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Session of
Typhoon Committee

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For Asia and the Pacific
And
World Meteorological Organization



REPORT OF THE FORTIETH SESSION OF TYPHOON COMMITTEE

Macao, China

21-26 November 2007

TABLE OF CONTENTS

40TH Session of Typhoon Committee

I.	ORGANIZATION OF THE SESSION	1
	Opening of the Session (agenda item 1)	
II.	ELECTION OF OFFICIERS (agenda item 2)	2
III.	ADOPTION OF THE AGENDA (agenda item 3)	2
IV.	WORKING SESSION OF METEOROLOGICAL, HYDROLOGICAL AND DISASTER PREVENTION AND PREPAREDNESS WORKING GROUPS (agenda item 4)	2
V.	THE COMMITTEE'S ACTIVITIES DURING 2006 (agenda 5)	2
	(a) Meteorological Component (agenda item 5.1)	2
	(b) Hydrological Component (agenda item 5.2)	6
	(c) Disaster Prevention and Preparedness Component (agenda item 5.3)	8
	(d) Activities on Training and Research (agenda item 5.4)	9
VI.	REVIEW OF THE 2006 TYPHOON SEASON AND PUBLICATIONS (agenda item 6)	10
VII.	COORDINATION WITH OTHER ACTIVITIES OF THE WMO TROPICAL CYCLONE PROGRAMME (agenda item 7)	11
VIII.	PROGRAMME FOR 2007 AND BEYOND (agenda item 8)	12
IX.	SUPPORT REQUIRED FOR THE COMMITTEE'S PROGRAMME (agenda item 9)	15
	(a) Arrangement for the Typhoon Committee Secretariat (TCS)	15
	(b) Technical Cooperation	17
	(c) Typhoon Committee Trust Fund (TCTF)	18
X.	DATE AND PLACE OF THE FORTIETH SESSION (agenda item 10)	19
XI.	SCIENTIFIC LECTURES (agenda item 11)	19
XII.	ADOPTION OF THE REPORT (agenda item 12)	19
XIII.	CLOSURE OF THE SESSION AND HAND OVER CEREMONY	19

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I. ORGANIZATION OF THE SESSION

1. The Fortieth Session of the ESCAP/WMO Typhoon Committee was held in Lotus Room, World Trade Center, Macao, China, from 21 to 26 November 2007.
2. The Session was attended by 82 participants from 13 out of 14 Members of the Typhoon Committee, namely: Cambodia; China; Hong Kong, China; Japan; Lao PDR; Macao, China; Malaysia; Philippines; Republic of Korea; Singapore; Thailand; the Socialist Republic of Viet Nam; and the United States of America (USA).
3. The Session was also attended by 2 observers, 1 from United Nations International Strategy for Disaster Reduction Secretariat (UN/ISDR), 1 from the Asian Disaster Reduction Center (ADRC). Representatives from the Economic and Social Commission for Asia and the Pacific (ESCAP), the World Meteorological Organization (WMO) and Typhoon Committee Secretariat (TCS) also attended the session. The list of participants is given in Appendix I.

Opening of the Session (agenda item 1)

4. The Session was declared open by his Excellency, Mr. Edmund Ho, Chief Executive of Macao Special Administrative Region of People's Republic of China, at 0930 hrs on Wednesday, 21 November 2007 in the Lotus Room, World Trade Centre in the presence of his Excellency Mr. Wan Yong Xiang, Commissioner of the Ministry of Foreign Affairs of the People's Republic of China in the Macao SAR and his Excellency Mr. Lau Si lo, Secretary for Transport and Public Works for Macao SAR.
5. The following statements were delivered at the opening ceremony:
 - The address of Dr. Fong Soi Kun, Director of Macao Meteorological & Geophysical Bureau (SMG);
 - The message of the Director of the Environment and Sustainable Development Division of UNESCAP, read by Mr. Le-Huu Ti, the representative of UNESCAP Secretariat; and
 - The address of Dr. Tokiyoshi Toya, the representative of the WMO Secretariat on behalf of Mr Michel Jarraud, Secretary-General of WMO.
 - The keynote address of Mr. Olavo Rasquinho, Secretary of Typhoon Committee in representation of the Chairman of Typhoon Committee.

The above-mentioned statements are given in Appendices II.A, II.B, II.C and II.D, respectively.

II. ELECTION OF OFFICERS (agenda item 2)

6. Dr. Fong Soi Kun, Director of SMG was elected Chairman and Mr. Suparerk Tansriratanawong, Director-General of Thai Meteorological Department and Dr. M.C. Wong, Assistant Director of Hong Kong Observatory were elected Vice-Chairmen of the Typhoon Committee (TC). Mr. Jeffrey LaDouce, Director of National Weather Service, NOAA-Pacific Region Headquarters was elected Chairman of the Drafting Committee.

III. ADOPTION OF THE AGENDA (agenda item 3)

7. The Committee adopted the agenda as shown in Appendix III.

IV. WORKING SESSION OF METEOROLOGICAL, HYDROLOGICAL AND DISASTER PREVENTION AND PREPAREDNESS WORKING GROUPS (agenda item 4)

8. Prior to the plenary session for the Committee, three parallel sessions on meteorology, hydrology and disaster prevention and preparedness (DPP) were convened on the morning of 21 November 2007 in three separate meeting areas to review progress of work during the past year, to identify priorities for cooperation and to recommend points to the Committee for consideration.
9. The major outcomes of the parallel sessions of the three Working Groups were reported to the plenary session as given in the following sections.

V. THE COMMITTEE'S ACTIVITIES DURING 2007 (agenda item 5)

10. The Committee was informed of activities carried out in 2007, including important achievements, key issues and future directions by each Member, TCS, WMO and ESCAP on meteorology, hydrology and disaster prevention and preparedness. The Terms of Reference of all Working Groups of the Committee are shown in Appendix IV.

(a) Meteorological Component (agenda item 5.1)

11. The Committee reviewed the activities of Members for implementing the TC Strategic Plan and its annual operating plan in relation to Meteorological Component during the past year, details of which are presented in Appendix V.
12. The Committee took note of the outcome of the parallel session of the Working Group on Meteorology (WGM) which met on Wednesday, 21 November 2007 (Appendix VI)
13. The Committee was informed by the representative of Japan that a questionnaire was sent to each Member to survey the current status of the migration of SAREP and RADOB to BUFR and the results of the survey were summarized and reported by Japan to a meeting of the Expert Team on Data Representation and Code held in Darmstadt, Germany in April 2007. In this regard, the Committee was pleased to note that Korea Meteorological Administration (KMA) developed software to convert TDCF code to ASCII code. This software will be provided to TC Members and other WMO Members upon request to allow them to address the migration issue related to SAREP and RADOB.
14. The Committee was informed by the representative of Korea that KMA and the Korea International Cooperation Agency (KOICA) jointly organized the First International Training Course on Analysis of Communication, Ocean, and Meteorological Satellite (COMS) Data. The Course took place at KMA in Seoul, Republic of Korea during 2-17

September 2007. The objectives of the course is to introduce the COMS which is the first geostationary meteorological satellite to be launched by Korea in 2009; to understand the COMS program such as development plan, satellite system, and data processing system; and to form a user community to share various information on the COMS. The participants came from 13 countries in Asia-Pacific area including Philippines, Thailand, and Viet Nam of TC Members.

15. The Committee accepted the proposal by the Regional Specialized Meteorological Center (RSMC) Tokyo to add the averaging time of sustained-wind to the EBT format. In accordance with the updated format, RSMC Tokyo will compile its best track data with Japan's observation data of 1996 to 2005 as an Expanded Best Track (EBT) prototype.
16. The Committee expressed its gratitude to Japan, to RSMC Tokyo - Typhoon Centre in particular, for the continued provision of tropical cyclone advisories/warnings as well as maintenance of the Numerical Typhoon Prediction Website and implementation of the annual on-the- job training for typhoon operation. The activities of RSMC-Tokyo in 2007 and implementation plan for the period of 2007 to 2011 are presented in Appendix VII.
17. The Committee noted with pleasure that the China Meteorological Administration (CMA) started-up the multi-temporal twin satellite observation mode to provide typhoon monitoring every 15 minutes during 2007 typhoon season.
18. The Committee was informed that on 10 October 2007, CMA presented FENGYUNCast system to 11 developing Countries in Asia Pacific region, which includes Myanmar, Democratic People's Republic of Korea (DPRK), Kyrgyzstan, Lao People's Democratic Republic, Malaysia, Nepal, the Philippines, Sri Lanka, Tajikistan, Uzbekistan and Viet Nam with a view to protecting the region from natural disasters under the WMO Voluntary Cooperation Programme (VCP) and bilateral arrangements.
19. The Committee was informed that, under the WMO RA II Pilot Project on the Provision of City-Specific NWP Products to Developing Countries via the Internet, four are Typhoon Committee Members among the 18 RA II participants. Currently, three NWP centres from Japan, Republic of Korea and Hong Kong, China are providing forecast products for a total of 160 cities, including 33 cities of the four Typhoon Committee Members.
20. The Committee was informed that Japan Meteorological Agency (JMA) extended its service to provide all Multi Functional Transport Satellite (MTSAT) High Rate Information Transmission (HRIT) imagery for registered National Meteorological and Hydrological Services (NMHSs) through the Internet as a backup to the direct broadcast from the satellites in March 2007, JMA is also planning to start providing small data capacity Joint Photographic Experts Group (JPEG) imagery through the Internet by the end of 2007.
21. The Committee was informed that, JMA started providing MTSAT imagery and Numerical Weather Prediction (NWP) products transformed for display with Satellite Animation and Interactive Diagnosis (SATAID) software as a WMO Information System (WIS) prototype service on 27 March 2007. Using the SATAID program, users can superimpose NWP products into satellite imagery.
22. The Committee was informed with satisfaction that the Bangkok – Singapore Global Telecommunication System (GTS) circuit has been upgraded from X.25/9.6 Kbps to the Transmission Control Protocol/Internet Protocol (TCP/IP) Frame Relay with the speed of 16 Kbps (**CIR**) and that Bangkok – Phnom Penh GTS circuit has also been connected using Virtual Private Network (VPN) via Internet.
23. The Committee was pleased to note that, in support of the Observing System Research and Predictability Experiment (THORPEX) Pacific Asian Regional Campaign (T-PARC) project, Joint Typhoon Warning Center (JTWC) has requested United States (US) Air Force support to use a WC-130 Hurricane Hunter aircraft during this event.

This request has been approved at the US Pacific Air Force level and being passed through the US Air Force chain-of-command. This aircraft will complement the US P-3 research aircraft already scheduled to participate in the project. The Committee was also informed that the JTWC will be replaced up to 5 military forecasters with civilian forecasters.

Conclusions:

24. On the basis of the information provided by Members and findings of the integrated workshop in Bangkok, Thailand in September as well as Parallel Session of WGM, the following conclusions were reached:
 - That important progress was made in the implementation of the TC Strategic Plan and annual operating plan under Meteorology during the past year by Members, especially the outcomes of the meeting of the WGM during the Integrated Workshop on Social Economic impacts of Extreme Typhoon-related Events (Bangkok, Thailand, 10-14 September 2007).
 - That substantial progress was made in the development of three projects, namely, "Typhoon Information Processing Systems (TIPS)", "Experiment of Improvement of Precipitation Forecasting related to Interaction between Monsoon and Tropical Cyclone" and "Global Telecommunications System (GTS) and Digital Video Broadcasting System (DVBS) Data Sharing".
 - That the final outcome of the WGM/RSMC consideration processes with an aim to review advantage and disadvantage for naming, numbering and labeling Tropical Depressions (TDs) was satisfactory.
 - That the progress of the assessment of change of frequency and intensity of tropical cyclones in the Typhoon Committee region was satisfactory, considering different historical database and standards of tropical cyclones with different conclusions.
 - That progress is being made in considering the classification of typhoons in the Typhoon Committee region, taking into account its significance for disaster risk management and facing challenges such as different averaging timing for measuring wind speed.
 - That most of the Members are not ready to use Satellite Report (SAREP) and Radar Observation (RADOB) in BUFR because of lack of decoding software or means of telecommunication.
 - That the contribution of the Chair of WGM, Mr Wang Bangzhong (China), and Vice Chair of WGM, Ms Duong Lien Chau (Viet Nam), during the past year deserved appreciation of the Committee.

Recommendations:

25. On the basis of the information provided by Members and the outcomes of the WGM parallel session and integrated workshop on Social Economic impacts of Extreme Typhoon-related Events (Bangkok, Thailand, 10-14 September 2007), the following recommendations were reached:
 - To further develop three projects, namely, "Typhoon Information Processing Systems (TIPS)", "Experiment of Improvement of Precipitation Forecasting related to Interaction between Monsoon and Tropical Cyclone" and "GTS and DVBS Data Sharing" with an aim to be adopted by the Typhoon Committee in the near future, considering that these projects may be implemented by using pilot approach, including to organize the workshop for further Introduction of TIPS of each Member in conjunction to **TRCG EPS** workshop, to come up with the proposal of "Experiment of Improvement of Precipitation Forecasting related

to Interaction between Monsoon and Tropical Cyclone”, and to support relevant member to draft plan for using the updated communication system.

- To agree that there is no need for naming or numbering tropical depression to avoid the confusion while it is necessary to label expected tropical depression by using RSMC existing system among the Members with the next 3 years or beyond, and to agree each member, depending on their respective circumstances, may develop its own tropical depression numbering or naming system to suit its own operation use including the improvement preparedness for developing tropical depressions.
- To further consider the classification of tropical cyclone with helpful information by WMO on this matter, noting that fine information related to tropical cyclone may enhance preparedness for intense typhoons, while changing categories used for a long time may cause some confusion to the public.
- To continue the assessment process on the change of frequency and intensity of tropical cyclone in order to provide the latest information on this matter for the policymaker and the public based on the existing assessment by the other international and regional organizations.
- To request WGM to put forward the procedures of consultation and discussion among the Member as well as RSMC during TC period by using the existing channels such as telephone, website and email system aiming at exchanging the latest information about the formation and development of tropical cyclones.
- To request Members concerned to take the necessary action to use SAREP and RADOB in BUFR with software assistance by the Republic of Korea if necessary, and to request the RSMC Tokyo to continue to disseminate both BUFR and alphanumeric SAREP and RADOB until the completion dates for their migration , which will be agreed by TC Members at the next TC session.
- To request Japan to appoint Mr. Kiichi Sasaki as the TOM Rapporteur.
- To request WMO to publish as early as possible the 2008 edition of the Typhoon Committee Operation Manual (TOM) as submitted by the Rapporteur, with the amendments given in Appendix VIII.
- To request Members to report on the status of implementation of the TOM performance measures, and the Rapporteur to submit the report to the next session of the Committee.
- To request WMO to upload the updated TOM on the TCP Website and distribute the 2008 edition in CD ROM format to Members by March 2008.
- To replace the TC names - Xangsane, Chanchu, Bilis, Saomai and Durian by Leepi, Sanba, Maliksi, Son Tinh and Mangkhut respectively, effective on 1 January 2008.
- To reappoint Mr Wang Bangzhong (China) as Chair and appoint Dr Nguyen Dai Khanh (Viet Nam) as Vice-chair, respectively.
- To urge the Members who still have not provided the EBT Data, especially those frequently affected by tropical cyclones, to send the data to RSMC Tokyo

(b) Hydrological Component (agenda item 5.2)

26. The session reviewed the activities of the Members and UNESCAP during the past year, details of which are presented in Appendix IX. Priority activities within the hydrological component among the Members include the following:

- Several traditionally important activities have been addressed by most of the Members, to which high priority needs to be attached continuously:
 - Improvement of real-time hydro-meteorological data collection networks and timely hydrological information and disaster warning dissemination
 - Extension of operational flood forecasting systems to more river basins
 - Improvement of flood forecasting model accuracy/performance
 - Activities that have been taken by some of Members and will need to be taken by more Members:
 - Preparation of flood hazard maps
 - Development of early warning system
 - Development of flash flood monitoring and warning system
 - Development of debris flow/landslide forecasting and warning system
 - Development of community-based flood forecasting and warning system
 - Improvement of hydrological products in response to users' needs
 - Dissemination of outputs and raising visibility of TC through various means
 - Public awareness activities such as education/training of local people on typhoon-related disaster risks
 - Activities that several Members have expressed interest in undertaking in the coming years include the following:
 - Development of urban flood monitoring, forecasting and early warning system for urban flood management
 - Development of Socio-economic Impact Assessment System of Typhoon-related Disasters
 - Research of Climate Change Impact Study on Water and Hydrology
 - Development of Satellite-Based Rainfall – Runoff Modelling System
 - Development of Dam inflow Forecasting System and Operation Rule
27. The Committee also noted the importance of the following activities in some Members:
- China has been exchanging and sharing the hydrologic data with other TC Members and organizations such as Democratic People's Republic of Korea, Viet Nam, and the Mekong River Commission (MRC) in 2007.
 - Thailand has cooperation with MRC Secretariat and other MRC countries (Lao PDR, Cambodia and Viet Nam) to improve the hydro-meteorological monitoring network in Mekong Mainstream.
28. The Committee took note of the report of the parallel session of the Working Group on Hydrology (WGH) which met on Wednesday, 21 November 2007 (Appendix X).
29. The Committee extended its sincere appreciation to the government of China for organizing the training course on Flood Forecasting System and its Application (OFFSIA) that was held successfully from 15 to 21 in Beijing, China. It was attended by 10 overseas participants from 7 selected members, namely the Democratic People's Republic of Korea, Lao PDR, Malaysia, Philippines, Singapore, Thailand and Viet Nam. The opening ceremony was also attended by TCS Secretary Mr. Olavo Rasquinho. The participants successfully fulfilled all the courses and at the end of the course, they were provided a certificate jointly signed by Bureau of Hydrology (BOH) and TCS.
30. The Committee noted with appreciation the active collaboration among the members of the WGH, and DPP experts and meteorologists of the Committee during 2007 and in the past few years. It also expressed its deep appreciation to the Governments of China, Japan, Malaysia, Philippines and Republic of Korea for the active support in the implementation of the eight ongoing projects and the financial contribution of the Ministry of Land, Infrastructure and Transport (MLIT) of Japan through the Infrastructure Development Institute (IDI) and the National Institute of Land and Infrastructure Management (NILIM) and the Ministry of Construction and Transportation (MOCT) of Republic of Korea through the Korea Institute of Construction Technology (KICT) and the Korea Water Resources Corporation (K-

Water) for the implementation of these projects by the WGH. The Committee also expressed its appreciation to the WGH Chair, Vice-Chairs and Secretary for their work in the past year and especially to Dr. Jinping Liu for his dedication.

- Project on Flood Hazard Mapping
- Project on Flash Flood Warning including Debris Flow and Landslides
- Project on Evaluation and Improvement of Operational Flood Forecasting System focusing on Model Performance
- Project on the Development of Guidelines for Reservoir Operation
- Project on Extension of Flood Forecasting Systems to Selected River Basins
- Project on the Establishment of Community-based Flood Forecasting System
- Project on Improvement of Hydrological Products in response to User's Needs
- On-the-job Training on Flood Forecasting between TC members

Conclusions:

31. On the basis of the information provided by Members and the outcomes of the WGH parallel session and integrated workshop on Social Economic impacts of Extreme Typhoon-related Events (Bangkok, Thailand, 10-14 September 2007), the following conclusions were reached:

- That good progress had been on the existing projects implemented by WGH and the intention of MLIT of Japan to extend the first two projects until 2009 and the Governments of Malaysia, and Republic of Korea to continue providing in-kind contribution to enable training of experts from other TC Members in their countries will benefit the Committee Members.
- That the Committee appreciates the commitment of the Government of China for the continued support to TC activities and the decision of Ministry of Water Resources (MWR) BOH to second the Hydrologist to TCS
- That the Committee endorsed the proposal of WGH to undertake the following two new projects and encourage Members to support in their implementation:
 - (i.) Project on Socio Economic Impact Assessment System for Investment in Flood Control & Management Measures Infrastructure (to be launched and led by the Republic of Korea)
 - (ii.) Project on the Management of Urban Floods (to be launched and led by China)

Recommendations:

32. On the basis of the information provided by Members and the outcomes of the WGH parallel session and integrated workshop on Socio-economic impacts of Extreme Typhoon-related Events (Bangkok, Thailand, 10-14 September 2007), the Committee made the following recommendations:

- To further develop the idea on Cooperative Project named Climate Change Impact on Water and Hydrology in selected river basins
- To re-establish the Working Group on Hydrology (WGH) responsible for the planning and promotion of cooperation among the TC Members in the implementation of the Strategic Plan and the Annual Operating Plan and to reappoint Mr Katsuhito Miyake, Japan, Chair and Dr Hong Il Pyo, Republic of Korea and to appoint Mr Liu Zhi-yu, People's Republic of China as Vice Chairs of WGH.
- To allocate US\$ 5,000 from the TC Trust Fund to support international travel for experts from TC Working Groups for a small inter-sectoral meeting on Urban Flood Management project in 2008.

(c) Disaster Prevention and Preparedness Component (agenda item 5.3)

33. The session reviewed the activities of the Members, UNESCAP, WMO and other collaborating organizations, during the past year, details of which are presented in Appendix XI. Priority activities within the DPP component among the Members include the followings:
- Progress on Typhoon Committee Disaster Information System (TCDIS) project
 - The 2nd DPP meeting in Seoul in August 2007
 - Integrated Workshop (IWS) in Bangkok in September 2007.
34. The Committee took note of the report of the Parallel Session of the Working Group on DPP as shown in Appendix XII. The election of officers was conducted in the Working Group on DPP.
35. The Committee was informed that the second DPP meeting was held in Seoul, Republic of Korea from 22 to 24 August 2007. Twenty participants from Members and international organizations discussed about TCDIS. During the DPP meeting:
- The participants finalized the design of TCDIS and agreed to provide inputs to the TCDIS by early September (before the IWS to be held in Bangkok, 10-15 September).
 - The participants discussed vision and future activities of TCDIS.
36. The Committee noted the ongoing enhanced project on TCDIS and expressed its appreciation to the Government of Republic of Korea for the provision of US\$350,000 for the implementation of TCDIS.
37. The Committee noted the need to have closer interaction not only among WGDPP members but also with other Working Groups to establish and operate TCDIS effectively.

Conclusions:

38. On the basis of the information provided by the Members and findings of the parallel session on WGDPP, the following conclusions were reached:
- That the Committee appreciated Dr. Sam-Kew Roh for his leadership and efforts during the last two years.
 - That the Committee recognized the importance of the outcomes of the Bangkok Workshop in September, Integrated Workshop on Social Economic Impacts of Extreme Typhoon-related Events, as the basis for future activities on TCDIS.
 - That future activities of WGDPP should include joint activities with WGM and WGH and rapid economic impacts assessment
 - That expert missions to up to four Members be carried out in 2008 and the review of progress be conducted in 2009.

Recommendations:

39. On the basis of the information provided by the Members and deliberations, the Committee made the following recommendations:
- To appoint Dr. Waon-Ho Yi from the National Institute for Disaster Prevention; the National Emergency Management Agency of the Republic of Korea and Dr. M.C. Wong from Hong Kong Observatory, Hong Kong, China as Chair and Vice Chair of the WGDPP respectively.

- To enhance the ongoing project on TCDIS to serve as a portal for TC Members on DPP matters.
- To develop a conceptual framework consistent with Multi-Hazard Early Warning Systems in conjunction with other WGs to make a link with the TCDIS
- To send expert missions on the TCDIS to interested Members in April/May 2008.
- To support the organization of public education events to raise public awareness on DRR jointly with WMO DPP Programme and UN/ISDR, as well as WGM and WGH, and consider if these would need to be added during the mission.
- To organize the third DPP Workshop in Korea in 2008.
- To conduct a training workshop on the socio-economic impacts of disasters during the IWS in 2008.

(d) Training and Research Coordination Group (agenda item 5.4)

40. The Committee took note of the report given in Appendix XIII prepared by the Chairman of the Training and Research Coordination Group (TRCG). In particular, the Committee thanked Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) for its dedicated effort in hosting the Roving Seminar in September 2007, the success of which was testified by the favorable feedback received from both the lecturers and participants through a post-event survey.
41. The Committee thanked Hong Kong, China for hosting a research fellowship programme attended by Viet Nam. It noticed, however, the relatively few fellowship offers in the year and Members were encouraged to offer or to participate in short or long term fellowships under the scheme.
42. The Committee took note of the successful training attachment of women forecasters from Cambodia and the Philippines to RSMC Tokyo in July 2007, and thanked TRCG Chair for reviewing available web-based resources on tropical cyclone forecasting training material.

Conclusions:

43. That the Committee endorsed the priority areas as given in the TRCG report and requested TRCG to coordinate training and research activities to meet the identified needs. In connection with an AWG initiative, it also asked TRCG to work with other working groups to formulate long-term projects to facilitate the study of climate change effects on cyclones' activity and related impacts within the Committee's region.
44. That the Committee supported the strategic re-structuring of TRCG activities, in particular the introduction of a 4-yearly TRCG workshop for TRCG members to meet, review and make coordinated plans for the implementation of training and research activities. It endorsed the TRCG-proposed AOP objectives for 2008 and agreed in principle the organization of the first TRCG workshop in early 2009. It also recognized the importance of establishing a web portal on the TCS website for the posting of knowledge-based reference material, including training material and research results.

Recommendations:

45. On the basis of the conclusions reached by the deliberation of Members, the Committee made the following recommendations:
 - To re-establish TRCG with the reappointments of Mr. Edwin S.T. Lai (Hong Kong, China) and Mr. Mitsuru Ueno (Japan) as Chair and Vice Chair of TRCG respectively;

- To request Members to re-confirm their respective focal points as members of TRCG, and to update the list of resource persons as appropriate;
- To endorse the proposed TRCG AOP for 2008, including the organization of a roving seminar under the support of Typhoon Committee Trust Fund together with a special training course on media skills in collaboration with WMO Public Weather Services (PWS) Programme.

VI. REVIEW OF THE 2007 TYPHOON SEASON AND PUBLICATIONS (agenda item 6)

46. The Committee noted that as of the end of October, twenty tropical cyclones (TCs) of tropical storm (TS) intensity or higher had formed in the western North Pacific and the South China Sea in 2007. This total is lower than the 30-year average (23.0 by the end of October 2007). Of these twenty, eleven tropical cyclones reached typhoon (TY) intensity, three grew to severe tropical storm (STS) intensity, and six attained TS intensity.
- The 2007 typhoon season began in April with the formation of KONG-REY (0701). From April to May, two tropical cyclones formed in the western North Pacific in response to enhanced convective activity there. From June to July, convective activity turned inactive over the sea around the Philippines and in the South China Sea, and the subtropical high was weak over the south of Japan. Of the three tropical cyclones that formed in this period (the 30-year average* is 5.8), two formed over the sea east of 140°E and one in the South China Sea. MAN-YI (0704) and USAGI (0705) moved northwestward and hit Japan, bringing serious damage to the country.
 - After August, convective activity became enhanced over the sea east of the Philippines, and the subtropical high turned strong over the sea south of Japan. Many tropical cyclones, which formed over the sea east of the Philippines and in the South China Sea, moved westward and hit China and Vietnam. PABUK (0706), WUTIP (0707), SEPAT (0708), WIPHA (0712), LEKIMA (0714) and KROSA (0715) brought serious damage to some Members including China, the Philippines and Viet Nam. On the other hand, FITOW (0709) and NARI (0711) moved northward, bringing serious damage to Japan and Korea. After HAIYAN (0716), all four tropical cyclones except FAXAI (0720) formed over the sea east of 140°E.
 - In 2007 (as of the end of October), the mean formation latitude and longitude were 19.7°N and 139.8°E, which is north and east of the 30-year average of 16.2°N and 136.9°E. The mean duration for TCs of TS intensity or higher was 4.0 days, which is shorter than the 30-year average of 5.2 days.
47. The Committee took note with appreciation the review of the 2007 typhoon season provided by the RSMC Tokyo-Typhoon Center as given in Appendix XIV.

