

THE ESCAP / WMO

# Typhoon Committee

## NEWSLETTER

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## Second Joint Session of the Panel on Tropical Cyclones and the Typhoon Committee *Phuket, Thailand February 20-28 1997*



Delegates to the 2nd PTC / TC Joint Session held at the Metropole Hotel in Phuket, Thailand

At its second joint session in Phuket, Thailand (February 20-28), Members of the Typhoon Committee and the Panel on Tropical Cyclones concluded that marked progress has been made over the last year in typhoon forecasting and warning system and likewise cited need for better regional cooperation on disaster mitigation between the two associations.

The weeklong session first held in the seaside resort town of Pattaya five years ago brought together seventeen member-countries from across the Asia-Pacific representing the Committee: Cambodia, China, Hong Kong, Japan, Lao PDR, Macau, Malaysia, the Philippines, Republic of Korea, Singapore, Thailand

and Viet Nam, and their counterparts from the Panel: Bangladesh, India, Pakistan, Sri Lanka and the Sultanate of Oman.

Regional Association II (Asia) President Z. Batjargal together with some observers from Brunei Darussalam, Indonesia, Papua New Guinea, U.S.A., the International Civil Aviation Organization (ICAO) and Commission for Atmospheric Sciences (CAS) also attended the session sponsored by the World Meteorological Organization (WMO) and the Economic and Social Commission for Asia and the Pacific (ESCAP).

Thai Meteorological Department





At the session's opening are (from left) Cengiz Ertuna, Representative of ESCAP; H.E. Somsak Thapsuthin, Deputy Minister of Transport and Communication of Thailand; Prof. G.O.P. Obasi, Secretary-General of WMO; and Smith Tumsaroach, Director-General of Thai Meteorological Department.

director-general Smith Tumsaroach, addressing the session, said appropriate measures on disaster mitigation and preparedness are urgently needed even as he noted that natural disasters such as tropical cyclones, floods and storm surges in the areas of the Pacific Ocean and Bay of Bengal were causing serious loss of human lives and damage to properties every year.

H.E. Somsak Thapsuthin, Deputy Minister of Transport and Communications of Thailand, in a welcome speech, pressed the two groups to carry out the recommendations made during the first joint session especially in exchange of information to increase capability in reducing the effects of natural disasters.

WMO Secretary-General G.O.P. Obasi, in a message, noted that warning systems in many parts of the world have improved markedly in recent years but said further efforts are needed to improve the accuracy and reliability of cyclone forecasts, particularly of unusual movements, sudden changes in intensity and long-range position forecasts.

Obasi asked the members to step up efforts to improve interaction between the national meteorological and hydrological services and the national agencies concerned with disaster prevention and preparedness. Moreover, he proposed a number of activities within the programmes of the Panel and the Committee such as the improvement of meteorological observing networks, upgrading of flood forecasting systems, and development of numerical storm-surge models and storm surge training.

ESCAP representative Cengiz Ertuna, underscoring the serious number of meteorological and water-related natural disasters affecting the region, said both members of the PTC and the TC had an enormous amount of work to do in terms of enhancing their

cooperation in improving emergency facilities and early warning systems, flood protection measures, training programmes, and technical cooperation among developing countries.

Ertuna took notice of the need to redraw funding support earlier provided by the UN Development Programme for the work of the two bodies especially with the expanded cooperation and productive partnership expected to result from this joint session.

Ertuna also briefed the Members on the development regarding the ESCAP project proposal for a two-phase regional seminar on flood risk analysis and mapping. The project aims to assist and provide technology transfer to developing countries in the field of flood risk analysis and mapping which is important for the systematic formulation and effective implementation of comprehensive flood loss prevention and management strategies.

The first phase of the project will constitute the countries of Bangladesh, Cambodia, Lao PDR, Malaysia, Myanmar, Nepal, the Philippines, Sri Lanka, Thailand and Viet Nam. Other countries in Asia and the Pacific vulnerable to frequent flooding will be covered under the second phase.

The Members in session also lauded ESCAP on its activities covering other aspects of hydrology and water resources including provision of guidelines for water pricing for irrigation and municipal water supply; investment promotion of the water sector; rehabilitation of contaminated rivers; promotion of the role of women in water supply and sanitation; and assessment of water resources of its members.

India proposed at the joint meeting the organization of research projects on unusual features of tropical cyclones for systems of the North Indian Ocean similar to the *SPECTRUM* project completed for the Pacific Ocean. The

proposal is expected to benefit member-countries of the Panel.

Meanwhile, China batted to give more priority to the improvement of operational system and called for the holding of joint investigations of similar problems faced in the region like the frequency and preferred periods for tropical cyclones which passed from the Committee to the Panel's area of responsibility.

A sub-committee of the CAS Working Group on Tropical Meteorology Research also reported to continue its investigation on the so-called *Drone Reconnaissance* for developing an observational system with unmanned aircraft.

Typhoon Committee Secretariat Coordinator Roman L. Kintanar reported that the Panel on Tropical Cyclones and the Typhoon Committee were included in the list of groups that could continue the efforts on natural disaster reduction after the termination of the *International Decade for Natural Disaster Reduction (IDNDR)*. The two regional bodies were identified by the IDNDR Scientific and Technical Committee at its Paris Meeting in January 1997 along with the IDNDR national committees, UN specialized agencies and regional commissions like WMO and ESCAP.

In line with this development, the session agreed to expand the scope of their training programme to give more importance to activities in tropical cyclone disaster preparedness and mitigation.

The session sought active participation from member-countries in the *Fourth International Workshop on Tropical Cyclones (IWTC)* in Haikou, China, in April 1998, possibly, coinciding with the holding of the *Regional Workshop on Doppler Tropical Cyclone Radars* set in Hua Hin, Thailand. The IWTC aims to improve collaboration and exchange between research and operational experts, while the doppler radar workshop seeks to advance inter-regional coordination and cooperation between the Panel and the Committee.

The session also noted the *International Expert Meeting on Participation of Women in Meteorology and Hydrology* organized by WMO in Thailand on 15-19 December 1997 in support of a UN resolution on the promotion of women. Female meteorologists from Members of the two bodies are expected to attend the conference.

Singapore was taken in as the thirteenth Member of the Committee on February 20. It was also announced that Hong Kong will become China's Special Administrative Region (SAR) when British colonial rule ends on 1 July 1997 and will be called Hong Kong, China. Hong Kong will be the site of the thirtieth session of the Typhoon Committee, set from 25 November to 1 December 1997.



