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Newsletter

Macao • China

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联合国亚太经社会/世界气象组织台风委员会第44次届会 44th Session of the UNESCAP/WMO Typhoon Committee

2012年2月6-11日, 中国杭州

Hangzhou, China, 6-11 February 2012



Group Photo TC 44

Taking into consideration that the Typhoon Committee has been developing more and more activities, the TC decided, at its 44th Annual Session, to request TCS to issue the TC newsletter twice a year. This is the first time that the newsletter is published in the middle of the year and we thank the Members that have responded to our invitation to collaborate with their articles and news.

The next TC newsletter will be published at the end of the year and I take this opportunity to invite the Members to submit articles and news taking into account the recommendation of the TC at its 44th annual session:

The 44th Session of the Typhoon Committee

The Forty-fourth Session of the ESCAP/WMO Typhoon Committee (TC) was held at the DAHUA Hotel, Hangzhou, China, from 6 to 11 February 2012.

The Session was attended by 120 participants from 11 of 14 Members of the Typhoon Committee, namely: China; Hong Kong, China; Japan; Macao, China; Malaysia; Philippines; Republic of Korea; Singapore; Thailand; the Socialist Republic of Viet Nam; and the United States of America (USA).

The Session was also attended by seven observers from: Joint Typhoon Warning Center (JTWC), International Civil Aviation Organization (ICAO), United Nations Environment Programme (UNEP), Commission for Atmospheric Sciences of World Meteorological Organization (WMO), International Association for Wind Engineering, WMO Regional Training Centre – Nanjing (WMO RTC Nanjing) and the Global Green Growth Institute (GGGI). Representatives of the Economic and Social Commission for

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“for the improvement of the newsletter and to enhance the TC visibility and efficient results, the newsletter should better focus on promoting TC activities to partners and potential donors. Chairs of all WGs committed to providing input to help accomplish this goal”

Besides the co-ordination of activities related to the interconnection between the working groups and other issues, TCS along with the AWG has been developing intense activity related to the revision of the main legal documents of the Committee. For this purpose frequent contacts were established with a view to prepare the Report of the AWG meeting, which was held in Seoul on 28 and 29 May 2012. This Report will serve as a basis for discussions to be undertaken during the 7th Integrated Workshop, to be held in Nanjing, 26-30 November 2012. It is expected the collaboration of Members in reviewing these documents so that they can reflect the will of all in order to make the Committee more efficient and effective.

During the current year the Secretariat continued its efforts to obtain funding for the activities of the TC and it was with great satisfaction that we have seen approved the application for the project *Synergized Standard Operating Procedures for Coastal Multi-Hazards Early Warning System*, by the ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness in Indian Ocean and Southeast Asian Countries. This project is one of six approved in more than sixty applications and we will make every effort so that it can be very useful for the countries involved, which are Bangladesh, Cambodia, China, India, Lao PDR, Malaysia, Maldives, Myanmar, Pakistan, Philippines, Sri Lanka, Thailand and Viet Nam.

We are very grateful not only to ESCAP and WMO, but also to IOC /UNESCO, ADRC and PTC for their contribution to the success of the application. The implementation of this project will also be a crucial opportunity to enhance the cooperation between TC and the Panel on Tropical Cyclones, both regional bodies of the WMO Tropical Cyclone Programme.

We are also grateful to the Macao Science and Technology Development Fund for having decided to provide financial assistance for the implementation of the project *Operational System for Urban Flood Forecasting and Inundation Mapping* (OSUFFIM), prepared by TCS, although this assistance still depends on additional support from other sources to allow make up the amount necessary to pursue the project.



Asia and the Pacific (ESCAP), WMO and Typhoon Committee Secretariat (TCS) also attended the session. Three representatives of the Philippines Typhoon Committee Foundation Incorporated attended the Opening Ceremony as well.

The Session was declared open by Dr. ZHENG Guoguang, Administrator of the China Meteorological Administration, at 09:50 am on Monday, 06 February 2012, in the presence of the Members' representatives. Statements were delivered at the opening ceremony by Mrs. GE Huijun, Vice Governor of Zhejiang Province; Dr. CHO SeokJoon, Chairperson of the Typhoon Committee; Mr. Koji KUROIWA, representative of the WMO Secretariat. A message from Mr. Yuichi ONO, representative of ESCAP secretariat, was also delivered. The inauguration speech was addressed by Dr. ZHENG Guoguang, Administrator of the China Meteorological Administration (CMA).

Dr. JIAO Meiyun, Deputy Administrator of CMA, was elected Chairperson and Mr. SHUN Chi-Ming, Director, Hong Kong Observatory (HKO), was elected Vice-Chairperson of the Committee. Mr. Jeff LaDouce, Regional Director National Oceanic and Atmospheric Administration (NOAA), National Weather Service, Pacific Region was elected Chairperson of the Drafting Committee.

Delivery of the Dr. Kintanar Award-2011



The representative of the National Meteorological Center of CMA (Dr. DUAN Yihong) with the plaque of Dr. Kintanar Award





The Administrator of KMA (Mr. CHO SeokJoon) receiving the Dr. Kintanar Award

The Dr. Roman L. KINTANAR Award for Typhoon related Disaster Mitigation was presented at the opening ceremony of the 44th TC Session to the National Meteorological Center of China Meteorological Administration (CMA) and Korea Meteorological Administration (KMA), by the Typhoon Committee Foundation Incorporated of the Philippines.

Workshop on the Use of Multi-Global Navigation Satellite Systems for Sustainable Development

The Secretary of TC was invited by the Secretary of the Economic and Social Commission for Asia and the Pacific (ESCAP), to participate at the “Workshop on the Use of Multi-Global Navigation Satellite Systems for Sustainable Development”, which was organized by ESCAP with support from the Japan Space Exploration Agency (JAXA), from 21 to 22 March 2012, at the United Nations Conference Centre, Bangkok, Thailand.

The objectives of the workshop were to link Multi-Global Navigation Satellite Systems (GNSS) data providers, end users, especially policy and decision makers, and related international agencies in the region, enabling them to share information and new policy options necessary to promote using navigation and positioning satellite systems for transportation, disaster risk reduction, environment and agriculture

as well as sustainable development in the region.

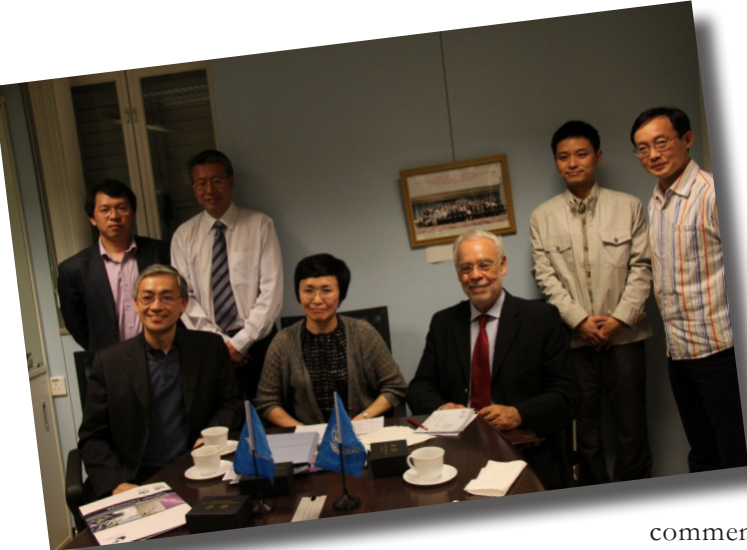
The presence of the Secretary of TC, the Secretary of the Panel on Tropical Cyclones, Mr. QamarUzZaman Chaudhry, and a representative of the Asia Disaster Reduction Center (ADRC), the senior researcher Mr. Takahiro ONO, permitted a fruitful discussion on the submission to the ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness in Indian Ocean and Southeast Asian Countries, of an application regarding the project formulated by TCS, Synergized Standard Operating Procedures for Coastal Multi-hazards Early Warning System. The expenses related to the participation at this workshop were supported by ESCAP.



Participants in the workshop on the Use of multi-Global Navigation Satellite Systems for Sustainable Development, Bangkok, Thailand, 21-22 March, 2012.

Visit to TCS Headquarters of the TC Chair and TC Vice-Chair

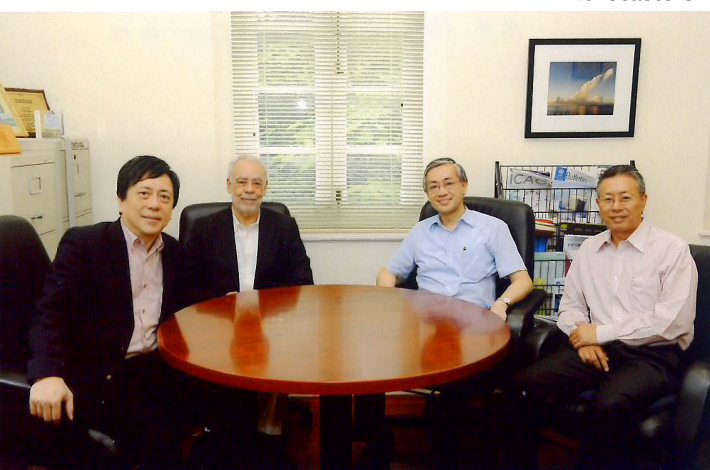
Ms. JIAO Meiyun, Deputy Administrator of CMA and Chair of the TC, and Mr. CM Shun, Director of Hong Kong Observatory and Vice-Chair of TC and Mr. Lei Xiaotu, Chair of the Working Group on Meteorology, Mr. Yu Jun from CMA visited in April the headquarters of TCS, in the village of Coloane, in Macao, China. This visit provided a very fruitful conversation about the activities of the Committee and also on the need to undertake the review of the main basic documents of the TC, in particular Rule of Procedure, Terms of Reference of the TC, TC Chair, TC Vice-Chair, etc.