Publications

48. Committee took note that the TCS published the 19th issue of the Typhoon Committee Newsletter in November 2007 and the 2006 Typhoon Committee Annual Review (TCAR) in November 2007 which were disseminated to the Members, ESCAP and WMO in electronic (CD-ROM) format. The Committee appointed the Typhoon Committee Secretary as the Chief Editor.
49. The Committee noted with appreciation that the RSMC Tokyo – Typhoon Center published the “Technical Review No.9” in March 2007 and the “Annual Report on the Activities of the RSMC Tokyo – Typhoon Center in 2006” in October 2007. These are available on the Web page of JMA/RSMC Tokyo – Typhoon Center <http://www.jma.go.jp/jma/jma-eng/jma-center/rsmc-hp-pub-eg/annualreport.html>.

VII. COORDINATION WITH OTHER ACTIVITIES OF THE WMO TROPICAL CYCLONE PROGRAMME (agenda item 7)

50. The Committee was informed by the representative of the WMO Secretariat that the Fifteenth World Meteorological Congress (Cg-XV), which was held in May 2007, endorsed that Tropical Cyclone Programme (TCP) should focus on the 1) capacity building, particularly for the Met Services in Small Island Developing States (SIDS), 2) collaboration with other WMO Programmes which are highly relevant for TCP such as those in Marine Meteorology, Public Weather Services and Hydrology and Water Resources, 3) active involvement of hydrologists and DPP experts in the regular sessions of the tropical cyclone regional bodies and 4) active contribution to the activities of Disaster Risk Reduction Programme.
51. The WMO Congress also endorsed TCP sub-project No.23 "Combined effects of storm surges/wind waves and river floods in low-lying areas", which aims to demonstrate the TC impact on low-lying areas and small island countries from the multi-angles especially by focusing the combined effects of storm surge, wind waves and river floods. A final outcome of this project will be a guidance material for the use of operational tropical cyclone warning service. The Committee was pleased to note that such outcome will be beneficial for promoting the Committee's projects with the common ground.
52. The Committee noted with satisfaction that two woman forecasters from Cambodia and Philippines had successfully undertaken the on-the-job training (OJT) in typhoon operations at the RSMC Tokyo – Typhoon Center from 18 to 27 July 2007. This was the seventh training at the RSMC starting in 2001 with the joint support of Typhoon Committee and WMO. The Committee expressed its gratitude to RSMC Tokyo for hosting the OJT training during the typhoon season every year.
53. The Committee was informed that the WMO Congress adopted WMO vision and strategic goals and approved WMO Action Plan in disaster risk reduction derived from Hyogo Framework for Action to be implemented through concrete regional and national projects. As part of the Action Plan, WMO formulated Multi-Hazard Early Warning Demonstration Projects including Shanghai Project in the Typhoon Committee region aiming at strengthening the inter-agencies cooperation, analyzing socio-economic benefits of early warning systems and sharing experiences and good practices.
54. With regard to the hydrology component, the Committee was informed that the Cg-XV underlined two major activities of the Programme; WHYCOS and Flood Forecasting Initiative. Mekong HYCOS, one of the regional components of WHYCOS, was developed jointly with Mekong River Commission and is expected to promote flood management and mitigation in the Mekong River Basin. With a support of French Government, this project has entered on the implementation phase in 2007 and will be completed in 2011. The Committee was pleased to note that it will bring a substantial benefit to Typhoon Committee Members; Cambodia, Lao, Thailand and Viet Nam.
55. As a main component of the Flood Forecasting Initiative, WMO proposed Flash Flood Guidance System to enhance the capabilities of WMO Members in issuing Flash Flood Warnings and to provide platforms in countries for closer cooperation between NHS and NMS to respond to disaster management authorities. For the first phase from 2007 to 2009, regional centers are being established including South East Asia with focus on Mekong Basin Region. In view of the closer cooperation between meteorologists and hydrologists, Typhoon Committee Members were encouraged to join the Flood Forecasting Initiative and Flash Flood Guidance System.

VIII. PROGRAMME FOR 2008 AND BEYOND (agenda item 8)

Advisory Working Group

56. The Committee noted that at the 39th Session of the Typhoon Committee, the Committee requested the AWG to undertake the Terms of Reference given in Appendix

XX of the final Report of the Typhoon Committee on its Thirty-Ninth Session, 4-9 December 2006, in Manila, Philippines.

57. The Committee noted important progress since the introduction of strategic planning and management approach to the regional cooperation programme of the Committee and the instrumental role of the AWG, UNESCAP and WMO in the establishment of a firm foundation for goal-oriented performance. The Committee recognizes the progress reported in this Session as a watershed event as a model for its future operations. In this context, it is important that the Committee continues to benefit from the assistance and support of UNESCAP and WMO as well as enhanced roles of TCS.
58. The Committee was then informed of the activities of the Advisory Working Group (AWG) in 2007.
59. The Committee was invited to review three actions presented by the AWG:
 - Review the activities of the Advisory Working Group during 2007 and review and approve three proposals
 - Review the progress and accomplishments of the TC in regards to the Integrated 2007 Typhoon Committee Annual Operating Plan (AOP)
 - Review and approve the proposed TC Integrated 2008 AOP; and
60. The TC was further requested to review and approve four AWG budget related requests.
 - Review and approve the 2008 TC budget
 - Modify the format for the annual TC budget by adding two additional columns to allow the Committee members to better track expenditures
 - That \$10,000 above the \$100,000 be allotted to the work of the AWG to create the flexibility for WGs, TCS, TRCG, and others to request additional funds from the AWG for non-budgeted, high priority items to accomplish the strategic goals of the Typhoon Committee.
 - To adjust future proposed budgets so they are based upon high priority items identified in the Strategic Plan and are also tied to results oriented actions and accomplishments.
61. The Committee noted with pleasure, the progress of the AWG in coordination with all of the TC Members and expressed its appreciation to the AWG for its excellent efforts as reported in Appendices XV through XVIII.
62. The Committee also noted with pleasure, the accomplishments of the WGs towards completion of Strategic Goals (SG) in the Strategic Plan 2007-2011.
63. The Committee was advised that Mr. James Weyman, due to other commitments, desires to step down as the AWG Vice Chairperson. However, recognizing his important contribution to the introduction and application of the strategic planning and management approach to the operations of the Typhoon Committee, the Committee has requested Mr. James Weyman to continue his services as the Vice Chair of AWG through 2008, which he has accepted. The Committee expressed its sincere appreciation to Mr. James Weyman for his full and dedicated support to the Committee during the past six years.

Conclusions:

64. The Committee expressed its sincere appreciation to the AWG Chair, Vice-Chair, and AWG members for their work in formulating and coordinating the Strategic Plan,

Annual Operation Plan, and the 2008 budget and reached the following conclusions:

- That the restructure of the TC has been accomplished and has demonstrated excellent results.
- That the accomplishments of the WGs, TRCG and RMG were consistent with the 2007 AOP and were properly aligned with the TC Strategic Plan
- That the AWG recommendation to re-format the member reports in accordance with the structure of AOP would better support documenting TC activities.
- That it is in the best interest of the TC to establish an AWG Secretary position.

Decisions:

65. The Committee decided to:

- Approve the recommendations submitted by WGM as expressed in paragraph 25.
- Approve the recommendations submitted by WGH as expressed in paragraph 32, except the request of an allocation of US\$5,000 for the urban flood management project, which will be further examined in consultation by AWG.
- Approve the recommendations submitted by WGDPP as expressed in paragraph 39.
- Approve the recommendation submitted by TRCG as expressed in paragraph 44. In view of the importance of the development of a knowledge database to institutionalize the information and experiences from the regional cooperation on training and research process, the Committee requested the TRCG to develop a concept note in cooperation with AWG and other Working Groups for presentation to the Committee at its 41st Session.
- Approve the AWG recommendation to modify the Members' report formats and requested the AWG provide a revised format template to members by 31 May, 2008.
- Approve the 2008 annual operating plan submitted by the AWG with the following modifications detailed in Appendix XVII.
- Approve the 2008 Budget as presented in paragraph 90 which includes USD \$10,000 above the USD\$100,000 TCTF allocation to be provided to the AWG to create flexibility for WGs, TCS, TRCG, and others to request additional funds from the AWG for non-budgeted, high priority items to accomplish the strategic goals of the Typhoon Committee.
- Approve the format modification submitted by the AWG containing the columns headings presented below and advised members that input would be required for previous year's expenditures not later than one month prior to convening the upcoming TC session.

Item	2007	2007	2008	2008
	Allotment	Expenditures	Proposed	Proactive Addition

- Approve the recommendation of the AWG to adjust future proposed budgets so they are based upon high priority items identified in the Strategic Plan and are also tied to results oriented actions and accomplishments.
- Create a 1 to 2 page brochure outlining the TC's vision, mission, Key Result Areas (KRAs) and Strategic Goals (SGs).

- Create an emblem/symbol for the Typhoon Committee in celebration of the 40th anniversary and noted that this would be a Member-wide submission with the TCS collecting member inputs and submitting the entries to the AWG, Member entries should be submitted no later than 15 March 2008 and final selection made no later than 15 April 2008.
- Develop TC song for the 41st session, requesting that members submit names of volunteers wishing to submit a song for consideration to the TCS for coordination with the AWG; the TCS will provide guidance's regarding intellectual property rights issues for submissions. Submission of names of volunteers is requested by 1 February 2008.
- Revise the TOR for the AWG to include a Secretary position to assist the AWG Chair and Vice Chair and would assume the role of the Vice Chairperson when the current Vice Chairperson departs the AWG.
- Re-establish the following Working Groups: Working Group on Meteorology, Working Group on Hydrology, Working Group on Disaster Prevention and Preparedness, Training and Research Coordination Group, Resource Mobilization Group and the Advisory Working Group with their respective Terms of Reference shown in Appendix IV.
- Request TCS in consultation with AWG to refine the draft rules and procedures and updated implementation plan for the Roman L. Kintanar Award for submission to the Committee at the 41st Session.
- Convene an IWS on "Coping with Climate Change in the TC Area"

IX. SUPPORT REQUIRED FOR THE COMMITTEE'S PROGRAMME (agenda item 9)

(a) Arrangements for the TCS

66. The TCS began officially its functions in Macao, China, after the signing ceremony of the "Agreement between the Government of the Macao Special Administrative Region of the People's Republic of China and the Typhoon Committee Regarding Administrative, Financial and Related Arrangements for the Typhoon Committee Secretariat", on 13 February 2007.
67. The Agreement is a complementary document to the "Host Country Agreement between the Government of People's Republic of China and the Typhoon Committee Regarding the Typhoon Committee Secretariat", which was signed on December 7, 2006, in Manila, Philippines, during the 39th Session of the Typhoon Committee.
68. The Typhoon Committee Secretariat organized a series of events to celebrate the inauguration of the new premises of the TCS in Macao, China on February 13 and 14, 2007, in collaboration with Macao Meteorological and Geophysical Bureau and the co-sponsorship of Macao Foundation.
69. One of these events consisted of the "High-Level Workshop on the TC Strategic Plan Implementation" with the purpose to enhance the cooperation among the TC Members for a more effective implementation of the TC Strategic Plan, which had been adopted in December 2006 at the 39th TC Session in Manila.
70. The Committee thanked the Macao Foundation for its financial assistance to the realization of the events related to the inauguration of TCS headquarters, "High-Level Workshop on the TC Strategic Plan Implementation", in February, 13-14, and to the 40th Session of the Typhoon Committee, in Macao, China;
71. Actions were also taken to recruit a Hydrologist for TCS. For that purpose the vacant notice TCS/VN001-2007 of 25 April was issued for all Members. There were three

candidates and, in order to proceed to the selection of the most suitable one, it was constituted a panel of evaluation. The selected Hydrologist was Mr. Jinping Liu, from the Bureau of Hydrology, Ministry of Water Resources of People's Republic of China. The process of recruitment was completed with the signature of a letter of agreement between TCS and the BOH.

72. In accomplishment of a TC decision taken in the 39th Session the TCS developed a implementation plan for the "Roman L. Kintanar Award for Typhoon-related disaster mitigation".
73. The Committee expressed its gratitude to the Government of People's Republic of China for signing the "Host Country Agreement" and for the secondment of a Hydrologist from the Bureau of Hydrology, Ministry of Water Resources.
74. The Committee also expressed its gratitude to the Government of Macao, China for hosting the TCS and for providing a full-time meteorologist, as well as its premises and the Endowment Fund to cover partly the cost of staff and the daily operations.
75. The Committee expressed its gratefulness to PAGASA for the assistance given to the present staff of TCS by the former staff.
76. The Secretary of TC, Mr. Olavo Rasquinho attended the 63rd Session of ESCAP, held in Almaty, Kazakhstan, 17-23 May 2007, where he presented the Report of the Typhoon Committee - 2006, under the item "Report of Regional Intergovernmental Bodies".
77. The meteorologist of TCS, Mr. Leong Kai Hong, in representation of the TC Secretary, participated in the Asian Conference on Disaster Reduction 2007, held in Astana, Kazakhstan, from 25 to 27 June 2007, invited by the Director of Asian Disaster Reduction Center. He participated as panelist in the discussions.
78. The Secretary, the meteorologist and the administrative secretary, Ms. Denise Lau, attended the Integrated Workshop on Social-Economic Impacts of Extreme Typhoon-Related Events, held in Bangkok, Thailand, from 10 to 14 September 2007.
79. The TC Secretary attended the Seventh Roving Seminar which was held in Makati City, Philippines, from 5 to 8 September 2007. He delivered a message in the opening ceremony on behalf of the TC Chairman, and also read the message of Mr. Edwin S.T. Lai, Chairman of the Typhoon Committee Training and Research Coordinating Group.
80. The TC Secretary also addressed a message at the opening ceremony of the Training Course on Flood Forecasting System and its Application (OFFSIA), which was held in Beijing, China, from 15 up to 21 October 2007. He also made a presentation on the TC activities and visited the premises of the China Meteorological Administration, guided by Mr Wang Bangzhong, and the Bureau of Meteorology, where he had the opportunity of thanking Mr. Deng Jian, Director-General of the Bureau of Hydrology, Ministry of Water Resources, for the continued support to TC activities.
81. The TC expressed its appreciation to TCS for the publication of the 2006 Typhoon Committee Newsletter (19) and the 2006 Typhoon Committee Annual Review through the joint efforts of the TCS staff and the national editors of the TC Members.
82. The current composition of TCS is as provided below. The Committee noted the position of expert on DPP will be filled pending negotiation between the Government of Macao, China and TCS,
 - Mr. Olavo Rasquinho - Secretary
 - Mr. Leong Kai Hong (Derek) – Meteorologist, seconded by the Macao Meteorological and Geophysical Bureau
 - Mr. Liu Jinping - Hydrologist, seconded by the Bureau of Hydrology, Ministry of Water Resources, People's Republic of China
 - Ms. Denise Lau – Senior Administrative Secretary

- Ms. Kou Meng Kit (Lisa) - Senior Finance Clerk

(b) Technical Cooperation

83. The Committee was informed of the technical cooperation activities of WMO and ESCAP in support of the programmes of the Typhoon Committee carried out in 2007, including the Voluntary Cooperation Programme (VCP), Emergency Assistance Fund scheme and Technical Cooperation among Developing Countries (TCDC) activities, and expressed its appreciation to ESCAP, WMO and collaborating partners for providing assistance to Members of TC.
84. The Committee noted that, in 2007, China; Japan; and the Republic of Korea made cash contributions to the VCP(F), and China; Hong Kong, China; Japan; the Republic of Korea; and the USA provided equipment, expert services and fellowships. Seven VCP project requests were submitted by four Members of the Committee. The Democratic People's Republic of Korea (DPRK), Lao People's Democratic Republic, and Viet Nam received support from China with the provision of FENGYUNCast systems. Japan and Oriental Electronics, Inc, Japan, supported the Philippines for the restoration of the GTS Message Switching System in NMC. In view of the VCP potential in support of activities of the Typhoon Committee, the Committee encouraged Members to further actively participate in the VCP activities. The Committee was informed that bilateral assistance is being provided by Japan to Cambodia and Lao PDR to improve meteorological services.
85. The Committee also noted the recent emergency assistance provided under the Emergency Assistance Fund scheme to WMO Members affected by natural disasters, including DPRK and Viet Nam, and those emerging from conflict. In 2007, China offered to support DPRK and Pakistan for the restoration of surface observing stations affected by floods. Affected Members who need emergency assistance were advised to utilize this scheme, and all Members were requested to consider possible support to the affected NMHSs. The Committee was further informed on the WMO fact-finding missions to Timor-Leste in late January 2007 for the establishment of its Meteorological Service with the participation of Australia; Indonesia; Macao, China; IOC-UNESCO; UN/ISDR; and WMO, and to Fiji in July 2007 with the participation of Australia; Kiribati; USA; SOPAC; SPREP; and WMO for finding out the status of RSMC Nadi-TCC operation and services; and discussing and finding ways to assist the Fiji Meteorological Service/RSMC Nadi - Tropical Cyclone Centre with the aim of sustaining and enhancing national and regional meteorological services and dissemination of information to users in the Pacific region. The Committee noted the key findings and recommendations of the mission that would address the short- and medium- to long-term requirements, and invited TC Members to give consideration to possible support, as appropriate.
86. The Committee was informed that within the framework of the TCDC, China organized the WMO Symposium on Strengthening Cooperation among NMHSs and WMO followed by the 2007 Study Tour in China from 3 to 13 September 2007 for 25 participants, mainly International Managers, from 21 Members of WMO. Five members (Cambodia, China, Malaysia, Republic of Korea and the USA) of the Committee participated in the Symposium and Study Tour in 2007.
87. The Committee was also informed of the planned restructuring of the WMO Secretariat for the better alignment of the WMO programme structure with the WMO Strategic Plan, which would establish a closer linkage between the Tropical Cyclone Programme and the Disaster Risk Reduction Programme and further harmonized capacity development and regional activities. In connection with the planned RA II session in late 2008, TC Members were encouraged to contribute to the evaluation of the RA II Strategic Plan for the Enhancement of National Meteorological Services (2005-2008) by responding to the questionnaire on the basic capabilities of the NMHSs.

(c) Typhoon Committee Trust Fund (TCTF)

88. The Committee reviewed the statement of account of TCTF for the period of 1 January to 31 December 2006 and the interim statement for 1 January to 30 September 2007 submitted by the representative of the WMO Secretariat as shown in Appendix XIX. The Committee was informed that China had contributed 12,000USD to TCTF for 2007 before the Session.
89. The Committee was informed that, in 2007, a special arrangement was concluded between WMO and TCS with Letters of Agreement for advanced provision of funds to TCS under TCTF for three TC events; 1) 49,200 USD for TC Integrated Workshop, 2) 14,000 USD for Roving Seminar and 3) 5,000 USD for International Training on Operational flood Forecasting System and Application. Such arrangement allowed TCS to take the initiative in financial management of those events and discharge its responsibilities in an effective manner.
90. Based on discussions at IWS, the AWG submitted the draft budget. The TC approved the following budget, submitted by the AWG for the period from 1 January to 31 December 2008.

1	Support to TCS for resource mobilization , representation at international meetings and the launch of TCS	15,000
2	Support the improvement of the TC web site	0
3	Support for attachment of two (2) women forecasters to RSMC Tokyo – Typhoon Center	5,000
4	Support for an integrated TC Workshop on Implementation of SP and priority activities : organization of integrated workshop (US\$3,000) for the host and others (US\$2,000)	5,000
5	Support for TRCG for roving seminars.	14,000
6	Support to AWG and other expenses approved by AWG	29,000*
7	Support flood forecasting training	0
8	OJT training in flood forecasting in Malaysia	3,000
9	Storm Surge Workshop	0
10	Support to WGM	13,000
11	Support to WGH	13,000
12	Support to WGDPP	13,000
13	Total	110,000
* Includes additional USD\$ 10,000 as discussed in Paragraph 65		
Any other emergency expenditure that can be justified for the use of the TCTF requires the concurrence of both the TCS Secretary and the Typhoon Committee Chairman. In this regard, emergency expenditure can only be executed if savings are realized elsewhere.		

91. In noting the need to ensure flexibility for the enhance operation of the Committee, it agreed to allocate USD10,000 above the limit USD100,000 to the AWG in order to support activities in other WGs, recalling its previous decision to limit the total plan budget including support costs within USD100,000.
92. To request the TC Chairperson to send an official request to WMO to seek the most appropriate way to effect the transfer, as soon as possible, of the budget of US\$110,000 for 2008 to TCS to enable the Secretariat to build up its capacity on project financial management according to the rules and procedures established by WMO.

X. DATE AND PLACE OF THE FORTY FIRST SESSION (agenda item 10)

93. The Committee noted that the Forty First Session will coincide with the 40th Anniversary since the establishment in 1968 in Bangkok. The Committee therefore welcomed the offer from Thailand to host the forty-first session in November 2008. The exact date of the 41st session will be communicated to UNESCAP, WMO, TCS as

well as the Chairperson of TC by January 2008. The meetings of TC Working Groups on meteorology, hydrology and DPP would be arranged by the WMO, UNESCAP and TCS in consultation with the Chairman and the host Member as an integral part of the Session.

XI. SCIENTIFIC LECTURES (agenda item 11)

94. The scientific lectures were presented as shown in Appendix XX. The Committee expressed its appreciation to all the lecturers and requested the TCS to disseminate all the lecture papers/PowerPoint presentation and to include them in the Typhoon Committee Annual Review for 2007.

XII. ADOPTION OF THE REPORT (agenda item 12)

95. The Committee adopted the report of the session at 10:15 hours, 26 November 2007,

XIII. CLOSURE OF THE SESSION

96. In his concluding statement, the Chairman of the Committee for 2007-08 noted the progress reported in this Session as a watershed event as a model for its future operations, which was made possible with the application of strategic planning and management approach, initiated at the 33rd Session also held in Macao, China in 2000. He particularly noted the instrumental role of the AWG, UNESCAP and WMO in the establishment of a firm foundation for goal-oriented performance. On behalf of the Committee, he called on UNESCAP and WMO to continue their assistance and support and further strengthened roles of TCS.
97. The Committee paid tribute to the important role played by the late Dr. Roman L. Kintanar in taking the leading role in developing not only the Typhoon Committee but also the Tropical Cyclone Programme of WMO, guiding the common efforts to deal with natural disasters in Asia and the Pacific, that is the most vulnerable region of the entire world. The Committee requested the representative of the Philippines to convey to the family of Dr Roman L. Kintanar and to PAGASA its sincere and heartfelt condolences and deep sorrow for this tragic loss. It also observed one-minute of silence to pay respect to the late Dr. Roman L. Kintanar.
98. With successful conclusion of the 40th Session, the Committee expressed its sincere appreciation to the Government of Macao SAR for its contribution and support extended to the TCS. It also expressed its appreciation to the Macao Foundation for the financial support to various activities of the Committee and its Secretariat, especially for financial support and hospitality provided to the 40th Session.
99. The delegates from the Members of the Typhoon Committee, representatives of UNESCAP, WMO and TCS and observers expressed their thanks and appreciation to the Government of the Macao, China and the Macao Meteorological and Geophysical Bureau for the successful hosting of the 40th session of the Typhoon Committee. They also expressed gratitude to Dr Fong Soi Kun, Director of Macao Meteorological and Geophysical Bureau and his staff for the warm hospitality and excellent arrangements made and also for organizing a tour through the beautiful sites of Macao. The Committee also expressed its sincere appreciation to the His Excellency Mr. Lau Si Io, Secretary for Transport and Public Works of Macao SAR and Mr. Olavo Rasquinho, Secretary of the Typhoon Committee for the hospitality extended to all the participants during their stay in the Macao.
100. The Session was closed by the Chairman at 10:55 hours, 26 November 2007.

LIST OF APPENDICES

I	List of participants
II (A,B,C,D)	Statements at the Opening Ceremony
III	Agenda
IV	Terms of Reference of TC Working Groups
V	Activities of Members in the Meteorological Component
VI	Report of the Parallel Session of the Working Group on Meteorology
VII	Activities of RSMC-Tokyo in 2007
VIII	Amendments to the Typhoon Operational Manual (TOM)
IX	Activities of Members in the Hydrological Components
X	Report of the Parallel Session of the Working Group on Hydrology
XI	Activities of Members in the Disaster Prevention and Preparedness Components
XII	Report of the Parallel Session of the Working Group on DPP
XIII	Report of the Training Research Coordinating Group for 2007
XIV	Review of the 2007 typhoon season provided by the RSMC Tokyo-Typhoon Center
XV	Report of AWG Activities in 2007
XVI	Annual Operating Plan Results in 2007
XVII	Annual Operating Plan in 2008
XVIII	AWG Proposal Budget for 2008
XIX	TCTF Financial Report
XX	List of Scientific Lectures
XXI	List of Acronyms and Abbreviations

APPENDIX I

**UNITED NATIONS
ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC (UNESCAP)
And
WORLD METEOROLOGICAL ORGANIZATION (WMO)**

Fortieth Session
Typhoon Committee
21-26 November 2007
Macao, China

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APPENDIX II A

Welcome Speech of the Director of Meteorological and Geophysical Bureau of the Government of the Macao Special Administrative Region on the opening of the Fortieth Session of the UNESCAP/WMO Typhoon Committee

(November 21, 2007)

- His Excellency Mr. Edmund Ho, Chief Executive,
- Your Excellency Mr. Wan Yongxiang, Commissioner of the Ministry of Foreign Affairs of the People's Republic of China in the Macao Special Administrative Region,
- Your Excellency Mr. Lau Si Io, Secretary for Transport and Public Works
- Distinguished Representative of UNESCAP, Mr. Lee Huu Ti
- Distinguished Representative of WMO, Mr. Tokiyoshi Toya
- Distinguished Secretary of the Typhoon Committee, Mr. Olavo Rasquinho
- Distinguished representatives of Members of the Typhoon Committee and Guests,
- Ladies and Gentlemen,

First of all, on behalf of the Government of the Macao Special Administrative Region, I would like to welcome the representatives of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), the World Meteorological Organization (WMO), Members of the Typhoon Committee and all other guests to this morning's open ceremony.

With strong support from the Central Government, the Agreement between the Government of the Macao Special Administrative Region of the People's Republic of China and the Typhoon Committee Regarding Administrative, Financial and Related Arrangements for the Typhoon Committee Secretariat was signed on 13 February in the beginning of this year. This is a remarkable moment the signing of the above-mentioned Agreement, not only for the Typhoon Committee itself but also is the first inter-governmental organization located in the Macao Special Administrative Regions after the revert of sovereignty and it will definitely enhance the position of Macao as a platform for cooperation with regional and international organizations.

The Typhoon Committee has been striving to reduce the losses caused by typhoons in the Asia and Pacific Region and playing an important role in promoting the cooperation in this regard. The Typhoon Committee Secretariat, located in Macao in the beginning of 2007, is the executive arm of the Committee and its main function is to advise Members on the technical and administrative coordination of plans for the implementation of improved meteorological, hydrological, disaster prevention and preparedness, and other facilities needed in the mitigation of typhoon damage.