## ESCAP/WMO Typhoon Committee Natural Disaster Prevention Award Tumsaroach earns Typhoon Committee '96 award



Director-General Smith Tumsaroach accepts the Typhoon Committee Natural Disaster Prevention Award for 1996 from T.C.F.I. Chairman Roman L. Kintanar as Prof. G.O.P. Obasi (right), WMO Secretary-General; and Mr. Cengiz Ertuna, Water Resources Chief (ESCAP), look on.

Mr. Smith Tumsaroach was honored with the Typhoon Committee Natural Disaster Prevention (TCNDP) Award for 1996 during an award presentation at the Metropole Hotel in Phuket, Thailand, before the start of the 2nd Joint Session of the Panel on Tropical Cyclones and the Typhoon Committee on February 20, 1997.

Mr. Smith, who currently serves as Chairman of the Committee, was presented with the plaque by the Typhoon Committee Foundation Inc., citing his outstanding services as Director-General of the Thai Meteorological Department, and for his dedication in promoting general awareness in reducing the impact of disasters caused by severe tropical cyclones in Thailand.

Responding to the award, Mr. Smith said he would set up the Smith Tumsaroach Foundation and launch a similar award supporting the activities of the Panel on Tropical Cyclones. He added that he was donating the money he won to serve as initial fund for the foundation. Mr. Smith also provided an additional amount as his own personal contribution to said fund.

The TCNDP award is given yearly to recognize special achievements in the enhancement of preventive measures to avoid the serious aftermath of natural disasters.

## T C h a n g e s

### Lam succeeds Lau



Dr. H. K. Lam

Dr. H.K. Lam took over as Director of the Hong Kong Observatory in December 1996 succeeding Mr. Robert Lau. He is also the Permanent Representative of Hong Kong, China with WMO.

Dr. Lam, 49, obtained his Doctorate Degree in Electronic Engineering from the University of Hong Kong in 1983. He joined the Observatory as Scientific Officer in 1971 after a brief career as a secondary school teacher.

He has demonstrated his acumen in various areas, having set up the first GMS ground receiving station at the Observatory in 1977, implemented the local seismological network with detailed analysis system in 1979, set up a computer-integrated radar system, also in 1979, designed and implemented the first-generation automatic weather stations in Hong Kong in 1981, and developed the wind shear warning system at the Hong Kong airport.

Dr. Lam is also a man of style, being credited with defining the standard technical writing style in the Observatory in 1976. He became the first Assistant Director responsible for radiation monitoring and assessment in 1990, setting up a background radiation monitoring network to define baseline radiation levels prior to the building of a nuclear power station in the region. He has also helped draw up an emergency contingency plan for nuclear accidents in Hong Kong.

On becoming the Director of the Hong Kong Observatory, Dr. Lam is confident that he will lead the department to serve the community better and in particular, in the provision of user-friendly weather services while unrelentingly working to develop techniques in weather forecasting.

### Lim is MMM's new head



Dr. Lim Joo Tick

Dr. Lim Joo Tick was named Director-General of the Malaysian Meteorological Service (MMS) on September 16, 1996 taking over from the retired Mr. Cheang Boon Khean.

Dr. Lim, 51, obtained his PhD in Meteorology from the University of Hawaii in December 1979, ten years after finishing a Mathematics degree from the University of Malaya. He joined the MMS as meteorologist on July 8, 1969. He gradually rose from the ranks as senior meteorologist (1977), Director (1980), Deputy Director-General II (1990), and Deputy Director-General I (1994).

Beginning in 1992, Dr. Lim got involved with the activities of the IGBP and WCRP/IGBP/IHDP-sponsored START (Global Change System for Analysis, Research and Training). He was a pioneer of the Southeast Asia Regional Committee for START (SARCS) and was, subsequently, appointed Chairman of the Malaysian National Technical Committee for START in November 1993.

Dr. Lim served as consultant (WMO/UNDP) in tropical/marine meteorology in Indonesia (1984), Viet Nam (1988) and Thailand (1992). From 1989 until March 1997, he played an active role as Vice-President of the Commission of Marine Meteorology (WMO Technical Commission) contributing to the development of marine meteorology in developing countries especially in Southeast Asia.

Dr. Lim has authored numerous journals and research papers. A recipient of the Malaysian Federal Award of *Kesatria Mangku Negara*, he is married to art director Yee Yok Mooi, and has two daughters, Pei Ching and Pei Ee.

### Rasquinho named to top MMGS post



Dr. Olavo Rasquinho

Dr. Olavo Francisco Valente Rasquinho was appointed Director of the Macau Meteorological and Geophysical Services (MMGS) in October 1996 succeeding Mr. Antonio Pedro F. da Costa Malheiro.

Dr. Rasquinho is a graduate of Physics and Chemistry from the University of Lisbon and has a post graduate course in Meteorology.

Dr. Rasquinho worked as WMO training expert in Angola (1982-85) and as ICAO expert in Mozambique (1990-91). He taught Meteorology at the University Eduardo Mondlane in Maputo, Mozambique in 1993, and formulated a project while he was a European Union consultant in Meteorology in Mozambique. He was also World Bank consultant in Aeronautical Meteorology in Guinea-Bissau in 1993.

For several years, Dr. Rasquinho represented Portugal in the Technical Committee of Cooperation Scientifique et Technique (COST- Meteorology) in Europe, Meteorology Group (METG- ICAO), and Commission of Aeronautical Meteorology (CAeM- WMO). He also served as Head of the Meteorological Office in Lisbon Airport and Chief of the Weather Analysis and Forecast Division of the Portuguese Meteorological Institute.



## **WOMEN OF DISTINCTION IN THE WEATHER SERVICE**

### **FU XIU ZHI**

**Director of the Fujian Provincial Meteorological Observatory, China Meteorological Administration**



The petite lady exudes a calm air of authority and cool quiet confidence which is further reinforced when she talks. As Director, Mrs. Fu Xiu Zhi takes care of the day-to-day operation of the Fujian provincial Meteorological Observatory.

It is not everyday that we hear of low key, women public servants earning recognition especially in a male dominated field as the weather business. In fact, one could count on one's fingers those illustrious ladies whose achievements and leadership stand out to achieve such a feat. When Mrs. Fu was chosen as Regional Director three years ago, the authorities could not have chosen a more committed person for the job.