A short break during the visit to the TCS headquarters- April 2012

Visit of TCS staff to the Hong Kong Observatory

The Meteorologist of TCS, Mr. Leong



Visit to Hong Kong Observatory

Kai Hong, and the Secretary, Mr. Olavo Rasquinho, visited the Hong Kong Observatory on June 22, where they were welcomed by Mr. CM Shun, Director of HKO, and Mr. Edwin Lai, Chair of the TRCG. The purpose of the visit was to discuss the summary report of the AWG meeting that was held in Seoul, Republic of Korea, on 28-29 May 2012, particularly in what refers to the review of the main legal documents of TC. They also had the opportunity to visit the Young Men's Christian Association (YMCA) of Hong Kong, where the 45th TC Session will take place.

60th Anniversary of SMG

The Hydrologist of TCS, Dr. Jinping Liu, the Meteorologist, Mr. Leong Kai Hong (Derek) and the Secretary of TC, Mr. Olavo Rasquinho, attended the

commemorations of the 60th Anniversary of the SMG.

The Secretary made a presentation on Strengthening Capacity Building in Typhoon Committee Members, in which he highlighted the role of TC in the transfer of technical and scientific knowledge from the most advanced TC Members to the less developed ones. For illustrating his point of view he briefly described the TC activities related to this issue, namely the TC fellowship scheme, the attachment of forecasters to the RSMC Tokyo and the Roving Seminars.

TCS Sent its Hydrologist Participating in the International Seminar in Nanjing, China

At the request of the Applied

Hydrometeorological Research Institute (AHMRI) and the College of Hydrometeorology (COM) under the Nanjing University of Information Science and Technology (NUIST), Typhoon Committee Secretariat (TCS) sent its hydrologist Dr. Jinping LIU participating in the



Dr. Jinping LIU was giving his keynote speech

international Seminar on 'Extreme Hydro-meteorological Events over Consideration of Global Climate Change' held on 9-10 May 2012 in Nanjing, China. The participants included the hydrologists and meteorologists from China, USA, Canada and Holland.

Dr. Jinping LIU briefed the organization structure and attribute of Typhoon Committee (TC), the main contents of TC strategic plan 2012-2016 and the advantage of cooperation mechanism of TC in his keynote speech titled Typhoon Committee Strategic Plan and Its Cooperation Mechanism. The participants showed their keen interest to involve in the activities of TC.

TCS Application Approved by ESCAP Tsunami Funding

TCS was informed recently by ESCAP that, the project proposal of 'Synergized Standard Operating Procedures for Coastal Multi-Hazards Early Warning System' for the ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness in Indian Ocean and South East Asian Countries has been in principle approved at the 7th round of funding by the Advisory Council of the Fund with certain conditions.

This project was proposed and submitted by TCS in the January, 2012 and discussed at the TC 44th Session held in Hangzhou, China. It was told that ESCAP received totally 68 proposals for the funding and after several rounds of review ended up with a recommendation of 6 projects. The application of the proposal got very strong support and cooperation from ESCAP and CMA of China, HKO of Hong Kong, China, RSMC of Japan, MMD of Malaysia, Pacific Region of NOAA, USA. TCS will be the contracting organization with three main partners including Panel of Tropical Cyclone (PTC), Asian Disaster Reduction Center (ADRC) and Intergovernmental Oceanographic Commission (IOC) of UNESCO.

The project will be lasted 24 months with total budget of about USD 457,000. The

main activities includes: 1) Reviewing and synergizing the existing Standard Operating Procedures (SOP) for coastal multi-hazard EWS in some Members of TC and PTC and developing the Manual/Handbook of Synergized SOPs for Coastal Multi-Hazards EWS, and 2) Enhancing the capacity building on performance of SOP for coastal multi-hazard EWS in some Members of TC and PTC. There are two main output, including: 1) Manual/Handbook of Synergized Standard Operating Procedures for Coastal Multi-Hazards Early Warning System, mainly focusing on the hydro-meteorological service, including SOPs related to warning providers, disaster managers, media and fishermen, and 2) Regular communication and cooperation mechanism between TC and PTC on coastal multi-hazard early warning, particularly southern countries in the region.

Macao Government Funds TC Cross-cutting Project UFRM

To respond to the requirement from the pilot cities of TC cross-cutting project of Urban Flood Risk Management (UFRM), Typhoon Committee Secretariat (TCS), in cooperation with Macao Meteorological and Geophysical Bureau (SMG), submitted a project proposal to the Science and Technology Development Fund (STDF) of Macao, China in December, 2011 for developing a real time Operational System for Urban Flood Forecasting and Inundation Mapping (OSUFFIM) for TC Members.

TCS was informed on May 4, 2012 by STDF of Macao that, the Administrative Committee of STDF decided the approval of the grant of MOP 1,400,000 (about US\$175,000) for the proposal of OSUFFIM. This is indeed very encouraging to Typhoon Committee as it shows that the expected benefits resulted from this project are well recognized.

The funding approved by STDF of Macao is part of expected budget. It is still not enough to achieve all goals of proposed OSUFFIM. TCS has requested STDF of Macao to reserve

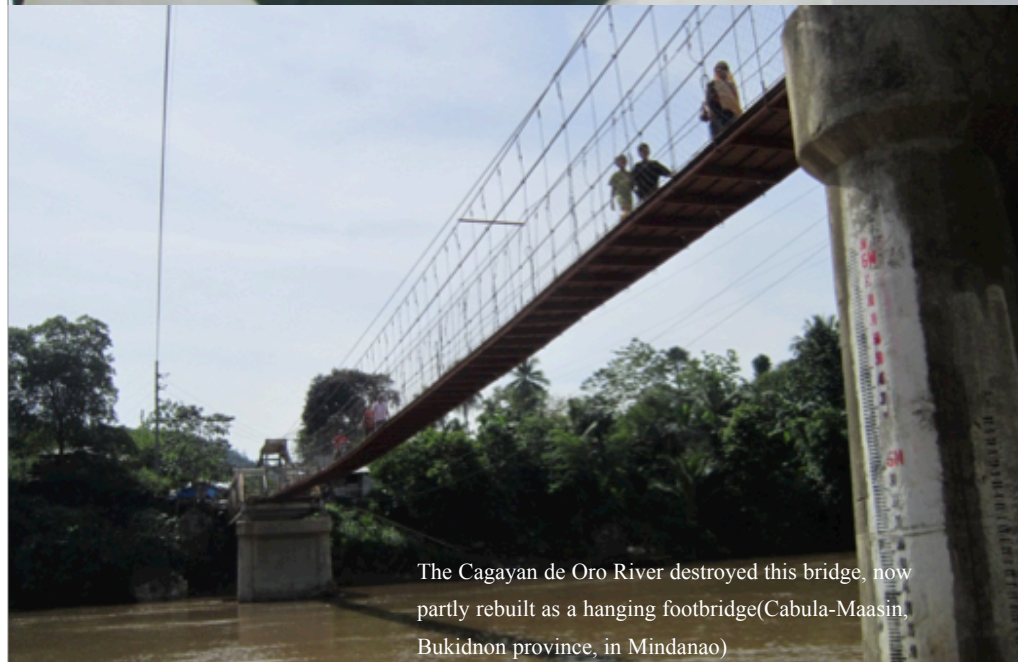
this grant for a period of one year to look for other potential financial resources to support this project. OSUFFIM is supposed to be freely provided to TC Members for promoting the capacity on urban flood risk management. TCS is doing its great effort to get more grants from other donors for developing OSUFFIM. The Secretary of TC Mr. Olavo Rasquinho likes to appeal for funding support to TC Cross-cutting project UFRM from TC Members and international/regional organizations.



Members of TC expert team visiting a relocation site in Cagayan de Oro



Staff from NDMI gave an introduction to the WGTCDIS



The Cagayan de Oro River destroyed this bridge, now partly rebuilt as a hanging footbridge (Cabula-Maasin, Bukidnon province, in Mindanao)

TC sends an expert mission to Mindanao, Philippines

The TC at its 44th Annual Session decided to organize a mission to assess the impacts of tropical storm Washi. The mission visited Manila and Cagayan

de Oro (CDO) city, in Mindanao. During the visit a seminar was held in Manila and in CDO, on the Web GIS Based Typhoon Committee Disaster Information System (WGTCDIS), developed by the National Disaster Management Institute (NDMI) of Republic of Korea. The team was composed of experts from ESCAP,



Report on Washi Expert Mission to Philippines

UNDP, elements of the TC WGDRR, the Secretary of TC and personnel from PAGASA. The report of the mission is posted on the TC Website.