I'm very happy that since the establishment of the Typhoon Committee Secretariat in Macao, all the feed-back that I received are very positive in the way of its operations and also the excellent liaison between TCS and MSAR Government.

I can assure you that Macao Government will honor the Agreement signed between Government of the Macao Special Administrative Region of the People's Republic of China and the Typhoon Committee.

Before I conclude my intervention, on behalf of the Government of the Macao Special Administrative Region, I would like to express our sincere gratitude to the Members Delegates for their participation in this Session and I'm sure that towards the end of the Session a fruitful deliberation will be achieved.

Thank you very much!

APPENDIX II B

MESSAGE FROM MR. RAE KWON CHUNG

Director of the Environment and Sustainable Development Division

UNITED NATIONS ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

It gives me great pleasure to address this message to the fortieth session of the Typhoon Committee.

At the outset, I would like to express our sincere appreciation to the Government of the Macao Special Administrative Region for hosting this session. I also wish to note with gratitude the generosity of Macao, China in hosting the Typhoon Committee Secretariat starting in 2007 and in providing financial support to the annual operations of the Secretariat. This fortieth session thus marks the first year of operations of the Typhoon Committee Secretariat at this new Headquarters.

I would also like to welcome all the distinguished delegates to the fortieth session of the Typhoon Committee, which is expected to be a watershed for a new era of regional cooperation on management of typhoon-related disasters. This new era marks with the commitment of all Typhoon Committee to achieve its vision to become “the World’s best intergovernmental, regional organization for improving the quality of life of the Members’ populations through integrated cooperation to mitigate impacts and risks of typhoon-related disasters”. Such a vision and such commitment are essential to translate the regional cooperation programme into important achievements in terms of saving lives and improving the livelihood of the many millions of people. These regional efforts are necessary not only the Typhoon Committee Area, but also for the entire Asia and the Pacific, which is known as the most vulnerable region of the world in terms of number of people killed and socio-economic damage. This is particularly true with the increasing impact of natural disasters in the region in recent years.

A recent study of UNESCAP showed that in the Typhoon Committee Area, typhoon-related disasters during the period from 1990 to 2006 accounted for 88 per cent of people killed by natural disasters and thus resulted in about 3,800 people killed by typhoon-related disasters per year. The typhoon-related disasters also accounted for 98 per cent of the total economic damage by natural disasters and resulted in an average annual damage of about US\$15 billion for the same period. In this connection, I would like to commend the Committee for its commitment to reduce the average number of deaths by typhoon-related disasters of 1990s to half by 2015 and the annual economic damage by 20 per cent by 2015. From the perspectives of UNESCAP, as an economic and social commission of the United Nations, achievements of these goals are expected to have far reaching impacts on the improvement of the socio-economic conditions of the people in the region and would thus contribute to the common efforts to achieve the Millennium Development Goals. I am therefore of the opinion that such achievements by the Committee will set an outstanding example for other subregional organizations of the world to replicate. Please rest assured of strong support of UNESCAP to

the efforts of the Committee on this endeavour.

I would like to take this opportunity to express our sincere appreciation to the Government of the Philippines for hosting the Typhoon Committee Secretariat over the course of the past 35 years, including the provision of valuable services of Dr Roman L. Kintanar in supervising the Secretariat as well as the services of meteorologists and hydrologists. On this occasion, I would like to pay tribute to the pioneering role of the late Dr Roman L. Kintanar and his long dedication and invaluable contribution to the work of the Typhoon Committee since its establishment.

I would also like to express our gratitude to the Ministry of Land, Infrastructure and Transport of Japan, and of the Ministry of Construction and Transportation of the Republic of Korea for their generous support in terms of financial and technical assistance in the implementation of various activities jointly undertaken by the Typhoon Committee and UNESCAP in the field of hydrology and to the National Emergency Management Administration of the Republic of Korea for their generous support to activities of the Committee on disaster prevention and preparedness.

I warmly welcome the important contribution of China and Malaysia in providing financial and technical support to the training of several hydrologists of the Committee through the window of South-South cooperation. I also express our appreciation to several other Typhoon Committee Members, such as China; Hong Kong, China; Macao, China; Malaysia; the Philippines; and the U.S.A, to support various activities of the Committee in these common endeavours. I wish to particularly appreciate the substantive support of the Regional Specialized Meteorological Centre of Tokyo, Japan, and the Hong Kong Observatory of Hong Kong, China, in the operations of the Committee.

UNESCAP is committed to supporting your efforts to enhance sub regional cooperation in typhoon-related disaster mitigation and water resources management within the framework of our own programme of work and available resources.

With your active participation, I am confident that the deliberations of the session will be fruitful and that the distinguished representatives will be able to provide useful guidance on the future activities of the Committee.

I wish the session every success.

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APPENDIX II C

WMO Address at the Opening of the Fortieth session of the ESCAP/WMO Typhoon Committee

by Dr Tokiyoshi TOYA
Regional Director for Asia and the South-West Pacific
WORLD METEOROLOGICAL ORGANIZATION

(Macao, China, 21 November 2007)

Your Excellency, Dr Edmund Ho, Chief Executive, Government of the Macao Special Administrative Region (MSAR)

Mr Wan Yong Xiang, Commissioner of Ministry of Foreign Affairs, China at MSAR

Dr Lau Si Io, Secretary of Transport and Public Works of MSAR

Mr Le Huu Ti, Representative of UN ESCAP

Mr Olavo Rasquinho, Secretary of the Typhoon Committee

Dr Fong Soi Kun, Director, Meteorological and Geophysical Bureau

Distinguished Delegates and Guests,

Ladies and Gentlemen,

It is a great pleasure for me to be here with you today as representative of the World Meteorological Organization, WMO, at the opening of the fortieth session of the ESCAP/WMO Typhoon Committee. On behalf of Mr Michel Jarraud, Secretary-General of WMO, I would like to welcome all the participants and to take this opportunity of thanking the Honourable Dr Edmund Ho, and through you, the Government of the Macao Special Administrative Region, for hosting the session in 2007 in this most fascinating city, Macao. I would also like to express my gratitude to Macao Foundation for supporting the participation from Cambodia and Lao People's Democratic. The presence of these Members is no doubt highly beneficial for us to discuss our regional cooperation under the newly-established course of action, Typhoon Committee Strategic Plan.

I also wish to express my deep appreciation, and that of WMO, to Dr Fong, Director, Meteorological and Geophysical Bureau, and his staff, for the warm welcome and hospitality, and for the excellent arrangements made to ensure the success of the session.

Within the Typhoon Committee community, I should like to express the WMO's appreciation of the excellent services provided by Dr Prisco Nilo, the Chairman of Committee, and leading members of Working Groups, who helped the Committee to implement the Strategic Plan during this critically important initial year. I would also like to express my appreciation to the Government of Japan for the services of the Regional Specialized Meteorological Centre in Tokyo, and extend thanks of WMO to UN ESCAP, for its long-standing close co-operation with WMO for jointly providing support to the activities of the Committee.

Distinguished Delegates and Guests,

Over the years, WMO has been promoting the importance of prevention and preparedness measures, including sectoral planning, risk management, early warning systems and emergency preparedness, to reduce the impacts of weather-, climate- and water-related hazards. Through the coordinated networks of the National Meteorological and Hydrological Services (NMHSs) of its 188 Members, WMO supports the provision of a wide range of products and services based on observations, monitoring, hazard analysis, forecasting and warnings. On the global scale, it is significant to note that while the number of these disasters and the associated economic losses has increased steadily from the 1950's to 2005, the

reported loss of life has decreased by a factor of 10, demonstrating that early warnings combined with emergency preparedness and response planning can indeed significantly contribute to saving lives.

In this regard, the collaborative work achieved by the ESCAP/WMO Typhoon Committee during recent years is highly valued by the WMO communities. The synergies established between the different components of the Committee and the increasing cooperation under the Typhoon Committee Strategic Plan are now leading this region to a better preparedness against typhoon disasters in a more coordinated and effective manner.

Dear Colleagues,

In May 2007, WMO adopted the WMO Strategic Plan at the Fifteenth World Meteorological Congress to contribute further to the safety and well-being of people in a forward-looking and strategically-oriented manner. The Congress also endorsed disaster risk reduction as WMO's highest priority and sanctioned the WMO Disaster Risk Reduction Action Plan, aimed at further reducing the loss of lives, livelihoods and property in relation to natural hazards around the world, tropical cyclones in particular. The Congress strongly endorsed its strategic priorities founded on the basis of the Hyogo Framework for Action (HFA) priority actions falling directly under the mandate of WMO.

To follow the resolutions of the Congress, WMO has also addressed itself to the restructuring of the Secretariat for the better alignment of the WMO programme structure with the WMO Strategic Plan. A closer linkage between Tropical Cyclone Programme and Disaster Risk Reduction Programme and harmonized development cooperation and regional activities are key elements of the restructuring.

Excellencies, Ladies and Gentlemen,

With its new course of action and the corresponding structure, I wish to assure you that WMO will continue to support your efforts towards better quality of life of the people in this region through integrated cooperation to mitigate impacts and risks of typhoon-related disasters.

On behalf of the Secretary-General of WMO, I would once again like to thank our host and wish you every success in your deliberations during the coming days.

Thank you.

APPENDIX II D

Keynotes Address of Mr. Olavo Rasquinho Secretary of Typhoon Committee

Mr. Edmund Ho Hau Wah - Chief Executive of Macao SAR

Mr. Wan Yong Xian – Commissioner of Ministry of Foreign Affairs of People's Republic of China

Mr. Lau Si lo -Secretary of Transport and Public Works of MSAR

Mr. Le Huu Ti – Representative of UNESCAP

Mr. Tokiyoshi Toya – Representative of the Secretary-general of WMO

Mr. Fong Soi Kun – Director of MMGB

Representatives of the Members of Typhoon Committee,

Representatives of the media,

Ladies and gentlemen,

On behalf of the Chairman of the Typhoon Committee, Dr. Prisco D. Nilo, I would like to thank your presence in this opening ceremony,

Thanks to the engagement of the Macao SAR Government, through the Meteorological and Geophysical Bureau, Macao has the honour to receive again representatives of the TC Members.

In a short period of less than one and a half years this is the third time that representatives of the Members of this Committee meet together in this Special Administrative Region of the People's Republic of China.

In September 2006 it was held in Macao, for the first time in the history of TC, a workshop integrating representatives of the Members involving experts of the three components: meteorology, hydrology and disaster prevention and preparedness.

In February of the current year, with the collaboration of the Meteorological and Geophysical Bureau and financial support of Macao Foundation, it was held the "High-Level Workshop on the TC Strategic Plan Implementation" with the purpose to enhance the cooperation among the TC Members for a more effective implementation of the TC Strategic Plan for 2007-2011. This workshop was integrated in the events which were held during the inauguration of the new headquarters of Typhoon Committee Secretariat.

Some months have past and Macao is again the stage of the most important annual meeting of the Typhoon Committee, in which the TC is going to discuss in detail the activities carried out in 2007, including important achievements, major issues

and establish future directives to be followed by the 3 components of its activities in the next years.

In the last decades there was a great progress in forecasting typhoon tracks and intensity and, consequently, there was a significant improvement in the accuracy and promptness of the warnings. This progress benefited the different sectors of society and public in general. The Meteorological and Hydrological services, in connection with the Civil Protection services, have contributed for the protection of property and safeguard of thousands lives in the fourteen Members of the Typhoon Committee. This Intergovernmental body, together with the other four regional bodies of the WMO Tropical Cyclone Programme distributed around the globe in basins where tropical cyclones are frequent, have much contributed for this achievement.

The transfer of the TC Secretariat to Macao, where the economic conditions can permit a greater financial support for its operation, will much contribute for a reinforcement of the actions of TC to protect property and people's lives.

The prestige of Macao Meteorological and Geophysical Bureau and the favourable economic situation of Macao SAR were surely two of the factors that have contributed for being chosen for host Member of the TCS.

I wouldn't like to refer how we are grateful to the Government of PR of China for all its engagement in the process of hosting the TCS in Macao and also for seconding a hydrologist from the Bureau of Hydrology, Ministry of Water Resource, and to the Government of Macao SAR for all the support and the secondment of a Meteorologist to work in our Secretariat. We are also grateful to Macao Foundation for the co-sponsorship of some events, namely this Session.

Macao is a well a known region of China, all over the world, for the gambling business. More recently it is also known as World heritage due to its history and monuments. It is in hands of the policymakers of Macao to take decisions to contribute for the enlargement to other areas through which Macao can be better known. The reinforcement of the support to this intergovernmental body, which was created under the auspices of United Nations Economic and Social Commission for the Asia and Pacific and the specialized agency of United Nations, World Meteorological Organization, will surely contribute for that purpose, through the engagement in actions of know-how transfer from the more advanced to the less advanced members.

A still greater involvement of the Macao SAR Government in supporting not only the daily operation of the TC Secretariat but also actions of capacity building involving the less developed countries would contribute to diminish the abyssal difference of the Human Development Index between the most and the least developed Members.

The Typhoon Committee Secretariat, under the guidance of the UNESCAP and WMO, and with a greater financial support of the Macao Government is committed in putting in practice measures in order to achieve the mission of this Committee: the safeguard of property and lives and the mitigation of the consequences of the Typhoon related disasters.

Thank you
21 November 2007

APPENDIX III

Typhoon Committee Fortieth Session

**21 - 26 November 2007
Macao, China**

AGENDA

1. Opening of the Session
2. Election of officers
3. Adoption of the agenda
4. Parallel working session of Meteorological, Hydrological and Disaster Prevention and Preparedness Working Groups
5. The Committee's activities during 2007:
 - 5.1 Meteorological component;
 - 5.2 Hydrological component;
 - 5.3 Disaster Prevention and Preparedness component;
 - 5.4 Other activities related to training and research
 - 5.5 Activities of the Advisory Working Group
 - 5.6 Activities of the Working Group on Resource Mobilization
6. Review of the 2007 typhoon season/annual publications
7. Coordination with other activities of the WMO Tropical Cyclone Programme
8. Programme for 2008 and beyond
9. Support required for the Committee's programme
10. Date and place of the Forty-first session
11. Scientific lectures
12. Adoption of the report

APPENDIX IV

a. TERMS OF REFERENCE OF THE WORKING GROUP ON METEOROLOGY(WGM)

In order to coordinate efforts on the implementation of various activities under the Meteorological Component with the aim to better support the socio-economic development process in the Typhoon Committee Area and to help accomplish the meteorological related goals and objectives in the Strategic Plan, the Typhoon Committee has established the Working Group on Meteorology (WGM) with the following Terms of Reference and operational modalities.

Terms of Reference

The WGM will promote cooperation among the Members in the implementation of activities under the Meteorological Component of the Committee's Strategic Plan with the aim to support the socio-economic development process and enhance cooperation among the Members in all the three components. (Training and Research are incorporated as part of these three.) Towards this end, the WGM is expected to advise and assist the Committee in:

- Identifying priority issues and areas of cooperation in the Meteorological Component;
- Promoting and facilitating the exchange of experiences and knowledge on latest developments and techniques related to the above issues and areas;
- Coordinating and implement priority activities and programmes of the Committee aiming at strengthening capacity of the Members in meteorology;
- Mobilizing resources to carry out priority activities of the Committee related to the meteorological Component;
- Reporting overall progress in the implementation of the meteorology component of the Strategic Plan; and
- Recommending to the Committee priority areas, programmes and activities for cooperation in meteorological research by related experts of the Members.

Membership

The WGM will consist of the following members:

- Mr Wang Bangzhong, China as Chairperson
- Dr Nguyen Dai Khan, Viet Nam as Vice Chairperson
- Members' representatives

The Committee also requests other interested Members to take part in the working group and invite ESCAP and WMO representative to be involved in the work of this Working Group. The term of service on the WGM is 1 year subject to extension authorized by the Committee.

Operation modalities

In view of the limited financial resources of the TC Trust Fund, the WGM is expected to perform its work through email and other means. If possible without financial support, the WG members should meet during the pre-session period before the TC Session.

Reporting requirements

The Chairperson of the WGM is required to submit an annual report on meteorological activities to implement Strategic Plan meteorology priority goals through the TCS to the TC Chairperson and the TC Members for their consideration under the framework of the Committee. This report will include recommendations related to priority activities to be undertaken in the coming years.

b. TERMS OF REFERENCE OF THE WORKING GROUP ON HYDROLOGY (WGH)

In order to coordinate efforts on the implementation of various activities under the Hydrological Component with the aim to better support the socio-economic development process in the Typhoon Committee Area and to help accomplish the hydrological related goals and objectives in the Strategic Plan, the Typhoon Committee has established the Working Group on Hydrology (WGH) with the following Terms of Reference and operational modalities.

Terms of Reference

The WGH will promote cooperation among the Members in the implementation of activities under the Hydrological Component of the Committee's Strategic Plan with the aim to support the socio-economic development process and enhance cooperation among the Members in all three components. Towards this end, the WGH is expected to advise and assist the Committee in:

- Identifying priority issues and areas of cooperation in the Hydrological Component;
- Facilitating the exchange of experiences and knowledge on latest developments and techniques related to the above issues and areas;
- Undertaking priority activities and programmes of the Committee aiming at strengthening capacity of the Members in hydrology and water resources;
- Mobilizing resources to carry out priority activities of the Committee related to the Hydrological Component;
- Reporting overall progress in the implementation of the hydrological component of the Strategic Plan; and
- Recommending to the Committee priority areas, programmes and activities for cooperation in research by related experts of the Members.

Membership

The WGH will consist of the following members:

- Mr Katsuhito Miyake, Japan as Chairperson
- Dr Hong Il-pyo, Republic of Korea as Vice Chairperson
- Dr Liu Zhiyu, China as Vice Chairperson
- Members' representatives

The Committee also requested other interested Members to take part in the Working Group and invited ESCAP, WMO and TCS Hydrologist to involve in this Working Group. The term in service of the WGH is one year subject to extension authorized by the Committee.

Operation modalities

In view of the limited financial resources of the TC Trust Fund, the WGH is expected to communicate through email and other means which require no financial resources from the Trust Fund.

Reporting requirements

The Chairperson of the WGH is required to submit an annual report on hydrological activities to implement Strategic Plan hydrology priority goals through the TCS to the TC Chairperson and the TC Members for their consideration under the framework of the Committee. This report will include recommendations related to priority activities to be undertaken in the coming years.

c. TERMS OF REFERENCE OF THE WORKING GROUP ON DPP (WGDPP)

In order to coordinate efforts on the implementation of various activities under the Disaster Prevention and Preparedness Component to better support the socio-economic development process in the Typhoon Committee Area and to help accomplish the DPP related goals and objectives in the Strategic Plan, the Typhoon Committee has established the Working Group on Disaster Prevention and Preparedness (WGDPP) with the following Terms of Reference and operational modalities.

Terms of Reference

The WGDPP will promote cooperation among the Members in the implementation of activities under the Disaster Prevention and Preparedness Component of the Committee's Strategic Plan with the aim to support the socio-economic development process and enhance cooperation among the Members in all three components. Towards this end, the WGDPP is expected to advise and assist the Committee in:

- Identifying priority issues and areas of cooperation in the Disaster Prevention and Preparedness Component;
- Promoting and facilitating the exchange of experiences and knowledge on latest developments and techniques related to the above issues and areas;
- Coordinating and implement priority activities and programmes of the Committee aiming at strengthening capacity of the Members in Disaster Prevention and Preparedness;
- Mobilizing resources to carry out priority activities of the Committee related to the Disaster Prevention and Preparedness Component;
- Promoting measures for more effective cooperation with other components of work of the Committee, including the development of a conceptual framework on multi-hazard early warning systems and public out-reach programmes;
- Reporting overall progress in the implementation of the DPP component of the Strategic Plan; and
- Recommending to the Committee priority areas, programmes and activities for cooperation in Disaster Prevention and Preparedness research by related experts of the Members.

Membership

The WGDPP will consist of the following members:

- Dr Waon-Ho Yi, Republic of Korea as Chairperson
- Dr M.C. Wong, Hong Kong, China; as Vice Chairperson
- Members' representatives

The Committee also requests other interested Members to take part in the working group and invite ESCAP and WMO representative to be involved in the work of this Working Group. The term of service on the WGDPP is 1 year subject to extension authorized by the Committee.

Operation modalities

In view of the limited financial resources of the TC Trust Fund, the WGDPP is expected to perform its work through email and other means. If possible without financial support, the WG members should meet during the pre-session period before the TC Session.

Reporting requirements

The Chairperson of the WGDPP is required to submit an annual report on Disaster Prevention and Preparedness activities to implement Strategic Plan DPP priority goals through the TCS to the TC Chairperson and the TC Members for their consideration under the framework of the Committee. This report will include recommendations related to priority activities to be undertaken in the coming years.

**d. TERMS OF REFERENCE OF THE TRAINING AND RESEARCH
COORDINATING GROUP
(TRCG)**

In order to coordinate efforts on various areas of research on tropical cyclones and their impacts on the socio-economic development process in the Typhoon Committee Area, the Typhoon Committee has established the Training and Research Coordination Group (TRCG) with the following Terms of Reference and operational modalities.

Terms of Reference

The TRCG is to promote research and training activities on various aspects of tropical cyclones analysis, forecasting and assessment of tropical cyclones and their impacts on the socio-economic development process and encourage cooperation of efforts among the Members. Towards this end, the TRCG is expected to assist in:

- Identifying scientific and technical problems in the analysis and forecasting of tropical cyclones and their impacts on water resources and measures for disaster prevention and preparedness;
- Facilitating the exchange of experiences and knowledge on latest development and techniques related to the above problems;
- Initiating activities and programmes aiming at improving the technical capacity and capability of Members to better serve the people in the region; and
- Recommending to the Committee priority areas and long-term plans for cooperation in research and training in support of the various KRAs of the Committee's Strategic Plan.

Membership

The TRCG will consist of a focal point of all the Members. The Director of the RSMC and all of the Chairpersons of the TC Working Groups can take part in the deliberations of the TRCG in their ex-officio capacity. The current Chairman of the TRCG is Mr. Edwin S.T. Lai of Hong Kong, China and Vice Chair is Mr. Mitsuru Ueno of Japan. The term of service of the TRCG is one year subject to extension authorized by the Committee.

Operation modalities

In view of the limited financial resources of the TC Trust Fund, the TRCG is expected to communicate through email and other means which require no financial resources from the Trust Fund. All submission for consideration by TRCG will have to be made through the focal point of each Member or through the Chairmen of the Working Groups established by the Committee. The TCS is requested to transmit all materials related to TRCG to the Working Group Chairmen. If possible without financial support, the TRCG members should meet during the pre-session period before the TC Session.

Reporting requirements

The Chairperson of the TRCG is required to submit an annual report on research and training activities relating to the priority goals through the TCS to the TC Chairperson and the TC Members for their consideration under the framework of the Committee. This report will include recommendations related to priority activities to be undertaken in the coming years.

e. TERMS OF REFERENCE OF RESOURCE MOBILIZATION GROUP (RMG)

1. Contact and maintain liaison with funding agencies with a view to soliciting financial support for projects.
2. Develop, manage and maintain a Resource Mobilization (RM) Database to support and facilitate resource mobilization activities of TC Members containing information on amongst others, financial resources, potential funding agencies, application procedures, results/status of projects, economic impact of projects.
3. Upon Members' request, offer advice and consultation related to RM issues, in particular on:
 - a. connection in between short-term easily-funded projects with long-term projects,
 - b. ways and means of meeting donors' requirements,
 - c. contractual/legal processes,
 - d. funding management of projects, and
 - e. seeking commitment for Members' respective Government to proposed projects.
4. Manage and maintain, in cooperation with TCS, a PR programme in RM with a view to promoting the image of and/or building up confidence of funding agencies in TC through successful implementation of projects.
5. Assess the resource implications and funding potential of projects in the strategic plan and biennial work plan.
6. Facilitate the exchange and sharing of experience and knowledge on issues related to RM in TC.
7. Develop and maintain a strategy plan for large-scale long-term regional projects.
8. Prioritize TC projects in accordance with the ease of obtaining funds for demonstrating the resource mobilization process, identify and liaise with potential donors.

f. TERMS OF REFERENCE OF ADVISORY WORKING GROUP (AWG)

Guidance

In establishment of the Advisory Working Group, the Typhoon Committee provided the following guidance for their assistance in planning and implementation of measures required for mitigation of typhoon-related disasters.

- To improve the efficiency and effectiveness of the Typhoon Committee, the TCS, and TCS Secretary.
- To promote international cooperation in the three components of Meteorology, Hydrology, and Disaster Prevention and Preparedness. Training and Research are incorporated as part of each of these three.
- To promote the use of advanced information technology and resource sharing among Members of the Typhoon Committee.
- To facilitate the implementation of the Strategic Plan, Annual Operating Plan, and Annual Budget.
- To enhance resources mobilization.

Terms of Reference

The Advisory Working Group (AWG) will assist the Chairperson of the Typhoon Committee and the TC Secretary to coordinate the implementation of TC decisions. The AWG will also act as a “Think Tank/Steering Group” function to advise and offer options or proposals, as required, to the Typhoon Committee Members, the Typhoon Committee, the TC Chairperson, TC Secretary.

- To monitor, review, and evaluate the Strategic Plan’s Key Results Areas, Strategic Goals, and Activities; the objectives/action of the Annual Operating Plan; and Annual Budget and make proposals concerning these documents and the evaluation of the results achieved to the Committee.
- To provide overall direction and oversight for the Associated Activities – Integrated listed in the Strategic Plan.
- To provide options and proposals to enhance the effectiveness of the Typhoon Committee, TC Chairperson, the TC Secretary, and the TCS.
- To assist in the consideration and coordination of prioritize project proposals and their budgets provided by the three components of TC. Training and Research are incorporated as part of each of these three.
- To provide options and assistance on collaborative activities among the three components and priority options to the Typhoon Committee.
- To provide options and assistance on mechanisms aimed at improving the implementation of the Strategic Plan and Annual Operating Plan.
- To assist in mobilizing resources to achieve the goals and objectives as determined by the Typhoon Committee in the Strategic Plan and Annual Operating Plan.
- Coordinate and harmonise activities among WGs, TRCG, RMG, and TCS.
- Monitor and ensure that the projects/activities authorized by the TC are being accomplished in a timely manner.
- Development, review and propose the format of the Members’ written reports and Members’ oral reports at the Typhoon Committee Sessions to focus on the results achieved on the Strategic Plan and Annual Operating Plan.
- To evaluate proposals for Typhoon Committee’s Members attendance at international meetings funded by the TCTF.
- Perform missions as required on strategic planning and project/grant proposals to selected Members.

Members

- Previous session Chairperson as Chairperson
- Mr. James C. Weyman, USA as Vice-Chairperson

- Ms. Genevieve C. Miller, USA as Secretary (with the understanding that the Secretary will replace the Vice-Chairperson upon the time Mr. Weyman leaves this position)
- Chairpersons of the TRCG, RMG, and the three working groups (meteorology, hydrology, and DPP) and the Head of RSMC Tokyo as core members, and
- Representatives of WMO and ESCAP (as ex-officio members)

The term of service on the AWG is 1 year subject to extension authorized by the Committee.

