

ESCAP / WMO TYPHOON COMMITTEE NEWSLETTER

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THIRTY FOURTH SESSION OF THE TYPHOON COMMITTEE IN US



Delegates to the thirty fourth session of the Typhoon Committee held at the paradise island of Hawaii.

The thirty fourth session of the Typhoon Committee took place in Honolulu, Hawaii, USA, from 28 November to 4 December 2001. The United States government went on with the hosting despite the disturbance caused by the September 11 attacks. Representatives from members of TC, ESCAP, WMO, TCS, the Commission on Atmospheric Sciences (CAS) and Asian Disaster Reduction Center met at the annual session to continue efforts on how to minimize typhoon damage in the region.

James Weyman, acting director of the Pacific Region of the U.S. National Weather Service, speaking on the first day of the week-long annual session, acknowledged the large attendance at the Hawaii session which he said was an indication of the strength of the regional collaboration to mitigate losses of lives and properties by typhoons. Weyman was elected as chairman of the Committee until its next session.

Lt. Governor Mazie Hirono of the State of Hawaii underscored the importance of the national meteorological and hydrological services to work together to improve forecast and warning systems for natural disasters, as well as the

benefits gained from the strengthened cooperation among members in the areas of disaster mitigation, research and water resource management.

In a special address, John J. Kelly, Jr., Director of the U.S. National Weather Service, highlighted the importance of bringing together multi-disciplinary experts for better coordination, and putting together regional cooperation development plans of weather services for the benefit of the citizens of this region and of the world. He invited the participants to visit the Pacific Tsunami Warning Center, Joint Typhoon Warning Center and the Regional Specialized Meteorological Center to see together the weather services and the systems in operation to improve tropical cyclone forecasts, in particular, the Emergency Meteorological Weather Information Network (EMWIN), a satellite communication system which he hoped would be available around the world in the future.

Kelly also said the NWS at present has the capability to provide six-month climate forecast. He encouraged the members to improve their quality of services and increase the interaction with decision-makers, the private sector, including

improvement in the formats of weather forecasts. He also encouraged the introduction of performance-based results and wished that the three disciplines, meteorology, hydrology, and disaster prevention and preparedness would work together for better servicing their communities.

Eisa Al-Majed, WMO representative, in a message said the session would develop strategies for coordinated actions to upgrade tropical cyclone forecasts and warning services, including Regional Specialized Meteorological Centers (RSMCs) operations, and improved public awareness. He informed the session that the Central Pacific Hurricane Center-Honolulu started to operate as the WMO RSMC for tropical cyclone in accordance with the decision of the Executive Council on July 1, 2001, even as the WMO Sixth long-term plans included a new programme on disaster prevention and mitigation activities.

Le-Huu Ti, ESCAP representative, thanked the U.S. government for hosting the session and for its active role since joining the Typhoon Committee in 1997 in the common efforts to achieve the objectives of the Committee even as he promised ESCAP's continued technical support for the Committee's activities.

Weyman, Kelly and Ti led the representatives in paying tribute to their late colleague Richard Hagemeyer, former director of the NWS Pacific Region. The session observed a minute of silence in honor of Hagemeyer who passed away in October.

At the session, the Committee noted the resolution submitted by the Honolulu workshop on the potential development of a unified N.W. Pacific tropical cyclone best-track data set in November 2001 and agreed to establish a working group which would further examine the feasibility, resources and implementation plan for a comprehensive tropical cyclone best-track data set covering the North West Pacific, taking into account issues related to cost recovery. The working group composed of Japan, China, Hong Kong, the Philippines and USA, will submit its report for consideration at the next session of the Committee.

The pre-session meeting of hydrologists recommended to re-establish the working group on hydrology component to ensure effective implementation of the action programme for the component based on the priority recommendations of the Expert Review Missions in 2001. A 4-day workshop on Integration of Risk Analysis and Management of Water-related Disasters into Development Process in the Typhoon Committee Area will be held in the Philippines in July 2002 which aims to sustain the interest generated by the comprehensive review on the activities under the Committee's hydrological and disaster prevention and preparedness components.

The hydrologists also proposed to establish a TC Web-site to enhance visibility of activities on the five components, and to participate in the 3rd World Water Forum set in Kyoto, Japan, in March 2003.

The Committee noted the increased interaction on Disaster Prevention and Preparedness (DPP) activities among members generated by the visit of the Expert Review Missions, and the urgent need of several members on the preparation and improvement of hazard maps and strengthening of related warning systems.

The Committee also noted the launching of the Hong Kong Observatory's Server for International Exchange in October 2001 which would initially provide the members products of HKO's Operational Regional Spectral Model via the Internet. The HKO had also developed two websites for WMO, the Severe Weather Information Center (SWIC), to collect and display warning messages issued by RSMC Tokyo-Typhoon Center and the National Meteorological and Hydrological Services (NMHSs); and the World Weather Information Service (WWIS), to display climatological



The Typhoon Committee in session.

information and weather forecasts by participating NMHSs in order to generate an integrated worldwide forecasting service.

The representative of CAS informed the Committee that the director of RSMC Tokyo-Typhoon Center, Masashi Nagata, will act as member of the International Committee for the Fifth International Workshop on Tropical Cyclones (IWTC-V) in Cairns, Australia, in the capacity as regional representative of TC.

The Committee approved the proposed vision statements, broad goals and priority objectives of the new Regional Cooperation Programme Implementation Plan (RCPIP) and invited the members to inform the Committee on which actions they would participate.

The Committee also reestablished the working group of the Typhoon Research Coordination Group (TRCG) to provide the overall framework for research collaboration among the members in all the components of the Committee. TRCG has recommended short-term research topics for the members to implement which include the continuation of the TRCG fellowship scheme; further development and sharing of results in the use of information through Internet; and securing of academic researchers' participation in cooperation research with TC forecasting application, including track forecasting with multi-model ensembles, heavy rain and local wind forecasting, and utilization of satellite microwave and radar data.

TRCG also recommended research topics for medium or long-term in cooperation with the scientific community such as IWTC, under the framework of RCPIP. These include model intercomparison project on tropical cyclone utilizing international intensive observation experimental data set; demonstration project including interactive display system to facilitate transfer of technology and exchange of information among members; and cooperative development of mesoscale models including data assimilation, quantitative precipitation, and air-sea interactions.

JMA offered the members for the attachment of two women forecasters to RSMC-Tokyo in July 2002 for on-the-job training in typhoon operation, and reported its plan to set up a Website with information for numerical predictions of tropical cyclone tracks with relevant major centers.

The Committee cited WMO's initiative to establish the Emergency Disaster Response Group to coordinate and assist NMHSs in disaster events and urged the members to provide information to WMO on any disaster to enable it to evaluate the needs of the NMHSs.

Noting the offer by the Asian Disaster Reduction Center to prepare and distribute an on-line list of websites on disaster prevention and preparedness information, the Committee also urged interested members to provide ADRC with related information for inclusion in the ADRC list.

Chiang Mai in Thailand will be the site of the next session of the Committee in November 2002.

HONG KONG OBSERVATORY EARNS 2001 TC NATURAL DISASTER PREVENTION AWARD

The Hong Kong Observatory was awarded last November 28 in Honolulu, Hawaii, the Typhoon Committee Foundation's 2001 Typhoon Committee Natural Disaster Prevention Award, becoming the first awardee to garner such an honor which did not come from the country (United States) hosting the annual session of the Typhoon Committee.