Tele-conference - Stakeholder and Advisory Meeting on the Mechanism – Hong Kong, China – July 17

On July 17, from 14:00 to 17:00, the TC Secretary participated in a teleconference, based in the Chinese University of Hong Kong, with the title Stakeholder and Advisory Meeting on the Regional Cooperative Mechanism on Disaster Monitoring and Early Warning, Particularly Drought (the Mechanism). During the conference it was raised the possibility of Macao to become the host of the future secretariat of the Mechanism.

TC AWG Made Important Decisions for Improving

TC Governance

Referring to the decision of TC 44th Session held in Hangzhou, China in from 7 to 11 February 2012, in order to improve the governance of TC and to decide some important issues, TC Advisory Working Group (AWG) had its meeting in Seoul, Republic of Korea from 28 to 29 May 2012. The meeting was jointly organized by TCS and KMA and attended by AWG members or their representatives, Vice-chairperson of TC and representatives of TC Chairperson, ESCAP, WMO and TC Secretariat (TCS).

The participants of the meeting reviewed TC existing

Follow-up of the Decisions and Recommendations

- Standardized Performance Based Metrics in the Key Results Areas (KRAs)
- Development of Synergies with ESCAP and WMO through Strategic Objectives and Policies and Operating Plans
- 2) Efficiency of TC Meeting
 - Review, Investigate, and Implement Methods and Procedures to Evaluate the Effectiveness of Training and Workshops
 - Technical Conference (TECO)
 - Integrated Workshop (IWS)
 - TC Annual Sessions
- 3) Resources Mobilization
- 4) Usefulness and Application of In-kind Contributions
- 5) Standardization and Harmonization of Members' Practices



legal documents, Term of Reference of WGs and procedures of TC activities and made very important revisions and recommendations according to the executive situation of TC in the recent years, including following 10 aspects as:

- 1) Improvement of Governance of TC
 - Review of the existing legal documents of TC, including TC Statute, TC Rules of Procedure (RoP), Terms of Reference (ToR) of TC, ToR of the Chair of TC, ToR of the Vice-Chair of TC, ToR of the TC Secretary and ToR of the TCS.
 - Review of ToR of AWG and WGs
 - Use of Decision and Action-based Documents and Consistent

to Promote Effective Warning, in particular Communication of Advisory and Warning Message to the Users

- 6) Procedures for hosting TCS and Selection of the Secretary for the next 4-year Cycle (2015-2018)
- 7) Agreements between TC and other Entities
 - Draft agreement between Nanjing University of Information Science and Technology (NUIST, Nanjing, China) and TC
 - Agreement Between China and TC on hosting TCS in Macao
 - Agreement between Macao SAR of China and TC regarding administrative, financial and related arrangements for TCS
 - Agreement between WMO and TC on TCTF
- 8) Typhoon Committee Trust Fund

(TCTF)

9) New Rules and Procedures
“Dr. Roman L. Kintanar Award for Typhoon-related Disaster Mitigation”

10) Other Business

- Ideas for improving TC efficiency and effectiveness

as well as representatives from the organizing institutions and so on.

During the meeting, participants discussed future activities of the working group, such as upgrade of the Typhoon Committee Disaster Information



- Drafting of meeting summary
The summary was distributed by the TC Members for comments and the recommendations are expected to be approved at next TC Session and put into operation since 2013.

WGDRR workshop in Seoul

TCS participated in the 7th Meeting of Typhoon Committee Working Group on Disaster Risk Reduction which was jointly organized by United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), the World Meteorological Organization (WMO) Typhoon Committee Secretariat, and the National Emergency Management Agency of the Republic of Korea in Seoul on 30-31 May 2012. The about 40 participants who attended the meeting included representatives from China, Japan, Malaysia, Philippines, Republic of Korea, Thailand, Viet Nam, Hong Kong and Macao Special Administrative Regions,

System (TCDIS), and strengthening international cooperation, etc.

ESCAP Organized Second Workshop on Applications of Space Technology to Enhance the Activities of the Typhoon Committee in Macao, China

United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) organized its second Workshop for the Project on Application of Space Technology for Water-related Disaster Reduction from 27 February to 2 March 2012 in Macao, China, which is one of the WGH AOPs, in cooperation with the Typhoon Committee Secretariat (TCS). The Workshop was hosted by Macao Meteorological and Geophysical Bureau (SMG) and financially supported by the Japan Aerospace Exploration Agency (JAXA).

The workshop was linked with TC cross-cutting project of Urban Flood



Applications of Space Technology to Enhance the Activities of the Typhoon Committee participants visit TCS



Risk Management (UFRM) as a follow up of the outcomes of the Workshop on Space Application to Reduce Water-related Disaster Risk in Asia held in Bangkok from 7 to 9 December 2010 and attended by participants from Cambodia, China, Japan, the Philippines, the Republic of Korea, Thailand, Vietnam and Macao, China.

The participants had presentations and hands-on train on Sentinel Asia and on remote sensing applications for disaster risk management, including optical and synthetic aperture radar. The participants also reviewed the progress on UFRM project and discussed the outline of the UFRM guidelines. The participants recommended that the guidelines should be specific to the Typhoon Committee area and reflect the on-going urban flood management activities and projects that are implemented in the region, including in developing countries where sophisticated flood forecasting and monitoring systems are not available.



UFRM participants

China, on 6-11 February 2012. The main drafters joined the meeting.

The participants reviewed and discussed in depth the existing contents and chapters and decided the changes and modifications for the second version. The participants concurred the provisional timetable for the UFRM Guidelines drafting. The finalization of the Guidelines is expected to submit to 45th TC Annual Session for approval and publication.

Draft Meeting on Urban Flood Risk Management (UFRM) Guidelines held in WMO RTC Nanjing, China

Referring to the decision at the TC 6th Integrated Workshop held in November 2011 in Nha Trang, Vietnam, and the generous offer from WMO Nanjing Regional Training Center (RTC), the Draft Meeting on Urban Flood Risk Management (UFRM) Guidelines of Typhoon Committee (TC) was held in the WMO Regional Training Center (RTC) in Nanjing, China from 13 to 14 February, 2012, following the TC 44th Annual Session held in Hangzhou,

Retirement of Mr. Antonio Viseu, Deputy Director of Macao Meteorological and Geophysical Bureau (SMG)

Mr. Antonio Viseu, Deputy Director of the Macao Meteorological and Geophysical Bureau (SMG), retired this year. TCS pays its respects to Mr. Viseu for his great dedication that always expressed in relation to the TC. He developed, along with the director of



SMG Dr Fong Soi Kun, the necessary arrangements to Macau becoming the headquarters of the Secretariat since 2007, for two periods of four years.

(News contributor: TCS)



The Secretary answering questions from a TV station of Hangzhou

Extracts from an interview to the Philippine Daily Inquirer (in Web)

PH is best lab for extreme weather chasers

By Kristine L. Alave
Philippine Daily Inquirer
1:33 am | Sunday, May 20th, 2012

A country that gets hit by 20 typhoons every year may not be the best place to live for most people. But for weather enthusiasts and storm chasers, the Philippines' reputation as storm central has made it the best place to witness the power of nature.

Dr. Olavo Rasquinho, head of the Typhoon Committee office in Macau, said the Philippines, with its active weather and geological systems, has become a valuable source of knowledge for meteorologists and other scientists studying volcanoes, floods and people's responses to them.

"The Philippines is a country prone

to natural disasters. We have learned a lot from the Philippines and with PAGASA ... The Philippines is the best laboratory for natural disasters," Rasquinho said in a recent interview.

Rasquinho, along with scientists from South Korea and Sri Lanka, visited Cagayan de Oro City recently to study the aftermath of Typhoon "Sendong." South Korea, the team said, will help the Philippine government install weather equipment in the region to prevent another disaster.

Rasquinho said typhoons are often seen as enemies because of the destruction they cause in communities that are not prepared to cope with them. But they are part of nature and are needed to balance world weather.

Typhoons also help in transferring energy from the lower latitudes to the higher latitudes, he said. "They help break droughts, they fill our dams," he said. Without typhoons, countries in the lower latitudes will warm up, while those in the north will get colder.

Rasquinho stressed that Filipinos must be prepared to face extreme climactic events. While climate-change studies

have yet to prove conclusively that the Pacific will see more and stronger typhoons in the long-term, the concept of climate variability in this part of the world has been observed, he said. This means that the Philippines should expect to see extreme typhoons in the years to come.

Rasquinho said the government should put early warning signals in vulnerable places. He noted that in the case of Sendong, which dumped 181 millimeters of rain in 24 hours in Cagayan de Oro, there were no rain gauges in the river systems and in the mountains that could have alerted the people downstream of the possibility of floods.

The communities should also be educated about the risks and be warned of incoming typhoons, Rasquinho said. The fact that typhoons rarely visit northern Mindanao has given residents there a false sense of security, which led to the loss of hundreds of lives when Sendong came last.