Operational modalities

AWG would conduct most of its work, coordination and communication through correspondence including e-mail, and would be supported by regular reporting from the TC Secretariat. As described in the above-proposed Terms of Reference of AWG, considerable amount of important issues and projects for TC and its Members will be discussed and accomplished by AWG. To enhance the efficiency of the operation of TC, it is recommended that an AWG meeting be held at least every year. At the request of the TC or TC Chairperson, the AWG will investigate and review issues, make recommendations and proposals, and if approved by the TC, assist in implementing approved projects, activities, etc.

APPENDIX V

Activities of Members in the Meteorological Component

CHINA

- 1) China Meteorological Administration (CMA) started-up the multi-temporal twin satellite observation mode to provide typhoon monitoring every 15 minutes during 2007 typhoon season.
- 2) CMA implemented upper air sounding intensive observations and field experiments during typhoon landfalling in 2007 for better analysis and forecast. Also other members could get these upper air intensive observation data via GTS at real time.
- 3) CMA gets improvement on typhoon NWP model development, a new vortex initialization scheme has been put on test for TC track forecast in 2007 and gets better performance than the previous operational system, so, CMA plans to put the new scheme in operational run in 2008.
- 4) On 10 October 2007, CMA presented 11 sets of FENGYUNCast system to 11 developing Countries in Asia Pacific region, which include Myanmar, DPRK, Kyrgyzstan, Laos, Malaysia, Nepal, the Philippines, Sri Lanka, Tajikistan, Uzbekistan and Viet Nam, in a drive to protect the region from natural disasters. And before 2007, CMA had presented this system to 7 countries, i.e. Bangladesh, Indonesia, Iran, Mongolia, Pakistan, Thailand and Peru.
- 5) CMA delivered typhoon warnings to the public via mobile-phone short message together with other ways in 2007, and this proves to be an effective way for DPP in China.
- 6) CMA amends and publishes the Methods for Issuing and Broadcasting the Warning Signals of Meteorological Disaster with 4 categories, for example, BLUE, YELLOW, ORANGE and RED typhoon warning signals.
- 7) CMA has published Atlas of China Disastrous Weather and Climate and Meteorological Disasters Yearbook of China in 2007.

HONG KONG, CHINA

Only two tropical cyclones, Pabuk and Francisco, affected Hong Kong, China up to end of September in 2007. One person was killed and 17 were injured in the case of Pabuk. Physical damage was generally not too extensive during the passages of the two cyclones apart from some collapsed scaffoldings and fallen trees.

Under the WMO RA II Pilot Project on the Provision of City-Specific NWP Products to Developing Countries via the Internet, four are Typhoon Committee Members among the 18 RA II participants. Currently, three NWP centres from Japan, Republic of Korea and Hong Kong, China are providing forecast products for a total of 160 cities, including 33 cities of the four Typhoon Committee Members.

Forecasting tools on EPS-based strike probability maps and JMA EPS cyclone intensity forecasts calibrated by an artificial neural network were put into operational trials in 2007. Other NWP-derived tools launched in the past year included: (a) time series of strike probability; (b) probability of strong/gale winds; (c) intensity forecasts from ECMWF deterministic and EPS products.

A new generation of meteorological information dissemination system was implemented as a decision-support tool for forecasters. Apart from enhanced visualization and dissemination features, a workflow engine is incorporated to facilitate forecaster's operation of warnings and preparation of bulletins during inclement weather conditions.

At the Hong Kong International Airport, a LIDAR-based automatic windshear alerting algorithm was developed in support of the Observatory's Windshear and Turbulence Warning System. The algorithm provided critical information covering the rain-free areas in between the rainbands of tropical cyclones.

A study on the recent decline of tropical cyclone activities in the South China Sea was carried out and the main results were presented in a major international conference on climate change held in Hong Kong in May 2007.

JAPAN

In March 2007, Japan Meteorological Agency (JMA) extended its service to provide all MTSAT High Rate Information Transmit (HRIT) imagery for registered National Meteorological and Hydrological Services (NMHSs) through the Internet as a backup to the direct broadcast from the satellites. JMA is also planning to start providing small data capacity (JPEG) imagery through the Internet by the end of 2007.

JMA started providing MTSAT imagery and Numerical Weather Prediction (NWP) products transformed for display with Satellite Animation and Interactive Diagnosis (SATAID) software as a WMO Information System (WIS) prototype service on 27 March 2007. Using the SATAID program, users can superimpose NWP products onto satellite imagery.

With respect to the improvement of numerical prediction in 2007, JMA started operating the new version of the third-generation global wave model (MRI-III) on 30 May 2007, and the 20-km Global Spectral Model (GSM) on 21 November 2007. Along with the operation of new GSM, an improved initialization scheme for tropical cyclones called Typhoon-Bogus scheme, was adopted into the GSM. This new scheme made significant improvement in the track forecast of some test tropical cyclone cases.

As JMA's contribution to the Typhoon Committee activity for the capacity building, especially in the improvement of knowledge and skills of the Members, RSMC Tokyo-Typhoon Center conducted the seventh Typhoon Committee training seminar in July 2007, inviting two forecasters from Cambodia and the Philippines. In September 2007, JMA dispatched an expert to the Typhoon Committee Roving Seminar held in Manila, the Philippines, to lecture on the topic of The Interaction of Tropical Cyclones with Monsoon Systems.

LAO PDR

New Operational Weather Monitoring and Forecasting at DMH of Lao PDR, under the Project for Establishment of Disastrous weather Monitoring System, Grant aid from the People of Japan MTSAT system: receives and displays the cloud image data transmitted from Multi – Functional Transport Satellite (MTSAT) of Japan and Radar System: radiates the radio wave of 250 KW amplified by the klystron, processes the signal of the echoes reflected from precipitation and detects various weather data (integrating rainfall, wind direction, wind velocity, etc....).

The Current status of the GTS links in Lao PDR, DMH is that the connection between Vientiane and Regional Telecommunication Hub (RTH) Bangkok with TCP/IP 64 kbps. Data collection from NHMS of Vietnam is through Internet (ADSL) to input to the chart plotter. For 6 Synoptic stations were extended the time of observation from 4 times in to 5 times (00, 03, 06, 09 and 12 UTC) and almost 20 stations are transmitting to sub- Region II, Bangkok through GTS.

Operational Tropical Cycle analysis and forecasting: With the utility of MTSAT in Tropical Cyclones, DMH has improved the operational work in analysing satellite data imageries. The procedure is based on the method delivered by Dvorak technique.

Since 2007 DMH improved delivering the daily weather forecast by real voice of forecaster through telephone line and broadcast on air by National Radio station. DMH website has been established and provides many products through this web page : (<http://dmhlao.etllao.com>).

Open house in DMH for elementary and high school students was conducted on 15 and 16 October 2007 (about 200 students have been visited). The purpose of this activity is to supply to them with the basis knowledge about the role of DMH so that some of them will be come interested in science and technology. Seminar at DMH on 18 October, 2007 for the Mass – media (TV , Radio , Newspaper, Magazines) and line Agencies (information users, about 30 persons). The purpose of this activity is to supply the basis knowledge to them so that they will

become able to use information effectively to contribute the protection of people's lives and property. Workshop at DMH on 22 - 23 October, 2007 for the staff of PHMS (provincial Meteorological and Hydrological Station), line agencies and school teachers (30 persons). The purpose of this activity is to supply the basis knowledge to them and to encourage them to teach the knowledge to the school student and the local people.

Under Technical Cooperation Project of JICA (the Meteorological and Hydrological Services Improvement project) has conducted several local trainings at DMH of Lao PDR such as:

- ***OJT for maintenance (Operation and maintenance of weather Radar).***
- ***Lecture on PC architecture (Computer network management)***
- ***Training in creation of web pages, using Dream weaver was conducted***
- ***Training on archiving of the Weather Radar data, include analysis of Radar Data, calibration of rainfall between radar data and rain gauge observation.***
- ***Training course in Aviation Weather for the 7 Meteorologists and 6 air traffic controllers.***
- ***Almost 50 DMH 's participants were participated in numerous international Trainings, Workshops Seminars, Conference, Meetings and Forum related to meteorology, Hydrology, DPP and Other that were held at Internationally. Related to the Tropical cyclone seminar, DMH staff participated to the international workshop on Tropical cyclone Disaster reduction at Guangzhou, China on 26 – 31 March 2007.***

MACAO, CHINA

Another document the "Agreement between the Macao Government of Special Administrative Region of People's Republic of China and the Typhoon Committee Regarding Administrative, Financial and Related Matters Arrangements for the Secretariat of the Typhoon Committee", was signed at the Government Headquarters, Macao-China, at 15:00 on 13 February 2007, by Excellency the Secretary for Administration and Justice of the Government of the Macao SAR, Dr. Florinda da Rosa Silva Chan, and the Chairman of the TC, with the presence of His Excellency the Chief Executive of the Government of the Macao SAR, Dr. Edmund Ho Hau Wah, to witness this important historic moment, in order to complement the above-mentioned Agreement.

The High-Level Workshop on the Typhoon Committee Strategic Plan Implementation was held in Macao between 13 and 14 February 2007. Nearly all Members attended this Workshop with the presence of Dr. Roman L. Kintanar, honorable former Coordinator and Secretary of the Typhoon Committee.

The Tropical Cyclone Name Nomination Contest was opened to Macao citizens, to substitute "Chanchu", as the first commemoration activity of the World Meteorological Day 2007, with the main objectives of promoting public awareness of the hazards related to tropical cyclones and enhancing public understanding of the Tropical Cyclone Signal System in Macao.

Seven SMG colleagues obtained Higher Diploma in Meteorology granted by Macao Polytechnic Institute in March 2007; another fourteen meteorological personnel are expected to complete the 2-year training course for Meteorological Technicians (MT), according to the requirements of 'Guidelines for the education and training of personnel in meteorology and operational hydrology' (WMO-No. 258), by the end of 2007.

"Cooperation Agreement between Meteorological and Geophysical Bureau and the Macao University of Science and Technology in the area of remote sensing" was signed on World Meteorological Day 2007. The first co-operative 3-year project will be "Development of Nocturnal Atmospheric Water Vapor Raman Lidar" headed by Prof. Y. S. Cheng with funding of around 4.89 million Macao patacas from Science and Technology Development Fund of the Macao SAR.

The premises of the Typhoon Committee Secretariat, courtesy provided by Macao SAR Government, were inaugurated on 13th February 2007. With all the legal instruments and hardware in place, the future work of Typhoon Committee will further reinforce.

MALAYSIA

Being near the equator, cyclones do not pose very significant threat to Malaysia. During October 2006 to September 2007 there were six tropical cyclones whose paths were within 700km of Malaysia. These cyclones had caused heavy and widespread rain, strong southwesterly winds of 40-60 km/h and rough seas with waves up to 3.5 m over the coastal waters of northwest and east coast of Peninsular Malaysia, Sarawak and Sabah. However these tropical cyclones had not cause significant damage to the affected areas.

The upgrading of observation facilities, forecast tools and models, and ICT systems has enhanced Malaysian Meteorological Department (MMD) capacity and capability in providing timely and improved weather forecasts and warnings to the public and disaster management agencies.

During year 2006/2007, MMD had also hosted and participated in a number of international and national workshop/seminar/meeting on meteorological and seismological related issues. These involvements help to enhance MMD's human capacity and capability buildings as well as national and international cooperation and collaboration.

PHILIPPINES

On the meteorological components, the meteorological and hydrological conditions during the period October 2006 to September 2007 were highlighted, focusing on the Tropical Cyclone summary, rainfall, and TC damages during the period. Progress in regional cooperation and selected RCPIP Goals and Objectives were also discussed.

It was reported that 15 TC entered the country's forecast area of responsibility during the period. 9 of which were typhoons, 5 tropical storms and 1 tropical depression. There were 5 landfalls, 4 were typhoons and 1 TD. In terms of the number of casualties, TY Durian was the deadliest. Its passage results to 734 deaths, 2340 injured and 762 missing caused by rain-induced mudslides of volcanic ash and boulders off the previously active Mayon volcano. The overall damages due to TC during the period reached US\$ 152 million.

In terms of hardware / software development and training process, it was reported that the Philippines through PAGASA has started the process of installing four Doppler radars, enhanced its forecasting capability with the installation of MTSAT receiving station, World Area Forecast System (WAFS) at two major international airports, upgrading of the GTS through VCP-WMO support and further assistance from JMA and repaired strengthened its 15 field weather stations. A list of training seminars conducted and attendance to foreign workshops, trainings fellowship were summarized. These include the Typhoon Committee Roving Seminar.

REPUBLIC OF KOREA

There were three typhoons that impacted Korea in 2007. One, Nari, of three typhoons made landfall over the Korean Peninsula which resulted in serious damage in Korea, especially in Jeju Island. KMA has been developing various tools for typhoon forecast based on the web such as typhoon formation guidance, intensity guidance, typhoon search system, and so on since 2006. KMA prepared software which can convert TDCF code to ASCII code. This software can contribute to have a solution for a migration affair regarding SAREP and RADOB to TC member countries.

MOCT/KICT has a 5 year new project from 2008 titled "Socio Economic Impact Assessment System for Investment in Flood Control & Management Measures Infrastructure" to develop the evaluation system for various types of flood control measures, which are implemented for basin wide integrated flood control policy such as river levees and storage facilities, etc. Also this new project focuses assist to determine the priorities of investment for disaster prevention related project and construction of infrastructures.

Reckless development with urbanization and, in consequence, increase of impermeable areas worsened the flood disaster causing function failure in infrastructures such as underground facilities, road, electric, gas, and water facilities. Also, community-based disaster management is not practiced due to the recovery-oriented management and less participation of local people. To solve these obstacles and improve current management system, several policies are proposed formulating a new paradigm.

The Committee was informed by the representative of Korea that KMA and the KOICA jointly organized the First International Training Course on Analysis of COMS (Communication, Ocean, and Meteorological Satellite) Data. The Course took place at KMA in Seoul, Republic of Korea during 2-17 September 2007. The objectives of the course is to introduce the COMS which is the first geostationary meteorological satellite to be launched by Korea in 2009; to understand the COMS program such as development plan, satellite system, and data processing system; and to form a user community to share various information on the COMS. The participants came from 13 countries in Asia-Pacific area including Philippines, Thailand, and Vietnam of TC member countries.

SINGAPORE

1. Progress in Member's Regional Cooperation and Selected Strategic Plan Goals and Objectives

Meteorology Component:

Under a Memorandum of Understanding between NOAA and National Environment Agency-Meteorological Services Division (NEA-MSD) for Technical Cooperation in Meteorology and Climate, a joint training workshop on the ASEAN Seasonal-Interannual Climate Prediction and its Application was conducted in Singapore. A follow-up of the Nov 06 training conducted at the International Research Institute for Climate and Society (IRI), it provided participants with an overview of seasonal forecasting methods with a focus on statistical downscaling with the aid of the Climate Prediction Tool. The model outputs are currently being used in Singapore in addition to other tools.

On the training progress, Singapore has been active in staff training. She participated in 6 regional training programmes hosted by China, Malaysia and Philippines. Some were Typhoon Committee sponsored training programmes.

2. Progress in Member's Important, High-Priority Goals and Objectives (towards the goals and objectives of the Typhoon Committee):

Meteorology Component:

Hardware and/or Software Progress-

Singapore is currently enhancing its seismic and tidal monitoring systems and development of tsunami modelling capability. These are expected to be completed in Aug 2008. In addition, a national tsunami response plan and a national tsunami task force led by MSD to coordinate the efforts of the various response agencies to deal with a tsunami incident have been formed.

Singapore is in the completion phase of the migration of the Main Computing System. Expected to be completed in Nov 07, the migration will replace the current system with an open system based on a J2EE 3-tier architecture. This will facilitate further development and integration of various computing resources in MSD and will present users with a more user-friendly web portal interface as well as support the provision of web services to users.

Other similar progress is the upgrade of the Weather Information Dissemination System. The system provides weather information to the public through various communication channels.

Research Progress

Singapore has developed a Systematic Objective Area Prediction (SOAP) system using the WRF as the underlying mesoscale prediction model. SOAP is on currently on operational trial.

THAILAND

- + To enhance data exchanges among the TC Members, the Bangkok – Singapore GTS circuit has been upgraded from X.25, speed 9.6Kbps to the TCP/IP Frame Relay with the speed of 16 Kbps (CIR), and Bangkok – Phnom Penh GTS circuit has also been connected using VPN via internet.
- +To strengthen the Indian Ocean Tsunami Warning System, TMD in collaboration with NOAA will deploy 2 more DART Bouys (Deep-ocean Assessment and Reporting of Tsunami) in 2007-2008 after the first DART Bouy was installed in December 2006

- +To support Tsunami warning system, 9 tidal gauges will be added to the existing 9 tidal gauges deployed in the Gulf of Thailand and in the Andaman Sea along the coastal areas of Southern Thailand. The installations are expected to be completed by 2008
- + Three C-band Doppler radars have been added to the existing 20 stations in the TMD's Radar Network in order to enhance the radar observation of the country to closely monitor rainfall pattern, cloud movement, and its intensity in the remote areas.
- + Replacing volunteer rainfall stations in northern Thailand with 110 automatic rain gauge stations, apart from the existing 161 automatic stations in the telemetering system of TMD. Data from the automatic stations will be incorporated into the existing telemetering network to strengthen flood monitoring and warning in the critical flood-risk areas of the country. Moreover, additional 820 stations will be incorporated into TMD's automatic rain gauge network by 2008.
- + Each TMD meteorological station will be equipped with an automatic station, thus there will be additional 87 automatic stations in TMD meteorological observation network by 2008.
- + The Vaisala Model RP20 will replace the Vaisala's retired model at 4 upper air stations, the installations are expected to be completed in 2008.
- + The improvement of observation for aviation by the deployment of 3 Automatic Weather Observation System (AWOS) at 3 local airports of the country.
- b. Training Progress
 - +20 staff of the TMD has opportunities to participate in the overseas training courses.
- c. Research Progress
 - +TMD, in cooperation with Asian Disaster Preparedness Centre (ADPC), initiated a joint research project on "Investigation of the 2006 Utaradit Major Flash Flood using WRF". The success of the joint research would hopefully reveal meteorological mechanisms behind this hazardous flood.
 - + GIS-based Typhoon Information System was developed to transform the recorded typhoon data into GIS for further development of TMD's Typhoon Information Processing system (TIPs).
- d. Interaction with users, other Members, and/or other components
 - + To give warning messages to people promptly, 127 multi-hazard Warning Towers in National Warning System of Thailand have been established and 144 more towers will be completed by 2008.
- e. Research Progress
 1. Thailand Monsoon Onset Estimation Using MM5 Model,
 2. Meteorological indicators for Heavy Rainfall Forecast: Case study of June 2006 Heavy rainfall in the North and Northeast of Thailand,
 3. Application of GIS for Tropical Storm-induced Windstorm Assessment over Thailand,
 4. The correlation between Run up of Tsunami and Coastal Characteristics,
 5. A Study of Meteorological Drought Index Model for Drought Areas in Northeastern Thailand.
- f. Opportunities for Further Enhancement of Regional Cooperation
 - +Thai Meteorological Department in collaboration with the WMO hosted the WMO CLIPS Training workshop for RA II (Eastern Part) for two weeks in Bangkok from 15 to 27 January 2007.
 - +In Mid-December 2007, TMD is very pleased to collaborate with WMO/IOC and NOAA to host the "WMO Multidisciplinary Workshop on the Exchange of Tsunami Warning, Related Information and other Warning in the Indian Ocean" at Bangkok, Thailand. The participants will be from the NMCs/NMHSs of the Indian Ocean countries and other international centers concerned.

USA

Tropical cyclone activity for the period of October 2006 to September 2007 was below normal for the Central Pacific and the Western North Pacific which was largely confined to the western portion of the Guam area of responsibility. Of those that did affect us, Hurricane Flossie in August was the first serious threat to the Hawaiian Islands in several years. Only six typhoons posed a threat to the islands in Micronesia but none caused any major damage.

International Pacific Desk Training Internship. The WMO Regional Association (RA) V, Pacific Desk Internship program trained 6 students from Solomon Islands, Kiribati, Tonga, Philippines, Samoa, and Niue.

The Committee was informed that the U.S. Department of Defense Joint Typhoon Warning Center (JTWC) will begin hiring civilian Typhoon Duty Officers to replace U.S. Air Force Officers that were assigned that duty. Plans are to hire 4 civilian forecasters by 1 April 2008. Plans are also to hire a civilian to be Director JTWC in-place of the U. S. Air Force office.

The Committee was also informed by the representative from JTWC that, in support of the T-PARC project, JTWC has requested U. S. Air Force support to use a WC-130 Hurricane Hunter aircraft during this event. This request has been approved at the U. S. Pacific Air Force level and being passed through the U. S. Air Force chain-of-command. This aircraft will complement the U.S. P-3 research aircraft already scheduled to participate in the project.

VIETNAM

1. Progress in Member's Regional Cooperation and Selected RCPIP Goals and Objectives:

a. Hardware and Software Progress

a.2 Technical advancement

- Visible and other imageries from MTSAT (JMA) were used in operational forecasting.
- Microwave imagery from the US Naval Research Laboratory website was used to support forecasters in locating the TC intensity and position

a.4 Numerical Weather Prediction

- From 24 October, 2007, the multi-layer soil model for HRM model comprises seven active layers for the heat (energy) and six for the soil moisture (water) budget has been used

a.5 The use of ensemble products

- Multi-model ensemble and consensus forecasts of tropical cyclone tracks are used during the course of producing tropical cyclone warnings.

b. Implication to Operational Progress

- The outputs of the higher resolution version of HRM model, especially its rainfall forecasts (for the cases when typhoons affect our coastal areas) showed a rather good guidance in indicating the regions of heavy rainfall.
- With the intensive utilization of numerical guidance and multi-model consensus forecasts from different NWP models as well as subjective TC advisories, operational predictions and warnings of TC tracks performed quite well.

2. Progress in Member's Important, High-Priority Goals and Objectives

a.2 Software for interactive operational forecasting

- New tropical storms forecast supporting software, **TCAid**, was designed and installed for operational works.

b. Implication to Operational Progress

- PC-Linux Cluster system (8 nodes, 16CPUs, RAM 16GB (2x8) has been put into operation at NCHMF since May, 2007. This system has replaced the old one (4 nodes, 8CPUs that had been out of service in May.
- The numerical model MM5 was applied to tropical cyclone track and intensity forecasts.

c. Research Progress

- Research on the implementation of 3D-VAR data assimilation scheme for HRM model using conventional observations is being carry-out.

APPENDIX VI

REPORT OF PARALLEL SESSION OF THE WORKING GROUP ON METEOROLOGY (WGM)

1. The meeting of the WGM was convened by Chair, Mr Wang Bangzhong (China) at 10:00 , November 21, 2007 in Lotus Room, World Trade Center, Macao, China. The meeting was attended by 30 participants from the Members of the Committee as well as the representative of WMO.
2. The Agenda for the meeting of WGM included the Report of WGM Chair, Reports of the Members in respective areas, and preparation of the WGM report including review of activities in the past year, recommendation for the coming year, and budget as well as nomination of officers for WGM.
3. The meeting took note of important progress made in the implementation of the TC Strategic Plan and annual operating plan during the past year under Meteorology by Members.
4. The meeting also noted that the outcomes of meeting of Working Group on Meteorology during the Integrated Workshop on Social Economic impacts of Extreme Typhoon-related Events (Bangkok, Thailand, 10-14 September 2007).
5. The meeting was satisfied with the development of three projects, namely, “Typhoon Information Processing Systems (TIPS)”, “Experiment of Improvement of Precipitation Forecasting related to Interaction between Monsoon and Tropical Cyclone” and “GTS and DVBS Data Sharing”.
6. The meeting noted with satisfaction the final outcome of WGM/RSMC consideration processes with an aim to review advantage and disadvantage for naming, numbering and labeling Tropical Depressions.
7. The meeting also noted with satisfaction the progress of assessment of change of frequency and intensity of tropical cyclone in Typhoon Committee region, considering different historical database and standards of tropical cyclones with different conclusions.
8. The meeting noted the progress of considering the classification of typhoons in the Typhoon Committee region, and discussed its significance for disaster risk management and facing challenges such as different averaging timing for measuring wind speed.
9. The meeting also noted that many Members of the Typhoon Committee are not ready to use SAREP and RADOB in BUFR because of decoding software or means of telecommunication.
10. The meeting expressed its appreciation to the Chair of WGM, Mr Wang Bangzhong (China), and Vice Chair of WGM, Ms Duong Lien Chau (Viet Nam), for their contribution during the past year.

11. The Members of the working group re-elected Mr Wang Bangzhong (China) as Chair and elected Dr Nguyen Dai Khanh (Viet Nam) as vice-chair, respectively.

Recommendation

On the basis of the information provided by Members and the outcomes of the WGM paralleled session and integrated workshop on Social Economic impacts of Extreme Typhoon-related Events (Bangkok, Thailand, 10-14 September 2007), the following recommendations were proposed to the Session of the Committee:

- To further develop three projects, namely, “Typhoon Information Processing Systems (TIPS)”, “Experiment of Improvement of Precipitation Forecasting related to Interaction between Monsoon and Tropical Cyclone” and “GTS and DVBS Data Sharing” with an aim to be adopted by the Typhoon Committee in the near future, considering that these projects may be implemented by using pilot approach, including to organize the workshop for further Introduction of TIPS of each Member in conjunction to TRCG EPS workshop, to come up with the proposal of “Experiment of Improvement of Precipitation Forecasting related to Interaction between Monsoon and Tropical Cyclone”, and to support relevant member to draft plan for using the updated communication system.
- To agree that there is no need for naming or numbering tropical depression to avoid the confusion while it is necessary to label expected tropical depression by using RSMC existing system among the Members with the next 3 years or beyond, and to agree each member, depending on their respective circumstances, may develop its own tropical depression numbering or naming system to suit its own operation use including the improvement preparedness for developing tropical depressions.
- To further consider the classification of tropical cyclone with helpful information by WMO on this matter, noting that fine information related to tropical cyclone may enhance preparedness for intense typhoons, while changing categories used for a long time may cause some confusion to the public.
- To continue the assessment process on the change of frequency and intensity of tropical cyclone in order to provide the latest information on this matter for the policymaker and the public based on the existing assessment by the other international and regional organizations.
- To request WGM to put forward the procedures of consultation and discussion among the member as well as RSMC during TC period by using the existing channels such as telephone, website and email system aiming at exchanging the latest information about the formation and development of tropical cyclones.
- To request Members concerned to take the necessary action to use SAREP and RADOB in BUFR with software assistance by the Republic of Korea if necessary, and to request the RSMC Tokyo to continue to disseminate both BUFR and alphanumeric SAREP and RADOB until the completion dates for their migration, which will be agreed by TC Members at the next TC session.

- To reappoint Mr Wang Bangzhong (China) as Chair and appoint Dr Nguyen Dai Khanh (Viet Nam) as Vice-chair, respectively.

APPENDIX VII

ACTIVITIES OF THE RSMC TOKYO - TYPHOON CENTER

1. Provision of RSMC Products

The RSMC Tokyo - Typhoon Center (referred to below as *the Center*) provides Typhoon Committee (TYC) Members with a range of products on tropical cyclones in the western North Pacific and the South China Sea through the GTS and the AFTN. Table 1 shows the total numbers of products issued by the Center in 2007 (as of the end of October). In late April, the Center started providing maximum wind gust speeds in its analysis as well as 24-hour, 48-hour and 72-hour forecasts of tropical cyclones (TCs) in the RSMC Tropical Cyclone Advisory (WTPQ20-25 RJTD). Maximum wind gust speeds are estimated to be about 1.4 times as fast as 10-minute average maximum sustained winds based on our recent research.