The annual Typhoon Committee Natural Disaster Prevention Award was created in 1989 in Tokyo following the decision of the Twenty First Session of TC to use the income derived from the Typhoon Committee Foundation to generate greater public awareness on disaster prevention and preparedness measures.

The Typhoon Committee Award was accepted by HKO Director H. K. Lam on behalf of the Observatory from TC Foundation chairman Roman Kintanar in ceremonies held during the opening of the TC session in Honolulu. HKO received the

award for its significant contributions to the Tropical Cyclone Programme that have been of special benefit to the emergency management community, the media and the general public in the Committee's area of responsibility.

HKO's especially noteworthy contributions include distinguished service as the chair of the Committee; extended and extremely effective chairmanship of the Typhoon Research Coordination Group, particularly, during the development period of the name list and procedures for naming tropical cyclones in the Western North Pacific and the South China Sea; making HKO's web page available to host the listing of the tropical cyclone names including definitions and native pronunciations; and for taking the initiative and providing the resources to develop an exclusive web page for the World Meteorological Organization that provides information on all active tropical cyclones anywhere in the world.

T Changes



Dr. Buranaprapa

Buranaprapa succeeds Sarathulthath

Dr. Prapansak Buranaprapa was appointed as new director-general of the Thailand Meteorological Department succeeding Wanchai Sarathulthath. Buranaprapa holds a Post Graduation degree in Transportation Engineering from the Oklahoma State University, and a Bachelor's degree in Political Science major in Public Administration. He received an honorary degree in Civil Engineering from the National Defense College of Thailand.

Buranaprapa was the director of the Bureau of Highways Construction and head of the Office of Inspector of the Ministry of Transportation prior to his post as head of TMD. He joined the Department of Highways in 1965 after receiving his honorary degree.

An associate professor in Highways and Pavement Engineering at the Asian Institute of Technology, Buranaprapa's specialization in road and highways construction, urban planning, and transportation safety and management has served him well as evident in his honorary positions as chairman of the Global Road Safety Partnership (GRSP) for Thailand, and honorary consultative member of the National Towns and Country Planning Committee, and the Land Transportation Management Committee.



Dr. Nagata

Nagata is new head of NTC-JMA

Dr. Masashi Nagata was appointed new head of the National Typhoon Center, JMA (RSMC Tokyo - Typhoon Center), taking over from Tatsuo Ueno on April 1, 2002.

Nagata, 47, holds a Ph.D. and B. S. degree in Geophysics from the University of Tokyo. He was a typhoon analyst and forecaster at NTC before his appointment as head.

Nagata joined JMA in 1978 starting as a technical staff member at the Seismological Division. He was a research scientist on mesoscale meteorology (with special interest in numerical modeling) at the Mete-

orological Research Institute from 1982 to 1993, including one year as a visiting scientist at the University of Illinois (1987-88).

As a senior R/D staff member at the Numerical Prediction Division of JMA (1993 to 1999), Nagata was in charge mainly with developing JMA's Typhoon Model. He led the WMO-CAS/JSC WGNE mesoscale model intercomparison project COMPARE Case III for Typhoon FLO (9019) from 1996 to 1999.

Cambodia

Int'l expert meeting on early warning for the Mekong River held

The Mekong River Commission (MRC), with the assistance of the government of Germany, hosted the International Expert Meeting on Early Warning for the Mekong River in Phnom Penh, Cambodia, from February 24 to March 1, 2002. The meeting, presided by MRC chief officer Joern Kristensen and Cambodia National Mekong Committee chairman Khy Taing Lim, was attended by MRC member countries (Lao PDR, Thailand, Vietnam, Cambodia) and other international organizations.

The expert meeting was held with the objectives to identify the most effective components for the MRC Early Warning System and the success of existing systems or models in different countries, to discuss the possibilities and limitations of the existing system, and to make recommendations on the basis of comparisons.

The MRC, tasked with the preparation of a Basin Development Plan for the Mekong River Basin under the Agreement on the Cooperation for Sustainable Development of the Mekong River Basin, initiated the formulation of a regional strategy on flood management and mitigation (FMM) in February 2001. Subsequent consultation sessions at the national and regional levels led to the adoption of a regional strategy on FMM for the Lower Mekong River basin by the Council of MRC in October 2001.

The MRC Strategy was designed to upgrade the existing MRC Forecasting System serving the countries in the Lower Mekong Basin, and to install a forecasting system based on modern technology combined with a more effective warning system. Efforts are being made to implement the regional strategy including the holding of the first annual Mekong Flood Forum in Phnom Penh on 23-24 April 2002.

China

First China climate conference held

The influence of climate and its changes on China's social and economic development aroused heated discussion among more than 200 participants in China's first climate conference held in Beijing, from 5 to 6 April 2002.

H.E. Li Peng, Chairman of the Standing Committee of the National People's Congress, presided at the opening of the conference. Hu Qili, Vice-Chairman of the Standing Committee of the Chinese People's Political Consultative Conference, speaking at the conference, said that climate change had become one of the key factors affecting the country's sustainable development.

Dr. Qin Dahe, Administrator of the China Meteorological Administration (CMA), and chief member of the China National Climate Committee, noted that China was marching ahead in research in climate and various climate changes with the establishment of a comprehensive observation network covering the atmosphere, ocean and land.

The two-day conference discussed the national climate program and the plan for China's climate observation system to outline the direction of the country's climate work for the next 10 years.

Forum marks World Meteorological Day celebration

In celebration of World Meteorological Day 2002, CMA held a forum at the Great Hall of the People, in Beijing on March 20, 2002, presided by Li Huang, Deputy Administrator of CMA. Qin Dahe, Administrator of CMA, spoke on "Enhance the Ability to Deal with Synoptic and Climatic Extreme Events for Social and Economic Sustainable Development."

At the forum, Qian Zhengying, vice-chairperson of the Standing Committee of the Chinese People's Political Consultative Conference (CPPCC), noted that the Chinese government was paying great attention to reduce the vulnerability of extreme weather events and strengthen the ability to prevent typhoon calamity. She added that it was the most urgent subject and basic task of the meteorological department.

Leaders from other Chinese government departments, such as, the Ministry of Science and Technology, State General Headquarters of Fighting Drought and Flood, State Environmental Protection Administration, State Oceanic Administration, Civil Aviation Administration, China Seismological Bureau and State Obviate Disaster Committee also participated in the forum.

The National Meteorological Center also held an open day activity. Since 1997, NMC has conducted an open day propaganda activity with nearly 2,000 people visitors every year. Through the yearly open day activity, NMC expands its influence in the society.



Above, WMD forum at the Great Hall of the People. (Inset) CPPCC Vice-chairperson Qian Zhengying with CMA Administrator Qin Dahe at the forum.

12th Session of National Workshop on Tropical Cyclone

The twelfth session of the National Workshop on Tropical Cyclone was held in Ningbo, Zhejiang Province of China, on April 9-12. More than a hundred experts from 43 meteorological units, including research, operation, colleges, military and aviation, participated in the workshop.