台风委员会秘书长 奥拉瓦·拉斯奎诺

WMO 为东亚区域培训中心和联合国的支助计划、国际气象组织人权委员会在孟加拉国发布重要报告。会议委员会第一会议于 2012 年 2 月在杭州召开。会议期间 WMO 为东亚区域培训中心作为联合国的会议培训中心。

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南京区域营销中心, 其次从委员会成员提供资源, 这是他们提高自身对外谈判能力。



As zonas baixas da cidade sofreram inundações que levaram ao desespero alguns moradores e comerciantes. Mas o cenário poderia ter sido muito pior se aquando da passagem do Vicente a maré estivesse alta, referiu o secretário-geral do Comité dos Turfeiros ao recordar as cheias do "Hagupiti" em 2008. Olavo Rasquinho diz ser difícil que outro tufão passe tão perto de Macau este ano, mas alerta que nada garante que tal não possa acontecer.

Estava em viagem quando o último tufão se aproximava de Macau e por isso não acompanhou a evolução da tempestade. Mas, contactado pelo ITM, Otávio Rasquinho recorreu às suas memórias para evidenciar a força do "Vicente". Dada a dimensão da tempestade, o secretário-geral do Comité dos Tufões sublinha que "o Vicente poderia ter tido consequências mais graves em termos de inundações, analogamente ao que aconteceu com o "Haguppi" (que em Setembro de 2008 levou a sério o sítio 8) caso a hora de passagem do tufão nas vizinhanças de Macau acontecesse simultaneamente à maré alta".

"Poderia provocar uma forte maré de tempestade, que consiste na junção dos efeitos da maré astronómica com a elevação do nível do mar; junto à costa por efeitos de ventos fortes e a própria elevação do nível das águas pela acção de uma zona da atmosfera caracterizada por pressões muito baixas", explicou o especialista, ressaltando que as suas declarações são fruto da sua opinião pessoal baseada na experiência.

Ainda assim, recorde-se que na zona do Porto Interior o nível da água chegou aos 90 centímetros, afetando várias pessoas. Em 2008, a passagem do Hagupit, a maré chegou a atingir os 4,6 metros de altura, o valor mais alto dos 15 anos interiores. A subida mais elevada tinha sido atingida com a passagem do tufão Becky, que registou níveis de 4,78 metros.

Também seja pouco provável que este ano a RAEM volte a ser afetada por outra tempestade com a mesma dimensão do Vicente, não é possível dar garantias. “Devido às pequenas dimensões de Macau será difícil outro tufão passar tão perto como aquele. No entanto, ainda estamos a meio de época dos tufões e nada nos garante que não poderá acontecer situação semelhante ou mesmo mais grave”, acrescenta Cláudio Rasquinho.

O diretor dos Serviços Meteorológicos e Geofísicos, Fong Sai Kue, também disse ao JTM, na imprensa, que o território não deverá ser afetado este ano por outra tempestade tão intensa. Porém, é esperado pelo menos mais um tufão que obrigará a irar o sinal 8.

O “Vicente” levou a histeria o sinal 9, enquanto que Hong Kong chegou mesmo a irar o 10. Otávio Rasquinho refere que a similitude pode ser diferente atendendo a vários fatores que vão desde os critérios estabelecidos em cada RAJE e às condições meteorológicas que se verificam. “A resposta [ao facto de Hong Kong ter ido o sinal 10] pode estar no facto de Hong Kong ter um efeito orográfico mais acentuado do que Macau, o que pode ter implicações na intensidade do vento”, equaciona.

“Outra hipótese poderá ser o facto de o modelo de previsão que mais influenciou a decisão dos meteorologistas na RAEM não ter sido o mesmo que os de Macau seguirem”, uma vez que “há vários meteorólogos e todos eles dão valores que, podendo ser semelhantes, são em geral diferentes no que respeita ao vento e outras variáveis meteorológicas”, esclareceu.

Deputados falam em ineficácia dos alertas de tempestade

Ho Ion Kong criticou o que considera ser a falta de capacidade do Governo fazer previsões relativas aos tufões, ao notar que em Macau o sinal foi içado uma hora mais tarde do que em Hong Kong. O deputado diz, assim, suscitador de problemas técnicos na avaliação da tempestade. Ho Ion Kong alega, mesmo, numa interpelação escrita, que a falta de diretizos atempados provocou o congestionamento do trânsito causando acidentes. A mesma oposição é partilhada por Paul Chan Wai Chi que aponta falhas no mecanismo de alerta para tufões. O deputado e membro da Associação Novo Macau deu o exemplo das inundações no Porto Interior, que deixaram muitas lojas e carros alagados, para mostrar a alegada falta de eficiência das autoridades. Chan Wai Chi realça que esta questão devia ter sido scutalizada antes da época das chuvas chegar.





TC Chair Deputy Administrator of CMA

Jiao Meiyan, born in 1962, holder of Master Degree of Science from Nanjing Institute of Meteorology (now renamed as Nanjing University of Information Science and Technology), Senior Engineer, Advisor for MA Candidates.

August 1983-September 1986: Forecaster of Jilin Meteorological Observatory;

September 1986-April 1989: Obtained Master degree from Nanjing Institute of Meteorology (now renamed as Nanjing University of Information Science and Technology);

April 1989-September 1991: Worked as engineer in Anhui Research Institute of Meteorological Sciences;

September 1991-March 1993: Deputy Director of Wuhu Municipal Meteorological Bureau;

March 1993-December 1994: Vice-director of Anhui Research Institute of Meteorological Sciences;

December 1994-April 1995: The Assistant of Director of Anhui Provincial Meteorological Bureau; Vice-director and director of Anhui Research Institute of Meteorological Sciences;

April 1995-March 2001: Deputy Director of Anhui Provincial Meteorological Bureau;

March 2001-December 2004 Deputy Director-General of National Meteorological Centre, CMA;

December 2004-November 2007, Director of National Meteorological Centre, CMA;

November, 2007-May 2008, Director-General of Forecasting Services and Disaster Mitigation; Director of National Meteorological Centre, CMA;

June, 2008-Now: Deputy Administrator of CMA;

She holds concurrent posts of deputy secretary-general of the State Flood Control and Drought Relief Headquarters, vice-chairmen of Chinese Committee of THORPEX Scientific Project, etc.

She was elected as the Chairperson of the UNESCAP/WMO Typhoon Committee in 2012.

Responsibilities:Assisting the Administrator in managing the forecast, service, emergency, disasters mitigation and information networks, Department of Emergency Response, Disaster Mitigation and Public Services, Department of Forecasting and Networking. Meanwhile in charge of contacting National Meteorological Centre, National Climate Centre, National Meteorological Information Centre, etc. and every meteorological bureaus of Central and South China. In charge of the research and development of numerical model.

TC Vice Chair Director of the Hong Kong Observatory

Mr. SHUN Chi-ming was appointed as the Director of the Hong Kong Observatory (HKO) on 14 April 2011. Mr. SHUN joined HKO in February 1986 as Scientific Officer. He was promoted to Senior Scientific Officer in April 1998 and then to Assistant Director in December 2008. Since 1993, Mr. Shun specialized in aviation meteorology. He implemented the Terminal Doppler Weather Radar for the new Hong Kong International Airport and led a team to develop the world-first LIDAR windshear detecting system. He served as the MET Vice-chair of the ICAO CNS/MET Subgroup in Asia/Pacific from 2003 to 2009. In February 2010, Mr. SHUN was elected President of the Commission for Aeronautical Meteorology (CAeM) of the WMO. "While I have worked many years in aviation weather service, tropical cyclone forecasting has always been one of my focuses. I look forward to working closely with members of the Typhoon Committee to seek further cooperation to improve warning services for the public", Mr. Shun said





TC News from Members



China



Main Activities of China in 2012

Since the 44th Session of TC, held in Hangzhou, 6-11 February 2012, China was represented in the following events:

- **WMO Typhoon Landfall Forecast Demonstration Project (TLFDP) Training Workshop on Operational Tropical Cyclone Forecast, in Shanghai, China, 12-14 June 2012**

The WMO-TLFDP Training Workshop on Tropical Cyclone Forecasting was held in Shanghai, China during 12-14

June 2012. More than 70 participants attended the meeting, including 16 lecturers from 7 institutions worldwide. The WMO-TLFDP is jointly supported by WMO's World Weather Research Programme (WWRP), Tropical Cyclone Programme (TCP) and Public Weather Service Programme (PWS). It is also an annual operating plan (AOP-Verification of Landfall Typhoon Forecast) of TC Working Group on Meteorology. This project has made

some progress in the past two years. Real-time forecast products have been collected; forecast products and its official website (<http://tlfdp.typhoon.gov.cn>) have been disseminated; training course has been launched; verification techniques on TC forecast have been improved, etc. Through this year's meeting, a set of verification techniques was established and the project will be extended to 2015.