2. Track Forecasts

Operational track forecasts for the 20 TCs that attained TS intensity or higher in 2007 (as of the end of October) were verified against the Center's analysis data*. Figure 1 shows the annual mean position errors of 24-hour (from 1982), 48-hour (from 1988) and 72-hour (from 1997) forecasts. The errors for this year are approximately 113 km (105 km in 2006) for 24-hour forecasts, 197 km (192 km) for 48-hour forecasts and 263 km (275 km) for 72-hour forecasts. The annual mean position errors for 24-, 48- and 72-hour forecasts in 2007 are almost the same as those from 2006. Figure 2 shows the ratios of annual mean position errors in operational forecasts (EO) to those of persistency-method** forecasts (EP) for 24-, 48- and 72-hour forecasts from 1990. The ratios of annual mean position errors of EO to EP are 42 % (52 % in 2006) for 24-hour forecasts, 30 % (42 %) for 48-hour forecasts and 25 % (36 %) for 72-hour forecasts, smallest since the start of operational forecasting. The results show that forecast performance was good this year, even though there were many recurving TCs whose tracks are difficult to forecast with high accuracy. The position error statistics of the 24-, 48- and 72-hour forecasts for the twenty TCs are shown in Table 2.

*The term *analysis data* refers to post-analysis data of the thirteen TCs from KONGREY (0701) to FRANCISCO (0713) and operational analysis data of the seven TCs from LEKIMA (0714) to FAXAI (0720).

**The persistency-method is based on the assumption that a tropical cyclone holds the same movement throughout the forecast period, and linear extrapolation of the latest 12-hour track is applied to obtain track forecasts. Position errors of the method are used to evaluate the relative performance of operational forecasts and model predictions.

3. Intensity Forecasts

Table 3 gives Root Mean Square Errors (RMSEs) of the 24-, 48- and 72-hour intensity forecasts for the 20 TCs in 2007 (as of the end of October). The annual mean RMSEs of central pressure forecasts were 13.3 hPa (14.1 hPa in 2006), 17.7 hPa (17.1

hPa) and 21.2 hPa (18.6 hPa) for 24-, 48- and 72-hours respectively, while those of maximum wind speed forecasts for 24-, 48- and 72-hours were 6.7 m/s (6.1 m/s in 2006), 8.5 m/s (7.7 m/s) and 9.6 m/s (8.3 m/s) respectively. The intensity forecasts were particularly difficult for the extremely developed TC SEPAT (0708) (with a central pressure of 910 hPa) and for TCs that developed rapidly, including NARI (0711) (45-hPa development in 24 hours) and WIPHA (0712) (50-hPa development in 24 hours).

4. RSMC Data Serving System

The Center operates the RSMC Data Serving System (RSMC-DSS) to provide TYC Members with NWP products such as GPs and observational data through the Internet. The RSMC-DSS is used by nine TYC members as of the end of October 2007. The products and data provided through the RSMC-DSS are listed in Table 4.

5. JMA Numerical Typhoon Prediction (NTP) Website

Since October 2004, the Center has officially operated the Numerical Typhoon Prediction (NTP) Website in cooperation with seven NWP centers: BoM (Australia), MSC (Canada), DWD (Germany), ECMWF, KMA (Republic of Korea), NCEP (USA), UKMO (UK). The NTP website provides predictions of tropical cyclone tracks derived from the models of major NWP centers in order to assist the NMHSs of TYC Members in their tropical cyclone forecasting and warning services. The NTP website is available only to registered organizations including the NMHSs of TYC Members and participating NWP centers. Eleven TYC Members other than Japan had accessed the NTP website as of the end of October 2007. The main contents of the site are as follows:

- 1) Predictions of tropical cyclone tracks, in table and chart form, from the participating NWP centers together with predictions by the Japan Meteorological Agency (JMA). Ensemble mean prediction of any combination of products is also available.
- 2) NWP model products, in chart format, from the participating NWP centers.

6. Migration of SAREP and RADOB to BUFR

The World Meteorological Organization (WMO) is facilitating code migration from Traditional Alphanumeric Codes (TACs) to Table Driven Code Forms (TDCFs) based on the migration plan approved by the extraordinary session of the Commission for Basic Systems (Cairns, 2002) and the 14th World Meteorological Congress (Geneva, 2003). In accordance with the migration plan, which calls for the migration of SAREP (Category 2) by 2006 and RADOB (Category 4) by 2008, the TYC Members concerned are urged to take the necessary action according to their national migration plans. The Committee expressed its concern at the 39th Session that some TYC Members would not be able to meet the deadlines specified. The TYC Secretariat, in cooperation with the Center, conducted a questionnaire survey of the current status of each TYC Member after the 39th Session. Nine TYC Members responded to the survey: Hong Kong, Republic of Korea, Lao PDR, Macao, Malaysia, the Philippines, Singapore, Thailand and Vietnam. The results of the survey were summarized and reported by JMA to a meeting of the Expert Team on Data Representation and Code held in Darmstadt, Germany, from 23 to 27 April 2007. The results show that many TYC Members are not ready to use SAREP and RADOB in TDCFs because of problems with decoding software or means of telecommunication. The Center will therefore continue to disseminate both BUFR and alphanumeric SAREP and RADOB until the completion dates for SAREP and RADOB

migration, which will be agreed by TYC Members at the 40th TYC Session.

7. Expanded Best Track Data Set for the Western North Pacific and the South China Sea

At the 36th TYC session (Kuala Lumpur, 2003), a plan to produce an *Expanded Best Track Data Set for the Western North Pacific and the South China Sea* (referred to below as *EBT*) was approved. The Committee, at the 39th session (Manila, 2006), urged TYC Members to send observational and disaster-related data from 1996 to 2005 as soon as possible. As of the end of October 2007, ten TYC Members had provided data to the Center. Considering that EBT would contribute to the disaster preparedness of TYC Members, those who have not yet provided their data are kindly requested to do so as soon as possible. In the process of basic screening of data submitted by TYC Members, the Center faced a problem in dealing with maximum sustained wind data in EBT. Although TYC Members use different averaging times in calculating sustained wind data (e.g. one minute by the USA, two minutes by China and ten minutes by Japan), only 10-minute averaged data can be treated in the format described in the summary report of the Working Group on a Unified North-West Pacific Tropical Cyclone Best Track Data Set (Appendix XV) approved at the 36th TYC session. In this regard, the Center proposed to the EBT contacts in December 2006 that an option for the averaging time of sustained wind data be added to the format, and this proposal was accepted with no comments. In accordance with the updated format, the Center will compile its best track data with Japan's observation data from 1996 to 2005 as an EBT prototype. The results, along with inquiries regarding any questionable data found in observational and disaster-related data submitted by TYC members, will be sent to the contacts by the end of this year.

8. Publications

The Center published *Technical Review No. 9* in March 2007 and *Annual Report on the Activities of the RSMC Tokyo - Typhoon Center in 2006* in October 2007. These are also available on the Center's website at

http://www.jma.go.jp/jma/jma-eng/jma-center/rsmc-hp-pub-eg/RSMC_HP.htm

9. Training

Two forecasters from Cambodia and the Philippines visited the Center from 18 to 27 July 2007 to participate in on-the-job training for typhoon operations. During the two weeks of training, the two forecasters experienced the operational procedures of the Center in the analysis and forecasting of tropical cyclones, including MAN-YI (0704).

10. Future Plans

The Center will start operation of the 20-km Global Spectral Model (GSM) from 00 UTC on 21 November 2007. In accordance with this, the Center will cease operation of the Typhoon Model (TYM). In addition, the Center will also begin operation of the Typhoon Ensemble Prediction System (TEPS) early in 2008, and will provide the results through the

NTP website.

11. Implementation Plans

Table 5 shows the implementation plans of the Center for the period from 2007 to 2011. The Center will be ending the HiRID/WEFAX broadcast service at 0230 UTC on 12 March 2008 with the broadcast of imagery at 0200 UTC.

Table 1 Monthly and annual total numbers of products issued
by the RSMC Tokyo - Typhoon Center in 2007 (as of the end of October)

Product	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
TCNA20	0	0	1	20	23	0	47	76	86	75			328
TCNA21	0	0	1	21	27	0	58	89	99	87			382
IUCC10	0	0	2	41	50	0	105	165	185	162			710
WTPQ20-25	0	0	4	41	56	0	120	183	202	179			785
WTPQ30-35	0	0	0	10	13	0	29	46	52	43			193
FXPQ20-25	0	0	3	30	40	0	86	135	149	128			571
FKPQ30-35	0	0	2	20	27	0	59	90	98	85			381
AXPQ20	3	0	0	0	1	1	0	2	3	6			16

Notes:

Names of the products and their headers via the GTS or the AFTN

Names	Headers
SAREP (TACs)	TCNA20/21 RJTD
(BUFR format)	IUCC30 RJTD
RSMC Tropical Cyclone Advisory	WTPQ20-25 RJTD
RSMC Prognostic Reasoning	WTPQ30-35 RJTD
RSMC Guidance for Forecast	FXPQ20-25 RJTD
Tropical Cyclone Advisory for SIGMET	FKPQ30-35 RJTD
RSMC Tropical Cyclone Best Track	AXPQ20 RJTD

Table 2 Mean position errors of 24-, 48- and 72-hour track forecasts
for the twenty TCs in 2007 (as of the end of October)

Tropical Cyclone			24-hour Forecast				48-hour Forecast				72-hour Forecast			
			Mean (km)	S.D. (km)	Num.	EO/EP (%)	Mean (km)	S.D. (km)	Num.	EO/EP (%)	Mean (km)	S.D. (km)	Num.	EO/EP (%)
TY	KONG-REY	(0701)	169	104	16	41	264	151	12	26	332	236	8	18
TY	YUTU	(0702)	113	70	17	38	194	104	13	20	367	118	9	18
TS	TORAJI	(0703)	144	88	2	-	-	-	0	-	-	-	0	-
TY	MAN-YI	(0704)	110	58	24	37	158	64	20	20	215	57	16	16
TY	USAGI	(0705)	91	43	20	34	170	91	16	31	350	173	12	41
TY	PABUK	(0706)	120	50	12	68	253	38	8	61	475	110	4	104
TS	WUTIP	(0707)	-	-	0	-	-	-	0	-	-	-	0	-
TY	SEPAT	(0708)	80	48	23	54	147	95	19	39	145	87	15	20
TY	FITOW	(0709)	68	29	36	36	121	61	32	25	224	85	27	28
STS	DANAS	(0710)	72	46	14	19	171	48	9	16	287	128	5	15
TY	NARI	(0711)	162	86	12	66	321	257	8	44	358	143	3	33
TY	WIPHA	(0712)	75	49	9	40	220	59	5	74	551	0	1	-
TS	FRANCISCO	(0713)	145	8	3	53	-	-	0	-	-	-	0	-
STS	LEKIMA	(0714)	114	69	13	45	191	69	9	35	390	87	5	60
TY	KROSA	(0715)	72	36	22	38	128	41	18	38	182	80	14	36
TS	HAIYAN	(0716)	-	-	0	-	-	-	0	-	-	-	0	-
TS	PODUL	(0717)	-	-	0	-	-	-	0	-	-	-	0	-
TS	LINGLING	(0718)	171	24	8	60	450	115	4	85	-	-	0	-
TY	KAJIKI	(0719)	363	200	8	67	833	310	4	57	-	-	0	-
STS	FAXAI	(0720)	276	114	3	31	-	-	0	-	-	-	0	-
Mean (Total)			113	90	242	42	197	163	177	30	263	147	119	25

Notes:

S.D. means standard deviation of operational forecast errors.

Num. means numbers of forecasts

EO/EP indicates the ratio of EO (mean position error of operational forecasts) to EP (mean position error of forecasts by the persistency method)

Table 3 Root Mean Square Errors (RMSEs) of 24-, 48- and 72-hour intensity forecasts
for the twenty TCs in 2007 (as of the end of October)

Tropical Cyclone			RMSE of 24-hour Forecast			RMSE of 48-hour Forecast			RMSE of 72-hour Forecast		
			Central pressure (hPa)	Maximum Winds (m/s)	Num.	Central pressure (hPa)	Maximum Winds (m/s)	Num.	Central pressure (hPa)	Maximum Winds (m/s)	Num.
TY	KONG-REY	(0701)	8.4	5.2	16	10.9	7.6	12	6.1	5.2	8
TY	YUTU	(0702)	14.5	7.0	17	21.3	10.7	13	18.1	9.1	9
TS	TORAJI	(0703)	2.0	0.0	2	-	-	0	-	-	0
TY	MAN-YI	(0704)	8.2	5.8	24	9.6	6.2	20	16.2	8.4	16
TY	USAGI	(0705)	7.9	4.3	20	11.5	6.1	16	16.8	8.4	12
TY	PABUK	(0706)	9.5	4.5	12	11.5	5.2	8	12.0	7.4	4
TS	WUTIP	(0707)	-	-	0	-	-	0	-	-	0
TY	SEPAT	(0708)	19.7	8.4	23	31.1	12.7	19	40.6	16.2	15
TY	FITOW	(0709)	7.8	4.1	36	11.8	5.2	32	17.4	6.5	27
STS	DANAS	(0710)	2.6	1.9	14	4.4	2.8	9	6.3	6.3	5
TY	NARI	(0711)	25.4	12.8	12	28.9	15.4	8	20.5	10.8	3
TY	WIPHA	(0712)	26.8	11.3	9	29.4	12.7	5	0.0	0.0	1
TS	FRANCISCO	(0713)	6.7	4.5	3	-	-	0	-	-	0
STS	LEKIMA	(0714)	5.2	3.9	13	5.6	3.9	9	11.1	5.0	5
TY	KROSA	(0715)	14.0	7.0	22	20.3	10.6	18	22.7	11.9	14
TS	HAIYAN	(0716)	-	-	0	-	-	0	-	-	0
TS	PODUL	(0717)	-	-	0	-	-	0	-	-	0
TS	LINGLING	(0718)	5.6	7.6	8	7.7	2.9	4	-	-	0
TY	KAJIKI	(0719)	21.4	10.3	8	15.6	6.8	4	-	-	0
STS	FAXAI	(0720)	6.5	2.1	3	-	-	0	-	-	0
Mean (Total)			13.3	6.7	242	17.7	8.5	177	21.2	9.6	119

Notes:

Num. means numbers of forecasts.

Table 4 List of GPV products and data on the RSMC Data Serving System
(as of 1 January 2008)

Model	GSM	GSM	GSM
Area and resolution	Whole globe, 1.25° × 1.25°	20°S–60°N, 60°E–160°W 1.25° × 1.25°	Whole globe, 2.5° × 2.5°
Levels and elements	10 hPa: Z, U, V, T 20 hPa: Z, U, V, T 30 hPa: Z, U, V, T 50 hPa: Z, U, V, T 70 hPa: Z, U, V, T 100 hPa: Z, U, V, T 150 hPa: Z, U, V, T 200 hPa: Z, U, V, T, ψ , χ 250 hPa: Z, U, V, T 300 hPa: Z, U, V, T, H, ω 400 hPa: Z, U, V, T, H, ω 500 hPa: Z, U, V, T, H, ω , ζ 600 hPa: Z, U, V, T, H, ω 700 hPa: Z, U, V, T, H, ω 850 hPa: Z, U, V, T, H, ω , ψ , χ 925 hPa: Z, U, V, T, H, ω 1000 hPa: Z, U, V, T, H, ω Surface: P, U, V, T, H, R†	10 hPa: Z, U, V, T 20 hPa: Z, U, V, T 30 hPa: Z, U, V, T 50 hPa: Z, U, V, T 70 hPa: Z, U, V, T 100 hPa: Z, U, V, T 150 hPa: Z, U, V, T 200 hPa: Z [§] , U [§] , V [§] , T [§] , ψ , χ 250 hPa: Z, U, V, T 300 hPa: Z, U, V, T, D 400 hPa: Z, U, V, T, D 500 hPa: Z [§] , U [§] , V [§] , T [§] , D [§] , ζ 700 hPa: Z [§] , U [§] , V [§] , T [§] , D [§] , ω 850 hPa: Z [§] , U [§] , V [§] , T [§] , D [§] , ω , ψ , χ 925 hPa: Z, U, V, T, D, ω 1000 hPa: Z, U, V, T, D Surface: P [¶] , U [¶] , V [¶] , T [¶] , D [¶] , R [¶]	10 hPa: Z*, U*, V*, T* 20 hPa: Z*, U*, V*, T* 30 hPa: Z°, U°, V°, T° 50 hPa: Z°, U°, V°, T° 70 hPa: Z°, U°, V°, T° 100 hPa: Z°, U°, V°, T° 150 hPa: Z*, U*, V*, T* 200 hPa: Z, U, V, T 250 hPa: Z°, U°, V°, T° 300 hPa: Z, U, V, T, D*‡ 400 hPa: Z*, U*, V*, T*, D*‡ 500 hPa: Z, U, V, T, D*‡ 700 hPa: Z, U, V, T, D 850 hPa: Z, U, V, T, D 1000 hPa: Z, U*, V*, T*, D*‡ Surface: P, U, V, T, D‡, R†
Forecast hours	0–84 (every 6 hours) and 96–192 (every 12 hours) † Except analysis	0–84 (every 6 hours) § 96–192 (every 24 hours) are also available for 12 UTC Initial time. ¶ 0–192 (every 6 hours)	0–72 (every 24 hours); 96–192 (every 24 hours) are also available for 12 UTC Initial time. ° 0–120 for 12 UTC † Except analysis * Analysis only
Initial times	00, 06, 12, 18 UTC	00, 06, 12, 18 UTC	00, 12UTC ‡ 00 UTC only

Model	GSM	Mid-range EPS
Area and resolution	20°S–60°N, 80°E–200°E 2.5° × 2.5°	Whole globe, 2.5° × 2.5°
Levels and elements	100 hPa: Z, U, V, T 150 hPa: Z, U, V, T 200 hPa: Z, U, V, T 250 hPa: Z, U, V, T 300 hPa: Z, U, V, T 500 hPa: Z, U, V, T, D, ζ 700 hPa: Z, U, V, T, D, ω 850 hPa: Z, U, V, T, D, ω Surface: P, U, V, T, D, R	250 hPa: μ U, σ U, μ V, σ V 500 hPa: μ Z, σ Z 850 hPa: μ U, σ U, μ V, σ V, μ T, σ T 1000 hPa: μ Z, σ Z Surface: μ P, σ P
Forecast hours	0–36 (every 6 hours), 48, 60 and 72	0–192 (every 12 hours)
Initial times	00, 12 UTC	12 UTC

Notes: Z: geopotential height U: eastward wind V: northward wind
 T: temperature D: dewpoint depression H: relative humidity
 ω : vertical velocity ζ : vorticity ψ : stream function
 χ : velocity potential P: sea level pressure R: rainfall

The prefixes μ and σ represent the average and standard deviation of ensemble prediction results respectively.

The symbols °, *, ¶, §, ‡ and † indicate limitations on forecast hours or initial time as shown in the notes below.

Table 4 (continued)

Data	Satellite wind data	Typhoon Information	Wave data	Observational data
Content/ frequency (initial time)	<p>High-density atmospheric motion vectors (BUFR)</p> <p>(a) MTSAT-1R (VIS, IR, WV)</p> <p>VIS: 00 and 06 UTC IR, WV: 00, 06, 12 and 18 UTC</p> <p>(b) METEOSAT-7 (VIS, IR, WV)</p> <p>VIS: every 1.5 hours between 01:30 and 15:00 UTC IR, WV: every 1.5 hours</p>	<p>Tropical cyclone related information (BUFR)</p> <ul style="list-style-type: none"> tropical cyclone analysis data <p>00, 06, 12 and 18 UTC</p>	<p>Global wave model (GRIB)</p> <ul style="list-style-type: none"> significant wave height prevailing wave period wave direction <p>Forecast hours:</p> <p>0–84 [every 6 hours] (00, 06 and 18 UTC)</p> <p>0–84 [every 6 hours] and 96–192 [every 12 hours] (12 UTC)</p>	<p>(a) Surface data (SYNOP, SHIP, BUOY)</p> <p>Mostly 4 times a day</p> <p>(b) Upper-air data (TEMP, parts A-D) (PILOT, parts A-D)</p> <p>Mostly twice a day</p>

Table 5 Implementation Plans of the RSMC Tokyo - Typhoon Center (2007-2011)

PRODUCT	2007	2008	2009	2010	2011	REMARKS
Satellite Observation						
MTSAT HiRID	—					All observed cloud images (full or half-disk)
MTSAT HRIT	—					All observed cloud images (full or half-disk)
MTSAT WEFAX	—					{ 8 times/day (4-sector), 24 times/day (Image H), 24 times/day (Image I or J)
MTSAT LRIT	—					{ 24 times/day (full-disk) 24 times/day (polar-stereo East Asia)
Cloud motion wind (SATO)	—					4 times/day
Cloud motion wind (BUFR)	—					4 times/day
Analysis						
RSMC Tropical Cyclone Advisory	—					8 times/day
SAREP (for tropical cyclones, TACs)					{ 8 times/day Position of cloud system center, etc.
SAREP (for tropical cyclones, BUFR)	—					{ 4 times/day Dvorak intensity
Sea Surface Temperature	—					
Objective analysis	—					
pressure pattern, etc	—					
Forecast						
RSMC Tropical Cyclone Advisory	—					{ 4 times/day up to 72 hrs ahead 8 times/day up to 24 hrs ahead
RSMC Prognostic Reasoning	—					2 times/day
RSMC Guidance for Forecast	—					4 times/day up to 84 hours ahead (20-km GSM)
NWP products	—					
pressure pattern, etc	—					
Numerical Typhoon Prediction Web Site	—					
tracks and prediction fields, etc	—					mostly updated 2 times/day
Others						
RSMC Tropical Cyclone Best Track	—					
Annual Report	—					Publication
Technical Review					Publication (as necessary)
SUPPORTING ACTIVITY						REMARKS
Data archive	—					
Monitoring of data exchange	—					
Dissemination of products	—					RSMC Data Serving System

Figure 1 Annual mean position errors of 24-, 48- and 72-hour operational track forecasts
(as of the end of October 2007)

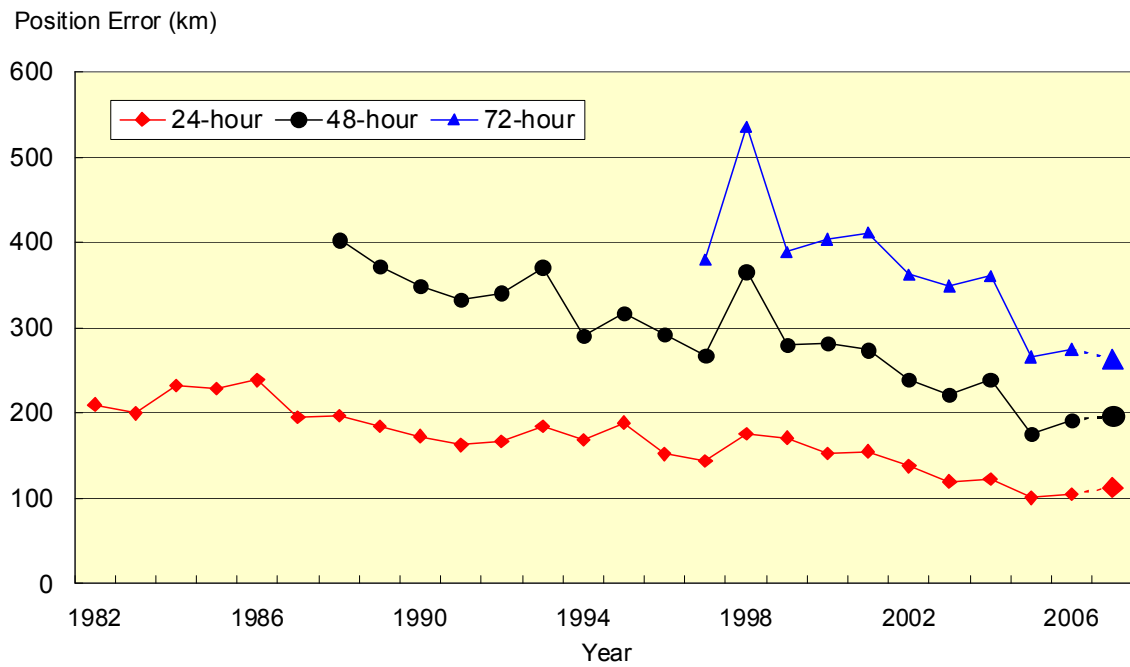
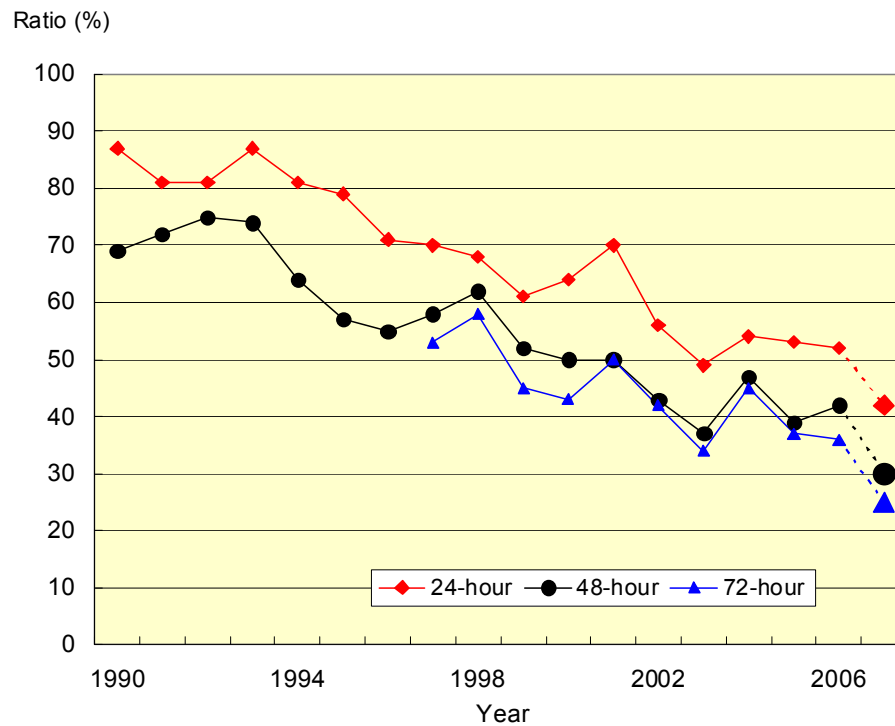


Figure 2 Ratios of annual mean position errors in operational forecasts (EO) to those of persistency-method forecasts (EP) from 1990 (as of the end of October 2007)



APPENDIX VIII

REPORT ON AMENDMENTS TO THE TYPHOON COMMITTEE OPERATIONAL MANUAL

Submitted by the Rapporteur

Introduction

1. The Typhoon Committee Operational Manual - Meteorological Component (TOM) has been reviewed and updated every year since its first issue in 1987. The 2007 edition was completed in June 2007 in accordance with the approval of amendments to the previous issue by the rapporteur of TOM at the 39th session of the Typhoon Committee (4 to 9 December 2006, Manila, Philippines).