Running a weather service can be an awesome responsibility especially for a woman but Mrs. Fu, an alumna of the Nanjing Institute of Meteorology and author of several research papers in meteorology, could serve as a role model. When Mrs. Fu entered the weather service 25 years ago it didn't take her a long time to adjust to the fact that she is really into government service - and to realise it is quite likely something that she can do better than anything else. When she talks about her work, her eyes light up, her hands become expressive and her voice betrays her enthusiasm.

As current head of the Fujian Meteorological Bureau she is the driving force in the realisation of the Bureau's current major project which is the Mesoscale Disaster Weather Warning System. This is a 5-year project which will cost about Y20M and will transform FMB into a dynamic weather service.

Mrs. Fu has played a major part in showing her workmates that there are several income generating activities and livelihood options open to those interested. According to her, she is happy to see the change in the lives of her colleagues especially with the upliftment of their economic conditions. The lady director has every reason to be pleased, statistics showed that in a year's time, the income of her staff increased by as much as 25%. Of course, she

has to consistently remind them that these activities should not in any way interfere with their official duties.

When asked if there is gender inequality in China's meteorological service, Mrs. Fu replied that she's not aware of such a thing. If a feminist is someone who believes there is inequality and actively works to achieve equality then the lady director is quick in saying she's not a feminist. But hasn't she ever encountered difficulty in handling a job that is dominated by men? "I like working with men. All my life, I have been working with them. And I have never encountered discrimination in this office."

How do her workmates perceive the director? They look to her as a very organised administrator, decisive and dedicated. But what they admire most about her is her humility.

How about her management style? She believes in collective leadership using a viable delegation of tasks facilitated by time management and a functional communication and co-ordination networking.

Mrs. Fu attributes whatever success she has to a positive work attitude complimented by a lot of hard work. She is also quick to add that the support she gets from upper management is indeed a blessing.

But in spite of the prominent niche she has carved in the weather business, Mrs. Fu has never neglected her most important career - mothering. Mother to two boys, one who works with the Shanghai stock exchange and the other a masteral student at Nanjing University she takes her role with the same dedication. A dutiful wife to a Director at the Department of Civil Affairs she admits juggling career and family is not an easy task. But with her husband's encouragement and all the love and support of her children, she was sure she could be an effective and useful director. And she is.

Mrs. Fu will continue to build new frontiers and break barriers. Whatever this lady does, she gives it a WHAM (whole heart and mind). Truly a woman of distinction.

### **ELAINE KOO**

**Hong Kong's first woman meteorologist**



The face with the infectious charm belongs to Elaine Koo, the first female professional meteorologist to have joined the almost century-old Hong Kong Observatory, which today have

35 females among a total of 249 professional and technical staff. Mrs. Koo became the first female Assistant Director in 1992, which she claims is due to seniority in the service.

Mrs. Koo obtained her BS and MS degrees in USA, in meteorology and air pollution meteorology, respectively. She has worked in the Hong Kong meteorological service in the fields of weather forecasting, hydrometeorology, air pollution meteorology, climatology, training and is now the head of the Development, Research and Administration Branch. She was also the very able Chief Editor of the Typhoon Committee Annual Review from November 1985 to 1988.

When asked to comment on the much-talked about prejudice faced by women especially those holding a professional position in the weather service, she just shrugged and commented that such is not the case in the Observatory. In her so many years stay in the Observatory, not once had she encountered any difficulty at work by being a female. She too, along with the male forecasters had to endure working on night shifts and long hours. Looking back, she felt sure that her male colleagues probably gave her preferential treatment when she was doing shift duty. Someone once said that in any field a woman has to be twice as good as a man to go half as far but for Mrs. Koo all one needs is a passion for work to get there.

Mrs. Koo entered the field of meteorology with a realistic approach. She had a clear understanding of what sort of duties she will have to perform and what hardships she will have to overcome in order to succeed. She is indeed very much committed to a meteorological career as attested by her colleagues. At work, she is totally engrossed, a perfectionist to whom nothing else matters at that moment. As a forecaster, she's good instinctively and technically. She is also a motivating force and a great unifier of people toward worthwhile objectives. This kind and cheerful lady boss of the Observatory has gained her co-workers respect, admiration, and also, many times, loyalty. It now becomes evident that she has carried off her current post by a combination of good qualifications, hard work, brains, and determination and just a little bit of luck. Nothing to do really with her age.

Don't mistake her for being an all-too serious meteorologist, though. Mrs. Koo is committed to social services in the community as well. She is currently the Second Vice President of the Zonta Club in Hong Kong.

And another side of her - the side that is very close to her family and looks forward to the thrice yearly trip to the USA to visit her two teenage sons "while they still let her," she adds - is the one so few people know. And the one that's most admirable of her.



# CHINA

## Integrated Observing Network for the Pearl River Estuary

The Integrated Observing Network for the Pearl River Estuary is the fruit of a successful cooperation among the Guangdong Meteorological Bureau, the Hong Kong Observatory and the Macau Meteorological and Geophysical Services. Started in 1994, the network aims to improve the capability of the three centers in weather forecasting and monitoring vital to the socio-economical development of the region.

In line with the joint project, a total of five Automatic Weather Stations (AWS) will be established by the three parties in the off-shore waters around the Pearl River Estuary. These five new AWSs will add to the existing station at Huangmao Zhou set up in 1985. The AWSs at the Tuoning and Neilingding Islands became operational in 1996 while another one in Wailingding Island is targeted in 1997.

Meteorological data collected by the AWS will first be transmitted via radio link to either Hong Kong or Macau at 10-min intervals. The data will then be shared among the centers through the Global Telecommunication System.

Since installation, the AWS network has been providing weather data for the daily operations of the centers concerned particularly during the passage of tropical cyclones over the northern part of the South China Sea.



Members of the Study Tour group with CMA's Deputy Administrator, Mr Yan Hong (front row, 4th from left)

## Typhoon Experts' Study Tour Successful

Meteorologists from nine members of the Typhoon Committee who took part in the successful roving study tour in China agreed it gave them great opportunity for the exchange of knowledge and experience on how to further the capabilities of operational forecasts using results of new studies.