● Launching of the inaugural issue of the Tropical Cyclone Research and Review

The first issue of the *Tropical Cyclone Research and Review* was launched during the 44th session. China Meteorological Administration, together with TCS, edits and publishes the Typhoon Committee science and technology journal quarterly from February 2012. This journal publishes research on tropical cyclones and review of tropical cyclone activities which are peculiar or causing disastrous impacts on Typhoon Committee Members. It also publishes review and research on hydrology and disaster risk reduction related to tropical cyclones. Contributions could be submitted through the website (<http://mc03.manuscriptcentral.com/tcrr>). Additional information is available at <http://tcrr.typhoon.gov.cn>.



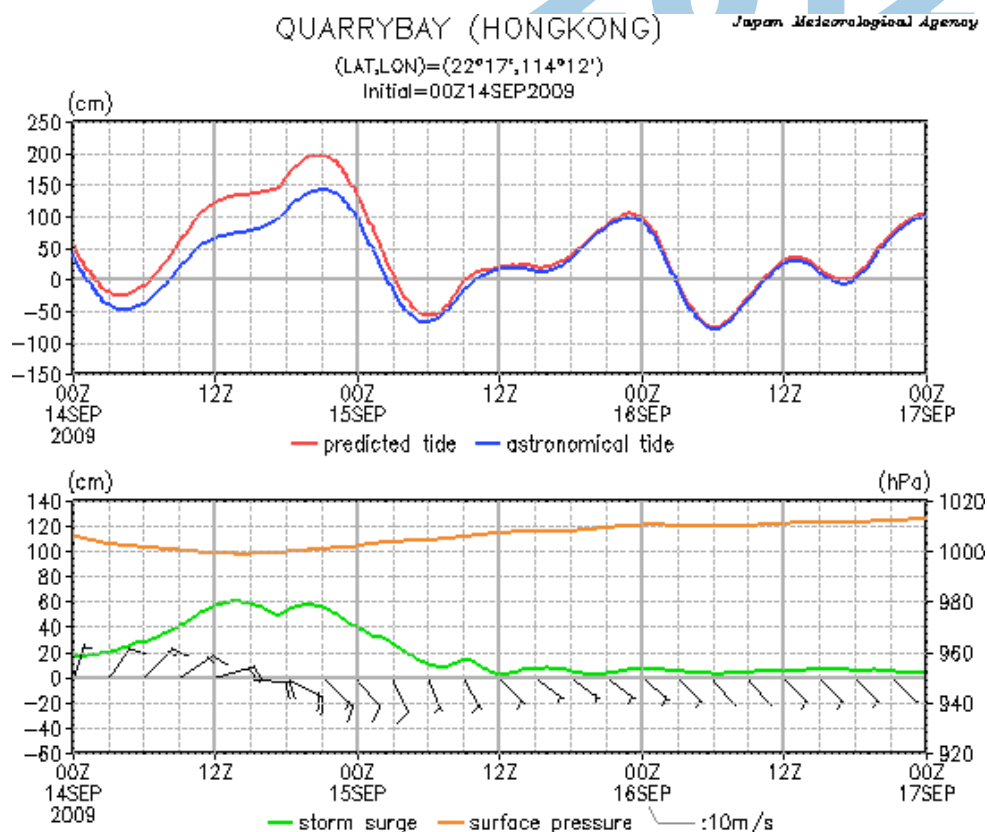
Japan

Provision of Storm Surge Time-series Charts for Typhoon Committee Members

JMA started to provide storm surge time-series charts for the three locations of Macao, Quarry Bay (Hong Kong) and Hua Hin (Thailand) on June 5, 2012. The charts are available on JMA's Numerical Typhoon Prediction website along with storm surge horizontal maps, which have been published on the server since 1 June, 2011.

These charts are provided by JMA in response to requests from Typhoon Committee Members, and show storm surges and predicted tides (i.e., the sum of storm surges and astronomical tides). Astronomical tides are estimated with 60 tidal potential constituents determined from tide observation data provided by Members. For users' reference, surface pressure and wind values used in the storm surge model are also included in the charts.

JMA plans to add more locations at the request of Typhoon Committee Members in due course. This service is



An example of a time-series chart (Quarry Bay, Hong Kong)
The upper figure depicts predicted (red line) and astronomical (blue line) tides (cm). The zero level of the upper figure represents MSL (mean sea level). The green line in the lower figure depicts predicted storm surges (cm). In the lower figure, surface pressure values (orange line) and wind barbs used in the storm surge model are also shown for reference.

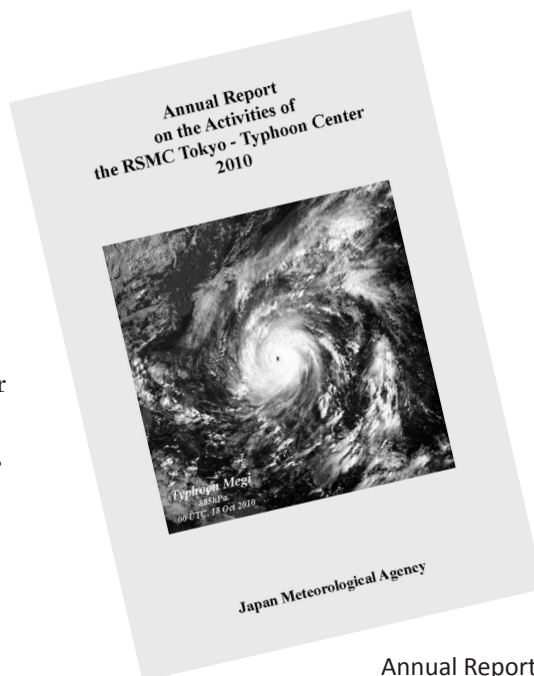
implemented within the framework of the WMO Storm Surge Watch Scheme (SSWS), and JMA started operation of a storm surge model for the Asian region in 2011. An outline of this model is

given in RSMC-Tokyo Typhoon Center Technical Review No. 14 (<http://www.jma.go.jp/jma/jma-eng/jma-center/rsmc-hp-pub-eg/techrev.htm>).

Publications released by the RSMC Tokyo - Typhoon Center

➤ Annual Report on the Activities of the RSMC Tokyo - Typhoon Center

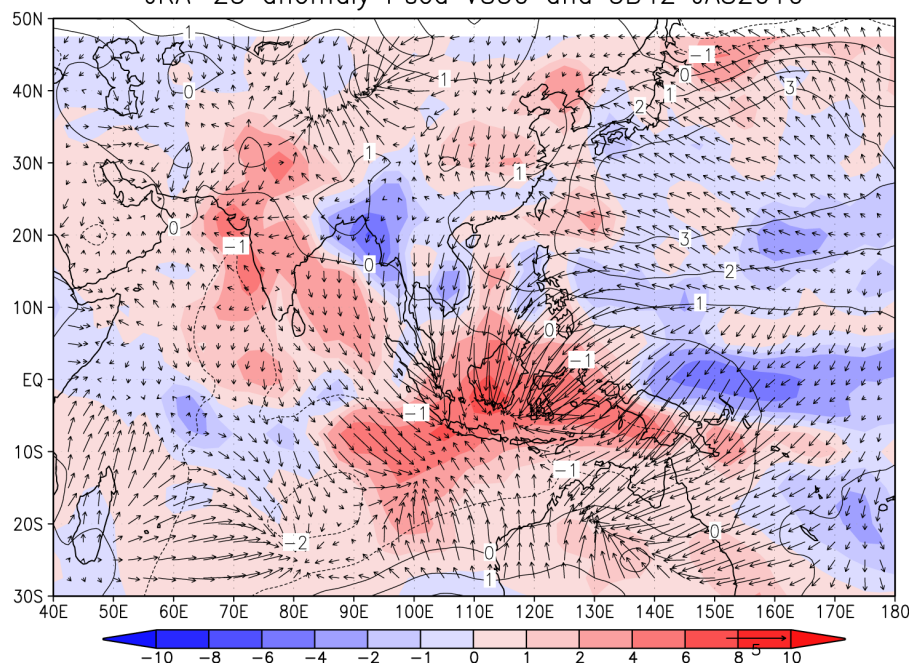
The Annual Report on the Activities of the RSMC Tokyo - Typhoon Center 2010 was released in December 2011. The publication details RSMC products, analysis of tropical cyclones, and verification/specifications of numerical models. The DVD version distributed to Members includes MTSAT satellite images of all 2010 tropical cyclones along with a satellite viewer program, SATAID.



Annual Report (DVD version
also available)

➤ RSMC Technical Review No. 14

JRA-25 anomaly Psea V850 and 3B42 JAS2010



RSMC Technical Review No. 14 was
released in March 2012.

This issue features:

- The Inactive Typhoon Season of 2010
- JMA's Storm Surge Prediction for the WMO Storm Surge Watch Scheme (SSWS)

The Technical Review includes a discussion of
the 2010 inactive typhoon season.

Both publications (the Annual Report
and the Technical Review) are available
on the RSMC Tokyo - Typhoon
Center website at [http://www.jma.
go.jp/jma/jma-eng/jma-center/rsmc-
hp-pub-eg/techrev.htm](http://www.jma.go.jp/jma/jma-eng/jma-center/rsmc-hp-pub-eg/techrev.htm).