The workshop discussed the progress in research and operational forecasts for the past two and a half years. A total of 86 reports were presented in plenary and group sessions which covered extensive fields such as landfalling, structure and intensity change, TC formation and short-term climate forecast, and track and impact.

The workshop also noted the contribution of new generation of monitoring instruments including Doppler radar, high-resolution digit satellite and intensive AWS to the identification of meso-small scale systems, and the optimization of initial fields. Also noted was the progress achieved in data assimilation field with more meso-scale features of target system being investigated.

Meanwhile, typhoon circulation variation has been investigated from more wider temporal and spatial scale. Also, other things from Antarctic ice cover, ENSO and South Asia High to beta scale cloud cluster and small-scale tornados that may have relationship with tropical cyclone activities. In addition, typhoon was noted as a system with sophisticated fine structure, and also discussed the dynamic feature of vortex Rossby wave.

Furthermore, old-generation experts in research, operation, teaching and management, discussed with young generation on how to improve typhoon forecast accuracy and promote typhoon research to world advanced level.



Prof. Chen Lianshou (left) of the Chinese Academy of Meteorological Sciences at the session's opening.

Regulation on issuance of pre-warning signals in Guangdong Province

The regulation on issuance of typhoon pre-warning signals in Guangdong province was put into practice in November 2000. Based on incomplete statistics, signals have been issued for 360 times at various weather observatories and stations across the province since April 2001 (of these typhoon signals, 106 were white, 158 green, 72 yellow, 20 red and 4 black).

Apart from the weather consultation phone line "121", the general public inquiring for information about the pre-warnings can also be informed through messages or rolling subscript on screen in broadcasting or TC programs. The pre-warning signals can be readily received in cities networked meteorologically.

The issuance of the signals in the province plays an important role in strengthening awareness on preventing meteorological damage in all walks of life, assisting in policy-making to combat disasters at all levels of government and functional departments, and minimizing losses caused by typhoons and effectively safeguarding the national economy, lives and property.

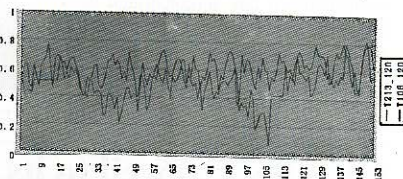
New global medium-range assimilation and prediction system

A new global medium-range assimilation and prediction system, in which the spectral model T213L31 is modified on the basis of the IFS codes of ECMWF and the 3D-OI analysis scheme is upgraded from operational version (T106L19), has been put into quasi-operation in March 2002 after 9 months parallel running with the operational one of the time (T106L19).

The new model T213L31 has many advanced technical functions, such as the introduction of the semi-Lagrangian treatment of the advection, use of a reduced Gaussian grid, the introduction of economies in the Legendre transforms, and improvements of the model's basic architecture. The main changes of the T213L31 model from the original IFS codes include the modification on message passing from blocked mode to non-blocked mode, and development of shared-memory parallelism of the codes using OpenMP; adjustment of long vectors to short vectors to reduce cost; optimization of the codes; development of the post-processing system, and others, in order to take advantage of the architectural features of IBM SP parallel computer in NMC/CMA and to meet the operation requirements on running time and on guidance products.

It is revealed from parallel experiment that the performance of the T213L31 system over the past months is better than the T106L19, not only on the predictions of large-scale circulations but also on the precipitation forecasts.

Comparison of anomaly correlation coefficients of North-Hemisphere 500 hPa height 120-h forecasts of T213L31 in blue and of T106L19 in pink over the period of July 1st to November 30th 2001.



CMA starts action plan for 2008 Olympic Games

The CMA has started to implement the scientific and technological action plan on meteorological service for the Olympic Games 2008. The plan's main task includes the application of advanced technology in the meteorological observation, development of high resolution numerical model, forecasting of severe weather, and conduct of research on relationship between weather and sports.

The action plan aims to set up the state-of-the-art forecast systems and sensitive disaster early warning systems to provide excellent weather services and friendly-user products for different users during the Summer Games.

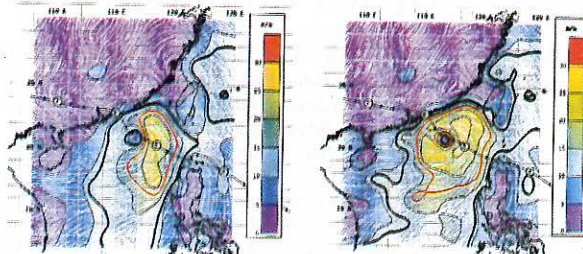
Hong Kong, China

Model initialization of tropical cyclones using quickSCAT sea-surface wind data

The Hong Kong Observatory has tested the assimilation of QuikSCAT sea-surface wind data in the hydrostatic Operational Regional Spectral Model (ORSM) and the non-hydrostatic model of the Advanced Regional Prediction System (ARPS) with tropical cyclone cases. The ORSM is run operationally at 60 km and 20 km resolutions to provide short-range forecasts while the ARPS is being run at 30 km and 6 km resolutions in an experimental mode.

In the numerical experiments, QuikSCAT wind data covering the circulation of tropical cyclone Utor (0104) over the South China Sea were assimilated in the analysis system of the ORSM and ARPS. After the ingestion of QuikSCAT data, positive impact was observed in the ORSM and ARPS surface wind analyses. The higher winds in the north-western quadrant are consistent with surface reports and the observed onset of gales in Hong Kong shortly after the analysis time. However, no significant impact on the forecast tracks in both ORSM and ARPS runs was found.

Indirect utilization of quickSCAT data through the application of bogussing technique was also experimented using ORSM. Some differences in the model forecast track were noted but the impact was not yet conclusive.



ARPS surface wind analysis for 12 UTC 5 July 2001, without QuikSCAT (left) and with QuikSCAT (right). Model resolution is 30 km. Isotach contours of 11.5 m/s (force 6) and 17.5 m/s (force 8) are highlighted in bold black and red, respectively.

Application of images from polar-orbiting weather satellites in HK

The HKO has installed in late 2001 a ground reception system for receiving images from polar-orbiting meteorological satellites. The images provide useful information to complement that from the geostationary meteorological satellites.

Thus far, the images' high resolution and the availability of the intermediate infra-red channel have enabled weather forecasters to discern easily the fog and mist in the coastal areas especially at night (brought about by maritime air during spring months), and the outbreak of hill fires in Hong Kong and southern China (most often occurring during the dry, cool months).



Image captured by NOAA-16 at 3:10 a.m. (Hong Kong time) on 17 January 2002. Mist and fog were highlighted in red.

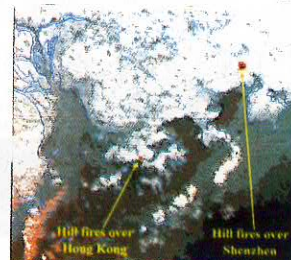
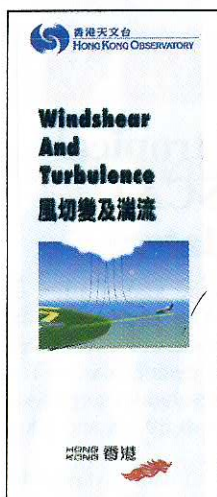


Image captured by NOAA-15 at 7:30 p.m. (Hong Kong time) on 27 November 2001. Hill fires were depicted in red and dark spots.