2. At the 39th session, the Committee decided that the rapporteur of the Japan Meteorological Agency (JMA) would continue arrangements for updating the TOM. In addition, considering that some of the performance measures described in the TOM have not been reviewed in recent years, the Committee also requested the Members to report on the status of implementation of TOM performance measures. On 13 June 2007, the rapporteur, Mr. Kiichi SASAKI, Head of the JMA National Typhoon Center invited the focal points of the meteorological component of the TC Members to provide proposals for further updates to the TOM and to submit a status report on the implementation of TOM performance measures.

3. As of the end of October 2007, proposals and status reports had been submitted by the 11 focal points of China, the Democratic People's Republic of Korea, Hong Kong - China, Japan, Macao - China, Malaysia, the Philippines, the Republic of Korea, Singapore, Thailand and Vietnam.

4. Given below are the major points of the proposed amendments in Annex 1:

- Update of information on marine meteorological observation in Malaysia (Chapter 2)
- Update of information on the RSMC products of Japan (Chapter 3)
- Update of information on telecommunications networks in Hong Kong - China, Japan and Thailand (Chapter 5)
- Update of information on radar observation in the Republic of Korea (Appendix 2-D)
- Update of information on facilities for receiving satellite imagery in Macao - China and the Republic of Korea (Appendix 2-F)
- Update of information on Japan's tropical cyclone prediction models (Appendix 3-A)
- Update of information on tropical cyclone prediction models of the Democratic People's Republic of Korea and Hong Kong - China (Appendix 3-B)

- Update of information on broadcasting stations for tropical cyclone warnings in Hong Kong - China (Appendix 4-C)
 - Update of information on the collection and distribution of information related to tropical cyclones in Hong Kong - China and Thailand (Appendix 5-C)
5. Shown below is a summary of the status reports submitted by the above Members. The results of the questionnaire related to status reports are attached as Annex 2-1.
- (a) Ten Members carried out upper-air observations up to 30-hPa level at 00 and 12 UTC and four Members made observations up to 70-hPa level at 06 and 18 UTC when a tropical cyclone approached an upper-air observation station.
 - (b) Six Members carried out radar observation when a tropical cyclone approached a radar station.
 - (c) Seven Members compiled tropical cyclone passage data, but only five of them sent the data to the Typhoon Committee Secretariat.
 - (d) Six Members conducted verifications of their analyses and forecasts, and two of them sent their results to the RSMC Tokyo – Typhoon Center.
6. Based on the above results, the rapporteur proposes amendments to the TOM as outlined below. The amendments are shown in Annex 2-2.
- Regarding (a) and (b) in paragraph 5, the results indicate that some Members have difficulties in the implementing upper-air observations at 06 and 18 UTC and radar observations. However, the relevant description in Section 2.1.2 and 2.3 of the TOM should be kept as it is since upper-air and radar observations are very important when a tropical cyclone is approaching.
 - Regarding (c), some Members did not send passage data to the Typhoon Committee Secretariat. This is probably attributable to the shortness of the deadline for data submission in view of JMA's experience that it is very difficult to submit data within a day of the cyclone passage due to the urgency of tropical cyclone operations during that passage. Considering the importance of passage for real-time monitoring and post-analysis of tropical cyclones, the submission deadline provided in Section 2.6 of the TOM needs updating.
 - Regarding (d), some Members conducted the verification of their analyses and forecasts and a few Members reported the results to the RSMC Tokyo – Typhoon Center. However, the relevant description in Section 6.3 of the TOM should be kept as it is, since the verification results are important for identifying the present status of Members' analyses and forecasts.

Action Proposed

6. The Committee is invited to:

- (a) Note the information given in this document; and
- (b) Review and approve the proposed amendments to the TOM with necessary modifications.

Annex 1

Draft Amendments to the Typhoon Committee Operational Manual – Meteorological Component (TOM) proposed by the Members

Page Line	Present Description	Proposed Amendment
CHAPTER 2		
8 12	2.2, para 3 Marine Meteorological observations are and transmitted regionally over the GTS.	<< to delete the paragraph>>
CHAPTER 3		
12	Table 3.1	<< to be replaced by>> new document (see Annex 1-1)
13	Table 3.2 excepting Naming rules of WMO headings	<< to be replaced by>> new document (see Annex 1-2)
16	Table 3.3 excepting Naming rules of WMO headings	<< to be replaced by>> new document (see Annex 1-3)
16	Table 3.3 (Naming rules of WMO headings) Z Prevailing wave direction N Northern hemisphere 1.25x1.25degs S Southern hemisphere 1.25x1.25degs	<< to be replaced by>> Z Wave direction N Northern hemisphere 0.5x0.5degs S Southern hemisphere 0.5x0.5degs
18	3.2 Forecast at RSMC Tokyo - Typhoon Center	<< to be replaced by>> new document (see Annex 1-4)
CHAPTER 5		
23	Fig.5.1	<< to be replaced by>> new document (see Annex 1-5)
24	Table 5.1, 1. Main Telecommunication Network Beijing - Tokyo Cable (FR), 48 kbps from Beijing / 96kbps from Tokyo (CIR) TCP/IP	<< to be replaced by>> Beijing - Tokyo Cable (MPLS), 1Mbps TCP/IP
24	Table 5.1, 3. Regional circuits Bangkok - Phnom Penh Fax	<< to add>> Bangkok - Phnom Penh Internet, IP VPN
Appendix 2-D		
14	Republic of Korea	<< to be replaced by>> new document (see Annex 1-6)

Page Line	Present Description	Proposed Amendment
Appendix 2-F		
2	<i>Macao, China and Republic of Korea</i>	<< to be replaced by>> new document (see Annex 1-7)
Appendix 3-A		
	<i>Japan</i>	<< to be replaced by>> new document (see Annex 1-8)
Appendix 3-B		
4	<i>Democratic People's Republic of Korea</i>	<< to be replaced by>> new document (see Annex 1-9)
6	<i>Hong Kong, China</i>	<< to be replaced by>> new document (see Annex 1-10)
Appendix 3-E		
1 23	<i>Description of the method</i> Three-dimensional multivariate optional interpolation is	<< to be replaced by>> Three-dimensional multivariate optimal interpolation is
Appendix 4-C		
	<i>Hong Kong, China (Call sign of coastal radio station)</i> VRX	<< to be replaced by>> broadcast via NAVTEX on 518kHz* *Coast station VRX closed on 1 October 2006
Appendix 5-A		
2	<i>Macao, China</i> Fax: (+853) 850557	<< to be replaced by>> Fax: (+853) 28850773
2	<i>Malaysia</i> Malaysian Meteorological Service (Headquarters: Jalan Sultan) Jalan Sultan, 46667 Petaling Jaya Malaysia	<< to be replaced by>> Malaysian Meteorological Department (Central Forecast Office, Director: Mr. Low Kong Chiew) Jalan Sultan, 46667 Petaling Jaya, Selangor Malaysia
3	<i>Thailand</i> <i>Weather Forecast Bureau</i> Director: Mr. Amom Chantanavivate Fax: (+66)(2) 398 9830 E-mail: weatherman@metnet.go.th <i>Meteorological Telecom. and Info. Division</i> Director: Dr. Somsri Huntrakul	<< to be replaced by>> Director: Mr. Somchai Baimoung Fax: (+66)(2) 398 9830 E-mail: weatherman@metnet.go.th Director: Kumpol Luengpetngam
Appendix 5-C		
		<< to be replaced by>> new document (see Annex 1-11)

Table 3.1 Chart-form products transmitted by RSMC Tokyo - Typhoon Center for regional purposes

Model	Area	Contents and Level	Forecast Hours	Initial time	Availability
Global Analysis/ Forecast Models	A' (Far East)	500hPa (Z, ζ)	Analysis	00, 12UTC	GTS
			24, 36	00, 12UTC	GTS, JMH
		500hPa (T), 700hPa (D)	24, 36	00, 12UTC	GTS, JMH
		700hPa (ω), 850hPa (T, A)	Analysis	00, 12UTC	GTS
			24, 36	00, 12UTC	GTS, JMH
	C (East Asia)	Surface (P, R, A)	24, 36	00, 12UTC	GTS, JMH
		300hPa (Z, T, W, A)	Analysis	00UTC	GTS
		500hPa (Z, T, A)	Analysis	00, 12UTC	GTS, JMH
		500hPa (Z, ζ)	48, 72	00, 12UTC	GTS
		700hPa (Z, T, D, A)	Analysis	00, 12UTC	GTS
		700hPa (ω), 850hPa (T, A)	48, 72	12UTC	GTS
		850hPa (Z, T, D, A)	Analysis	00, 12UTC	GTS, JMH
		Surface (P, R)	24, 48, 72	00, 12UTC	GTS, JMH
			96, 120	12UTC	JMH
	O (Asia)	500hPa (Z, ζ)	96, 120, 144, 168, 192	12UTC	GTS
		850hPa (T), Surface (P)			
	Q (Asia Pacific)	200hPa (Z, T, W), Tropopause (Z)	Analysis	00, 12UTC	GTS
		250hPa (Z, T, W)	Analysis, 24	00, 12UTC	
		500hPa (Z, T, W)		00, 12UTC	
	D (N.H.)	500hPa (Z, T)	Analysis	12UTC	GTS
	W (NW Pacific)	200hPa (streamline)	Analysis, 24, 48	00, 12UTC	GTS
		850hPa (streamline)		00, 12UTC	
JCDAS	D' (N.H.)	100hPa (Z, Z anomaly to climatology)	5-day average of analysis	00UTC	GTS
		500hPa (Z, Z anomaly to climatology)			
Ocean Wave	C'' (NW Pacific)	Surface (height, period and direction)	12, 24, 48, 72	00, 12UTC	GTS, JMH

Notes:

(a) Area

A', C, O, Q, D, W, D' and C'' are illustrated in Figure 3.1.

(b) Contents

Z: geopotential height ζ : vorticity

T: temperature

D: dewpoint depression

ω : vertical velocity

W: wind speed by isotach

A: wind arrows

P: sea level pressure

R: rainfall

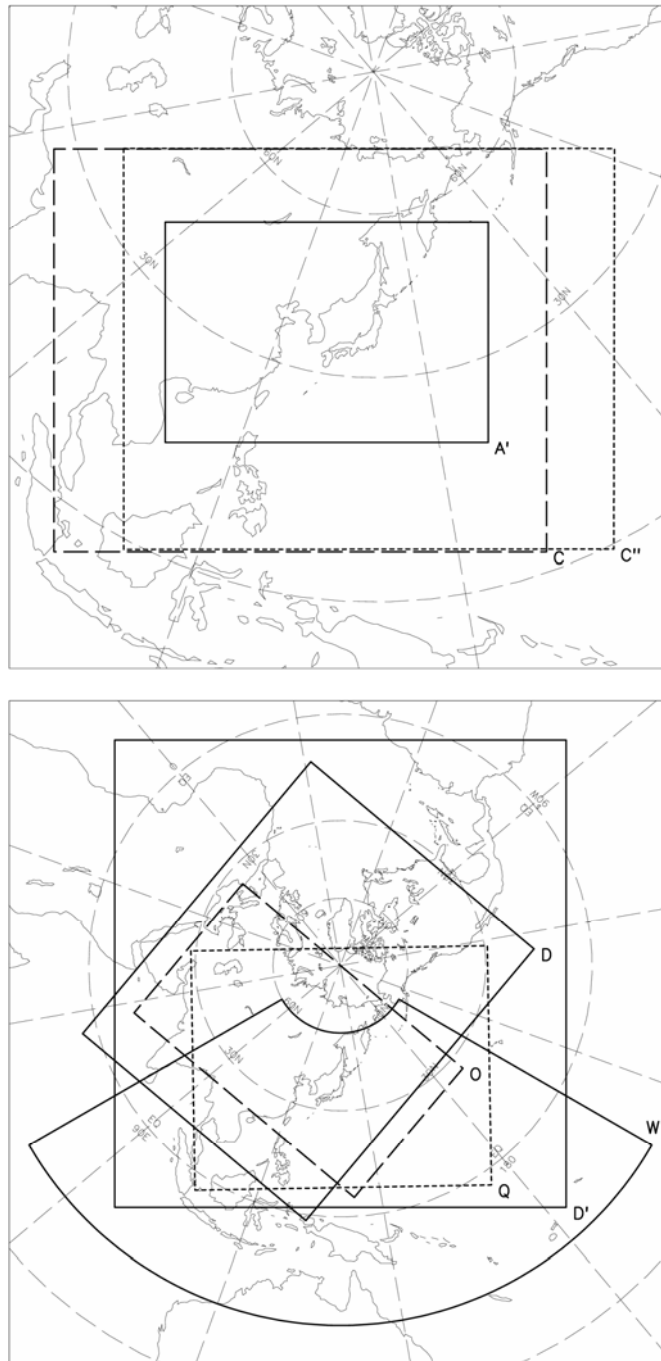


Figure 3.1 Output areas for facsimile charts transmitted through GTS and radio facsimile JMH

Annex 1-2

Table 3.2 Grid point value output products of Numerical Weather Prediction
by RSMC Tokyo – Typhoon Center for regional purposes

Model	GSM	GSM	GSM
Area and resolution	Whole globe, 1.25°×1.25°	20°S–60°N, 60°E–160°W 1.25°×1.25°	Whole globe, 2.5°×2.5°
Levels and elements	10 hPa: Z, U, V, T 20 hPa: Z, U, V, T 30 hPa: Z, U, V, T 50 hPa: Z, U, V, T 70 hPa: Z, U, V, T 100 hPa: Z, U, V, T 150 hPa: Z, U, V, T 200 hPa: Z, U, V, T, ψ , χ 250 hPa: Z, U, V, T 300 hPa: Z, U, V, T, H, ω 400 hPa: Z, U, V, T, H, ω 500 hPa: Z, U, V, T, H, ω , ζ 600 hPa: Z, U, V, T, H, ω 700 hPa: Z, U, V, T, H, ω 850 hPa: Z, U, V, T, H, ω , ψ , χ X 925 hPa: Z, U, V, T, H, ω 1000 hPa: Z, U, V, T, H, ω Surface: P, U, V, T, H, R†	10 hPa: Z, U, V, T 20 hPa: Z, U, V, T 30 hPa: Z, U, V, T 50 hPa: Z, U, V, T 70 hPa: Z, U, V, T 100 hPa: Z, U, V, T 150 hPa: Z, U, V, T 200 hPa: Z [§] , U [§] , V [§] , T [§] , ψ , χ 250 hPa: Z, U, V, T 300 hPa: Z, U, V, T, D 400 hPa: Z, U, V, T, D 500 hPa: Z [§] , U [§] , V [§] , T [§] , D [§] , ζ 700 hPa: Z [§] , U [§] , V [§] , T [§] , D [§] , ω 850 hPa: Z [§] , U [§] , V [§] , T [§] , D [§] , ω , ψ , χ 925 hPa: Z, U, V, T, D, ω 1000 hPa: Z, U, V, T, D Surface: P [¶] , U [¶] , V [¶] , T [¶] , D [¶] , R [¶]	10 hPa: Z*, U*, V*, T* 20 hPa: Z*, U*, V*, T* 30 hPa: Z°, U°, V°, T° 50 hPa: Z°, U°, V°, T° 70 hPa: Z°, U°, V°, T° 100 hPa: Z°, U°, V°, T° 150 hPa: Z*, U*, V*, T* 200 hPa: Z, U, V, T 250 hPa: Z°, U°, V°, T° 300 hPa: Z, U, V, T, D*‡ 400 hPa: Z*, U*, V*, T*, D*‡ 500 hPa: Z, U, V, T, D*‡ 700 hPa: Z, U, V, T, D 850 hPa: Z, U, V, T, D 1000 hPa: Z, U*, V*, T*, D*‡ Surface: P, U, V, T, D‡, R†
Forecast hours	0–84 every 6 hours and 96–192 every 12 hours † Except analysis	0–84 every 6 hours § additional 96–192 every 24 hours for 12UTC ¶ 0–192 every 6 hours	0–72 every 24 hours and 96– 192 every 24 hours for 12UTC ° 0–120 for 12UTC † Except analysis * Analysis only
Initial times	00, 06, 12, 18UTC	00, 06, 12, 18UTC	00UTC and 12UTC ‡ 00UTC only

Model	GSM	Mid-range EPS
Area and resolution	20°S–60°N, 80°E–200°E 2.5°×2.5°	Whole globe, 2.5°×2.5°
Levels and elements	100 hPa: Z, U, V, T 150 hPa: Z, U, V, T 200 hPa: Z, U, V, T 250 hPa: Z, U, V, T 300 hPa: Z, U, V, T 500 hPa: Z, U, V, T, D, ζ 700 hPa: Z, U, V, T, D, ω 850 hPa: Z, U, V, T, D, ω Surface: P, U, V, T, D, R	250 hPa: μ U, σ U, μ V, σ V 500 hPa: μ Z, σ Z 850 hPa: μ U, σ U, μ V, σ V, μ T, σ T 1000 hPa: μ Z, σ Z Surface: μ P, σ P
Forecast hours	0–36 every 6 hours, 48, 60, and 72	0–192 every 12 hours
Initial times	00UTC and 12UTC	12UTC

Notes: Z: geopotential height U: eastward wind V: northward wind
T: temperature D: dewpoint depression H: relative humidity
 ω : vertical velocity ζ : vorticity ψ : stream function
 χ : velocity potential P: sea level pressure R: rainfall

The prefixes μ and σ represent average and standard deviation of ensemble prediction results, respectively.

The symbols °, *, ¶, §, ‡ and † indicate limitations on forecast hours or initial time as shown in notes below.

Table 3.3 List of other products and data by RSMC Tokyo – Typhoon Center for regional purposes

Data	Satellite wind data	Typhoon Information	Wave data	Observational data
Contents/ Frequency (initial time)	<p>High density atmospheric motion vectors (BUFR)</p> <p>(a) MTSAT-1R (VIS, IR, WV)</p> <p>VIS: 00 and 06 UTC IR, WV: 00, 06, 12 and 18 UTC</p> <p>(b) METEOSAT-7 (VIS, IR, WV)</p> <p>VIS: every 1.5hours Between 01:30UTC and 15:00 UTC IR, WV: every 1.5hours</p>	<p>Tropical cyclone Related information (BUFR)</p> <ul style="list-style-type: none"> tropical cyclone analysis data <p>00, 06, 12 and 18 UTC</p>	<p>Global Wave Model (GRIB)</p> <ul style="list-style-type: none"> significant wave height prevailing wave period wave direction <p>Forecast hours:</p> <p>0–84 every 6 hours (00, 06 and 18UTC)</p> <p>0–84 every 6 hours and 96–192 every 12 hours (12 UTC)</p>	<p>(a) Surface data (SYNOP, SHIP, BUOY)</p> <p>Mostly 4 times a day</p> <p>(b) Upper-air data (TEMP, parts A-D) (PILOT, parts A-D)</p> <p>Mostly 2 times a day</p>

3.2 Forecasts at the RSMC Tokyo – Typhoon Center

The RSMC Tokyo - Typhoon Center should prepare the products for numerical weather prediction shown in Appendix 3-A. These products should be made available to Members in real-time, and should include the following:

(i) deterministic forecast products of a high resolution global model to predict the change in large-scale atmospheric circulation patterns as well as the tropical cyclone movement and intensity

(ii) ensemble forecast products using a lower resolution version of the global model to enable estimation of uncertainties in tropical cyclone movement and intensity as well as to reduce forecast errors by using statistical methods such as ensemble mean (to be made available in early 2008).

The RSMC Tokyo - Typhoon Center should also prepare several statistical models for predicting the track of the tropical cyclone and apply the Dvorak method for the prediction of the intensity change of the tropical cyclone. Other relevant synoptic methods should also be applied for predicting the tropical cyclone.

The RSMC Tokyo - Typhoon Center should summarize in a consolidated form all available information and prepare the final forecasts of the tropical cyclone when it exists in the responsible area. These forecasts should include:

- (i) 24, 48 and 72-hour forecast position;
- (ii) forecast intensity and wind distribution;
- (iii) prognostic reasoning;
- (iv) tendency assessment if possible.

Furthermore, the RSMC Tokyo - Typhoon Center should prepare a 24-hour ocean wave forecast once a day for the western North Pacific. The forecast track is transmitted in alphanumeric form through GTS. A list of forecast products of the RSMC Tokyo - Typhoon Center, other than alphanumeric form, is shown in Tables 3.1, 3.2 and 3.3.

Note: Underlined sentences indicate the portions of update.

5.4 Meteorological telecommunications network for the Typhoon Committee region

The network is shown in Figure 5.1 and its present status is summarized in Table 5.1.

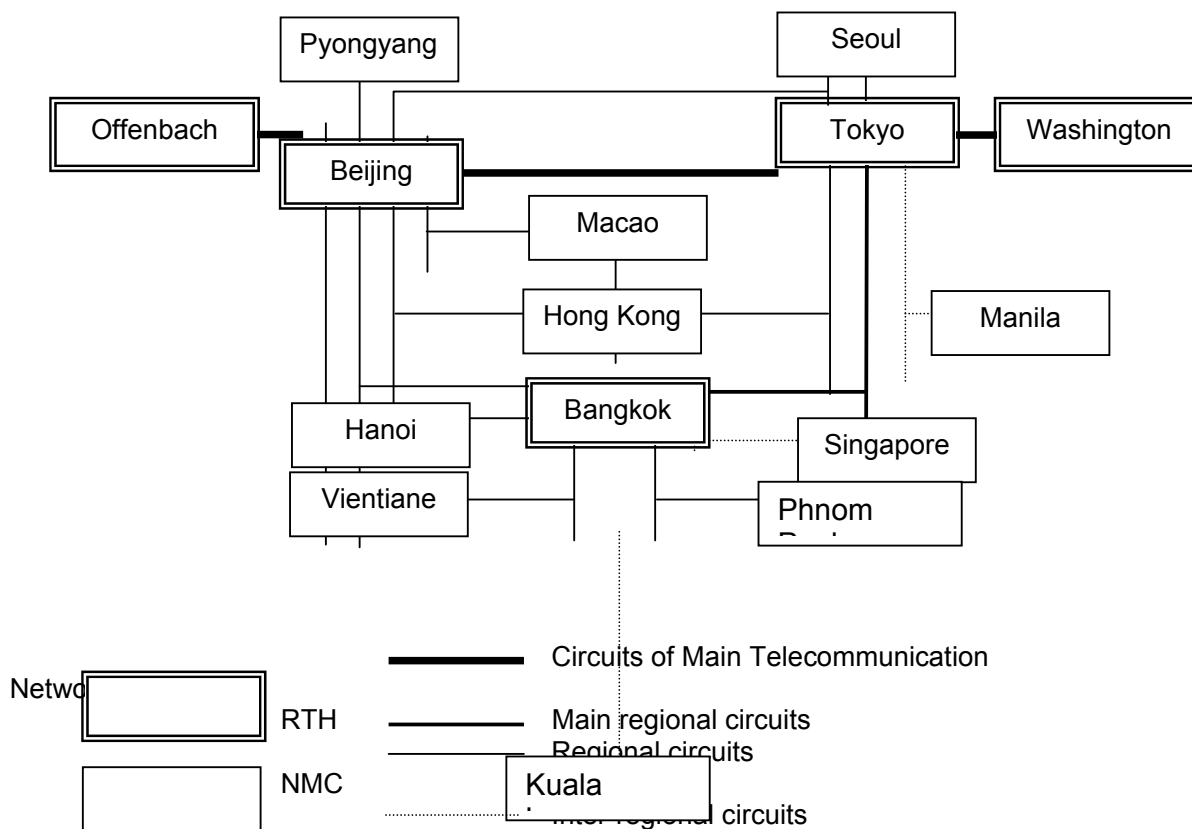


Figure 5.1 Meteorological telecommunication network for the Typhoon Committee region

Annex 1-6

APPENDIX 2-D, p.14

Name of the Member **Republic of Korea - 1**

NAME OF STATION		Gosan	Seongsan	Donghae	Osungsan	Baengnyeong-do
SPECIFICATIONS	Unit					
Index number		47185	47189	47106	47144	47102
Location of station		33° 17' N 126° 10' E	33° 23' N 126° 53' E	37° 30' N 129° 07' E	36° 01' N 126° 47' E	37° 56' N 124° 40' E
Antenna elevation	m	91	59	53	227	185
Wave length	Cm	10.3	10.3	5.6	11.0	5.3
Peak power of transmitter	kW	750	750	250	750	250
Pulse length	μ s	1.0; 4.5	1.0; 4.5	0.83; 2.0	1.0; 4.5	1.0; 2.0
Sensitivity minimum of receiver	dBm	-112	-112	-108	-112	-108
Beam width (Width of over -3dB antenna gain of maximum)	deg	1.0	1.0	1.2	1.0	1.0
Detection range	km	250 (volume) 500 (lowest tilt)	250, 500	240, 480	240, 480	256, 480
Scan mode in observation 1.Fixed elevation 2.CAPPI 3.Manually controlled		2, 3	2, 3	2, 3	2, 3	2, 3
DATA PROCESSING						
MTI processing 1.Yes, 2.No		2	2	2	2	2
Doppler processing 1.Yes, 2.No		1	1	1	1	1
Display 1.Digital, 2.Analog		1	1	1	1	1
OPERATION MODE (When tropical cyclone is within range of detection) 1.Hourly 2.3-hourly 3.Others		3 (continuous)	3 (continuous)	3 (continuous)	3 (continuous)	3 (continuous)
PRESENT STATUS 1.Operational 2.Not operational(for research etc.)		1	1	1	1	1

APPENDIX 2-D, p.15

Name of the Member **Republic of Korea - 2**

NAME OF STATION		Jindo	Gwangdeok - san	Myeonbong - san	Gwanaksan	Gudeoksan
SPECIFICATIONS	Unit					
Index number		47175	47094	47148	47116	47160
Location of station		34° 28' N 126° 19' E	38° 07' N 127° 26' E	36° 11' N 129° 00' E	37° 26' N 126° 58' E	35° 07' N 129° 00' E
Antenna elevation	m	494	1066	1129	637	545
Wave length	cm	10.3	10.3	5.3	11	11
Peak power of transmitter	kW	750	750	250	850	850
Pulse length	μ s	1.0; 2.5	1.0; 4.5	0.83; 2.5	1.0; 4.5	1.0; 4.5
Sensitivity minimum of receiver	dBm	-112	-112	-112	-114	-114
Beam width (Width of over -3dB antenna gain of maximum)	deg	1.0	1.0	1.0	1.0	1.0
Detection range	km	240, 480	240, 480	200, 400	240, 480	240, 480
Scan mode in observation 1.Fixed elevation 2.CAPPI 3.Manually controlled		2, 3	2, 3	1	2, 3	2, 3
DATA PROCESSING						
MTI processing 1.Yes, 2.No		2	2	2	2	2
Doppler processing 1.Yes, 2.No		1	1	1	1	1
Display 1.Digital, 2.Analog		1	1	1	1	1
OPERATION MODE (When tropical cyclone is within range of detection) 1.Hourly 2.3-hourly 3.Others		3 (continuous)	3 (continuous)	3 (continuous)	3 (continuous)	3 (continuous)
PRESENT STATUS 1.Operational 2.Not operational(for research etc.)		1	1	1	1	1

APPENDIX 2-F, p.2

* Macao, China receives FY-2C.
* Republic of Korea receives AQUA (MODIS, AIRS, AMSU, AMSR-E), FY-1 (CHRPT) and TERRA (MODIS).
* Singapore receives AQUA (MODIS), FY2B (S-VISSR), FY-1 (CHRPT) and TERRA (MODIS).

