early promotion three times.

Johnson is an honor graduate from the University of Kansas with a degree in geography, and earned his master's degree in human relations from Webster's University. He is a graduate of



the National War College, Maxwell School of Citizenship and Public Affairs at Syracuse University, and from the Paul Nitze School of Advanced International Studies at Johns Hopkins University.

### Nagasaka succeeds Kitade



Koichi Nagasaka

Koichi Nagasaka, 59, succeeded Takeo Kitade as

new director-general of the Japan Meteorological Agency (JMA). Nagasaka holds a B.Sc degree, Faculty of Science from Nagoya University.

Nagasaka joined the JMA in 1967 assigned at the Oceanographical Division of Maizuru Marine Observatory. Prior to his appointment as director general, he served as director of different divisions and departments of JMA, including the Fukuoka District Meteorological Observatory, from 1993 to 2004.

Nagasaka, who has been involved in the international activities mainly in the framework of WMO, is a member of several academic societies and national committees in Japan, including the Oceanographic and Meteorological Societies, and National Committees for Polar and Oceanographic Research. He is the author of numerous technical papers and publications.

logical Societies, and National Committees for Polar and Oceanographic Research. He is the author of numerous technical papers and publications.

### New director general of TMD named



Anant Thensathit

Anant Thensathit, 60, was appointed new director-general of the Meteorological Department of Thailand on 1 October 2003 succeeding Prapansak Buranaprapa who retired from service.

Anant, who joined the Thai Department as a junior meteorologist in 1967, holds a B. Sc degree in Mathematics and Meteorology from Chulalongkorn University (Thailand) and Florida State University (USA), respectively.

Anant was holding the position of deputy director general of TMD prior to his designation as director-general. He received the Knight Grand Cross (First Class) of the most Noble Order of the Crown of Thailand.

## NEWS FROM TC MEMBERS

### China

#### Case studies of tropical cyclones with GRAPES

In 2001, the China Meteorological Administration (CMA) launched GRAPES (Global/Regional Assimilation Prediction System), a national key project, in order to develop next generation of Numerical Weather Prediction (NWP) system.

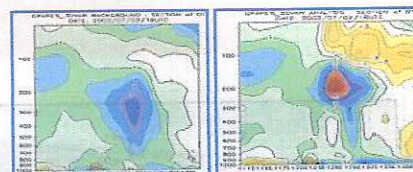
The major objectives of the project, aside from developing new NWP systems for both operational and research applications based on the recent achievements in atmospheric sciences, were to set up a base for further development toward a new climate system model for the studies on climate change and operation of short term climate prediction; enhance the link between academic research and operation; and to accelerate the transfer of research results to operational applications.

By the end of 2003, a new experimental GRAPES had been set up. GRAPES consists of two essential parts: a 3D-VAR frame and a semi-implicit and semi-lagrangian dynamical model with full compressible and non-hydrostatic approximation. Some case studies on tropical cyclones have been carried out with the new GRAPES. The preliminary results showed the potential capability of the new GRAPES on tropical cyclone predictions.

**RAMMASUN typhoon case study.** The experiment was designed as: GRAPES\_3DVAR for the analysis; WRF (Weather Research and Forecast) model for the numerical prediction; Initial time: 4<sup>th</sup> July 2002, at 15UTC; Conventional data with (or without) ATOVS radiances used for the simulation; Resolution of  $0.5625^\circ \times 0.5625^\circ$  in horizontal and 31 layers in vertical; First guess and lateral boundary conditions provided by the global operational model T213L31 of NMC/CMA; 45 hours for the forecast time.

In comparison to the background, the

GRAPES\_3D-VAR analysis results proved that the TOVS data is quite beneficial to improve the initial conditions of a tropical cyclone: much warmer core (see Fig. 1), cyclonic and anti-cyclonic tangential wind circulation better established (instead of

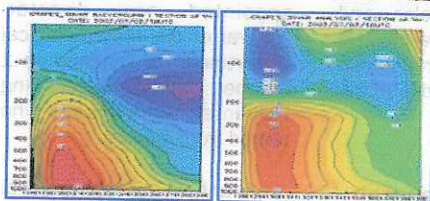


a) without ATOVS b) with ATOVS by GRAPES-3D-VAR

(Fig. 1) The altitude-longitude cross section of the temperature deviation from the horizontal averaged-temperature along  $23^\circ\text{N}$ .

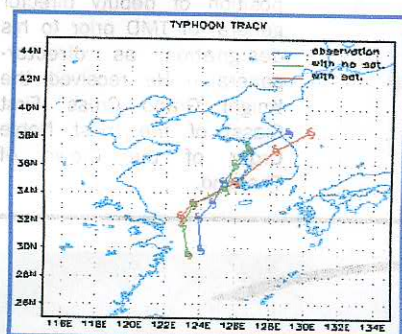
an only cyclonic circulation) in vertical from low levels to upper levels (Fig. 2) and more moist vertical structure. Consequently, the typhoon track predictions are significantly improved. For example, after 45 hours from the initial time, the position of RAMMASUN predicted by the model with 3D-VAR is clearly situated east of the Korean peninsular, very close to the





a) without ATOVS b) with ATOVS by GRAPES-3D-VAR  
(Fig. 2) The altitude-longitude cross section of the tangential wind along 23°N.

position observed. In contrary, the position of RAMMASUN predicted by the model without ATOVS still stayed west of the Korean peninsular (see Fig. 3).