Windshear and turbulence alert service

The HKO provides aviation weather services for international air navigation. One aspect of the work is to alert pilots on possible windshear and turbulence in the vicinity of the Hong Kong International Airport. Real-time alerts of windshear and turbulence are generated by an automated system comprising a Terminal Doppler Weather Radar and a network of anemometers in the vicinity of the airport for relay by air traffic controllers to aircraft landing at the airport or prior to take-off. Forecasting techniques have also been developed for the forecaster to issue windshear and turbulence alerts for broadcast on the Automatic Terminal Information System (ATIS).

Apart from the round-the-clock alert service and on-going enhancement of the alert facilities, HKO has embarked on educating the aviation community and the public with a view to increasing the awareness and

understanding of windshear and turbulence in Hong Kong. In addition to the conduct of regular liaison meetings and briefings from time to time, a pamphlet on windshear and turbulence has been published and distributed to pilots, airlines, air traffic controllers, and other members in the aviation community. The pamphlet gives the meaning of the phenomena, their causes, frequency of occurrence, the alert service, and precautions people should take. It can be viewed on HKO's website (http://www.weather.gov.hk/publica/gen_pub/windshear.pdf).

HKO's virtual exhibition hall

The HKO launched its Virtual Exhibition Hall on the Internet on February 8, 2002, one of the achievements of the Hong Kong Special Administrative Region government's initiative on Electronic Service Delivery Scheme.

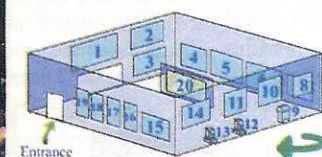
With the establishment of the Virtual Exhibition Hall, the public can view the hall exhibits at the HKO headquarters via the Internet. Using special interactive multi-media techniques, the Hall provides visitors with a panoramic view of the exhibition hall while they browse through the exhibits on the Internet. They can virtually tour around to study the details of any exhibits at their own home or anywhere with Internet connection. A number of interactive games and demonstrations are designed to facilitate understanding of the underlying concepts of the exhibits, making the tour more lively and interesting.

The HKO headquarters' exhibition hall is always popular and has attracted over 30,000 visitors, including students, teachers and members of the public since its inauguration in 1983. The Virtual Exhibition Hall is no exception and has received over 83,000 visitors during the first month, helping a lot in promoting public understanding on meteorology, geophysics, and environmental radiation, as well as the wide range of services provided by the Observatory.

The Virtual Exhibition Hall will be updated regularly to keep pace with the latest development at HKO and to meet public demands. The Hall can be accessed through HKO's home page at: <http://www.weather.gov.hk/contente.htm> or as alternative, it can be accessed directly at: http://www.weather.gov.hk/education/cyber_exh_hall/index_ef.htm.



Schematic Plan of the Main Exhibition Hall



(Please move the mouse cursor to the diagram above or below to see the previews of the exhibits)



The front page of the exhibition on "Weather observation and public weather services."

Training programme on AWOS organized

A training programme on Automated Weather Observing Systems (AWOS) was organized by HKO under the WMO's Voluntary Cooperation Programme (VCP) from November 5 to 23, 2001. Five trainees from the countries of Iran, Kazakhstan, Mongolia, Sri Lanka and Thailand were selected from a total of 20 applications and attended the training programme.

The 3-week training programme was aimed at promoting a better understanding of the technical aspects in the development and implementation of automated weather observing systems through lectures, tutorials, practical sessions and outstation visits. The programme covered an overview of meteorological sensors, hardware and software development tools and techniques, fault diagnosis and trouble shooting, and siting criteria.

The participants presented country reports and shared experiences. In view of the demand, another training programme on AWOS will be held in November to December 2002 as HK's contribution to 2002 WMO VCP.



AWOS training programme participants posed with Dr. H.K. Lam (fourth from left), Director of HKO.

HK's first weather buoy

For the first time, HKO has deployed a buoy in support of its weather services. The buoy was installed in late 2001 over the waters west of the Hong Kong International Airport. Supported by solar power, it transmits wind, pressure, temperature and humidity data every 10 seconds, via radio.

The buoy helps fill in the weather information gap over the data-sparse area. Despite the short time period since commencement, it has demonstrated its usefulness in providing advance warnings to aircraft in respect of windshear due to sea breeze and frontal passages. HKO plans to deploy more buoys for weather monitoring purposes.



First weather buoy

HK bids farewell to its last signal station

Dr. H.K. Lam, Director of HKO, officiated at the closing ceremony of Hong Kong's last tropical cyclone signal station in Cheung Chau Island on January 26, 2002 witnessed by some 40 HKO staffers and friends.

The history of tropical cyclone warning service in Hong Kong can be traced back as early as in 1884 when visual tropical cyclone warning signals started to be hoisted at signal stations to alert the public to impending tropical cyclones. These stations reached their peak in the early 1960s when over 40 signal stations were around Hong Kong.

In recent years, the advancement in information and telecommunication technology, which has resulted in the dissemination of up-to-the-minute tropical cyclone warnings, weather information and forecasts through the internet, electronic media as well as personal mobile communication gadgets, has made the function of tropical cyclone signal stations no longer useful. The decommissioning of the Cheung Chau signal station signified the end of an era of the signal stations in Hong Kong.

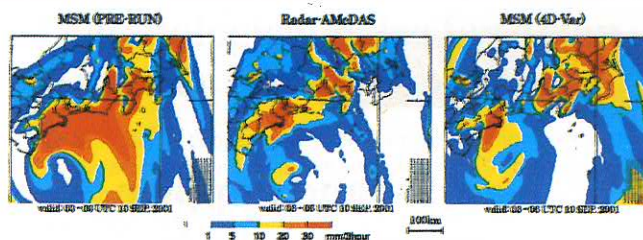
Japan

JMA operates 4D-Var system

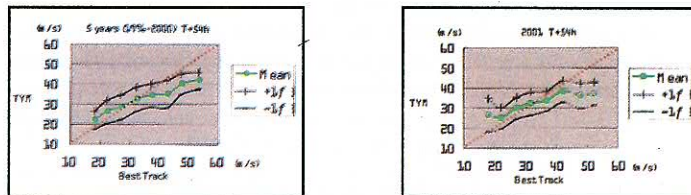
The Japan Meteorological Agency (JMA) has started operation of the four-dimensional variational data assimilation (4D-Var) system for the hydrostatic Mesoscale Model (MSM) with a horizontal resolution of 10 km. In March 2002. The 4D-Var system was developed by JMA in 1997 to assimilate observational data which are varied in time and space, including those from wind-profilers, satellites and Radar-AMeDAS (radar/raingauge coupling system), with higher accuracy and thus improving the performance of MSM, in particular, prediction of heavy rains.

Until the installation of the 4D-Var system, initial conditions for MSM had been prepared by the 3-hour PRE-RUN, which is composed of 3-dimensional optimum interpolation for assimilating conventional data during the 3-hour period just before the initial time and physical initialization for assimilating Radar-AMeDAS precipitation data at one-hour intervals. The 4D-Var system took over PRE-RUN and has conducted 3-hour cycle analyses to prepare initial conditions for MSM.

In a case study for TY DANAS (0115) which hit Tokyo in early September 2001, MSM with 4D-Var system predicted heavy rains associated with the typhoon fairly precise as compared to that with PRE-RUN.