OUTLINE OF RSMC TOKYO – TROPICAL CYCLONE PREDICTION MODELS

(a) Global Spectral Model (GSM-0711)

Data Assimilation:

- 4-D variational calculus (4D-VAR)
with its own 3 to 9-hours prediction used as a first guess back ground (6-hours assimilation window)
- Data cut-off at 2.3 hours from synoptic time for prediction model
at 5.2 ~ 11.2 hours from synoptic time for assimilation cycle
- Dynamic quality control considering temporal and spatial variabilities
- 0.1875° x 0.1875° Gaussian grid (1920 x 960)
- Model p-sigma hybrid levels (60) + surface (1)

(bogusing of tropical cyclones)

- Axis-symmetric structure based on Frank's (1977) empirical formula with parameters prescribed on forecasters' analysis mainly applying the Dvorak method to MTSAT imagery
- Asymmetric structure derived from first-guess field (prediction using GSM)
- Bogus structure is given as pseudo-observation data to the analysis for the prediction model

Initialization:

Incremental initialization by Ballish et al. (1992) and vertical mode initialization by Bourke and McGregor (1983)

Operation:

(schedule)

Four times a day (0000, 0600, 1200 and 1800UTC)

(integration time)

84 hours from 0000, 0600 and 1800UTC, and 216 hours from 1200UTC

Prediction model:

(dynamics)

- Hydrostatic, primitive, semi-Lagrangian-form equations
- Semi-implicit time integration
- TL959 (~20km grid) spectral discretization in the horizontal direction
- Finite differencing on 60 p-sigma hybrid levels in the vertical direction

(physics)

- Horizontal diffusion by linear second-order Laplacian
- Arakawa-Schubert (1974) cumulus parameterization with modifications by Moorthi and Suarez (1992), Randall and Pan (1993) and Kuma and Cho (1994)
- Prognostic cloud water scheme by Smith (1990)
- Bulk formulae for surface fluxes with similarity functions by Louis (1982)
- Vertical diffusion with the level-2 closure model by Mellor and Yamada (1974) with moist effect included
- Gravity wave drag by Palmer et al. (1986) and Iwasaki et al. (1989)
- Simple Biospheric Model (SiB) by Sellers et al. (1986) and Sato et al. (1989a,b)

Boundary conditions:

(SST)

0.25° x 0.25° daily analysis with climatic seasonal trend

(b) Typhoon Ensemble Prediction System

Initial condition:

Interpolation of the initial condition for GSM plus ensemble perturbations

Methods to make ensemble perturbations:

- Singular vector method
- Linearized model and its adjoint version based on those adopted in 4-D variational calculus, which consist of full dynamics of Eulerian integrations and full physical processes containing representations of vertical diffusion, gravity wave drag, large-scale condensation, long-wave radiation and deep cumulus convection
- T63 (~180 km grid) spectral discretization in the horizontal direction
- Finite differencing on 40 p-sigma hybrid levels in the vertical direction

Ensemble size:

11

Operation:

(schedule)

Four times a day (0000, 0600, 1200 and 1800 UTC) (to be determined)

(tropical cyclone conditions that can trigger model prediction)

- a tropical cyclone of TS intensity or higher exists in the area of responsibility (0°N - 60°N, 100°E - 180°E)

- a tropical cyclone is expected to reach TS intensity or higher in the area within the next 24 hours
- a tropical cyclone of TS intensity or higher is expected to move into the area within the next 24 hours

(maximum number of predictions)

Three for each synoptic time (0000, 0600, 1200 and 1800 UTC)

(integration time)

132 hours (to be determined)

(domain)

globe

(Prediction model)

- Lower-resolution version of the GSM
- TL319 (~55 km grid) spectral discretization in the horizontal direction
- Finite differencing on 60 p-sigma hybrid levels in the vertical direction

Initialization:

Non-linear normal mode initialization based on Machenhauer (1977)

Name of the Member: **Democratic People's Republic of Korea**

Item	Method	Type of output
Name of the method	Northern Hemisphere Model of Typhoon Track Prediction (NHMTTP)	Every 3 hours up to 168 hours
Description of the method	<p>Governing equation: primitive equations</p> <p>Forecast domain of NHMTTP: Northern Hemisphere</p> <p>Resolution: T63L14</p> <p>Time integration scheme: Semi-implicit</p> <p>Integration method: nudging of ECMWF prediction data 24 hourly.</p> <p>Physical processes:</p> <ul style="list-style-type: none"> - radiation considering short and long wave - Kuo-type cumulus convection - Large scale condensation - Surface physical processes - PBL by K model - Fourth order diffusion <p>Frequency of forecast: twice a day (00 and 12 UTC)</p> <p>Objective analysis: 3DVAR</p> <p>Initialization: digital filter</p>	

Annex 1-10

APPENDIX 3-B, p.6

Name of the Member: **Hong Kong, China**

Item	Method	Type of output
Name of the method	Operational Regional Spectral Model (ORSM)	Tropical cyclone position forecasts, surface and upper level prognoses up to 72 hours from 60-km ORSM and up to 42 hours from 20-km ORSM. Tropical cyclone forecast guidance bulletins based on the 60-km ORSM will be disseminated through the GTS when a tropical cyclone is within 10N to 30N and 105E to 125E.
Description of the method	See Appendix 3-E	

COLLECTION AND DISTRIBUTION OF INFORMATION

RELATED TO TROPICAL CYCLONES

Type of Data	Heading		Receiving station										
			TD	BJ	BB	HH	MM	SL	NN	KK	IV	PP	MC
Enhanced surface observation	SNCI30	BABJ	BJ	O	BJ	BJ	TD	TD	BJ	BB	BB	BB	
	SNHK20	VHHH	HH	HH	BJ	O		TD	BB	BB	BB	BB	
	SNJP20	RJTD	O	TD	TD	TD		TD	BB	BB	BB	BB	
	SNKO20	RKSL	SL	TD	TD	TD		O	BB	BB	BB	BB	
	SNLA20	VLJV	BB	BB	IV				BB	BB	O	BB	
	SNMS20	WMKK	BB	BB	KK	BJ			BB	O	BB	BB	
	SNMU40	VMMC	HH	MC	BJ	BJ		TD	BB	BB	BB	BB	O
	SNPH20	RPMM	MM	TD	TD	TD	O	TD	BB	BB	BB	BB	
	SNTH20	VTBB	BB	TD	O	TD		TD	BB	BB	BB	BB	
	SNVS20	VNNN	BB		NN	BJ			O	BB	BB	BB	
Enhanced upper-air observation	USCI01	BABJ	BJ	O	BJ	BJ	TD	TD	BJ	BB	BB	BB	
	USCI03	BABJ	BJ	O	BJ	BJ	TD	TD	BJ	BB	BB	BB	
	USCI05	BABJ	BJ	O	BJ	BJ	TD	TD	BJ	BB	BB	BB	
	USCI07	BABJ	BJ	O	BJ	BJ	TD	TD	BJ	BB	BB	BB	
	USCI09	BABJ	BJ	O	BJ	BJ	TD	TD	BJ	BB	BB	BB	
	UKCI01	BABJ	BJ	O	BJ	BJ		TD	BJ	BB	BB	BB	
	ULCI01	BABJ	BJ	O	BJ	BJ		TD	BB	BB	BB	BB	
	ULCI03	BABJ	BJ	O	BJ	BJ		TD	BB	BB	BB	BB	
	ULCI05	BABJ	BJ	O	BJ	BJ		TD	BB	BB	BB	BB	
	ULCI07	BABJ	BJ	O	BJ	BJ		TD	BB	BB	BB	BB	
	ULCI09	BABJ	BJ	O	BJ	BJ		TD	BJ	BB	BB	BB	
	UECI01	BABJ	BJ	O	BJ	BJ		TD	BB	BB	BB	BB	
	USHK01	VHHH	HH	HH	BJ	O	TD	TD	BB	BB	BB	BB	
	UKHK01	VHHH	HH	HH	BJ	O		TD	BB	BB	BB	BB	
	ULHK01	VHHH	HH	HH	BJ	O		TD	BB	BB	BB	BB	
	UEHK01	VHHH	HH	HH	BJ	O		TD	BB	BB	BB	BB	
	USJP01	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	UKJP01	RJTD	O	TD	TD	TD		TD	BB	BB	BB	BB	
	ULJP01	RJTD	O	TD	TD	TD		TD	BB	BB	BB	BB	
	UEJP01	RJTD	O	TD	TD	TD		TD	BB	BB	BB	BB	
	USKO01	RKSL	SL	TD	TD	TD	TD	O	BB	BB	BB	BB	
	UKKO01	RKSL	SL	TD	TD	TD		O	BB	BB	BB	BB	
	ULKO01	RKSL	SL	TD	TD	TD		O	BB	BB	BB	BB	
	UEKO01	RKSL	SL	TD	TD	TD		O	BB	BB	BB	BB	
	USMS01	WMKK	BB	TD	KK	TD	TD	TD	BB	O	BB	BB	
	UKMS01	WMKK	BB	TD	KK	TD	TD	TD	BB	O	BB	BB	
	ULMS01	WMKK	BB	TD	KK	TD	TD	TD	BB	O	BB	BB	
	UEMS01	WMKK	BB	TD	KK	TD	TD	TD	BB	O	BB	BB	
	USPH01	RPMM	MM	TD	TD	TD	O	TD	BB		BB	BB	
	UKPH01	RPMM	MM	TD	TD	TD	O	TD	BB		BB	BB	
	ULPH01	RPMM	MM	TD	TD	TD	O	TD	BB		BB	BB	
	UEPH01	RPMM	MM	TD	TD	TD	O	TD	BB		BB	BB	
	USTH01	VTBB	BB	TD	O	TD	TD	TD	BB	BB	BB	BB	
Continued to the next page													

Type of Data	Heading		Receiving station										
			TD	BJ	BB	HH	MM	SL	NN	KK	IV	PP	MC
Enhanced Upper-air observation	UKTH01	VTBB	BB	TD	O	TD		TD	BB	BB	BB	BB	
	ULTH01	VTBB	BB	TD	O	TD		TD	BB	BB	BB	BB	
	UETH01	VTBB	BB	TD	O	TD		TD	BB	BB	BB	BB	
	USVS01	VNNN	BB	TD	NN	TD	TD	TD	O	BB	BB	BB	
	UKVS01	VNNN	BB	TD	NN	TD		TD	O	BB	BB	BB	
	ULVS01	VNNN	BB	TD	NN	TD	TD	TD	O	BB	BB	BB	
	UEVS01	VNNN	BB	TD	NN	TD	TD	TD	O	BB	BB	BB	
	URPA10	PGTW	*	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	URPA11	PGTW	*	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	URPA12	PGTW	*	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	URPA14	PGTW	*	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	URPN10	PGTW	*	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	UZPA13	PGTW	*	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	UZPN13	KNHC	*		TD	TD		TD	BB	BB	BB	BB	
	UZPN13	KWBC	*	TD	TD	TD		TD	BB	BB	BB	BB	
	UZPN13	PGTW	*	TD	TD	TD		TD	BB	BB	BB	BB	
Enhanced ship observation	SNVB20	VTBB			O				BB	BB	BB	BB	
	SNVB20	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	SNVD20	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	SNVE20	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	SNVX20	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	SNVB21	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	SNVD21	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	SNVE21	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	SNVX21	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	SNVX20	RPMIM	MM	TD	TD	TD	O	TD	BB		BB	BB	
	SNVX20	VHIIH	HH	HH	BJ	O	TD	TD	BB	BB	BB	BB	
	SNVX20	VNNIN	BB	TD	NN	TD		TD	O	BB	BB	BB	
Enhanced radar observation	SBCI30	BABJ	BJ	O	BJ	TD	TD	TD	BJ	BB	BB	BB	BB
	SCCI30	BABJ		O	BJ	BJ			BB	BB	BB	BB	
	SBCI60	BCGZ		O	BJ				BJ	BB	BB	BB	
	SCCI60	BCGZ	HH	O	BJ				BB	BB	BB	BB	
	SBHK20	VHIIH	HH	HH	BJ	O	TD		BB	BB	BB	BB	
	SBJP20	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	SDKO20	RKSL						O					
	SDMS20	WMKK	BB	TD	KK	TD			BB	O	BB	BB	
	SDPH20	RPMIM	MM	TD	TD	O		TD	BB		BB	BB	
	SDTH20	VTBB	BB	TD	O	TD			BB	BB	BB	BB	
	SDVS20	VNNIN	BB	TD	NN	TD	TD		O	BB	BB	BB	
Satellite guidance	TPPN10	PGTW	*		TD	TD			BB	BB	BB	BB	
	TPPN10	PGUA	*		TD	TD			BB	BB	BB	BB	
	TPPA1	RJTY	*	TD	TD	TD	TD		BB	BB	BB	BB	
	TPPA1	RODN	*	TD	TD	TD	TD		BB	BB	BB	BB	
	TCNA20	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	TCNA21	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	

Type of Data	Heading		Receiving station										
			TD	BJ	BB	HH	MM	SL	NN	KK	IV	PP	MC
Tropical Cyclone Forecast	FXPQ01	VHHH			BJ	O			BB	BB	BB	BB	
	FXPQ02	VHHH			BJ	O			BB	BB	BB	BB	
	FXPQ03	VHHH			BJ	O			BB	BB	BB	BB	
	FXPQ20	VHHH	HH	HH	BJ	O	TD	TD	BB	BB	BB	BB	
	FXPQ24	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	FXPQ25	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	FXPQ29	VTBB			O								
	FXPH20	RPMM	MM	TD	TD	TD	O	TD	BB	BB	BB	BB	
	FXSS01	VHHH			BJ	O			BB	BB	BB	BB	
	FXSS02	VHHH			BJ	O			BB	BB	BB	BB	
	FXSS03	VHHH			BJ	O			BB	BB	BB	BB	
	FXSS20	VHHH	HH	HH	BJ	O	TD	TD	BB	BB	BB	BB	
Warning	WDPN31	PGTW	*	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WDPN32	PGTW	*	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WHCI28	BCGZ	HH	HH	BJ	BJ			BJ	BB	BB	BB	
	WHCI40	BABJ	BJ	O	BJ	BJ			BJ	BB	BB	BB	
	WSPH	RPMM	*	TD	TD	TD	O	TD	BB	BB	BB	BB	
	WTMU40	VMMC	BJ	MC	BJ	BJ			BB	BB	BB	BB	O
	WTPN21	PGTW	*	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WTPN31	PGTW	*	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WTPN32	PGTW	*	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WTPH20	RPMM	MM	TD	TD	TD	O		BB		BB	BB	
	WTPH21	RPMM			TD		O		BB		BB	BB	
	WTPQ20	VHHH	HH	HH	BJ	O		TD	BB	BB	BB	BB	
	WTSS20	VHHH	HH	HH	BJ	O			BB	BB	BB	BB	
	WTHH20	VTBB	BB	TD	O	TD			BB	BB	BB	BB	
	WTVS20	VNNN			NN	BJ			O	BB	BB	BB	
	WTPQ20	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WTPQ21	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WTPQ22	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WTPQ23	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WTPQ24	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WTPQ25	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WTKO20	RKSL	SL	TD	TD	TD		O	BB	BB	BB	BB	
Prognostic Reasoning	WTPQ30	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WTPQ31	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WTPQ32	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WTPQ33	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WTPQ34	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
	WTPQ35	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	
Others Best track	AXPQ20	RJTD	O	TD	TD	TD	TD	TD	BB	BB	BB	BB	

**Results of questionnaire
on the status of implementation in 2006
of the TOM performance measures for the analysis and forecast
of tropical cyclones**

Member: **11 Members answered**

Introduction

The 39th session of the Committee requested the Members to report on the status of implementation of TOM performance measures and the Rapporteur to submit the report to the next session of the Committee using Annex II of WRD/TC.39/1 Add.1, considering that some of the performance measures described in Typhoon Committee Operational Manual (TOM) have not been reviewed in recent years.

This questionnaire helps the Members report on the status of implementation in 2006 of the following TOM performance measures for the analysis and forecast of tropical cyclones.

Section 2.1.2 of TOM

The radiosonde/radiowind observation carried out at 0000UTC and 1200UTC should reach the 30hPa level for more than 50 percent of the ascents.

Upper-air stations in the areas affected by tropical cyclones of TS intensity or higher should also make radiowind observations at 0600 and 1800UTC which should aim at reaching the 70hPa level.

Q1: Did your country carry out radiosonde/radiowind observations at 00UTC and 12UTC in 2006?

A1: Yes (Always) **8** Yes (Usually) **2** Yes (Sometimes) **0** No **1**

Q2: (If 'Yes' in Q1) Did the observations reach 30hPa level for more than 50 percent of the ascents in 2006?

A2: Yes **8** No **2**

Q3: Did your country make radiowind observations at 06UTC and 18UTC when a tropical cyclone of TS intensity or higher approached an upper-air observation station in your country in 2006?

A3: Yes (Always) **4** Yes (Usually) **0** Yes (Sometimes) **0** No **6** No answer **1**

Q4: (If 'Yes' in Q3) Did the observations usually reach 70hPa level?

A4: Yes **3** No **1**

Section 2.3 of TOM

It is essential that radar observations continue as long as a tropical cyclone of TS intensity or higher remains within the detection range of the radar.

Q5: Did your country conduct radar observations when a tropical cyclone of TS intensity or higher approached a radar station in your country in 2006?

A5: Yes (Always) **5** Yes (Usually) **1** Yes (Sometimes) **0** No **0** No radar **3** No
answer **2**

Section 2.6 of TOM

Each Member's tropical cyclone forecast center should compile reliable passage, landfall, near-buoy passage, near-ship passage data, tabulate that data and send it to the Typhoon Committee Secretariat (TCS) a day after cyclone passage for distribution to the other Members.

Q6: Did your country compile passage (reliable, near-buoy, near-ship) and landfall data of a tropical cyclone which approached your country in 2006?

A6: Yes **7** No **2** No answer **2**

Q7: (If 'yes' in Q6) Did your country send passage (reliable, near-buoy, near-ship) and landfall data of a tropical cyclone to the TCS after a tropical cyclone approached your country?

A7: Yes **5** No **0** Sometimes **1** No answer **1**

Section 6.3 of TOM

After the end of each typhoon season, each Member will conduct the verification for its analyses and forecasts and send the report to the RSMC Tokyo-Typhoon Center in accordance with the standard procedure as shown in Appendix 6-D.

Q8: Did your country conduct the verification for its analyses and forecasts in 2006?

A8: Yes **6** No **3** No answer **2**

Q9: (If 'yes' in Q8) Did your country send the verification report to the RSMC Tokyo-Typhoon Center?

A9: Yes **3** No **3**

**Draft amendments to
the Typhoon Committee Operational Manual – Meteorological Component (TOM)
proposed by the Rapportuer based on status reports**

Page	Line	Present Description	Proposed Amendment
CHAPTER 2			
10	1	<p>2.6</p> <p>Each Member's tropical cyclone forecast center should compile reliable passage, landfall, near-buoy passage and near-ship passage data, tabulate that data and send it to the Typhoon Committee Secretariat (TCS) a day after cyclone passage for distribution to other Members. The task is assigned to the focal point for the meteorological component of each Member. A proposed tropical cyclone passage report is shown in Appendix 2-G.</p>	<p><i><<to be replaced by>></i></p> <p>Each Member's tropical cyclone forecast center should compile reliable passage, landfall, near-buoy passage and near-ship passage data, tabulate that data and send it to the Typhoon Committee Secretariat (TCS) within a week after cyclone passage for distribution to other Members. The task is assigned to the focal point for the meteorological component of each Member. A proposed tropical cyclone passage report is shown in Appendix 2-G.</p>

APPENDIX IX

Activities of Members in the Hydrology Component

Cambodia

Cambodia continues to promote the capacity of hydrological data collecting, flood forecasting and warning in 2007.

China

The National Mountain Flood Prevention Planning has been approved and initiated in China. The plan is concerned with the mountain and hill areas for torrent disaster prevention in the 29 provinces of China with 32753 small river basins. The investment of the plan is about 25 billion Dollars. The first target gives priority to non-engineering structures, and to combine non-engineering and engineering measures.

The 3-year project of the National Flood Control Commanding System (First-Phase) has been implemented since 2005. China is planning to construct 224 sub-centers of hydrological information. 125 sub-centers will have been set up by the end of 2007, and the decision-making support system is to be completed by 2008.

MWR-BOH and TCS collaborated in organization of the training course on Flood Forecasting System and Its Application (OFFSIA), which was held in Beijing, China. The training course was attended by 10 overseas participants from 7 selected Members of the Typhoon Committee. China sponsored 25000 US Dollars as the training and board/dodging expenses for the foreign trainees. MWR-BOH agreed to provide the continued technical support to the members of TC in the use of China National Flood Forecasting System.

China proposed a draft road map for the project on flood-related disaster risk management in TC urban areas from 2008 to 2010. The expected achievement of the project on the Management of Floods in Urban Areas is to prepare "Guidelines on flood mitigation and management for urban planning and development in the Typhoon Area".

Hong Kong, China

Dynamic hydrological and hydraulic computer models for the drainage system were developed to provide quantitative information on the risk of flooding, the impacts of development and the performance of various flood loss mitigation options. All the trunk and major branch river channels in the flood prone region in the northern part of Hong Kong had been digitized into the MIKE11 model for the review of hydrological criteria for the release of basin-wide flood warning in the region. A computerized stormwater drainage asset inventory and maintenance system had also been developed.

In the past year, several research studies were completed, including a sensitivity analysis of the hydraulic effect of mangrove growth in river estuary and an analysis of the effects of climate change on stormwater drainage system. A project was also undertaken in collaboration with the Hong Kong Observatory to derive the 2-hour Probable Maximum Precipitation for Hong Kong to support flood risk assessment

Japan

The River Subcommittee of the Council for Social Infrastructure under MLIT of Japan established a "Review Subcommittee on Flood Control Measures Adaptive to Climate Change". This subcommittee is conducting analyses and evaluations of the changes in such characteristics as the frequency or scale of flood damage, sediment disaster, and storm surge disasters caused by climate change, as well as their effects on society.

The International Center for Water Hazard and Risk Management (ICHARM) has launched a new Master's Degree Program called the "Water-related Risk Management Course in Disaster Management Policy Program", to build a community of experts and professionals to deal with water-related disasters, particularly in developing countries that have proven to be more vulnerable to natural disasters. It is a one-year program jointly organized by ICHARM and the National Graduate Institute for Policy Studies (GRIPS) with the support of the Japan International Cooperation Agency (JICA). With its project based on the Regional Cooperative Program Implementation Plan (RCPIP), Japan is playing a central role in promoting technical

cooperation projects for the "Preparation of Flood Hazard Maps" e.g. organizing "Flood hazard mapping training program (2002-2009)" and "the Establishment of Warning Systems for Flash Floods, including Debris Flow and Landslides".

In recent years, climate change has led to heightened risk of flood damage. For large rivers as well as small and medium rivers, therefore, highly accurate control and highly effective maintenance needs to be implemented to maintain and improve the functions of rapid and efficient disaster-prevention facilities. In Japan, MLIT utilize aerial laser measurement that can capture wide-area terrain data simply with high density. With these measurements, the channel cross-section of medium- and small-size rivers is grasped, followed by calculation of flow capacity, which in turn contributes to surveys and evaluations of the flood safety of rivers.

The Sabo Department of the MLIT formulated a "Guideline on Warning and Evacuation for Sediment-related Disaster Prevention," which was issued in April 2007. Practical procedures involved in "Information Communication," "Issuing an Evacuation Advice," "the Creation and Operation of an Evacuation Center," "Support for the Weak," and "Raising Disaster-Prevention Awareness" are covered in the Guideline.

"Sediment-Related Disaster Warning" is issued to support the judgment of the head of the local authority that officially announces an evacuation order and voluntary evacuation of inhabitants when a Sediment-Related Disaster caused by heavy rain is likely. Detailed information is also provided through the homepage. Warning services were available in 38 prefectures as of September 30, 2007, and will be available in all 47 prefectures in Japan by March, 2008.

LAO PDR

Almost of 21 Hydrological stations was installed at Nam Ngum River Basin (Nam Ngum River) in last year. HYMOS software has been installed at Hydrological Division (DMH) for processing and Analysis stream flow, DMH receives Flood Forecast products from MRC by Internet.

Under project WUP (Water Utilization Program) of MRC, the software SWAT (Soil Water Assessment Tool), IQQM (Integrated Quantity and Quality Model) and ISIS (Hydrodynamic Model) were installed at Hydrological Division (DMH). The Hydrologist could operate and provided the flood mapping for specific flood risk areas such as flood mapping for Num Ngum Reservoir, Mahaxay district (Xebangfay river) and Xebanghieng river. The data base system that monitors all the Hydrological stations managed by DMH and achieves Hydrological observation data was developed. The products of flood forecasting lead -time has been extended from 24 hours in to 48 hours and update every day.

The local technical seminar concerning of the database that is utilized for the management of the Hydrological stations and the Observation data was held at Hydrological division of DMH on 18th June. Hydrologists participated on Operational Flood forecasting system and its application 15-21 October 2007 in China.

Macao, China

The annual Seminar on Climate Forecasting in South China during the Rainy Seasons of 2007, with special focus on rainfall prediction, was held with neighboring meteorological bureaus at Guangzhou, China on 15-17 March.

Local seasonal rainfall forecasts are submitted to Excellency the Secretary for Transport and Public Works as reference in monitoring and predicting the salinity of tap water and making appropriate measures and policies.

Malaysia

The Department of Irrigation and Drainage (DID) to date has installed about 375 telemetric stations in 38 river basins. Of this a total of 44 stations have been installed this year which comprises 27 new water level telemetry stations and 32 new rainfall telemetry stations.

DID under the Regional Cooperation Project and Implementation Programme (RCPIP) has developed a web-based and online early warning system known as "The Debris and Mudflow Warning System for Cameron Highlands" and this project will be expanded to other area in Kuala Lumpur which is prone to land slide. DID had also initiated flood hazard mapping projects

for the districts in the southern region of Peninsular Malaysia which were severely hit by the recent December 2006 and January 2007 floods.

DID also continues to enhance her flood website, InfoBanjir (<http://infobanjir.water.gov.my>) in terms of IT technology, hardware, procurement and network expansion as well as its contents to meet the customer's requirement. The improvement on the ICT facilities and forecasting tools and models had helped DID to enhance her early warning system for hydrological related hazards, especially on floods.

DID continues to improve her capacity buildings as well as national and international cooperation and collaboration, by being actively involved in many international and national seminar/workshop/meeting on hydrological related issues. Under the intensified research priority area namely Sg. Kerayong Urban Hydrology Study is nearing completion. The results of this study will help improve existing urban stormwater drainage design.

Philippines

The Philippines highlighted its flood hazard mapping activities and the implementation of the community-based flood forecasting and warning system in the identified highly vulnerable areas.

Republic of Korea

MOCT/KICT has a 5 year new project from 2008 titled "Socio Economic Impact Assessment System for Investment in Flood Control & Management Measures Infrastructure" to develop the evaluation system for various types of flood control measures, which are implemented for basin wide integrated flood control policy such as river levees and storage facilities, etc. Also this new project focuses assist to determine the priorities of investment for disaster prevention related project and construction of infrastructures.