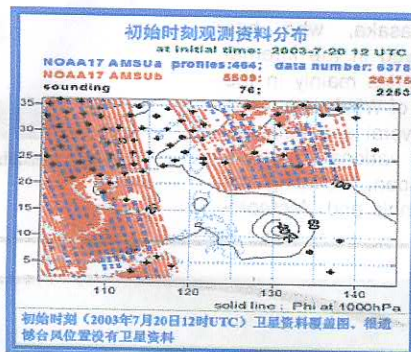


(Fig. 3) Rammasun typhoon tracks observed (blue line) and predicted (red line: with ATOVS, green line: without ATOVS).

KONI and IMBUDU double typhoon case study. The experiment was designed as: GRAPES\_3DVAR for the analysis; GRAPES\_SISL model for the numerical prediction; Initial time: 20<sup>th</sup> July 2003, at

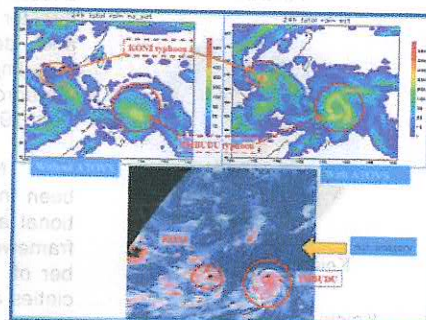
12UTC; Conventional data with (or without) ATOVS (AMSU-A and AMSU-B) used for the simulation; Resolution of 0.5625°×0.5625° in horizontal and 31 layers in vertical; First guess and lateral boundary conditions provided by the global operational model T213L31 of NMC/CMA; 24 hours for the forecast time.

The number of data reports used for experiment, including ATOVS data, is about 15 times to those used by the current routine Ol scheme: 32853 data reports against 2253 data reports (Fig. 4).



(Fig. 4) The coverage of observations introduced by GRAPES 3D-VAR at initial time of 12 UTC/20/07/2003 for the KONI and IMBUDU typhoon case studies. The blue points indicate the AMSU-A profiles, the red points: AMSU-B profiles, the black crosses: radiosonde profiles. The ratio of the total observation reports used in GRAPES 3D-VAR assimilation against the radiosonde reports is 32853 against 2253, about fifteen times!

As expected, the better predictions of intensity, position and spiral cloud band structure for two typhoons: KONI and IMBUDU, were found in comparison to the simulations without ATOVS data (Fig. 5). It proved again a positive impact of ATOVS on the analysis and prediction of tropical cyclone associated with the severe weather events.



(Fig. 5) The fields of precipitations accumulated over 24 hours. Valid time: 00UTC/20/07/2003 ~ 00UTC/21/07/2003. On left-up, simulation by GRAPES without ATOVS; on right-up, simulation by GRAPES with ATOVS; at bottom, satellite imagery at 00UTC/21/07/2003.

All experiments presented above were carried out in a no-cyclonic mode. It is well recommended that the experiments need to be conducted in a cyclonic mode of assimilation to test the accumulative effects of the continual impact of data sets.

### 13th National Workshop on Tropical Cyclones



Opening of the 13<sup>th</sup> Session of National Workshop on Tropical Cyclones (NWTC-XIII).

The thirteenth National Workshop on Tropical Cyclones (NWTC-XIII) was held in Daishan County, Zhejiang province, from 10 to 14 April 2004. About 107 participants, from scientific research and operational departments, universities and polytechnics, and military and civil aviation sectors, attended the session. Topics included detecting technique, track, structure and intensity, wind and rain influence, and climatic aspects of tropical cyclones). For detailed information, log on to: [www.typhoon.gov.cn](http://www.typhoon.gov.cn).

### China Typhoon Museum opened

The China Typhoon Museum, in Daishan County Zhejiang province, was opened to public on 10 December 2003. It is located beside the Kaomen Dam, a very famous dam in China known as "the First Dam against Typhoon in Zhejiang province".

The Typhoon Museum is the first museum with a theme on disasters in China. It is a multi-function museum with a wide range of purposes, including science popularization, scientific research and tourism. Its total construction area is 5000 square meters scheduled for completion in three stages. The first stage, which has been finished, covers an area of 2500 square meters



mainly for demonstrating images, pictures, materials related to typhoons, etc. The second stage will function as an area for typhoon simulation and research, and the third stage will serve as a conference center.



China Typhoon Museum



Kaomen Dam in Zhejiang province

## Hong Kong

### Meteorological courses conducted



An officer of the Hong Kong Observatory lectures at a weather training course.

The Hong Kong Observatory conducted its first introductory meteorological courses for the general public and government personnel in 2003.

A wide range of real-time weather information is now available on the Observatory's web page. Besides using personal computers at home or in the office, such weather information is also accessible anywhere anytime through the Observatory's Personal Digital Assistant (PDA) website using a PDA.

The courses are custom-designed to enable the general public and government personnel to make good use of the weather information on the web. Course participants were taught the fundamental concepts of weather chart analysis, weather forecasting and interpretation of radar and satellite imagery.

The courses were met with very enthusiastic response, and a repeat was planned in early 2004 to meet public demand. Training courses on other topics are also in the pipeline.

### HK automates upper-air sounding operation

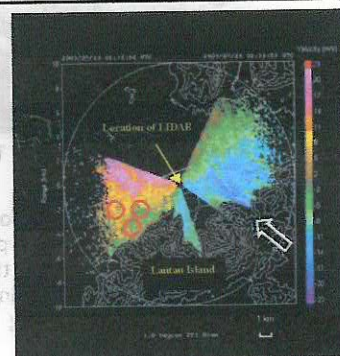
An Automatic Upper-air Sounding System was set up at the King's Park Meteorological Station of the Hong Kong Observatory in early 2004, marking a new era of upper-air sounding in Hong Kong, China.