Forecast and observation of 3-hour amount rainfall associated with TY DANAS (0115) just before landfall on the Kanto region, Japan. An 18-hour forecast of MSM with PRE-RUN (left) and that with 4D-Var (right) are compared with an actual observation by Radar-AMeDAS (middle).



TYM's performance is shown in comparison with best tracks. Mean values and standard deviations of errors of TYM's 54-hour MWS forecasts from 1996 to 2000 (left) and for 2001 (right) are presented. In this verification, forecasts are stratified by wind speeds 5 m/s intervals (open circles indicate the ranks with less than 20 forecasts). Note that 54-hour forecasts of the model are used to make official 48-hour forecasts of tropical cyclone intensity in operation.

RSMC Data Serving System upgraded

JMA has upgraded the RSMC Data Serving System (DSS) with three PC servers equipped with large-capacity hard-disks which are sustainable for substantial increase of data for provision in April 2002. The new system is also equipped with Load Balancer for server-clustering to achieve high fault-tolerance and uninterrupted operation even at maintenance.

In addition to the Global Spectral Model (GSM) product at 1.25 (resolution in thinned grid, which started being provided in April 2002, JMA plans to extend the range of products from the new RSMC DSS as appropriate based on the requirement from the users.

JMA has been operating the RSMC DSS since 1995 in providing TC members with NWP products and observational data through the Internet. As of March 1, 2002, eight members were registered for accessing RSMC DSS.



New RSMC DSS

JMA and NOAA reach agreement for GOES-9 to back up GMS-5

The National Oceanic and Atmospheric Administration (NOAA) and Japan Meteorological Agency (JMA) held discussions to explore the feasibility of using GOES-9 in place of GMS-5 in an emergency.

GMS-5, on extended operation after the failed launching of its successor, MTSAT-1R, in November 1999, is expected to remain functional in 2002 without additional measures. But in anticipation of a serious problem that may arise in 2003 from unavoidable deterioration that would force further and drastic reduction of GMS-5's observational capabilities, including an abrupt malfunction in scanning the earth, led to the NOAA-JMA talks.

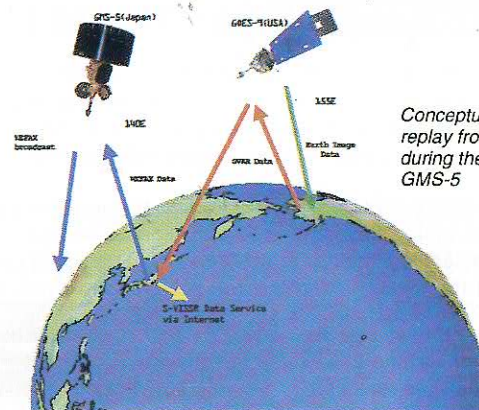
Japan and the United States have agreed on the establishment of the GMS-5 backup system with GOES-9 and concluded the Implementing Arrangement between JMA and NOAA last May 10. According to the arrangement, NOAA moves GOES-9 from 105W, the present position for standby on orbit, to 155E to cover the western Pacific for emergency backup. In case of serious trouble with GMS-5, NOAA relays GOES-9

Meeting of working group on hydrology held

The members of the working group of TC hydrological component met in Tokyo, Japan, on 25-26 February 2002, for discussions on TC members' responses to the implementation of priority projects proposed by the August 2001 workshop and Review Mission. The two-day meeting was chaired by Junji Miwa, representative of the Japan Ministry of Land, Infrastructure and Transport (MLIT) with TC.

The five-member working group agreed to lead in the implementation of the pilot projects recommended by the Review Mission. Since some of the pilot projects did not receive sponsorship from the members, the group decided that an examination in further detail was needed to be done during the workshop on "Integration of Risk Analysis and Management of Water-related Disasters into Development Process in the TC Area," to be held in the Philippines in July 2002, preparation of which was also tackled at the meeting.

The unsponsored pilot projects were the assessment of national requirements and capabilities on hydrological and disaster prevention and preparedness components, pilot project for data sharing between TC members to enhance flood forecasting accuracy, development of guidelines for dam operation in relation to flood forecasting, and the on-the-job training on flood forecasting for TC members. The outputs from these recommended projects will be incorporated into the related components in the TC Regional Cooperation Programme Implementation Plan (RCPIP) to ensure success in their respective objectives.



Conceptual figure of data replay from GOES-9 during the back-up of GMS-5

image data to JMA on an hourly basis. JMA disseminates WEFAX images for SDUS (Small-scale Data Utilization Station) users via GMS-5 as has been performed by the satellite. JMA is arranging to provide high-resolution images (S-VISSR) data via Internet to the current MDUS (Medium-scale Data Utilization Station) users of the NMHSs.

The backup system will enable geostationary meteorological satellite observations to continue without interruption in case of failure of GMS-5 thus securing satellite data for the countries in Eastern Asia and the Western Pacific for operational meteorological services including prevention of natural disasters. It will be all set in the spring of 2003 and will continue until MTSAT-1R starts normal operation.

Republic of Korea

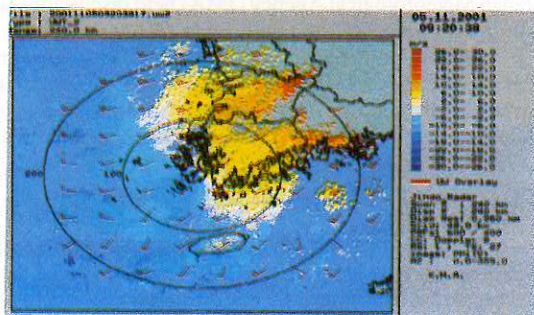
New S-band doppler radar installed

A new S-band doppler radar was installed by the Korea Meteorological Administration (KMA) on Mt. Chum-Chal in Jin-Do Island in December 2001 for monitoring of adverse weather coming from the south-western part of Korea. The radar, located at the southwest corner of the Korean peninsula, is 485m high from sea level. It has a radius of coverage of 240-480 km. and supports the functions of severe weather watch in the southwest region along with six other radars.

Front view of the Jin-Do S-band Doppler radar.



An image from the Jin-Do radar.

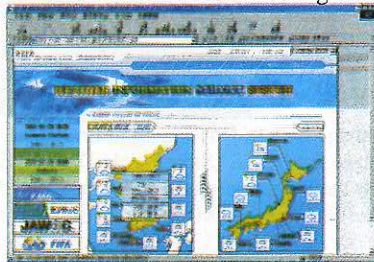


Weather support for 2002 Korea/Japan World Cup

Weather information which consisted of observation, forecast and climatology was provided by KMA during the successful 2002 Korea/Japan World Cup, held for the first time in Asia, from 30 May -30 June, with the help of automatic weather stations installed at the ten venues nationwide.

The information was provided through the Internet translated in seven languages, including English and French. Surface weather conditions, such as wind, temperature and rainfall amount in the venues were monitored in real-time and provided in the observation section along with other observation data such as radar and satellite imageries, distribution of lightning, and weather condition at major airports.