The ten-day study tour which was organized by the China Meteorological Administration covered the cities of Guangzhou, Nanhai, Fuzhou, Shanghai and Beijing, from 9 to 18 December 1996. It featured a workshop on the last day which discussed future cooperation between the Members within the framework of the Typhoon Committee.

With the exception of the Thai participant who spoke on the use of SSM/I imagery as a new tool for tropical cyclone forecasting and research, the rest of the group talked on the present typhoon warning practices in their respective national weather services. Technical reports were presented by the Chinese hosts such as the Mesoscale Disaster Weather Warning System, a major project of the Fujian Meteorological Bureau.

## 714SD Doppler Weather Radar Installed

Two S-band 714SD Doppler Weather Radars have been in operational use since 1996 in the cities of Shantou and Xiamen. These were developed by China for practical application in monitoring the formation, development and movement of tropical cyclones; providing scientific information for design of hydrotechnical projects; and in the organization of flood control activities.

The radars with Doppler capabilities detect position and intensity of rainstorms ranged 600km and the velocity of meteorological targets within 300km distance.



An AWS located in Tuoning Island showing the Stevenson Screen (foreground) with the Anemometer and solar panel.

## Operational Numerical Forecast of Tropical Cyclone

A numerical model for Typhoon Track Prediction (MTTP) was developed in 1992 for operational use in tropical cyclone forecasting in China. Its horizontal resolution reaches 50km and vertical resolution is 15 layers.

The model was used for over 300 forecasts in 1993. The 24-hour forecast error of the position of tropical cyclone center was about 180km and the 48-hour forecast about 330km. It produced 156 operational forecasts in 1996. The 24-hour forecast error of the position of tropical cyclone center was 191km and the 48-hour forecast was 356km.

The model's performance in the 1996 typhoon season has been characterized as excellent. The error of the track forecast for 24 and 48 hours was 145 and 295 km, respectively. However, its performance for the track after turning from northwest to northeast was unsatisfactory with the error for 24 and 48 hours being 210 and 379 km, respectively.



714SD Doppler Weather Radar installed in Shantou, China.



# HONG KONG, CHINA



## Terminal Doppler Weather Radar Installed at New Hong Kong Intl Airport

A Terminal Doppler Weather Radar (TDWR) was installed for the detection and warning of convective weather induced wind shear in the vicinity of the new Hong Kong International Airport at Chek Lap Kok. The Hong Kong setup follows closely the design of the US Federal Aviation Authority TDWR systems currently being installed at major US airports.

The implementation of the TDWR project commenced in mid-1993 with a consultant assisting the Observatory in overseeing site selection, system acquisition and station construction. A contract was awarded for the supply, installation and commissioning of the TDWR system in late 1994. In September 1996, installation of equipment was made while post-installation system optimization and acceptance tests were completed in January 1997.

The TDWR detects and sends warnings on microburst and windshear to air traffic controllers for alerting pilots of aircrafts landing at or taking off from the airport. The weather detection, data processing and warning algorithms are carried out in real time and results are presented automatically on user-friendly displays.

The TDWR is kept in continuous operational state to serve the new airport upon its opening set in April 1998.

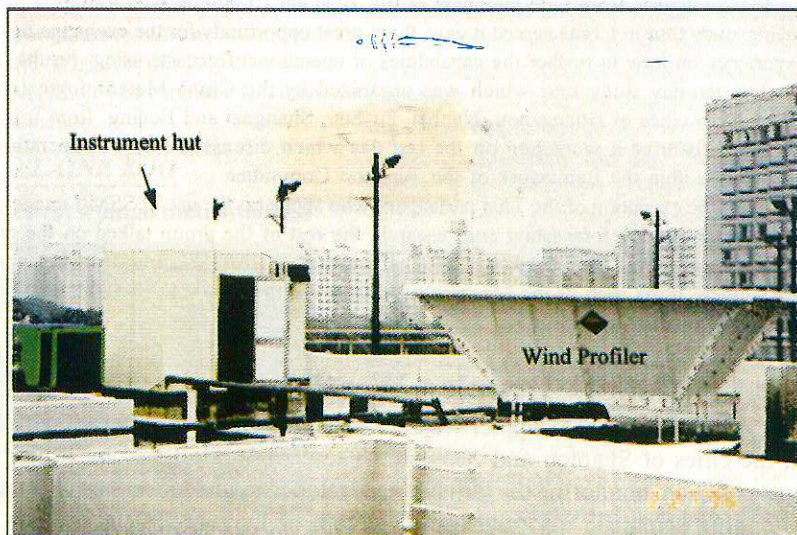
*Installed tower of TDWR near Hong Kong airport.*

## Observatory Acquires Wind Profiler

A wind profiler was acquired by the Observatory in February 1996 for observing low level winds. It operates at 1299 MHz with a beam width of 9 degrees. The range, height resolution and sampling time are user-selectable, while typical parameters used are 6000m, 200m and 10 minutes, respectively. Above 80% of the time, the wind speeds and directions observed by the profiler and radiosonde were within  $\pm 2$  ms<sup>-1</sup> and  $\pm 30$  degrees of each other.

The ability of the wind profiler to provide continuous vertical wind sounding data at regular time intervals makes it a very useful tool to depict the movement and intensity change of tropical cyclones in near real-time.

When a tropical cyclone approaches, winds will always strengthen aloft several hours before at the surface. By observing the wind change at higher level using the profiler, it is possible to extrapolate and hence predict the onset of strong, gale and hurricane force winds at the surface. Furthermore, by applying trigonometric techniques and some basic knowledge of typical typhoon structure, it is also possible to give reasonable estimates of the maximum winds near its center.



*Site of the wind profiler at the Observatory looking southeast.*



# REPUBLIC OF KOREA

## Seoul Hosts MOFFS III Workshop

Some 25 experts in operational hydrology of member countries in WMO Region II and V (Asia and the South-West Pacific) including Bangladesh, China, India, Malaysia, the Philippines, Sri Lanka, Thailand, Viet Nam and the Republic of Korea took part in the WMO workshop on Management Overview of Flood Forecasting Systems (MOFFS) III, organized by the Water Resources Bureau, Ministry of Construction and Transportation of the host country, held at the Seoul Palace Hotel on 19-21 March 1997.

The 3-day workshop included discussions focusing on the development, uses and operation of the MOFFS as well as exchange of experience on flood forecasting through case studies.