The system completely automates the HKO's Automatic Upper-air processes of radiosonde preparation, balloon filling and launching. It eliminates the risk associated with manual filling of balloons with hydrogen and manual launching in inclement weather conditions, in particular during the passage of tropical cyclones. The outcome is increased efficiency, manpower savings, and enhanced personnel safety.

### Severe turbulence during typhoon Imbudo's passage

A total of 31 flights reported encounter with turbulence at the Hong Kong International Airport (HKIA) during the passage of Typhoon IMBUDO (0307) on 24 July 2003. Of these encounters, 15 were moderate to severe turbulence. The Doppler Light Detection and Ranging (LIDAR) System operated by the Hong Kong Observatory at the airport revealed the small-scale wind disturbances with a length scale of several hundred meters associated with the turbulence.



LIDAR Doppler radial velocity display revealing small-scale wind disturbances with marked wind changes over a length scale of several hundred meters (see areas circled in red). Cold/warm colors indicate winds blowing towards/away from the LIDAR. The white arrow indicates the background wind direction.

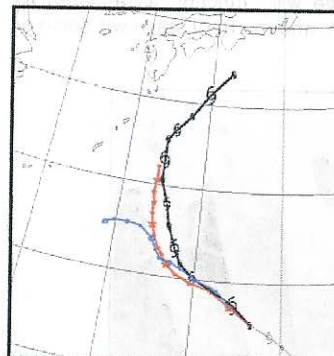


## Japan

### JMA Typhoon Model improved

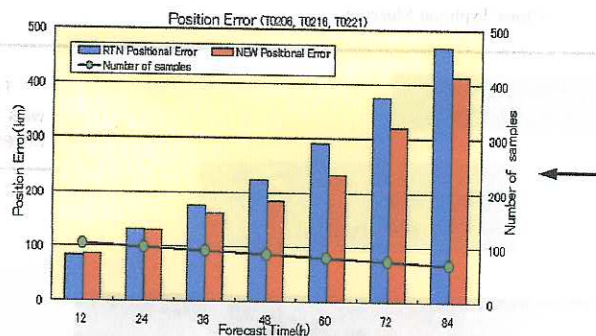
The Typhoon Model (TYM) with a new physical process package was put into operation in July 2003 at the Japan Meteorological Agency (JMA). In this package, a prognostic cloud scheme and radiation scheme including the direct effect of aerosols were newly introduced. Along with this introduction, the prognostic Arakawa-Schubert cumulus parameterization scheme and the estimation of the roughness length on the sea surface in TYM were modified.

Preliminary experiments with three typhoons in 2002 were carried out for 108 cases. Figure 1 shows the tracks for T0206 (CHATAAN) predicted by the old TYM and the new TYM, and the analyzed typhoon track. The recurvature of the typhoon movement was well predicted by the new TYM, while it was not predictable for the old TYM. Figure 2 shows the comparison of the mean positional errors between the old TYM and the new TYM. A remarkable improvement in mean positional errors is seen at a later stage of the forecast time. The mean positional error is reduced by 56 km in 72-hour forecast. As for typhoon intensity forecast, the new TYM shows almost the same performance as the old TYM.



(Fig. 1) Predicted tracks for the T0206 (CHATAAN)  
(Initial time: 00 UTC 6 July 2002)  
Black line: Analysis.  
Blue line: Old TYM.  
Red line: New TYM.

(Fig. 2) Mean positional error of TYM.  
Blue bar (OLD) is the old TYM.  
Red bar (NEW) is the new TYM.  
Green Dots indicate the number of samples.



### Typhoon operational forecasting training scheduled



On-the-job trainees at RSMC Tokyo Typhoon Center

The Typhoon Operational Forecasting Training has been conducted by the RSMC Tokyo-Typhoon Center of JMA, annually, based on the agreement with the Typhoon Committee since 2001. The objective of the training is to improve the tropical cyclone analysis and forecasting skills of forecasters from the members of the TC.

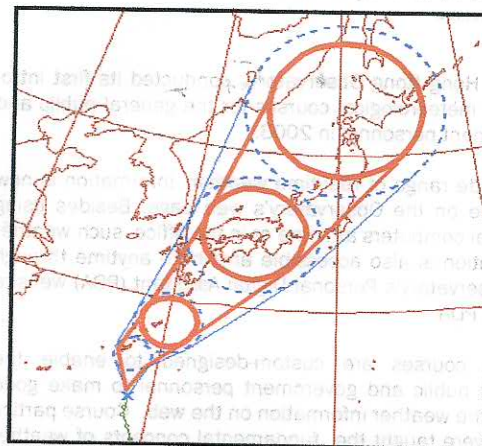
In 2003, the training was carried out for two forecasters from China and Thailand from 23 July to 1 August. It included the introduction of operations at RSMC Tokyo, and lectures and on-the-job training on tropical cyclone analysis and forecasting.

Two forecasters from Hong Kong and Malaysia were invited to participate in the training to be held from 28 July to 6 August 2004.

### Tropical cyclone track forecasts improved

The Japan Meteorological Agency (JMA) narrowed probability circles for the tropical cyclone (TC) track forecast starting June 1, 2004. This improvement is based on the verification results of the recent TC track forecasts.