Hourly nowcasts for the rain, wind and temperature at the venues were provided in the forecast section up to 8 hours in advance before the game started. A mesoscale model output (horizontal resolution of



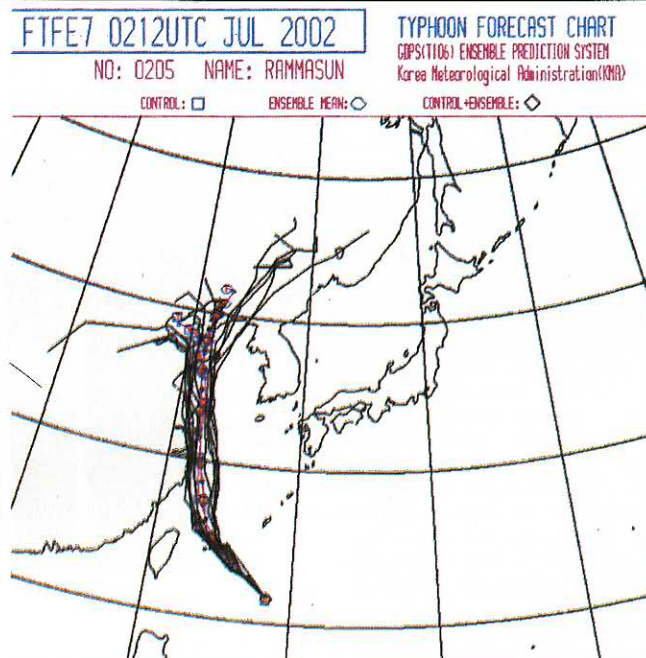
Website weather information for 2002 World Cup.

30km and 5km) and the latest observations are integrated to produce the hourly forecasts. Also included were today and tomorrow's weather forecasts, weekly and monthly advisory, and seasonal outlook.

Operation of medium-range ensemble prediction system

An ensemble prediction system (EPS) with breeding modes has been in operation for medium-range prediction at KMA. The intermittent data assimilation system with the global spectral model T106/L21 is used to find breeding modes. The six-hour model output is corrected with new observations to yield a control initial condition.

A total of thirty two breeding perturbations are used for the EPS at KMA. Numerous products are generated, including ensemble mean, standard deviation, and spaghetti plot for a given geopotential. Multiple typhoon tracks have also been generated with the EPS. The ensemble mean field has higher accuracy in terms of RMSE errors than the deterministic one, particularly for a longer lead time.

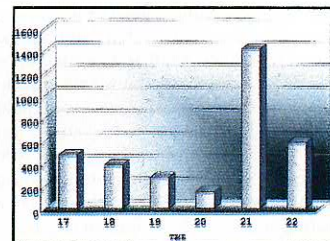


An example of ensemble tracks for No. 5 Typhoon Rammasun

Intensity forecast and warning service for yellow sand

KMA issues special information when severe Yellow Sand storm is expected to come. The information is based on the latest trajectory model calculated on isentropic surfaces (295K, 300K, 305K) of the global model, satellite imageries from GMS and NOAA retrieved from the difference of brightness temperature (TBB11 - TBB12), ground observations with PM10, a lidar installed at GAW observatory and reports from visual observations.

A very severe Yellow Sand storm hit most cities of Korea on March 21-23. The daily mean concentration for fine dust particles observed at the GAW observatory was as high as 1,407.3/S. Schools and airports were closed while factories for semi-conductors and other sensitive products reduced their working hours. KMA began issuing warnings for Yellow Sand storm, in addition to special forecasts, on April 10 to alert the public and disaster authorities.



Daily variation of dust concentration observed by GAW on March 17-22, 2002.

Macao, China

Macao SAR marks WMD 2002

The Macao Meteorological and Geophysical Bureau (MMGB) led World Meteorological Day 2002 celebration in Macao SAR with a set of activities aimed at enhancing the Bureau's capability on weather monitoring and prediction. The celebration included the launching of a new website and the extended local four days forecast, as well as the inauguration of a new wind and temperature profiler system.

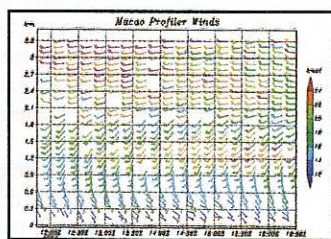
The new MMGB website (<http://www.smg.gov.mo>) provides faster and plentiful information and will directly show the current temperature and humidity as well as the forecast at the main page. Relevant in force warnings will also be displayed at the main page promptly during significant weather such as tropical cyclone, rainstorm, thunderstorm and strong monsoon wind.

Several database enquiry and web technique were also added. A new web server with speed upgrade from 64K to 100M locally and 194K overseas provides faster transmission capability.

A four-day weather forecast was launched to provide early weather information to the public, tourism agencies, sports associations, festival organizers and others. A new installed wind and temperature profiler system was also inaugurated to monitor low-level wind and temperature. The data are useful for applications on mesoscale analysis and forecasting, air quality modeling and atmospheric boundary layer research.



Top photo- Ao Man Long (2nd from left) Sec. of Transportation and Public Works presides WMD affair. Above- MMGB Director Fong Soi Kun (right) leads inauguration ceremony for wind and temperature profiler system.



Wind and temperature profiler system Wind data display

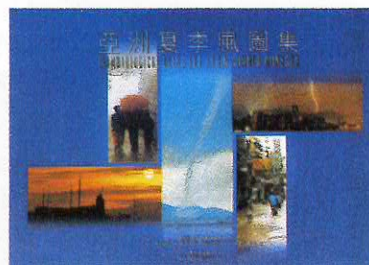
Climatological Atlas for Asian Summer Monsoon published

The MMGB, in cooperation with Zhongshan University and supported by the Macao Foundation, has published the Climatological Atlas for Asian Summer Monsoon in May 2001. The volume is the first comprehensive Atlas for Asian summer monsoon published at home and abroad. The Atlas is considered an important achievement in monsoon climatology research.

For a long period of time, meteorologists have conducted numerous studies on Asian monsoon with valuable results. Recently, colleagues in the USA have collected and analyzed comprehensively global meteorological data for the past several decades and made public. This laid the foundation on scientific research in meteorology and the compilation of the Atlas.

The Atlas, in English and Chinese versions, aims to provide a climatic outline of Asian summer monsoon for further understanding of the mechanisms for atmospheric general circulation in Asian monsoon region and for its weather and climatic evolution. Introduced in the Atlas is our preliminary knowledge of the onset, maintenance and retreat of Asian summer monsoon.

The Atlas can be purchased through the Macao Foundation at (853) 9880224/9880210 (telephone) or (853) 968658 (fax) or (e-mail) ntleong@macau.ctm.net



Malaysia

Tropical Storm VAMEI - an unprecedented tropical storm of the 21st century

Prepared by the Malaysian Meteorological Service

A monsoon disturbance embedded within the monsoon trough was located over the South China Sea between the East Malaysian State of Sarawak and Southern Peninsular on 22 December 2001. The system gradually propagated westward, slowly intensified on the night of 26 December and eventually developed into Tropical Storm VAMEI which was categorized as a Category I typhoon by the Joint Typhoon Warning Center in Hawaii on 27 December 2001 0000UTC, based on naval ship observations.