Following an explanation on the background, principles and structure of MOFFS given by featured speaker Allan Lambert of UK, the participants presented case studies covering current status, problems and future plans of the flood forecasting and warning systems in their respective countries, in particular, on the use of MOFFS.



MOFFS Workshop participants with UK's Allan Lambert (seated, 4th from right) and ROK's Han-Se Lee (standing, 2nd from left), new hydrologist and flood forecasting expert of TCS.

## Geophysical Fluid Dynamic Korea (GFDK) Typhoon Model

In the 1995 hurricane season, the National Hurricane Center of the U. S. National Weather Service began using a Geophysical Fluid Dynamic Laboratory (GFDL U.S.A.) hurricane model that can predict the path of the hurricane more accurately than its predecessor by 20 percent. The Korea Meteorological Administration (KMA) supported by the Korea Meteorological Research Institute and the Ministry of Science and Technology introduced the GFDL hurricane model for its operational use in 1996.

The initial condition is obtained from NCEP AVN (T126L28) global run at GFDL. However, the initial condition for the model is provided by Global Data Assimilation Prediction System (GDAPS, T106L21) at KMA. Boundary conditions for sea surface temperature (SST) are re-evaluated for the eastern Asia region.

The major feature of the new model is a successful method of vortex specification which uses filtering procedure to remove the original vortex from analysis of global model and replace it with vortex generated by the other model. The axisymmetric component of the specified vortex is generated by time integration of the axisymmetric typhoon model.

Time integration of a simplified barotropic vorticity equation with beta effect included ensures that axisymmetric and asymmetric components are mutually consistent. The sum of the symmetric and asymmetric components yields the specified vortex which is added to the environmental field.

The model is a primitive equation model formulated in latitude, longitude and sigma coordinates with 18 vertical layers. The grid systems consist of triple-nested movable mesh. The most inner horizontal resolution is one-sixth degree. The nested mesh moves together with typhoon. The outermost domain extends 75° in the meridional and longitudinal directions.

The model has a more sophisticated physics package and initialization scheme than the current KMA typhoon model. The GFDK physics package includes moist convective adjustment, a Monin-Obukhov scheme for surface flux calculation, Mellor and Yamada level-two turbulence closure scheme, infrared and solar radiation parameterization, and bulk subsurface layer.

The GFDK will provide typhoon track forecasts for 72 hours projections (twice a day: 06, 18UTC) with specified lateral boundary values taken from every 6 hour running of the Global Data Assimilation Processing System (GDAPS) global model.

## 3rd Intl Study Conference on GEWEX in Asia and GAME and 2nd GAME Intl Science Panel Meeting held



Participants to the GAME - ISP meeting preceding the GEWEX - GAME conference.

The 3rd International Study Conference on GEWEX (Global Energy and Water Cycle Experiment) in Asia and GAME (GEWEX Asian Monsoon Experiment), in conjunction with the 2nd Meeting of the GAME International Science Panel, was held at Seogwipo Hotel in Cheju Island, on 24-28 March 1997.

Sponsored jointly by the Meteorological Research Institute (MetRI) and KMA with the support of the Meteorological Society and the Federation of Water Science and Engineering Societies of Korea, the Study Conference discussed recent studies on Asian monsoon research and directions of future studies. A detailed discussion was made on the topic to establish the academic background to control intensive observation period.

The Panel Meeting took up international cooperation, implementation plan, intensive observation period, and exchange and management of GAME observations. A total of 106 paper presentations covered various topics such as energy and water cycle in Asia Monsoon, physical processes concerning inter-annual variation, the role of biosphere in surface-atmosphere interaction and hydrological processes, and GCM experiment.

The two meetings contributed largely in networking the field experiment with Japan, China and Korea for studying the Chang-ma (rainy season) and heavy rainfall and internationalizing the intensive Chang-ma observation project managed by MetRI and KMA.



# MACAU

## WMD and WWD '97 plaza exhibits

Joint celebrations for World Meteorological Day (WMD) and World Water Day (WWD) 22 & 23 March 1997, led by the Macau Meteorological and Geophysical Services (MMGS) and the Macau Water Supply Company featured plaza exhibitions themed-*Weather and Water in Cities* and *The World's Water Is There Enough*.

A commemorative designed envelope with printed postage stamp was also issued. Mr. Olavo Rasquinho, Director of MMGS, made the rounds of radio and television shows to promote citizen awareness on concerns relative to the events and enjoin their participation in the festivities marking the two-day worldwide special occasions.

The WMD affair culminated in a dinner reception in which, following tradition, medals were presented to the staff members of MMGS who have rendered long service in meteorology.

## Second Guangdong-Hong Kong-Macau Conference on Operational Meteorology

The 2nd Guangdong-Hong Kong-Macau Conference on Operational Meteorology was successfully held in Macau on 14-15 April 1997 at the MMGS Conference Hall. This three-city meet was first held in Shenzhen City.

Twenty four meteorologists and geophysicists took part in the conference with the main objective of improving coordination in operational meteorology and providing adequate weather information, particularly, in the Pearl River Delta Region, considered as one of the fastest growing regions in China.

Discussions included the following topics:

- joint installation of automatic weather stations in the Pearl River Delta;
- issues concerning data exchange and communication;
- coordination on issuance of storm signals and heavy rain warnings;
- exchange of radar information; and
- monitoring of mesoscale weather systems and other meteorological services.



Opening the WMD and WWD exhibits are (from left) Olavo Rasquinho, Director of Macau Meteorological and Geophysical Services; Mario Abreu, Chief of the Undersecretary for Economic - Coordination Office; Vitor Pessoa, Undersecretary for Economic-Coordination; Alves de Paula, Undersecretary for Transportation and Public works and Jim Conlon, Executive Director of the Macau Water Supply Organization.



Director Rasquinho (2nd from left) and Mr. A. de Paula (4th from left) preside the medals presentation for long service.



Dr. Rasquinho (left) addresses the opening of the three-city conference.



Conference participants.

## dpp conference held

More than 100 participants mostly directors and teachers from 111 public and private schools in this Portuguese colony held a conference on November 22 seeking to promote disaster awareness and mitigation.

The meeting capped a three-month intensive campaign in disaster preparedness in the media. Emergency measures were discussed regarding tropical storms, fire and other natural hazards, giving special attention to the territory's guidelines on evacuation plans.