The verification of the forecasts from 2001 to 2003 indicated the feasibility of reduction in the radii of the probability circles by about 10% on an average compared to the previous ones, in particular 25% for TCs with the movement speed of more than 15 kt.



Above figure shows a comparison of the new probability circle with the old one in the case of a track forecast of TY Etau (0310) issued at 12UTC 6 August 2003. The red solid circles indicate new probability circles, and the blue dashed ones describe old probability circles.



The narrowed probability circle is expected to allow disaster prevention activities to be more effectively coordinated.

A circular range into which the tropical cyclone is expected to move with the probability of 70 % at each validation time.

### JMA begins precipitation nowcast operation

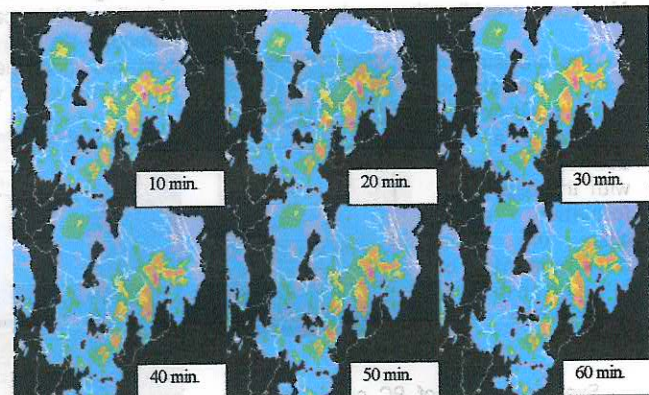
The JMA started the precipitation nowcast on 1 June 2004. Its main purpose is to provide disaster prevention authorities with more detailed information on heavy rains.

The precipitation nowcast provides forecasts of 10-minute precipitation up to one hour ahead with a horizontal resolution of about 1 km all over Japan (covering 20°N-48°N, 118°E-150°E) based on rainfall data from radar observations at intervals of 10 minutes. It is issued every 10 minutes.

In the nowcast, future rainfall distribution is derived from the extrapolation of the distribution and movement of rainfall

observed by radars which are calibrated by raingauge data from a weather observation network called AMeDAS (Automated Meteorological Data Acquisition System).

It is expected to contribute to more accurate and timely startup of disaster prevention activities.



A precipitation nowcast up to one hour ahead

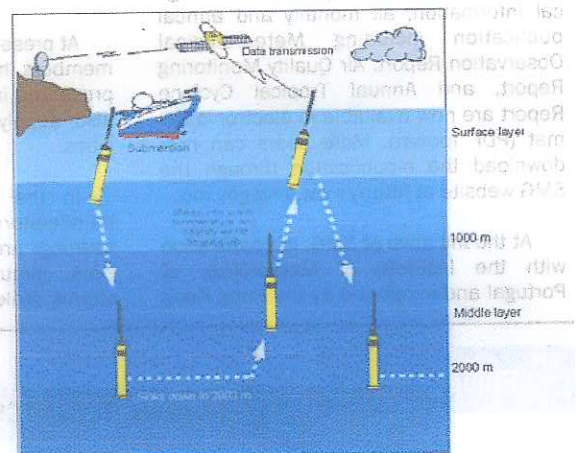
### First Argo science workshop

The first Argo Science Workshop, sponsored by the Japan Marine Science and Technology Center (JAMSTEC) and the US National Oceanic and Atmospheric Administration (NOAA), was held in Tokyo on 12-14 November 2003 with more than 250 participants from 22 countries.

The Argo project deploys profiling floats called Argo floats to observe water temperature and salinity from the sea surface to the water depth of 2000 meters. The observational data from these floats are automatically transmitted via satellites. JMA operates the Japan Argo Data Assembly Center to distribute the data for real-time international exchange. The floats are planned to cover the global ocean. The array has reached over 40% of its final total as of June 2004.

The Workshop, through oral and poster presentations and discussions, provided an opportunity for the exchange of information on the findings of the studies using Argo and other profiling floats; demonstrate the key role of Argo to play in oceanographic

observations; and to identify ways to further develop Argo for operational programmes.



Argo float

### Macao

#### Macao celebrates WMD 2004

The Meteorological and Geophysical Bureau of Macao SAR (SMG) celebrated the World Meteorological Day 2004 with a set of activities to promote the theme for this year's celebration - "Weather, Climate and Water in the Information Age."

A series of lecture entitled "Interactive



SMG Dir. Fong Soi Kun presides 2004 WMD affair.

Talk on Meteorology" was provided to local high school students from March 8-19. The schools were given five different topics to choose from: 100 Years of Macao Climate, Our Future Climate, Knowing Rainstorm, El Niño and La Niña and its Impact, and Air Pollution and Health. The SMG staff lectured a total of 5616 students from 17 high schools.



Atomic Clock with precision up to nanoseconds ( $10^{-9}$ ) to provide time service was also inaugurated on WMD at the SMG Headquarters, with the Secretary for the Transports and Public Works, Eng. Ao Man Long, presiding the event.

The precision of time is crucial and is the base for the success in all the activities related with the Age of Information, especially the rapid development of e-government, e-commerce and e-signature.