Dec 2011 to May 2012

● **Total Lunar Eclipse
Observing Activity**

A 6-hour total lunar eclipse phenomenon occurred on December 10 2011 and was visible in Macao. In order to enhance the public understanding on astronomy as well as to promote scientific knowledge, the Macao Meteorological and Geophysical Bureau (SMG) and the Civic and Municipal Affairs Bureau (IACM) jointly organized an activity namely “Lunar Eclipse Observing Activity”, in which over 200 citizens participated. Aside from eclipse observation, the activity included an astronomy workshop which aimed to teach the public to create a simple telescope for eclipse observation. In addition, a talk on astronomy was held for strengthening the public understanding on astronomical phenomena.



● **The 26th Session of
Guangdong-Hong Kong-
Macao Seminar on
Meteorological Science and
Technology and the 17th
Session of Meteorological
Cooperation Meeting**

Meteorological experts from the Guangdong Province, Hong Kong and Macao took part in the “26th Session of Guangdong-Hong Kong-Macao Seminar on Meteorological Science and Technology and the 17th Session of Meteorological Cooperation Meeting” held in Macao.

During the cooperation meeting, the three parties summarized the overall situation of their meteorological operations in the past years and discussed the possible cooperation in the future, whereas in the science and technology session, 24 papers were presented, which included topics on tropical cyclones, climate change and

severe weather cases.

The three parties have established a close working relationship among each other over the years, with the target

of providing sound meteorological services to the public, as well as working for the prosperity and development in the Pearl River Delta.





- **Workshop on Application of Space Technology to Enhance the Activities of Typhoon Committee**

The workshop on “Application of Space Technology to Enhance the Activities of Typhoon Committee” was held from 27 February to 2 March 2012 in Macao, organized by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), the World Meteorological Organization (WMO) and the ESCAP/WMO Typhoon Committee Secretariat (TCS). The workshop was financially supported by the Japan Space Exploration Agency (JAXA) and hosted by the Macao Meteorological and Geophysical Bureau.

The objective of the workshop is to enhance the capacity of water-related disaster management through a technical training on space applications. GIS-based disaster risk management tools, the progress of establishing the “disaster warning system” and other space application methods were introduced during the workshop, in addition to the revision of the progress and implementation of the comprehensive research project on Urban Flood Risk Management (UFRM).



- **Celebration of the World Meteorological Day 2012 and the 60th Anniversary of SMG**

The Year 2012 is the 60th anniversary of the Macao Meteorological and Geophysical Bureau (SMG). On 23rd March, SMG held a celebration for the World Meteorology Day and its 60th Anniversary at the Convention Hall of the Macao Science Center. The opening ceremony included an introduction of the history of SMG, inauguration of the “Exhibition of

the Old Meteorological Instruments” which was jointly organized by the Macao Science Center, as well as a seminar with the theme of “Climate Change” which aimed to raise the public concern on global warning. In addition, a temporary postal counter was set up in the venue by the Macao Post Office, which offered commemorative postmark service, free personalized stamps and envelope for public collection.

The “Exhibition of the Old Meteorological Instruments” was held at the Macao Science Center from March to September 2012. A collection of precious meteorological instruments was displayed in the exhibition, such as the vacuum tube transmitter and electric puncher, the rain gauge used in the sixties, the first meteorological satellite signal receiver in Macao, the Jordan sunshine recorder, the measurement of cloud base height by searchlight and the wind direction and speed recorder etc. SMG hoped that the exhibition of the old meteorological instruments helped to strengthen the public’s understanding of the development history of the meteorological instruments, as well as to induce the public’s interest in exploring scientific knowledge.

● The 5th Guangdong-Hong Kong-Macao Seminar on Earthquake Science and Technology

The “5th Guangdong-Hong Kong-Macao seminar on Earthquake Science and Technology” was held in Macao from 12-13 April, 2012, with participation of the seismic and geophysical experts from Guangdong, Hong Kong and Macao. Ten units from three places attended the meeting, which included the South China Sea Institute of Oceanography, Chinese Academy of Sciences, Guangdong Provincial Seismological Bureau, the Hong Kong Observatory, Hong Kong Civil Engineering and Development Department, Hong Kong University, Chinese University of Hong Kong, Hong Kong University of Science and Technology, City University of Hong Kong and the University of Macau.

Twenty two papers were presented during the seminar, which included the monitoring and analysis of the earthquake, earthquake damage prediction, seismic business systems development and engineering seismology. The seminar was organized for the purpose of promoting cooperation in seismic monitoring, analysis, systems development, as well as to reinforce ability of data



exchange among different units, and to strengthen communication and

interaction among personnel of the three parties for enhancing their professional knowledge.



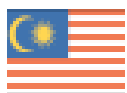


● Meteorological Society Forum

Meteorological professionals from the Chinese Meteorological Society, the

Portuguese Institute of Meteorology and Geophysics, Meteorological Society of Hong Kong and the Macao Meteorological and Geophysical Bureau

(SMG) attended the “Meteorological Society Forum” organized by SMG. The forum aimed to establish a platform to strengthen communications among the four places, and to discuss the possible challenges in operating a meteorological society. Another objective of the forum is to explore the feasibility of establishing a meteorological society in Macao. During the meeting, meteorological professionals introduced the organization structure and their daily operations in running a meteorological society. Valuable advices were obtained from different parties which lay an important foundation to the founding of a meteorological society in Macao.



Malaysia

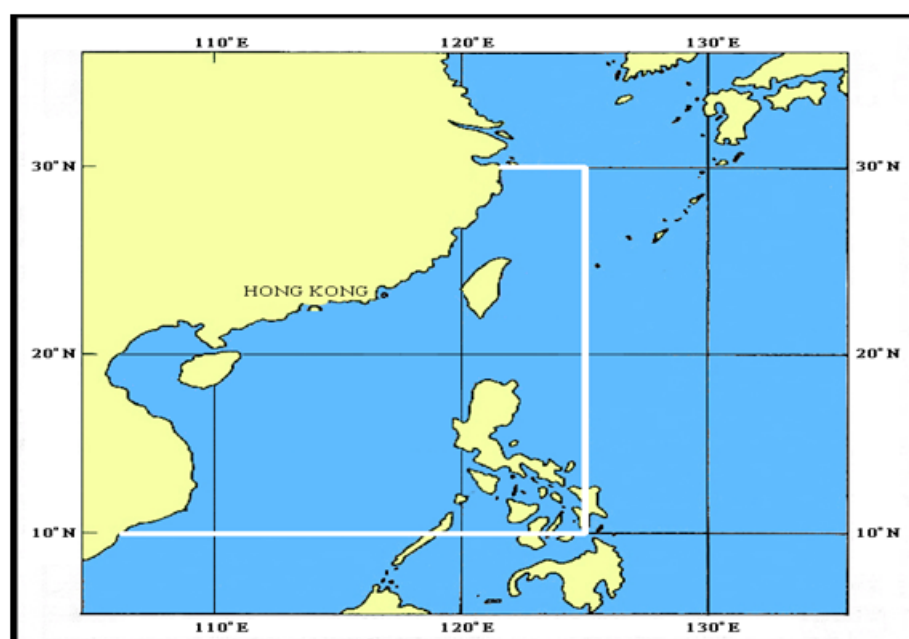
Implementation of Tropical Cyclone (TC) Intensity Forecast at the Malaysian Meteorological Department (MMD)

A Meteorological officer from the MMD was attached at the Hong Kong Observatory (HKO) from 24 October to 23 December 2011 under the Typhoon Committee Fellowship Scheme 2011. During the period, a joint research project with HKO on the comparison of performance of various multiple-model ensemble techniques in forecasting intensity of tropical cyclone using the Tropical Cyclone (TC) Information Processing System (TIPS) were performed. The research domain is as indicated in **Figure 1**. Mean Absolute Error (knots) for TC intensity forecast for various models and ensemble mean for the year 2011 is as shown in **Figure 2**. Currently a

5-member ensemble using the Japan Meteorological Agency Wave model and the WAM model driven by the NCEP-GFS, US-GODAE, WRF and MM5 surface wind fields are being

adapted into the Tropical Cyclone Intensity Forecast System at MMD and are scheduled to be completed by December 2012.