Disaster awareness meeting.



## 2nd Technical Conference on Management of Meteorological and Hydrological Services in Asia set

The Second Technical Conference on Management of Meteorological and Hydrological Services in Asia is slated to be held at the Conference Hall of the new headquarters of MMGS in Taipa Grande, Macau, on 4-8 November 1997. This is the first time Macau will host an important WMO meeting since it became a member of this organization in January 1996.

The WMO meeting will focus on topics adopted during the XI Session of the Regional Association II - Asia held in Ulan Bator, as follows:

- a) Meteorology - challenges and opportunities facing WMO and the national meteorological and hydrometeorological services;
- b) Planning and management;
- c) Framework for the future-sustainable strategies including capacity building and environmental issues;
- d) Regional cooperation; and
- e) Appropriate technology for use in meteorological and hydrological fields.



The new MMGS Headquarters in Taipa Grande.

## MALAYSIA

### Rare Storm Hits Sabah

The deadliest storm in years ripped through western Sabah, wiping out thousands of homes, killing at least 234 people and affecting scores.

More than 4,000 homes in Kota Kinabalu were destroyed or severely damaged by *Greg* when it hit Sabah directly before dawn on 26 December 1996, considered a rare weather event in this Malaysian territory.

Depressions which are spawned in the south China Sea close to Malaysia, normally tend to move west and northwestwards either passing Viet Nam or the Gulf of Thailand. *Greg*, first detected as a depression, developed into a tropical storm but moved eastward instead, thereby hitting land in Sabah.



Tropical storm *Greg* wreaked economic havoc in Western Malaysia (photos above) costing at least US \$ 55 million.

## PHILIPPINES

### IDNDR Project- High Winds in Urban Areas

A research group from the University of Portsmouth visited Manila on 9-11 September 1996 to conduct meetings related to the *IDNDR Project - High Winds in Urban Areas* funded in the UK by the Overseas Development Administration.

The research project team was composed of Professor Brian E. Lee, Prof. Wyatt, Dr. Wills and Mr. Davis. They met with the officers of the Typhoon Committee Secretariat, Dr. R. L. Kintanar and Mrs. N. C. Lomarda, and two PAGASA researchers.

Discussions between the two groups focused on the effects of typhoons in densely populated urban areas.

### FRICS Mission in Manila

A Japanese team from the Foundation of River and Basin Integrated Communication (FRICS) in Japan held discussions with TCS and PAGASA officials when the group visited the Philippines on February 10, 1997.

The meetings took up present status, policy and planning of river information systems in both countries, as well as future plans and programs of the Expert's Conference.

The FRICS organized the Expert's Conference on River Information Systems in 1994 and 1996 in Japan with the objective of improving technical information exchange among experts in Asia on river, basin and related fields.



## THAILAND

### King of Thailand conferred WMO honorary award

His Majesty King Bhumibol Adulyadej of Thailand was honored in a special tribute by the World Meteorological Organization (WMO) on 18 February 1997 on the occasion of the fiftieth anniversary of his accession to the throne.

A certificate and a barometer were presented to His Majesty at an audience in Chitralada Villa-Dusit Palace, by Prof. G.O.P. Obasi, WMO Secretary-General, in recognition of his leadership and valuable contribution to the promotion of meteorology and related geosciences, and for his continued support to WMO and the world meteorological community and, in particular, the Meteorological Service of Thailand.

"I was extremely impressed to learn that Your Majesty follows the weather events very closely and imparts your knowledge, wisdom and understanding of these phenomena to the nation. I am convinced that this has ensured the support of your Government for the Thai Meteorological Department in its continuing modernization efforts," Obasi said at the presentation.

The Thais have long been aware of the deep and abiding interest of the King in a variety of environmental issues that include weather and climate. He follows closely weather developments from satellite imagery of the Geostationary Meteorological Satellite (GMS) of Japan displayed hourly on a TV monitor at his Dusit Palace in Bangkok. He receives daily weather charts and forecasts from the Meteorological Department.

King Bhumibol, in a Royal speech, said that once, the Meteorological Department sent him a weather forecast with a memo saying, 'To Your Majesty, followed by, 'For your consideration. That meant for him the department was using him as a forecaster and he felt that it was an honor.



WMO honors King Bhumibol. Prof. G.O.P. Obasi confers WMO honor to His Majesty King Bhumibol at the Dusit Palace. "He had clearly demonstrated his keen knowledge and interest in the climate and weather phenomena, such as the floods and droughts that recently affected the Kingdom and people of Thailand," Obasi said of the King of Thailand at the award ceremony.



Radar Network training Course with Dr. R. Rinehart (middle).

### Radar Network / Meteorological Applications Training Course

The Thai Meteorological Department (TMD) conducted a Radar Network Training Course on 25-29 November 1996, with Dr. Ronald E. Rinehart of the Department of Meteorology, Center for Aerospace Sciences, North Dakota University, USA, as instructor.

The five-day training sponsored by the Thai Equipment Co., Ltd. was attended by some 31 participants from TMD.

Meanwhile, a Radar Meteorological Applications Training Course is slated on 25-29 November 1997 at the Meteorological Department. Topics for discussion included Background history: Radar hardware; Electromagnetic waves; Insect lab; Radar equation for point targets; Distributed targets; Logarithmic units; Filter paper drop-size measurements; Error analysis; Doppler velocity measurements; Spectrum width and turbulence; Manual dual-doppler analysis; Non-meteorological targets; Meteorological targets; Clear-air return; Advanced applications, Quantification and Calibration.

## JAPAN

### new GSM improves typhoon track prediction

The Japan Meteorological Agency (JMA) has been operating the new Global Spectral Model (GSM) for providing typhoon forecast including an 8-day weather forecast since March 1996. Typhoon track predictions with the new GSM have considerably improved compared with those of the previous GSM.

Typhoon positions predicted with the GSM were verified using the RSMC Tokyo Best Track data. Results showed that the mean distance errors have been remarkably reduced in the new GSM at forecast times of 48 and 60 hours by as much as 20% from those in 1994 and 35% in 1995. Sensitive experiments have revealed that the newly introduced Arakawa-Schubert scheme (instead of the Kuo Scheme) and the upgrade of the horizontal resolution were instrumental in the reduction of the errors.