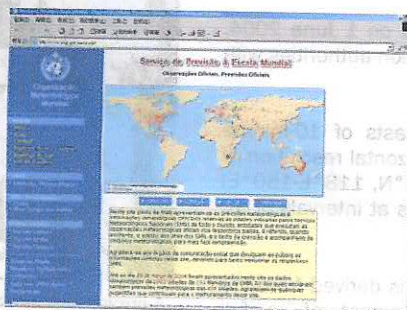


Synchronization of PC clocks is now being provided through time server in SMG web, as well as special time service to e-government and private sector.

In order to reinforce better service and easiness of the exchange of meteorological information, all monthly and annual publication including Meteorological Observation Report, Air Quality Monitoring Report, and Annual Tropical Cyclone Report are now available in electronic format (PDF format). More users can now download the e-publication through the SMG website at <http://www.smg.gov.mo>.

At the initiative of SMG, in cooperation with the Institute of Meteorology of Portugal and supported by the Hong Kong

Observatory, a new service in Portuguese was launched offering access to the latest weather forecasts of the world's cities issued by the National Meteorological and Hydrological Services (NMHSs). The new website which can also be accessed through <http://www.worldweather.org>, is operated under the auspices of WMO. It is the Portuguese version of the World



New website service in Portuguese

Weather Information Service (WWIS) website developed by Hong Kong on behalf of WMO.

At present, 1003 cities from 153 WMO members have their climatological data presented in this web site. 90 members also supply weather forecasts for 858 cities.

In the case of small-scale severe thunderstorms and rainstorms, specific warnings are possible only a few hours, or even minutes, before the damaging storms strike. Even for that critical short

period, warnings now rely on the technology of Doppler weather radar as well as skilled forecasters, high-speed telecommunications, and effective radio and TV contacts, to transmit the warnings to the affected communities. Thus, in cooperation with the local mobile telecommunication company, mobile phone users can now use the "Cell Broadcast" weather information service to receive the weather information, including three weather forecast reports issued daily, and instant severe weather warning if issued. The "Cell Broadcast" mode is different from the SMS (Short Message Service) mode since the former disseminates the information instantaneously to all the users while the latter disseminates one after another.



Version 2.0 of "100-Year of Macao Climate" CD-ROM was also published succeeding Version 1.0 last year.

Version 2.0 is enriched with more meteorological parameters, tabulated and graphical analyses information. Monthly and annual climate data as well as 100-year or 48-year daily average climate data are available in the CD-ROM.

## Philippines

### Kuroiwa, Ti visit TCS

Koji Kuroiwa, Deputy Head of the Office of International Affairs of Japan Meteorological Agency, visited the Typhoon Committee Secretariat (TCS), Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) and the Asian Development Bank (ADB) in Manila, from 29 to 31 March 2004, in connection with the implementation of the proposals on resource mobilization for the attainment of the objectives of the Typhoon Committee.



Left photo. Koji Kuroiwa (2nd from right) poses with (from right) TCS' Martin F. Rollin, Jr. (meteorologist), Margaret Bautista (hydrologist) and Bella Mendoza, Rose Anillo and Hannibal Marayag (staff). Right photo. Kuroiwa is flanked by R. L. Kintanar (left) and M. F. Rollin, Jr.

of TC to prepare a synthesis report based on the responses to a questionnaire on achievements, successes and problems of TC members in mobilizing resources. The report will be provided to the Working Group on the Review of Operations and Structure of the Typhoon Committee for subsequent development of on or two project proposals on resource mobilization.

Kuroiwa also met with ADB official Nesiem Ahmad, Director of Regional Sustainable Development Department and Joseph Weinstock, Senior Environment Specialist, to get their views on most strategic approach for possible projects of TC to be bankrolled by institutions in Asia including the ADB.

Le-Huu Ti, Economic Affairs Officer of the Economic and Social Commission for Asia and the Pacific (ESCAP) also visited the TCS on 30 June 2004 prior to his participation at the Workshop on

Kuroiwa was appointed as rapporteur at the thirty sixth session





Le-Huu Ti (right) of ESCAP meets with Martin F. Rellin, Jr. (left) and Roman L. Kintanar, meteorologist and coordinator of TCS, respectively.

Strategic Planning and Management (SPM) of Water Resources, held in Manila, from 1-2 July 2004.

The workshop, organized by the National Water Resources Board (NWRB) and sponsored by the ESCAP, forms part of Phase III of the ESCAP project "Capacity Building on SPM of Natural Resources Development and Environmental Protection" which was implemented in 2000.

The Philippines has been selected as one of the countries for the case studies to be undertaken in the five sub-regions of Asia and the Pacific on application of SPM for integrated water resources management (IWRM). The programme of ESCAP is to compile relevant experiences and achievements on application of SPM for integrated water resources management.

The findings of the compilation will be the subject of a regional workshop on SPM in Bangkok in November 2004 as contribution of UNESCAP to the implementation of the outcomes and meeting the targets established at the World Summit on Sustainable Development (Johannesburg, September 2002), to develop integrated water resources management plans by 2005.

## Republic of Korea

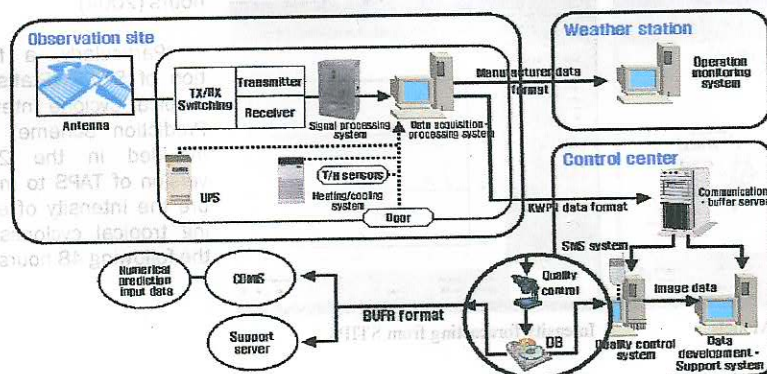
### Wind profiler network established

The first phase of the project on the establishment of the wind profiler observing network in Korea, which was started in 2001 to enhance the upper-air observing capability of the Korea Meteorological Administration (KMA) by installing a total of 10 wind profilers over the Korean peninsula until 2007, was successfully completed in 2003.