Figure 1: TIPS Research Domain



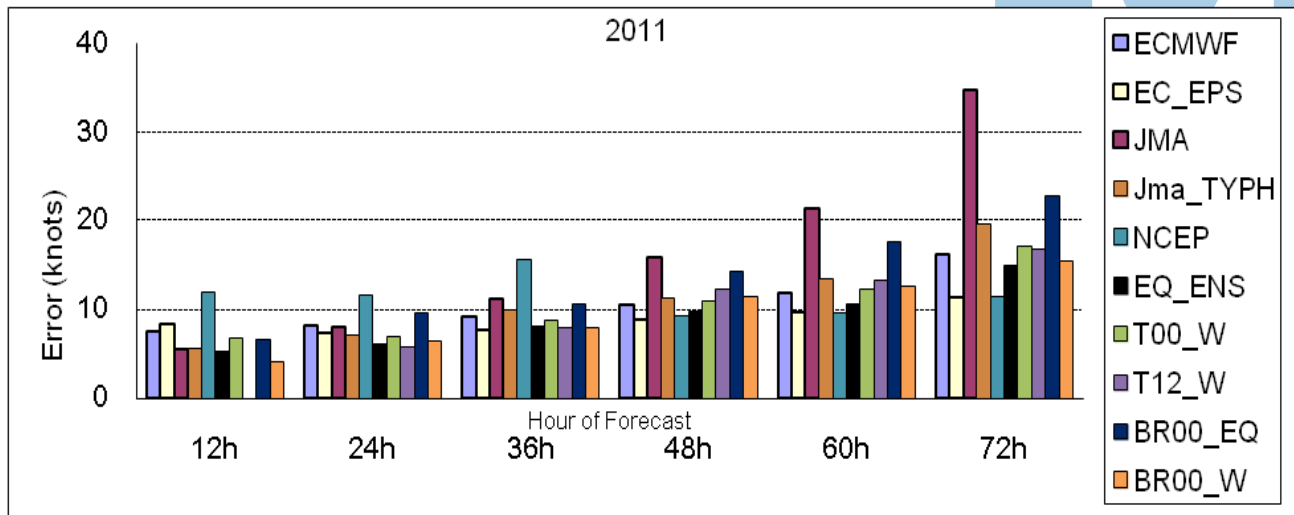


Figure 2: Mean Absolute Error (knots) for TC intensity forecast for various models and ensemble mean (EQ_ENS) for the year 2011



Rep. of Korea

1. KMA hosted the Advisory Working Group meeting of the ESCAP/WMO Typhoon Committee

The AWG meeting of the ESCAP/WMO Typhoon Committee was held on 28-29 May in Seoul, Republic of Korea. AWG members who are representatives of ESCAP and WMO, working group chairs of the Typhoon Committee, and staff from TCS and KMA were attended the meeting. And the meeting was co-chaired by Dr. Woo Jin Lee on behalf of the chairman of the AWG, Mr. Seok-Joon Cho, and Mr. Olavo Rasquinho, secretary of the TC.

At the meeting, the rules, operational procedures, terms of references were reviewed for the competency of the Typhoon Committee for the benefit of all Members. Many issues were raised and intensively discussed, including the reorganization of the meetings such as the IWS and the TC Session, updates of the TC's main legal documents, follow-up of the decisions and recommendations made at the



44th Session, and follow-up action plan to draft the AWG report. The concrete proposals on the main issues discussed at the AWG meeting, will be reviewed

at the 7th IWS to be held in Nanjing, China in coming November. And the final report will be submitted to the 45th session.

2. KMA Started 5-day Typhoon Forecast Service

The 5-day typhoon forecast has been produced on operational mode from May 2012, after the three year long test operation since 2009 summer. This includes typhoon intensity, track, and radius of strong wind and the radius of 70% probability circle (Fig. 2). The track bias has been reduced gradually since 2009, and amounts to 500 km for D+5 (120 hours)

The 5-day forecast is issued four times a day (00, 06, 12, and 18UTC) for the typhoons over the northwest pacific basin, which is available through GTS and KMA's website (http://web.kma.go.kr/eng/weather/typhoon/typhoon_5days.jsp).

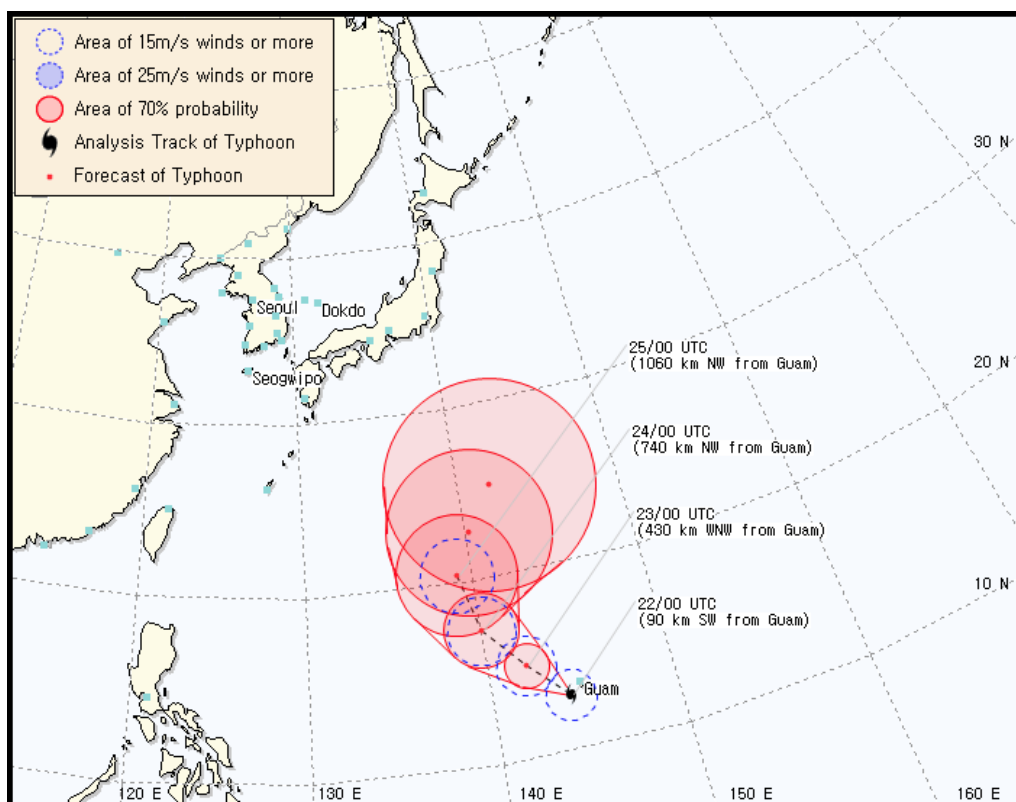


Figure 2. Example for a 5-day (new) typhoon forecast chart provided by KMA.



Figure 3. Commemorative photo of the TAPS technology transfer between Republic of Korea and Viet Nam

3. Technology Transfer of the Typhoon Analysis and Prediction System (TAPS)

As part of the Transfer of the Typhoon Information Processing System (TIPS) technology (Objective No. 3) in annual operating plan (AOP) of the working group on meteorology (WGM) of the Typhoon Committee, KMA transferred the newly developed TAPS technology to Viet Nam from 30 January to 4 February 2012.

KMA also opened the training course on TAPS to the experts from Viet Nam from 11 to 13 June 2012. The course includes some practical works to install TAPS and collect, process, and transmit data in TAPS as well as structure explanation of TAPS. Through the training course, the experts learned how they use and manage operationally TAPS by its own efforts. KMA hopes that the technology transfer of TAPS will greatly contribute to improve the typhoon forecast skill of Viet Nam, strengthening the bilateral cooperation between Republic of Korea and Viet Nam.

4. Capacity Building of Typhoon Analysis and Forecast through the Typhoon Research Fellowship Program

The 2012 Typhoon Research Fellowship Program, as part of the Training and Research Coordination Group (TRCG) Fellowship Program of the ESCAP/WMO Typhoon Committee was successfully completed. Three typhoon forecasters who are from the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA), Department of Meteorology and Hydrology (DMH) of the Lao PDR, and the Thailand Meteorological Department (TMD) were trained during two months (1 May to 30 June 2012) by the staffs of

the National Typhoon Center of the Korea Meteorological Administration (NTC/KMA) and an Korean company, OPENSNS Ltd. The trainees carried out training and research on optimizing typhoon forecast using TAPS as well as on the genesis and dissipation of tropical cyclones. They performed enthusiastically their missions, drafting a training report in spite of the short period. They improved their typhoon analysis and forecast skill as well as shared their ideas and plans for applying the TAPS system.

Since 2011, the NTC/KMA had carried out the Fellowship Program for a number of typhoon experts from Asian countries. The Fellowship Program will be continued in the next year in the

beautiful Jeju island of South Korea where the NTC/KMA are located (the period may be from May to June). Overall expenses (including round-trip ticket and living expense during their stay (if available, accommodation) will be supported by the KMA. The circular letter for offering the KMA's fellowship will be sent to the members by the TCS at least one month before the commencement. Anyone who has an operational experience of TC forecast can apply to the fellowship.



Mr. Renito B. Paciente
(PAGASA, Philippines)



Mr. Bounteum
Sysouphanthavong
(DMH, Laos)



Ms. Plaidao Khumchaiyaphun
(TMD, Thailand)

Figure 4. Three experts awarded the Typhoon Research Fellowship in 2012.