The Typhoon Model (TYM), operational since 1988 was likewise verified and results showed that it had a higher accuracy compared to the old GSM. This proved that the accuracy of forecast typhoon positions of the new GSM is almost the same as the TYM.

Before March 1996, with only the TYM in use, Typhoon Committee Members were provided with typhoon forecasts at 12 hour intervals (i.e. 06 and 18 UTC). With the addition of the new GSM, which is run at 00 and 12 UTC, Members now receive more accurate typhoon forecasts every 6 hours.



## RSMC Data Serving System

JMA, as part of the activities of RSMC Tokyo-Typhoon Center, established the RSMC Data Serving System (RSMC DSS) in April 1995 to provide the members of the Typhoon Committee (TC) with a large volume of NWP products (GPV) through the Internet and Integrated Services Digital Network (ISDN).

With the upgrade of the data set on RSMC DSS in February 1997, the following are now available from the system: a) GPV (Surface pressure, Height, Wind, Temperature, Dew-point depression, Total precipitation, Vertical velocity, Relative vorticity, Stream function and Velocity potential) with resolution of  $1.25 \times 1.25$  degree for the Asian area up to 72 forecast hours; b) GPV (Surface pressure, Height, Wind, Temperature, Dew-point depression, Total precipitation) with resolution of  $2.5 \times 2.5$  degree for global area up to 120 forecast hours; and c) the same elements as a) with the resolution of  $2.5 \times 2.5$  degree. In addition, NWP products, observational data (SYNOP, SHIP, TEMP, PILOT, etc.) are also available. These data may be upgraded if possible upon users request.

JMA welcomes application of individual Members of TC for access to RSMC DSS. As of July 1, 1997, eight Members have registered, five of which use the system daily. The Members usually obtain necessary data on the server within 10-40 minutes after the start of access to the server, but, sometimes, it may take more than 50 minutes for some members to obtain data depending on traffic conditions on the Internet.

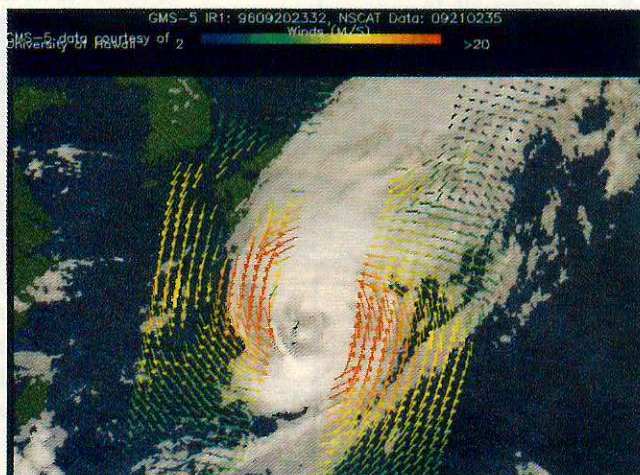
JMA will continue efforts to improve RSMC DSS for more effective use in cooperation with the members.

## Utilization of ADEOS/NSCAT Wind Data

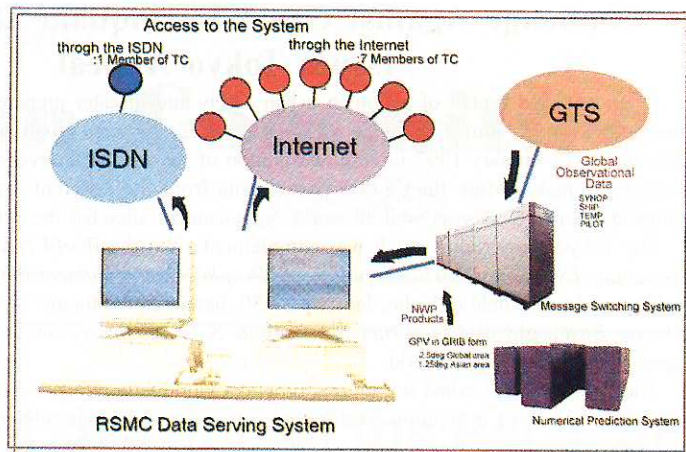
Japan's Advanced Earth Observing Satellite (ADEOS) was launched from Tanegashima Space Center by the National Space Development Agency (NASDA) in August 1996. Its main function is to contribute to global observations of the atmosphere and the ocean for better understanding of climate change. ADEOS is equipped with a variety of meteorological sensors which are expected to be useful for monitoring ocean weather, ozone and greenhouse effect gases.

The NASA Scatterometer (NSCAT), developed by the National Aeronautics and Space Administration (NASA), is one of the sensors to measure surface wind speeds and directions over the global oceans.

NSCAT data were transmitted to JMA from NASDA within 6 hours after the observation until the recent trouble of ADEOS in June 1997. On said occasion, some practical experiments in taking NSCAT data into the JMA Global Spectral Model (GSM) through its data assimilation system were undertaken and the results showed NSCAT data has potential to improve the accuracy of NWP products. Further development in the utilization of NSCAT data will continue provided this kind of observations will resume in the near future.



A composite of a GMS-5 infrared image and NSCAT data observed at about 15UTC on 20 September 1996. A strong cyclonic wind field around Typhoon Violet (9617) is well depicted.



## COMPARE Project Case III set

JMA is the lead center which will undertake Case III of the COMPARE (Comparison of Mesoscale Prediction and Research Experiments) project under WMO-CAS/JSC-WGNE. A typhoon during the SPECTRUM/TCM-90/TYPHOON-90 special observation period was chosen for Case III to test limited-area mesoscale models of 19 participating institutions and groups.

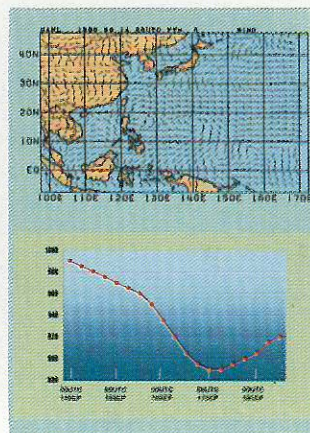
Under the experimental plan prepared by JMA, the intense development of typhoon (Flo) will be studied extensively in the model intercomparisons. Analysis fields prepared by the Meteorological Research Institute (MRI) with the JMA Global Data Assimilation System, as well as those prepared by the National Centers for Environmental Prediction (NCEP) of the US will be used as initial and lateral-boundary fields for prediction models.