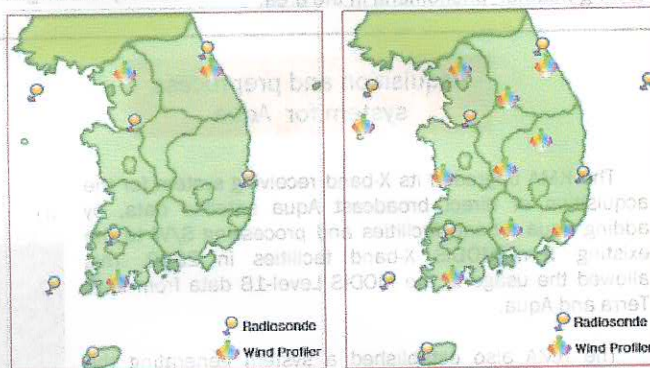
Under phase I, three wind profilers were installed at field sites in Haenam, Munsan and Ganneung area while a control center to collect and process observed wind profiler data was set up at the KMA headquarters in Seoul.

Each wind profiler, which is being operated with an antenna of 1.3GHz, sends observed data up to the height of 5 km to the control center at an interval of 10 minutes and displayed at the website of the Wind Profiler Network that has windows of time series of observed data, vertical gradient, ranged-corrected SNR, spectral width and skewness.

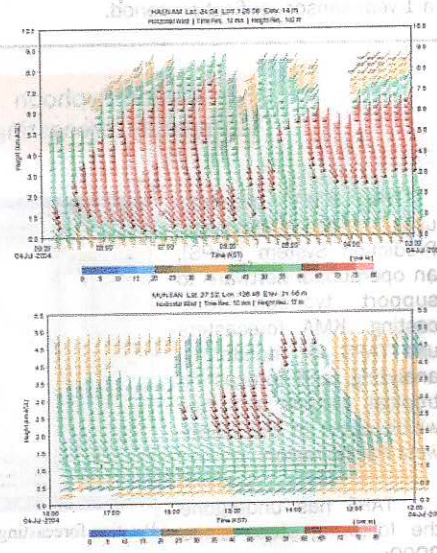
After quality control and processing of data in BUFR code on a real-time, data is transmitted to the KMA's 3 dVar system of 10 km resolution for assimilation. Such assimilated data is used for running of KMA NWP models for short-range forecast. The schematic diagram (below) shows the flow and processing of observed data. Processed data in BUFR code is also being provided to research institutes and universities in Korea for collaboration.



The data flow of KMA Wind Profiler Network



Present (left) and future (right) network for upper-air observation with 8 radiosondes and 10 wind profilers.

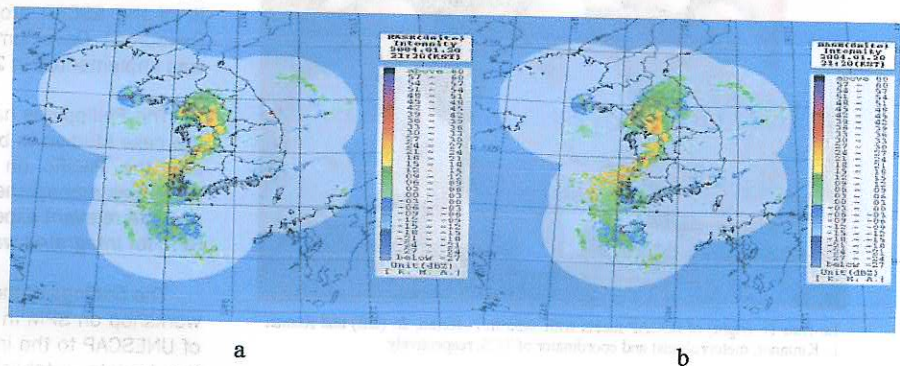


Wind profiler data at Haenam and Munsan sites when typhoon Mindulle passed through southwest (upper) and west coast of South Korea (lower) on 3-4 July 2004.



## New S-band and C-band weather radars installed

The KMA installed an S-band weather radar at Mt. Gwangdeok (Gwangdeoksan) and a C-band radar at Mt. Myeonbong (Myeonbongsan) in 2003 to compensate the radar beam blockage area in Gangwon and Gyeongbuk inland province, respectively. During Typhoon Rusa's passage in 2002, the existing KMA radar network had not detected much of the rainfall in Gangwon province. With the installation of the Gwangdeoksan radar and operated in winter of 2003, it has aided effectively in monitoring and detecting weather phenomena in the area.



Distribution of radar echoes (a) without and (b) with Gwangdeok radar at 21:20KST on January 20th 2004.