Table 1. List of Typhoon Research Fellowships by KMA since 2001

| Subject | Fellow | Period |
|---|--|-------------------------|
| TC track forecasting with use of super-ensemble | Dr. Taoyong PENG (China) | 15 Jun - 15 Nov 2001 |
| Numerical modelling on typhoon intensity change | Dr. Hui YU (China) | 15 Jul -15 Sep 2002 |
| Analyses on the responses of extratropical transition of tropical cyclone to its environment | Dr. Vicente B. MALANO (Philippines) | 1 Jun - 31 Aug 2004 |
| Evaluation of the model performance in typhoon prediction in the high-resolution global model (T426L40) | Ms. Sugunyanee YAVINCHAN (Thailand) | 1 Aug - 30 Oct 2005 |
| Numerical simulation of Typhoon RUSA with a very high resolution mesoscale model, and calibration of intensity of typhoon with Kalman filtering | Mr. Vo Van HOA (Viet Nam) | 1 Jun - 31 Aug 2006 |
| Seasonality of tropical cyclone activities over the western north Pacific | Ms. Ming YING (China) | 22 Sep - 20 Dec 2008 |
| Improvement of typhoon analysis and forecast with KMA's TAPS | Mr. Quang Nang TRAN (Viet Nam) | 1 Sep - 27 Nov 2010 |
| Study on the tropical cyclone genesis in the northwestern Pacific | Mr. Kamol Promasakha Na SAKOLNAKHON (Thailand) | 1 Sep - 27 Nov 2010 |
| Improvement of typhoon analysis and forecast with KMA's TAPS | Mr. Jori J. LOIZ (Philippines) Mr. Chukiat THAIJARATSATIAN (Thailand) | 1 Sep - 30 Nov 2011 |

5. Enhancement of physical parameterization and data assimilation for the operational global model

In 2012 KMA upgraded its operational global numerical weather prediction system. Major changes in the global NWP system include enhancement of physical parameterization schemes of the global model such as large-scale precipitation and convective parameterization schemes, and enhancement of horizontal resolution of global 4DVAR inner loop from

N144(~90km) to N216(~60km) with low resolution (N108) pre-conditioning. TC prediction performance of the new global model was compared with that of the old operational model for summer 2011. Fig. 5 shows the comparison of TC position prediction errors averaged for the 5 TC cases (1106~1111) from the two models (blue: old, red: new). Relative performance of the TC prediction from the two models is slightly different for each TC cases, but the new model shows generally similar or better performance compared to

the old model. Significant difference of the TC distance error in 3~4-day forecast shown in Fig. 5(a) is mainly due to different TC prediction results for 1110(Merbok) case. Comparison of the TC intensity prediction error in terms of central mean sea level pressure (Fig. 5(b)) also shows similar result. The averaged central pressure error from the new model is generally smaller than that from the old system both in the short- and medium-range forecasts.

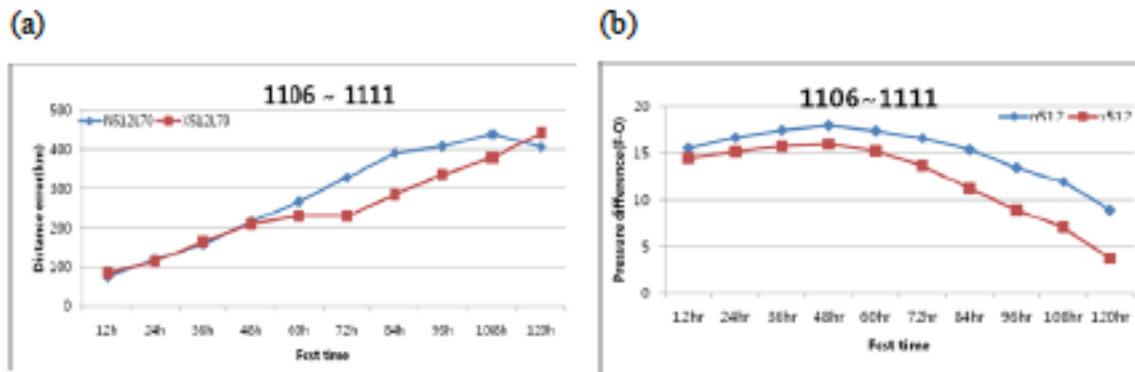


Figure. 5. Comparisons of TC (a) distance error and (b) central pressure error from the old (blue) and new (red) global model averaged for the 5 TC cases in 2011.

Investigation of historical flood sites and flood forecasting systems in Philippines and Thailand (5th-15th June 2012)

As a part of AOP6(WGH) project 'Development of Comprehensive counterplan for extra-ordinary flood' in Typhoon Committee Area, the investigation for the historical flood sites and flood forecasting systems in Philippines and Thailand was implemented from 5th-15th June 2012. The objective was to investigate the extreme flooding sites such as Manila (Philippines) and Bangkok (Thailand) and the capabilities and operation status of the flood control systems for implementing AOP6(WGH) which is led by Ministry of Land, Transport, and Maritime Affairs (MLTM) of Korea and cooperated by Royal Irrigation Department (RID) of Thailand and Philippines Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) of Philippines.

In Philippines, the general hydrological and geological characteristics, the flood forecasting and warning systems, and dam operation rules were discussed with the hydrology engineers in PAGASA. Then, Pantabangan Dam, San Roque Dam, and Angat/Ipo Dam were visited to investigate the characteristics of the

irrigation water supply managed by National Irrigation Administration (NIA), the hydropower generation and flood control of multi-purpose dams managed by National Power Corporation (NPC), and the municipal and industrial water supply in Metro Manila, respectively. To understand the water supply in dry season, the regulation of water rights was introduced by National Water Resources Board (NWRB). Lastly, a doppler radar center of which the observed data is applied in the flood forecasting systems in Philippines was visited as a field trip to Tagaytay.



Meeting in PAGASA



Pantabangan Dam



Flood Control Center in PAGASA



Doppler Radar Station

In Thailand, the Chao Phraya river is the largest river covered more than 30% of the area of Thailand and flow through the center of Bangkok city. Also the extreme flood occurred in 2011. Therefore, the investigation was focused in the Chao Phraya river basin. There are four tributaries, Ping, Wang, Yom, and Nan rivers, in the Chao Phraya river. In the confluence of the four tributaries, the Chao Phraya Dam was built to regulate the flow rate for water supply and flood control in the downstream of the Chao Phraya river. On the first day, RID was visited to discuss the extreme flood occurred in 2011 and the hydrological and geological characteristics. RID is the biggest organization in charge of irrigation and flood control. On the second day, Electricity Generating Authority of Thailand (EGAT)

which manages 33 large multipurpose dams including Bhumibol Dam and Sirikit Dam over the entire Thailand was visited to understand the dam operation and flood control rules. Next meeting was held at the Department of Drainage and Sewerage, Bangkok Metropolitan Administration (BMA) which was established to protect the Bangkok metropolitan area from urban floods by constructing open and closed drainage systems with pump stations. Lastly, Crong Ratpho channel which is a shortcut in the meandering part of the river for the flood control was visited.

The three countries will continue interchanging the information and ideas about flood control and mitigation and the results of this investigation will be presented in the Working Group for Hydrology (WGH) workshop hosted by MLTM, Korea at the second week of Oct. 2012. The investigation was successfully implemented due to the nice and seamless preparation of the relevant organizations and local agencies.



Meeting in RID



BMA



Chao Phraya Dam



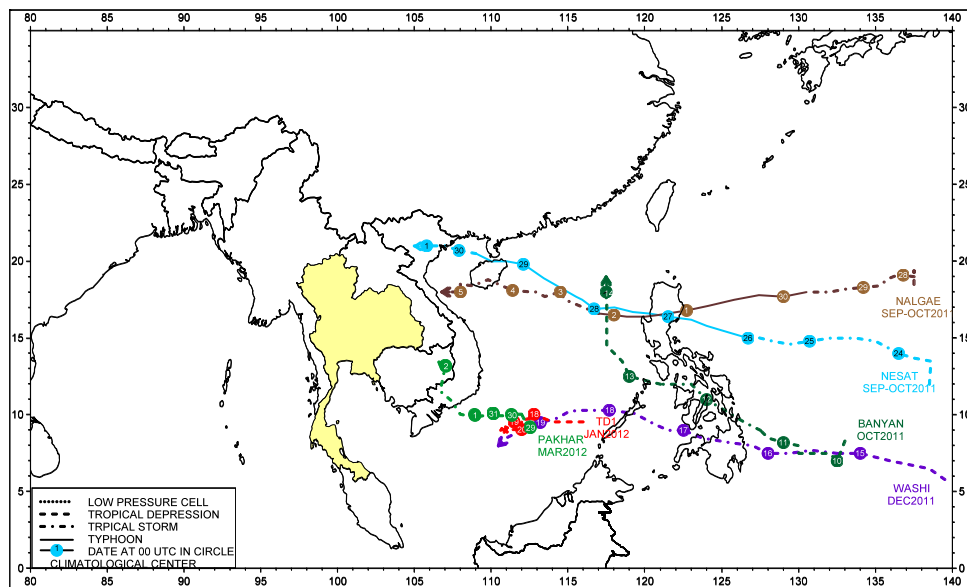
Crong Ratpho Channel



Tropical Cyclone (1st October 2011 - 30th April 2012)

Since 1st October 2011 until 30th April 2012, 6 tropical cyclones altogether had taken place in the area between latitudes $0^{\circ} - 25^{\circ}$ N and longitudes $90^{\circ} - 120^{\circ}$ E. Although these 6 tropical cyclones developed in the Pacific Ocean, none of them entered Thailand and directly affected Thailand.

Tracks of Tropical Cyclone during 1st
October 2011 – 30th April 2012



Climatological Center

Meteorological Development Bureau

Meteorological Department

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