The announcement of the experiments and descriptions of the case were made in May 1997. Data sets of the initial fields have been sent to the participants.

Following up on the discussions in the second COMPARE Workshop in Toulouse in September 1996, this case adopts a two-tiered strategy in which a second set of experiments will be designed to further investigate interesting scientific issues raised by the first set of experiments.

The expected schedule will be (1) submission of the first set of prediction results to the lead center by November 1997; (2) designing the second set of experiments by April 1998; (3) submission of the second set of experiments by the end of summer 1998; and (4) holding of workshop for discussion of the whole results in late fall or winter 1998.

Meanwhile, institutions and groups that have limited-area models and have interest in tropical cyclone simulation are invited to participate in the COMPARE project.



MRI / JMA Global Analysis used as one of the initial fields of the experiments in Case III of COMPARE. Surface wind fields valid at 00UTC on 14 September 1990 with Flo at 17.3N, 140.5E and Ed at 19.2N, 124.9E. Flo developed rapidly and reached 890hPa at 00UTC on 17 September 1990.



## Challenge Against Great Earthquake Disasters '97 Issues Tokyo Appeal

Japan unveiled a plan of action in urban safety and disaster preparedness at the close of the international symposium "Challenge Against Great Earthquake Disasters '97" held in Tokyo and Kobe on 13-17 January 1997 in commemoration of the second anniversary of the Great Hanshin-Awaji Earthquake. More than 5,000 participants from the different Japanese ministries, private companies, public sector as well as world organizations attended the symposium.

The Tokyo symposium which was complementary to the *World Health Organization (WHO) International Symposium on Earthquakes and People's Health: Vulnerability Reduction, Preparedness and Rehabilitation* held in Kobe, January 27-30, bannered the theme "Achieving Solidarity among Citizens, Businesses and Government to Create Safe and Worry-Free Cities" and issued a major appeal to the cities of the world.

The *Tokyo Appeal* called for, among others, a worldwide effort to relay earthquake information pertaining to hazard mitigation, restoration, recovery and other related knowledge; incorporate concepts of emergency preparedness and hazard mitigation into all urban policies; devise means for securing expenditures required for enhancing safety; and establish emergency management and disaster prevention as a comprehensive and multi-disciplinary field of study, based on the combined approaches of the natural and social sciences.

Among the pool of distinguished speakers were Dr. Frances Winslow, Emergency Preparedness Director (City of San Jose, CA); Dr. Alberto Palacios, Office of Emergency Services Director (Chile); Dr. Polat Gulkan, Professor, Department of Civil Engineering (Turkey); Mr. Roberto Meli, Director, National Center for Disaster Prevention (Mexico); Dr. Roman L. Kintanar, Chairman, Scientific and Technical Committee of UN IDNDR (Phil); Mr. Teddy Boen, Secretary-General, Society for Earthquake Technology (Indonesia); Mr. Joseph G. Terry, Jr., Director of Planning and Evaluation, Disaster Services, American Red Cross; and Mr. James Lovell, Jr., Captain, Apollo 13 (USA).

## Launch of Multi-Functional Transport Satellite Set

The Multi-functional Transport Satellite (MTSAT) will be Japan's successor to GMS-5 with a projected launch date in summer of 1999. Its two main functions will be the continuation of meteorological services in the JMA and air traffic control services.

MTSAT will carry one Visible (VIS) sensor and four Infrared (IR) sensors. An additional IR sensor for observational function of MTSAT will improve the capacity to detect night fog and improve the accuracy of the measurement of sea surface temperature, while the enhanced signal quantizing will improve the quality of the imagery.

The MTSAT will also improve two kinds of direct broadcast services: the High Resolution Imager Data (HiRID) broadcast, in place of the present S-VISSR service, and the Low Rate Information Transmission (LRIT) which will disseminate NWP products (GPV) and meteorological observational data to national Meteorological Services and the Members of the Typhoon Committee, in addition to the cloud imagery. The current analogue WEFAX service will continue for the time being after the commencement of the LRIT service. Specifications of HiRID and LRIT will be announced soon.



Dr. Kintanar of UN IDNDR Scientific and Technical Committee, spoke on the Filipino experience in past earthquake disasters.

## RSMC-Tokyo starts 72-hour typhoon track forecast

On 1 July 1997, the Regional Specialized Meteorological Center (RSMC) Tokyo-Typhoon Center started extending the typhoon track forecast from 48 hours to 72 hours. The probability percentage of the typhoon location within the area of possible position has also been revised from 60% to 70% to express the uncertainty of the track forecasts.

The commencement of the 72-hour typhoon track forecast was based on the improvement of typhoon track predictions with the Global Spectral Model (GSM) and the Typhoon Model (TYM) upgraded in March 1996.

Typhoon forecast charts are provided via radio broadcast (JMH) for the national Meteorological Services and marine users. The 72-hour typhoon forecasts are also included in the Tropical Cyclone Advisory which is being disseminated via the GTS to the Members of the Typhoon Committee.



| Channel           | VIS                                                                                                               | IR1                     | IR2                     | IR3                   | IR4                   |
|-------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------|-----------------------|-----------------------|
| Wavelength        | 0.55-0.80 $\mu\text{m}$                                                                                           | 10.3-11.3 $\mu\text{m}$ | 11.5-12.5 $\mu\text{m}$ | 6.5-7.0 $\mu\text{m}$ | 3.5-4.0 $\mu\text{m}$ |
| Resolution        | 1 Km (VIS), 4 Km (IR) at the sub-satellite point                                                                  |                         |                         |                       |                       |
| Signal Quantizing | 10 bits for both VIS and IR channels (1,024 gradations)                                                           |                         |                         |                       |                       |
| Communications    | S-band (Receiving: 2026-2035 MHz, Transmitting: 1677-1695 MHz)<br>UHF (Receiving: 402 MHz, Transmitting: 468 MHz) |                         |                         |                       |                       |

|                    | HiRID      | LRIT       | WEFAX      |
|--------------------|------------|------------|------------|
| Frequency          | 1587.1 MHz | 1691.0 MHz | 1691.0 MHz |
| Polarization       | Linear     | Linear     | Linear     |
| Modulation         | BPSK       | BPSK       | AM-FM      |
| Transmission speed | 660 Kbps   | 64 Kbps    |            |

Major missions of MTSAT

Appearance of geostationary MTSAT