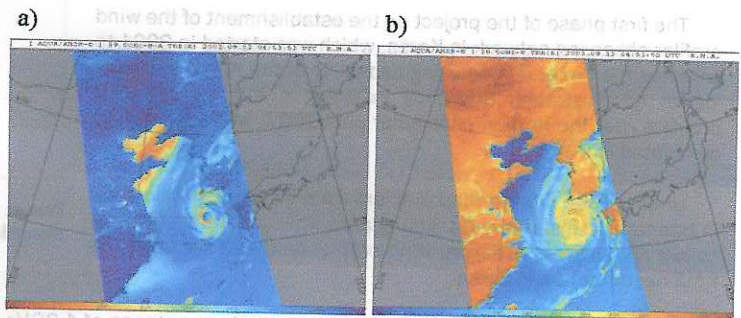
The Myeonbongsan radar is under test-run and will be operational in mid-2004.

## Acquisition and preprocess system for Aqua

The KMA upgraded its X-band receiving system for the acquisition of direct broadcast Aqua satellite data, by adding Aqua X-band facilities and processing S/W to the existing Terra/MODIS X-band facilities in 2002. This allowed the usage of the MODIS Level-1B data from both Terra and Aqua.

The KMA also established a system generating the Level-1B data from AIRS, AMSU, AMSR-E within sensors of Aqua in 2003. This processing system is termed ACAP (Aqua Catalog And Products generation). ACAP is the Level-1B product generation system for the Aqua/AMSR-E, which is based on the processor ADS (AMSR Data processing Software) developed by KMA and STREC with cooperation from Japan's NASDA (National Space Development Agency). ADS was released to the public in June 2003 after a 1-year sensor verification period.

At present, KMA has been carrying out a Level-2 geophysical parameter retrieval using Level 1B data. In addition, KMA will establish a web-based imagery display system and validation system at the end of 2004.



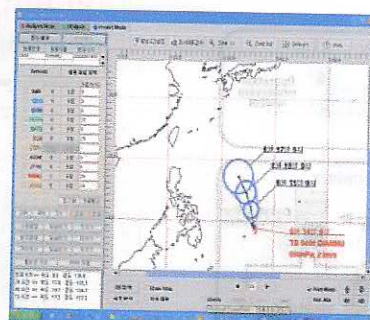
An example of microwave imagery from AMSR-E on Aqua for the 14th typhoon MAEMI passing through the Korean peninsula. a) 36.5 GHz image and b) 89.0 GHz image at 0453UTC on September 12, 2003.

## 48 hour typhoon intensity forecasting

The KMA presently uses Typhoon Analysis and Prediction System (TAPS), an operational software to support typhoon forecasting. KMA forecasters use TAPS for monitoring, analyzing, and forecasting tropical cyclone activities which occur in the North-west Pacific region.

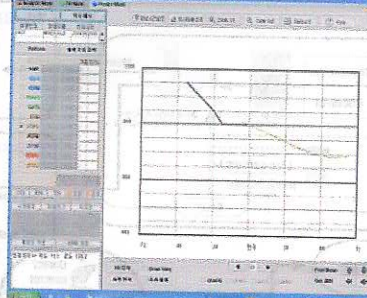
TAPS has undergone the following steps since 2000:

- Construction of TAPS by METRI/KMA and Kongju National University (2000-2003)



Position forecasting from Models

- Position forecasting of existing typhoons for the following 72 hours (2003)
- Intensity forecasting of existing typhoons for the following 48 hours (2004)



Intensity forecasting from STIPS

Particularly, a function of STIPS (Statistical Tropical Cyclone Intensity Prediction Scheme) was included in the 2004 version of TAPS to measure the intensity of existing tropical cyclones for the following 48 hours.



## New typhoon bogussing scheme

One of the most important issues in numerical typhoon modeling is realistic bogussing of the observed typhoon. Approximating the intensity and location of the bogussed typhoon close to the observation data is essential to improve typhoon track and intensity prediction. In addition, bogussed typhoon fields are required to be harmonized in a dynamic balance.

As the 3DOI (3-Dimensional Optimal Interpolation) was replaced with 3DVAR (3-Dimensional VARIational method) in December 2003 at KMA as an analysis scheme for the global model data assimilation system, more meteorological observation could be assimilated in the KMA's analysis system. One example was the 3DVAR typhoon bogussing, where the observation increment and error ratio for

the typhoon would be diagnosed and used as an input for the 3DVAR system.

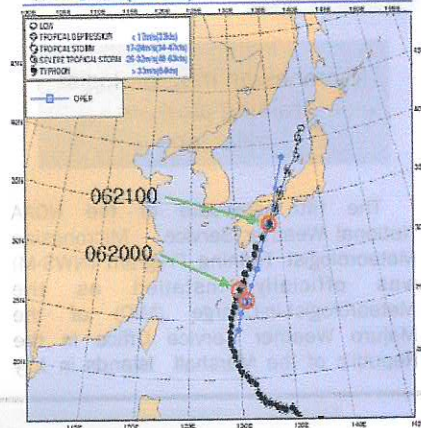
In this scheme, the typhoon in the background field of the 3DVAR cycle is moved to the observed position, where the surface pressure and wind fields are compared with the observed fields to decide the observation increment. The observation error is empirically determined as a linear increase with the distance from the typhoon center.

The application of the 3DVAR typhoon bogussing technique for the past typhoon events showed promising results. Verification of typhoon tracks and intensities indicated that the new scheme has a better prediction capability. The most noticeable improvement was the realistic representation of pressure at the typhoon center. The new typhoon bogussing scheme is now in operation in KMA since June 2004.