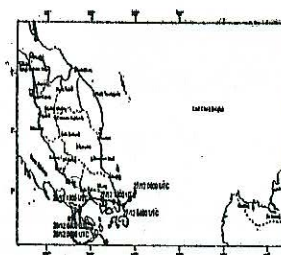
The storm was unique in that it was designated as having tropical storm strength located at an exceptionally low latitude of 1.5°N on 27th December 2001 just east-northeast of Singapore. This unprecedented

tropical storm passed by the southern part of Peninsular Malaysia on the night of the 27th and moved in the Straits of Malacca on the morning of 28 December 2001. The previous recorded lowest latitude for a tropical storm was 3.3°N for Tropical Storm SARAH in 1956.

The wind observations over land, however, did not indicate the intensity of TS VAMEI. The highest sustained wind speed of 22 knots gusting to 46 knots was recorded at Mersing, located at 2.5°N, 104°E. Only the radar echoes from the doppler radar in Singapore and the satellite imageries from GMS indicated the intensity of the storm with its well-formed structure.

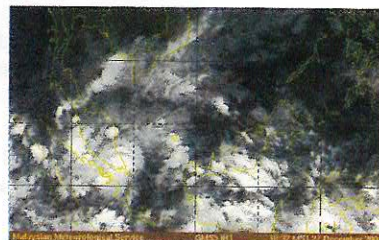
Strong winds and continuous torrential rain resulted in massive flooding in the States of Johore and Pahang in Peninsular Malaysia. The recreational forest area at Gunung Pulai, located about 65km from Johore Baru, was extensively damaged and the uprooted trees caused widespread exposure of top soil.

A mudslide also occurred at Kampung Seri Gunung Pulai, sweeping away four houses and killing five people. Many low lying areas in Johore and Pahang were badly affected by the flood. The Johore State Government had estimated losses of more than RM 13.6 million (US\$3.6 million) with 13,195 people evacuated to 69 flood relief centers while in Pahang, many areas which were under flood water from the earlier massive flooding, experienced the second bout of massive flooding with about 4,195 evacuated to flood relief centers.



Track of
Tropical
Storm
VAMEI

Tropical
Storm
"VAMEI"
over the
southern
part of
Peninsular
Malaysia



Philippines

Thirteenth Session of RA V (South-West Pacific)

Member countries of the WMO Regional Association (RA V) for South-West Pacific called for the establishment of regional climate centers during its thirteenth session held in the Philippines on May 21-28. The session was presided by WMO Secretary-General G.O.P. Obasi and RA V Acting President R. Sri Diharto.

RA V urged its members to strengthen their National Meteorological Services' capabilities to meet the growing demands for improved weather and climate services and products. It reiterated that the NMS should be the national voice in issuing warnings for tropical cyclones and other severe weather phenomena.

The Association agreed to implement a regional action plan for the development of the meteorological services in the Pacific Region through close regional cooperation among all the members in addition to promoting on-going and new regional technical cooperation initiatives in collaboration with development partners. It agreed to prioritize natural disaster mitigation and preparedness projects as many of its members in the South-West Pacific Region were highly vulnerable to natural disasters such as tropical cyclones and associated storm surges, floods and droughts.



Participants to the Thirteenth Session of RA-V posed with Prof. G.O.P. Obasi (front row, 8th from right), WMO Secretary General.

The Association stressed that further attention should be given to the programme on education and training, including the promotion of distance learning (education) within and among its members in the region, to enable them to strengthen their human resources. It also established a Working Group on Climate-related matters and a Task Team to provide guidance and assistance in the designation and implementation process for the establishment of Regional Climate Centers within the region.



Group photo of participants to the Ninth Session of TCC with Stephen C. Ready (seated, 3rd from right), TCC Chairman and Elsa H. Al-Majed (seated, 2nd from right), Regional Director for Asia and the South West Pacific (WMO).

Ninth Session of Tropical Cyclone Committee (South Pacific and South-East Indian Ocean)

The ninth session of the Tropical Cyclone Committee was held in Pasig City, Philippines, on May 16-20. The biennial session addressed the meteorological aspects of the tropical cyclone warning system including critical measures needed under the hydrological and disaster prevention and preparedness aspects of the TCC programme.

The session reviewed the status of the work under all components undertaken under the new Technical Plan for the development of services for the period 2001-2002 formulated during the 8th TCC session. The session was to propose a new project on aspects of sustainable development efforts of the members to be incorporated in the updated plan in view of the World Summit on Sustainable Development in Johannesburg in August-September 2002.

The session also reviewed the activities within the WMO Tropical Cyclone Programme and the framework within which it operates. It made proposals for further development of the TCP, strengthening of the links within it and, in particular, for implementation of the Fifth WMO Long-Term Plan (SLTP) and the Action Plan for the International Strategy for Disaster Reduction (ISDR) and the Action Plan for the International Strategy for Disaster Reduction (ISDR), and Sustainable Development for Small Island Developing States.

Twentieth Session of the EC Panel of Experts on Education and Training

The twentieth session of the WMO Executive Council (EC) Panel of Experts on Education and Training, hosted by the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) and Phil. Department of Science and Technology, was held in Quezon City, Philippines, on April 15-19.

The panel session, presided by Gustavo V. Necco, Director of WMO Education and Training Department and John Zillman, Chairman of EC Panel of Experts on Education and Training, discussed and reviewed the activities of the WMO Regional Meteorological Training Centers (RMTCs) aimed at strengthening its worldwide network of 23 centers to become more efficient and focused on the highest priority needs of the WMO community.

The Panel serves as an advisory body to the WMO Executive Council on all aspects of technical and scientific education and training in meteorology and operational hydrology. The Philippines serves as the RMTC for the South West Pacific.

Workshop on Integration of Risk Analysis and Mgm't of Water-related Disasters into Development Process in the TC Area set July 22-25

Hydrologists and disaster prevention and preparedness experts from members of the Typhoon Committee, training institutions and other international organizations are expected to attend the Workshop on Integration of Risk Analysis and Management of Water-related Disasters into Development Process in the Typhoon Committee Area, set in Quezon City, Philippines, on July 22-25.

The four-day workshop is organized by the Typhoon Committee Secretariat, in cooperation with PAGASA; the Government of Japan, through the Ministry of Land, Infrastructure and Transport (MLIT), Infrastructure Development Institute (IDI) and Japan International Cooperation Agency (JICA); and the Economic and Social Commission for Asia and the Pacific (ESCAP).

The objectives of the workshop are to exchange information on the existing situation in the members in the integration of risk analysis and management of water-related disasters into development process and their experiences in the improvement of the framework, modalities and practices for better integration; to promote the development of integrated hazard maps of water-related disasters from tropical cyclones and establishment of flash flood and sediment disaster forecasting and warning systems for pilot areas in members; and to identify priority activities and formulate projects for better impact in the implementation of the action programme for the hydrological component and related initiatives in the DPP component for fund mobilization.

Thailand

TMD sets up natural disaster awareness and mitigation project

The occurrences of devastating natural disasters have evidently increased in Thailand and seem likely to become more severe in the years to come as a result of environmental changes, weather diversity and increase in population. Recent disasters included the Hat Yai flood in November 2000 and the Wangchin and Namkor flash floods in May and August 2001, respectively.

Addressing the increase in flash floods occurrences, the Thailand Meteorological Department (TMD) had set up the Natural Disaster Awareness and Mitigation Project comprising two different major tasks - the Village Meteorological Volunteers and the Watch and Warn Measures. The project aimed to give villagers the basic meteorological tools and knowledge necessary for local warning and flood mitigation in the communities.