## TYPHOON TRACK PREDICTION

NAME: DIANMU (LOW-9406)

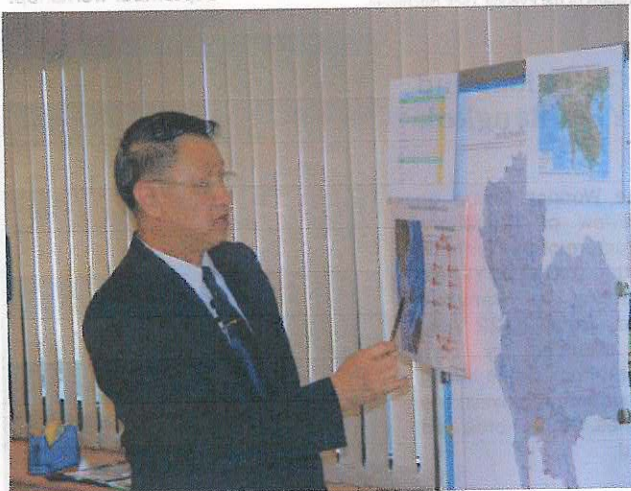
Issued at 00UTC 19 Jun 2004



The predicted typhoon track (blue) by 3DVAR typhoon bogussing at 00UTC 19 June 2004, and the observed track (black), for the sixth typhoon of 2004, Dianmu.

## Thailand

### TMD director-general in Open Green World



Anant Thensathit

Anant Thensathit, director general of the Meteorological Department of Thailand gave an interview in Open Green World on 28 May 2004.

Anant said on the TV program that the landslides at Mae Ramat, Tak province, in upper Thailand, on 20 May 2004, was the result of the impact of the 02B Tropical Cyclone in the Andaman Sea. He warned the people in the upper part province to be prepared and be alert to flooding and heavy rain during



Aftermath of the killer floods in Mae Ramat

August-September and for people in the south during October-November.

Anant noted that the killer floods and mudslides that struck Mae Ramat killed 6 people, destroyed nearly 200 houses and damaged more than 300 houses which left 6000 people homeless. Infrastructures and agricultural areas were also severely affected as the results of the 2-day accumulated rain just immediately before the severe event, particularly, the 124.7 mm. of the 20 May heavy rain.

Anant further warned especially those who live in the flood-prone areas in the mountains to be aware of this kind of natural disaster, particularly, when the 24 hr. rainfalls are above 90 mm. He issued concern in June-September when they should be more alert to heavy rain during this period of active monsoon trough when upper Thailand will be mostly affected.

Moreover, Anant stressed that in the October-November-December period, Thailand will be under the influence of north-east monsoon carrying cold air from China which marks the beginning of the winter season.



## USA

### Micronesian meteorologist training program milestone

The fifth graduate of the NOAA National Weather Service – Micronesian Meteorologist Training Program (NWS-M) was officially installed as the Meteorologist-in-Charge (MIC) of the Majuro Weather Service Office in the Republic of the Marshall Islands in July

2004. This installation is a milestone for the NWS-M and represents the completion of the first phase of the program.

Now, for the first time, all five of the Micronesian Weather Service Offices have MICs with a bachelor degree in meteorology and extensive training in weather operations. The Offices (MICs) are:

Republic of Palau

- WSO Koror (Maria Ngemaes),

Federated States of Micronesia,

- WSO Yap (David Aranug)

- WSO Chuuk (Johnson Elimo)

- WSO Pohnpei (Ceasar Hadley), and

Republic of the Marshall Islands

- WSO Majuro (Reginald White)

The second phase of the NWS-M program is now in progress with students from Micronesia studying for a degree in meteorology at the University of Hawaii.

On completion of their degree and operational training, they will return to their home stations/WSOs with a rich background in science and operations for improving the weather services within Micronesia.

### WGH meeting in Seoul

The meeting of the Working Group in Hydrology (WGH) was held at the Korea Water Company building in Seoul, Korea, on 27-28 February 2004. The group members from China, Japan, Korea and Malaysia, was joined by hydrologists from the Korea Meteorological Agency, with Typhoon Committee Secretariat hydrologist Margaret Bautista as well as experts from local water-related agencies.

The group discussed their activities for 2004, including the program of activities of the workshop entitled "Living with Risk: Dealing with Typhoon-related



KIWE's Koh Denk-Koo (third from right) briefs the hydrologists on the technical details of the Pyeong Taek catchment.

Disasters as part of Integrated Resource Management" to be held in Seoul in September.

The WGH also went on a field trip at Pyeong Taek catchment, selected for the on-site training on flood hazard mapping which is one of the activities for the September workshop.

### Meeting of the Working Group on the Review of Operations and Structure of the Typhoon Committee (WG ROSTY) in Bangkok



WG ROSTY meeting

The 3-day meeting, presided by WG chairman James Weyman of USA, reviewed and discussed the information collected from the members of TC. More refined proposals to be submitted at the 37th TC session were developed on the following topics:

- \* New proposed Terms of Reference (TOR) for the TC, TC chairperson, TC vice-chairperson, TC secretary, TC secretariat, TC advisory working group, and working groups on meteorology, hydrology, and disaster prevention and preparedness, and Typhoon Research Coordinating Group;
- \* Frequency of TC meetings, strategic plan and annual operating/work plan, and seeking and obtaining feedback/input from and among TC members; and
- \* Effective and efficient budgetary process of the TC, resource mobilization, and strategies and one/two detailed projects proposals to be used for resource mobilization.

The Typhoon Committee Newsletter is published in English by the Typhoon Committee Secretariat (TCS).

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