The Village Meteorological Volunteers were initiated at Wangchin, Yom basin in May 2001, in the aftermath of the severe flash floods that

killed many people living in the remote mountainous areas. TMD has enlisted volunteers in each village to report daily and consistently to meteorologists and Local Unit authorities of the areas meteorological data, particularly, the amount of rainfall obtained from each rain gauge set up at several strategic points in flood-risk areas.

For the Watch and Warn Measures, TMD has installed 20 radar stations in many parts of Thailand to detect rain features, especially, heavy rain in the flood-risk areas. Rain intensities will be monitored and analyzed at TMD and Regional Meteorological Centers of different regions before disseminating warnings to the people in flood-risk villages.

With the integration of the Village Meteorological Volunteers and the Watch and Warn Measures, TMD hopes the people in remote, flood-risk areas will receive more timely and accurate flood warnings in terms of the degree of severity. Most importantly, the twin tasks will promote natural disaster awareness among the villagers for the benefit of their own communities.



Flash floods ravaged Wangchin area in May 2001.



TMD officers setting up rain gauges in catchments points.



Students living in flood affected areas attend a lecture in basic natural disaster awareness.



Village meteorological volunteers receive their certificates after completing basic meteorological course in natural mitigation and awareness.



Aviation coordination workshop, Micronesian manager's meeting held

In the United States of America, the National Weather Service (NWS) Forecast Office (WFO) Guam conducted an Aviation Coordination Workshop on October 3, 2001, attended by representatives from the major airlines that service Guam and local airport officials. The workshop discussed the aviation program, both regional and local, a topic on tropical cyclones, and the use of the RSMC Tokyo's tropical cyclone guidance for SIGMETs issued by WFO's Guam and Honolulu for the area west of the international dateline beginning May 1, 2002.

WFO Guam also hosted the Micronesian Manager's Meeting in November 2001, which focused on more professional and independent Weather Service Offices (WSO) in support of Micronesian and NWS requirements. The meeting established the WSO mission, 5- to 7-year goals and responsibilities.

Tropical cyclone preparedness workshops

From June to September 2001, the WFO Guam's Warning Coordination Meteorologist provided tropical cyclone preparedness workshops for the Emergency Management Office and other government offices on Yap, Federated States of Micronesia (FSM); Palau, Republic of Palau (RoP); Saipan and Rota, Commonwealth of the Northern Mariana Islands; Chuuk and Pohnpei, FSM; and Majuro, Republic of the Marshall Islands.

New auto-tracking antenna installed

In February 2002, contract personnel installed and conducted training for the new auto-tracking antenna to copy Emergency Manager's Weather Information Network (EMWIN) transmissions from GOES-7 spacecraft. Because of GOES-7 orbital nutations, auto-tracking antennas are needed to improve EMWIN reception.

EMWIN is the outcome of development work by NWS in partnership with the U.S. Federal Emergency Management Agency (FEMA), state and local emergency managers, and other public and private organizations to provide simple and effective means of receiving emergency information. Sites receiving this new EMWIN system are located on islands of Pohnpei, Chuuk and Yap in the FSM, at Koror in the RoP, and Guam.

Pakyo exercise conducted

WMO Guam, in conjunction with Guam Civil Defense, military interests on the island and the Joint Typhoon Warning Center (JTWC), conducted its annual typhoon preparedness exercise "Pakyo" (Chamorro word for strong wind) in May 2002. The scenario was one of an intense typhoon threatening Guam.

This 3-day exercise consisted of all agencies simulating operations that dealt with an intense typhoon expected to wreak havoc on Guam. The JTWC, now located in Hawaii, posted exercise Pakyo products on their web site. WFO Guam, in turn, used these products to issue tropical cyclone public advisories/statements and provided briefings to the Guam Civil Defense for their action. The island agencies exercised decision-making processes and emergency plans based upon forecast information and simulated accidents.

U.S. NWS Central Pacific Hurricane Center acquires RSMC status

The WMO Executive Council at its 53rd Session in Geneva (June 2001), approved the recommendation of the 12th Session of the Commission for Basic Systems (Nov-Dec 2000) to designate the Central Pacific Hurricane Center, Honolulu, Hawaii (USA), as an RSMC with activity specialization in tropical cyclones on the basis of requirements for cyclone warning and forecasting in the North Central Pacific Ocean basin, north of the equator from 180 degrees West to 140 degrees West.

The title of the RSMC is "RSMC Honolulu-Hurricane Center" similar to that of Miami "RSMC Miami-Hurricane Center." The Director of RSMC Honolulu is James Weyman, 2001-2002 Chairperson of the WMO/ESCAP Typhoon Committee and a member of WMO Region V Tropical Cyclone Committee.

Hagemeyer, 77

Richard (Dick) Hagemeyer, a NOAA pioneer with over 51 years of service, died on October 25, 2001 in Honolulu, Hawaii. He was 77.

Hagemeyer joined the National Weather service (then the U.S. Weather Bureau) in 1950 and served at Wake Island, Palau and Majuro in the Marshall Islands for the first 7 years of his career. Subsequently, he held numerous managerial positions at the headquarters level of the US NWS Pacific Region and its parent agency, the National Oceanic and Atmospheric Administration, in Washington, D.C. He returned to Hawaii in 1982 as Director of US NWS Pacific Region, and remained in this position until his passing. In 1987, he received the U.S. Department of Commerce Gold Medal, the department's highest award, for outstanding leadership of the Pacific Region.

Hagemeyer had four loves in his life - his wife Helen, his church, the people and cultures of the Pacific Islands and Pacific Rim, and the National Weather Service. He took pride in expanding meteorological training opportunities for Pacific Islanders and ensuring that they received the benefits of the most advanced technology available. He led the Typhoon Committee effort to develop a single, representative list of names for tropical storms and typhoons for the northwest Pacific.

Hagemeyer will be remembered for his leadership in developing the U.S. Tsunami Program, for modernizing weather services in Hawaii and the Pacific Region, and improving coordination of tropical cyclone response in the Pacific. He made a difference and left a better world for many people. He will be missed.



Richard "Dick" Hagemeyer

Pacific Tsunami Warning Center renamed

On December 1, 2001, a ceremony was held renaming the Pacific Tsunami Warning Center in honor of the late Richard H. Hagemeyer, former NWS Pacific Region Director, hosted by Jack Kelly, Director of the U.S. NWS.

The ceremony was attended by Eni Faleomavaega, American Samoan delegate to the U.S. Congress, representatives from the State of Hawaii U.S. Congressional offices, state and local officials, as well as participants at the 34th Session of the Typhoon Committee. The occasion included a talk by Jeanne Johnston, a survivor of the 1946 Tsunami that destroyed Hilo Bay.



Mrs. Helen Hagemeyer (middle) posed with NWS officials and guests in front of the Richard H. Hagemeyer Pacific Tsunami Warning Center which include US Samoan delegate E. Faleomavaega (fourth from left), Brig. Gen. John J. Kelly, Jr. (fourth from right), Director of NWS, James Weyman (third from right), acting Director of NWS Pacific Region and Jeanne Johnston (third from left), survivor of 1946 Hilo Bay tsunami disaster.