Regarding the two leading project from Ministry of Construction and Transportation (MOCT), MOCT/K-water prepares the general and technical guide lines(GLs) of reservoir operation. MOCT/K-water will finalize the GLs and distribute them to the members. Also MOCT/K-water will provide consultation to members on specific dam operation cases when needs arise. One of the output from the project of "Evaluation and improvement of operational flood forecasting system focusing on model performance" is 'Decision Support System for Flood Forecasting Operation & Planning(DSSFOP)'. MOCT hosted a workshop for the interested members to discuss & exchange the members experiences about the flood forecasting system evaluation from 5. Feb. to 7. Feb. 2007, Seoul, Korea. Web-based DSSFOP will be provided for the members use and the manual will be published. Also MOCT/KICT will open discussion to the members to improve decision support system.

Thailand

The Royal Irrigation Department (RID) installed the upper Chao Phraya telemetering projects in the Chao Phraya river basin to link with the lower part that started from Ayuthaya province down to the gulf of Thailand. Department of Water Resources (DWR) has cooperation with Mekong River Commission Secretariat (MRCS) and other Mekong River Country (Lao's PDR, Cambodia and Vietnam) to improve the hydro-meteorological monitoring network in Mekong Mainstream under the Appropriate Hydrological Network Improvement Project (AHNIP), Basin development plan, Water utilization program, Environment program, Flood mitigation management program and drought management program, Mekong HYCOS and start up integrated knowledge management program.

RID expanded area of coverage in case of Chao Phraya river basin by installing the upper Chao Phraya telemetering system to strengthen the forecasting results in Chao Phraya

river basin which is the largest basin in Thailand. Thailand is setting up the hydro-meteorological stations network and early warning system.

Department of Water Resources had been done researches such as the delineation of River Basin boundaries (25 Major river basins including 254 sub-river basins), integrated water resources management and so on.

United States of America

In the Western North Pacific, drier than normal conditions east of 145E longitude led to drought conditions early in the year for the Republic of the Marshall Islands. Guidance from WFO Guam initiated water conservation efforts early enough to avoid a major crisis.

Viet Nam

In 2007, Viet Nam established the flash flood warning system with 7 automatic rainfall gauges in Ngan Sau and Ngan Pho rivers of Ha Tinh province and established the flash flood warning system with 2 automatic rainfall gauges in Ngoi Lao and Ngan Pha rivers of Yen Bai province. Viet Nam Continued to develop the software for the preservation of hydro-meteorological database, for hydrological data collection, processing and timely transmitting hydrological information and forecasts to end-users, some software for automatically input and output of the new hydrological models MARINE, FIRR, Hydraulic model and model for reservoir's regulation.

In 2007, Viet Nam Carried out flash flood mapping project, American NWSRFS Model for Flood and inundation forecasting and warning in Hong–Thai Binh river system, flood prediction and inundation warning technology in Ve–Tra Khuc river system, development of 5-day flow prediction technology to large reservoirs in Da and Lo river system and development and application of the WETSPA and HECRAS for flood simulation and prediction in Thu Bon–Vu Gia river system.

UNESCAP

In 2007, ESCAP continued to extend its technical support to the Typhoon Committee's activities in several areas of its work, apart from its regular activities related to water resources management. The additional activities included those implemented with the support of Typhoon Committee's experts at the Second Asia Ministerial Conference on Disaster Risk Reduction and those related to the regional workshop on "Socio-economic Impacts of Extreme Typhoon-related Events", which was jointly organized by the Thai Meteorological Department, the Typhoon Committee Secretariat, UNESCAP and others at the United Nations Conference Centre in Bangkok in September 2007. With respect to water resources management, as part of its participation in the preparation for the First Asia-Pacific Water Summit, UNESCAP supported involvement of the Typhoon Committee Secretariat and experts of its various Members in the preparatory process, including the Regional Workshop on Monitoring of Investment and Results in Water Resources Management with emphasis on water-related disaster risk management, at the Third South-East Asia Water Forum. In addition, UNESCAP also provided technical support to various studies and activities of the Working Group on Hydrology, especially those related to flood forecasting and reservoir operations as well as assessment of socio-economic impacts of typhoon-related disasters.

WMO

1. Introduction and recommendation

In the intersessional period of the Typhoon Committee, a number of activities have been undertaken that have the potential of strengthening the hydrological component of the Typhoon Committee. It is recommended that the Typhoon Committee and WMO seek ways to further improve collaborative activities in the region to make best use of available resources and to increase the effectiveness of activities to the benefit of member countries in the region and in particular their hydrological and meteorological services.

2. Flood Forecasting Initiative

Launched in 2003, the principal objective of the Flood Forecasting Initiative is to strengthen the cooperation between National Hydrological and Meteorological Services to deliver timely and more accurate products and services required in flood forecasting and warning. The initiative encompasses both riverine and flash floods. As a result of eight regional workshops, a Strategy and Action Plan for the Enhancement of Cooperation between National Hydrological and Meteorological Services for Improved Flood Forecasting had been adopted during a global

synthesis conference on Improved Hydrological and Meteorological Forecasting in November 2006.

Key features of the Strategy and Action Plan (SAP) include:

- i. The SAP promotes the preparation of national implementation plans
- ii. The SAP suggests the implementation of demonstration projects at various levels (country-specific, sub-regional and regional projects).
- iii. At the regional level, the SAP advocates the establishment of a framework under which partnerships and development assistance could be provided and coordinated amongst the Members and the various contributing agencies while taking advantage of existing regional and international arrangements.
- iv. The SAP also addresses requirements of well-established flood forecasting and warning systems for their further improvement through the development and use of new technology.

3. Flash Flood Guidance System

As part of the WMO Flood Forecasting Initiative, two regional flash flood forecasting workshops had been held in Tsukuba (Japan) and Lhasa (China) in 2005, followed by an International Symposium on Flash Flood Forecasting in Costa Rica in May 2006. As a follow-up, a Flash Flood Guidance System (FFGS) with global coverage has been proposed in May 2007 by a consortium including WMO, the Hydrologic Research Centre (HRC in San Diego, USA), the US National Weather Service and the US Agency for International Development/Office of Foreign Disaster Assistance (USAID/OFDA). Objectives of the FFGS include

- To enhance the capabilities of Members in issuing Flash Flood Warnings
- To provide platforms in countries for closer cooperation between NHS and NMS to respond to disaster management authorities
- Demonstrate the implementation in at least four regions and to expand globally based on the experiences in the regional pilot projects

During the first phase (2007-2009) of the FFGS, regional centers would be established as follows:

- Central America (upgrading the existing one) (2007)
- South East Asia with focus on Mekong Basin Region (2007)
- Southern Africa (early 2008)
- Central Asia-Middle east (later part of 2008)

About 20-25 countries will be initially covered under the system and personnel trained to make use of the System.

4. Mekong-HYCOS

After four years of development, the Mekong River Commission (MRC) in cooperation with the World Meteorological Organization (WMO) is implementing the Mekong-HYCOS Project funded by the French Development Agency and the French-GEF. The preparatory phase started in January 2007 and the project is planned to be implemented over the period 2007 to 2011. As a regional project of WMO's World Hydrological Cycle Observing System (WHYCOS), the main objective of the Mekong-HYCOS Project is to establish an efficient and accurate hydro-meteorological data collection and transmission system at basin level, while also strengthening relevant national and regional capacities. The hydrological and meteorological information generated through the project will be shared between the MRC's four member countries of Cambodia, Lao PDR, Thailand and Viet Nam and MRC's Flood Management and Mitigation Programme (FMMP). The Mekong-HYCOS Project will establish a basin wide hydro-meteorological information system, which spatially covers mainstream and main tributaries of the Mekong river system. It is expected that under the Mekong-HYCOS project, more than 20 hydro-meteorological stations will be upgraded. The Mekong-HYCOS system will be integrated into the existing MRC monitoring system, while improving the national hydrological networks and river monitoring/forecasting capacities.

5. Associated Programme on Flood Management (APFM)

The Associated Programme on Flood Management (APFM) has been established in 2002 as a joint initiative of WMO and the Global Water Partnership (GWP). Its mission is to support

countries in integrated flood management within the overall framework of integrated water resources management. Integrated Flood Management (IFM) is a development policy that aims at maximizing the net-benefits derived from flood plains and to minimize losses of life and livelihoods from flooding. The APFM has firmly established the principles of Integrated Flood Management in the Flood Management Policy Series (<http://www.apfm.info/publications.htm>), and conducted various regional pilot projects to establish a clear view on the issue of practical application of the concept in the field. One of those projects in South-Asia has focussed on Community Approaches to Flood Management. This project was conducted until 2006 in India, Bangladesh and Nepal. (See http://www.apfm.info/regional_projects/sastac.htm). Current efforts of the APFM focus on the establishment of Help Desk for Integrated Flood Management (IFM Help Desk). This Help Desk is a facility that will provide guidance on flood-related issues to countries that want to adopt the IFM concept. The added value of the IFM Help Desk is aimed at providing balanced and independent flood management policy guidance as well as the provision of a quality control mechanism for technical inputs into flood management projects proposals for flood-affected areas. Another essential aspect of the IFM Help Desk is the formation of a capacity building component currently under development. For more info visit www.apfm.info or contact apfm@wmo.int.

6. Climate Change Expert Meeting

Recognizing that climate information is presently not widely used by water managers, WMO in December 2006 organized an expert meeting on Water Manager Needs for Climate Information in Water Resources Planning. The meeting showed that climate predictions and seasonal climate outlooks at present have the highest potential to be more readily used while predictions of climate variability and change, while inherently useful, are not yet ready to be applied from an engineering point of view and other techniques, such as using multi-model ensembles and downscaling techniques are required to improve prediction skills to reduce large uncertainties. Major outcomes of the expert meeting were:

- Participants encouraged the development of demonstration projects based on a project proposal developed by WMO “Bringing Climate Information to Water Managers” and
- Participants developed an agenda and work plan for a WMO initiative on “Improvement in Water Resources Planning through the Use of Climate Information”.

7. RA II (Asia) Working Group Hydrology

The working group had been established by the WMO Regional Association II (Asia) in December 2004. It met from to 2007 in Beijing, China to discuss its current work plan until the end of 2008 and the proposed future activities for the period 2008 – 2012. Current activities include the following working areas:

- I. Improving Institutional Capacity both Nationally and Regionally (K. Fukami, Japan)
- II. Disaster Mitigation – Improvements to Short-duration (Flash) Flood Forecasting Capabilities in Urban Areas (P. Petvirojchai, Thailand)
- III. Disaster Management – Climate Variability and Hydrological Aspects of Drought (Z. Liu, China)
- IV. Water Resources Assessment, Availability and Use (Surface water and groundwater) in cooperation with UN ESCAP and IGRAC (S. Awan, Pakistan)
- V. Improved Accuracy of Flow Measurements and Estimation in RA II (F. Yazadandoost, Iran)

For the period 2008 – 2012, the working group proposed the themes below for approval by the Fourteenth Session of RA II (Asia) in December 2008:

- I. Improving Institutional Capacity including the implementation of the RA II Strategic Plan for NHTs and Technology Transfer in the context of HOMS
- II. Disaster Mitigation – Implementation of the WMO Flood Forecasting Initiative including Flash Flood Forecasting Capabilities and Mass Movements
- III. Disaster Management – Hydrological Aspects of Drought, including Drought Monitoring, Regional Water availability analysis, assessment of water scarcity and deficits
- IV. Water Resources Assessment, Availability and Use (Surface water and groundwater) and Sedimentation in Rivers and Reservoirs
- V. Improved Accuracy of Hydrometric and Sediment Observations including Space-based Technologies in RA II

- VI. Hydrological responses to climate variability and change and promotion of the use of climate information by water managers
- VII. Regional exchange of hydrological data and information including WHYCOS and contributions of regional aspects of INFOHYDRO

8. Publications

Two manuals of interest to the TC are nearing completion: Manual on Flood Forecasting and Warning and the Manual on PMP. These manuals are being prepared under the professional guidance of the WMO Technical Commission on Hydrology (CHy).

APPENDIX X

THE REPORT OF WGH PARALLEL SESSION

1. Parallel session of Working Group on Hydrology (WGH) was held in the morning on Wednesday, 21 November 2007 in the Lotus Room, World Trade Centre.
2. Totally 14 participants from China, Japan, Malaysia, RO Korea, Thailand, USA and TCS attended WGH parallel session which discussed the activities of 2007, plan for 2008, Resources and possible new strategy on hydrology and water.
3. The Parallel session of WGH reviewed its 2007 Annual Operating Plan agreed by the ESCAP/WMO Typhoon Committee at its 39th Session, held in Manila from 4 to 9 December 2006.
4. In 2007, there are 8 ongoing WGH-related Projects
 - Pilot project on the preparation of Inundation and Water-related Hazard Maps led by Japan
 - Pilot project on the establishment on flash-flood warning system (including debris flow and landslides) led by Japan
 - Development of guidelines for the dam operation in relation flood forecasting led by Korea
 - Evaluation and improvement of operational flood forecasting system focusing on model performance led by Korea
 - Extension of flood forecasting systems to selected river basins led by China
 - On-the-job Training on Flood Forecasting between TC members led by Malaysia
 - Pilot project on the establishment of community-based flood forecasting system led by Philippines
 - Improvement of Hydrological products in response to user needs led by Philippines
5. The progress of Flood Hazard Map Project
 - Japan has established Technical Help Desk on the ICHARM website and started its operations and has been working on the upload of Good Practice onto the web. Moreover, China and Malaysia reported that their major FHM projects had been approved and would start in the year 2007. The Philippines presented that they also had made further advances on their FHM project with resident participation, and Thailand and Vietnam explained about their projects as well. The other countries made reports that even though they were facing some challenges, they had started to put efforts into FHM activities.
 - In regards to each country's progress: (1) a legal system is built, and a hazard map is made available to the public; (2) a hazard map is made, but not yet shown to the public; (3) the model map of a hazard map is made, and efforts to make the hazard map take place in multiple places; (4) the creation of a model map has not started yet...etc., the fact that each country was at a different level was confirmed.
 - Therefore, it was recognized that the technical challenges for the members to create FHM were managed, but policy makers as well as legal positioning and consensus were necessary.
6. The progress of the project on Flash Flood Warning including Debris Flow and Landslides
 - In last calendar year 2006-2007, Japan established technical help desk on a web site (<http://www.sabo-int.org/index.html>) and started technical consultation to support typhoon committee. Each member will be able to (1) download the guideline and guideline, (2) have technical supports from NILIM or MLIT by e-mail, and (3) share Q&A information.

- Many members are in trial to set CLs to model locations but facing lack of past data. China launched a National Mountain Disaster Monitoring and Prevention Planning proposed by the Ministry of Water Resources (MWR) in conjunction with Chian Meteorology Adimistration (CMA) and other concerned Ministries.
7. The progress of the project on Evaluation and Improvement of Operational Flood Forecasting System focusing on Model Performance
- To carry out the project on Evaluation and Improvement of Operational Flood Forecasting System focusing on Model Performance, MOCT, ROK mobilized USD 30,000 to convened a Typhoon Committee Hydrological component workshop for the exchange of technology on evaluation and improvement of Flood Forecasting System, joined by about 20 participants from China, Japan, Lao PDR, Philippines, Vietnam, ROK and UNESCAP from 5 to 7 February, 2007.
 - The objectives of this Workshop are: (1)exchange member's information on the existing situation in dealing with operational flood forecasting system and member's experiences in the improvement of the framework; (2)To collect data in related with performance of the operational flood forecasting system (rainfall & stage data, major flood events, etc.); (3)To practice the technologies for evaluating the flood forecasting system with improved Management Overview Of Flood Forecasting Systems (MOFFS); (3)To exchange member's technologies for the improvement of the input data in operational the flood forecasting system; (4)To exchange member's technologies for the improvement of the calibration strategy in flood forecasting model; (5)To identify priority needs of the TC Members in promoting the flood forecasting in the context of typhoon-related disaster management and other priority projects for better regional cooperation in the hydrological component.
8. The progress of Project on the Development of Guidelines for Reservoir Operation
- ROK prepared general guidelines and technical guidelines and distributed them to interested members for comments.
9. The progress of the project on Extension of Flood Forecasting Systems to Selected River Basins
- With the aim to accelerate the progress of the China-led project on Extension of flood forecasting systems to selected river basins, and share the Chinese good practice of developing and application of flood forecasting system, at the thirty-ninth session of the Typhoon Committee held in Manila, Philippines, from 4 to 9 December 2006, the Delegate from China has informed the Committee that it would organize the training on "Operational Flood Forecasting System and its Application (OFFSIA)" inviting trainees from selected TC members. TC decided to allocate US\$5,000 to support international travel for trainees from selected TC members to participate in the training. China mobilized about US\$25,000 to support the training course including accommodation, facilities and human resources.
 - At the kind invitation of Bureau of Hydrology, Ministry of Water Resources (MWR-BOH), China, in cooperation with the TCS, the training on OFFISA will be held in Beijing, China from 15 to 21 October 2007. The objective of this training course is to enable the trainees to learn the technology, knowledge and experience, especially the good practice of developing the application of flood forecasting system. Subsequently the trainees can share the knowledge acquired in the training course among the officials and engineers who engage in the flood forecasting and disaster management in their own countries.
 - This training course accommodated 15~20 trainees, among which 10 foreign participants are invited from 7 TC members, namely DPR of Korea, Laos, Malaysia, Philippines, Singapore, Thailand and Vietnam, who are currently engaged in flood forecasting or disaster management issues in the public sector.
 - The training on OFFSIA consisted of 2 days of lectures, 3 days of exercises and presentations. In addition, the trainees are to have a technical visit to MWR-BOH and national computer network center of the ministry. 8 professors or senior engineers from national institutions and universities are to give lectures and practical instruction.
 - As the first such training course held in China, the MWR-BOH is aimed to provide high level training in flood forecasting system and application by making use of its good practice of developing and application of national flood forecasting system.

- To express the support to the training course, TC AWG decided at the Workshop to send the Secretary of the Typhoon Committee, Mr. Olavo Rasquinho, to present at the training course. At the training course, Mr. Olavo Rasquinho gave a brief introduction to the activities of the organization of UNESCAP/WMO Typhoon Committee. In his presentation he provided information of tropical cyclone programme and regional components, specialized groups of TC, vision and mission of TC, strategic plan for 2007-2011, composition of Typhoon Committee, and so on.
- The training course issues the Certificates joint signed by TCS and BOH to participants, which is first time in TC to issue such kind of Certificates.
- The report provided by China about the TRAINING COURSE ON FLOOD FORECASTING SYSTEM AND ITS APPLICATION (OFFSIA)

10. The progress of the project on the Establishment of Community-based Flood Forecasting System

- The Philippines is the lead country in the proposed CBFFWS project for the WGH of the TC. In the recently concluded WGH Bangkok Workshop (September 2007), Mr. Hilton Hernando of the Philippines did the presentation of the CBFFWS project. The CBFFWS project is a non-structural set of community activities that enhances the resiliency of flood-affected communities to flood disasters. The presentation focused mainly on the increasing number of communities in the Philippines that have already been employing the said project in their area. This clearly shows the acceptability of the project in most of the flood-affected communities that are not covered by an automated (Telemetered) Flood Forecasting & Warning System.
- The progress of the project to date is on the additional activities that are now being adopted to further enhance the CBFFWS, for example, making community-friendly flood hazard maps (FHM), the installation of additional flood markers at established CBFFWS projects, and the use of simpler data sheets (user-friendly) for hydrological observations. In addition to this, a DVD documentation of the experience of one province in the Philippines with regards to the establishment of a CBFFWS in their area was already produced with the help of the JICA.
- The immediate future program of the project (CBFFWS) is to formulate draft guidelines for setting-up a CBFFWS. The draft guidelines, expected this month (November), will be distributed to member countries for comments and recommendations. Hopefully, before the end of the year, the final draft report will be completed. The Philippines is willing to share experiences and help other member countries in working out a similar program in their area. In this connection, some CBFFWS experiences in the country will be compiled in a CD-ROM and distributed to TC member countries. PAGASA of Philippines prepared the report on CBFFWS

11. The progress of the project on Improvement of Hydrological Products in response to User's Needs

- The project showed some of the improvements on the information of forecast rainfall in the Philippines, and hence possible flooding, at municipal-city levels in GIS format as presented in an internet webpage. This information has been shown to be important particularly to tourist, visitors and the like. Another thrust of the project is to develop user-friendly hydrological products and information for daily use.
- The progress and future of the project is to request all member countries to submit various hydrological products in their country and sent via e-mail. All of these will be compiled in a CD-ROM and redistributed back to member countries. The compiled CD-ROM will be used as a reference for each member country that may want to try the other country's hydrological products and possibly apply it in their own situation.

12. The progress of the project on the Management of Floods in Urban Areas (to be launched by China)

- The Project on the Management of Floods in Urban Areas would be carried out for three purposes as following: (1)to exchange the experiences on management and mitigation of floods and typhoon-related disaster in urban area between TC Members; (2)to share the technology of urban flood monitoring and methodology of urban flood forecasting and prediction, early warning and disaster assessment between TC Members; (3)To promote management of urban flood and other typhoon-related disasters in TC area.

- The expected achievement of the project on the Management of Floods in Urban Areas is to prepare "Guidelines on flood mitigation and management for urban planning and development in the Typhoon Area".
 - As decision made by ESCAP/WMO Typhoon Committee on its thirty-ninth session, China will lead this project. To carry out the project successfully and fruitfully, guidance from ESCAP and WMO and cooperation of TC Members and other TC working groups (WGM, WGH, WGDPP, TRCG, AWG and RMG) are indispensable because of its complicity and comprehensiveness.
 - The following activities are proposed by China representative for the expected achievement: (1) survey of emerging issues in the Committee Area joint-organized by ESCAP, WMO and TC; (2) collection and compilation of experiences on management and mitigation of floods and typhoon-related disaster in urban areas among the TC Members; (3) collection and compilation of technology and methods on monitoring and early warning of urban floods and typhoon-related disaster among the TC Members; (4) pilot study of urban flood disaster impact assessment by using ECLAC; (5) Joint research of rainfall~runoff mechanism in urban area by TC Members; (6) regional cooperation including possibility to collaborate with ICHARM to prepare for the Asia-Pacific Water Summit.
 - As leading country, China proposed the road map for the project. The project will last to the year 2010. The expected outcome will come out at the end of the project period.
 - The WGH recognized that to carry out cooperation and research on urban flood disaster management is very important and necessary to TC members. Since the urban flood management relates to meteorology, hydrology and disaster prevention and preparedness and other aspects, this will be the first one to integrate WGM, WGH and WGDPP and other TC working groups into one project.
13. The progress of On-the-job Training on Flood Forecasting between TC members
- TC decided at its Session held in Manila, Philippines, from 4 to 9 December 2006 to allocate TCTF \$2,000 USD for international travel of participants for on-the-job training on flood forecasting in Malaysia as one of WGH activities for 2007.
 - The representative from Malaysia confirmed OJT and has decided the OJT of 2007 will be held in January 21 – February 28, 2008 for 2 trainees from 2 TC members.
14. The Parallel session of WGH discussed the AOP of 2008. Totally there will be 10 projects including 8 ongoing projects and 2 new projects in WGH as below:
- Project on Flood Hazard Mapping
 - Project on Flash Flood Warning including Debris Flow and Landslides
 - Project on Evaluation and Improvement of Operational Flood Forecasting System focusing on Model Performance
 - Project on the Development of Guidelines for Reservoir Operation
 - Project on Extension of Flood Forecasting Systems to Selected River Basins
 - Project on the Establishment of Community-based Flood Forecasting System
 - Project on Improvement of Hydrological Products in response to User's Needs
 - On-the-job Training on Flood Forecasting between TC members
 - Project on the Management of Urban Floods (to be launched and led by China)
 - Project on Socio Economic Impact Assessment System on infrastructure projects for disaster prevention (to be launched and led by the Republic of Korea)
15. Flood Hazard Map Project
- In 2008, China and Malaysia will begin their FHM projects, and the Philippines will continue to promote the creation and usage of community-based FHM. In addition, the Philippines, Thailand and Vietnam are planning to make FHM in designated areas. Moreover, the manual of "Ubiquitous Hazard Map" and its good practices are expected to be presented from Japan. Furthermore, in terms of the progresses of these projects, TC members and ex-trainees with experience of JICA FHM training course will continue to cooperate with each other for the advancement of FHM.
 - Each country has decided to do the following activities.
 - China and Malaysia will further their projects
 - The Philippines will make and utilize community-based FHM

- Thailand and Vietnam will make FHM in the designated areas
 - The other countries will decide on model areas and try to make FHM
 - Japan will introduce its experience of the hazard map, the manual of “Ubiquitous Hazard Map” and its case examples
 - Regarding these projects, it was confirmed that the implementation of the projects was to be done in cooperation with ex-trainees with experience of JICA/ICHARM FHM Training Course, and the results were to be shared among TC members.
16. The project on Flash Flood Warning including Debris Flow and Landslides
- Through Technical Help Desk (THD), Japan will actively make technical consultation with interested members for setting CLs. All interested members will set CLs at model sites
 - Japan to further study how to apply CLs for locations where past data are scarce and provide results to members.
 - Specifics of this project:
 - Provide a guidance for local communities where there is little information for evacuation (sediment-related disasters are major cause of loss of lives)
 - Required equipment is small –rainfall gages, etc.
 - Community can also manage and handle by themselves if trained –can be model of community capacity building;
 - Provision of GL, THD; a model style of TC regional cooperation.
17. The project on Evaluation and Improvement of Operational Flood Forecasting System focusing on Model Performance
- ROK will open discussion to the members to improve the system more 6 months (tentative).
 - Specifics of this project:
 - Provide “decision-support system” to policy-makers – could stress the importance of extending Forecasting systems
18. The project on the Development of Guidelines for Reservoir Operation
- ROK provides consultation to members on specific dam operation cases when needs arise. (how to address stakeholder involvement could still be a matter of discussion) .
 - Specifics for this project
 - Optimal use of existing facilities – also for adaptation to CC
 - Management of whole water cycle - both excessive and scarce water – well fits the scope of IWRM
19. The project on Extension of Flood Forecasting Systems to Selected River Basins
- China will make technical consultations if any from members in next years.
 - China may provide expert to participate in On Job Training (OJT) in Malaysia which will be organized in January 2008.
 - Specifics of this project:
 - Another typical model TC regional cooperation
 - Efficient ways of sharing information and experience in TC region
20. The project on the Establishment of Community-based Flood Forecasting System
- Philippines will provide consultation to members who will do model CB exercises at their own locations.
 - Specifics of this project:
 - Good model of cooperation among governments (both central and local) and communities
 - Empower communities, people-centered setting
 - Enhance the moral and social responsibilities to communities
 - Coordinated effort among TC sectors will be achieved
 - Easy to maintain with cheaper cost
21. The project on Improvement of Hydrological Products in response to User’s Needs

- TCS in collaboration with Philippines and interested members, to collect more user-friendly information (not only hydrology-related) and make additions/upgrading to the first version.
 - What more user-friendly information is needed will be the matter of discussion across Working Groups.
 - Specifics of this project:
 - Provides valuable hydrological information to different sectors of society
 - Promotes regional cooperation between TC Members
 - Provides an informative webpage that will be made available to the TC Region.
 - Provides documentation of TC Members' practices in the improvement of their hydrological products.
22. On-the-job Training on Flood Forecasting between TC members
- In 2008, Malaysia will conduct 3-week training course.
 - Malaysia also plans to organize another training course within 2008 inviting participants from other locations. For this purpose, TCTF will be necessitated.
 - Specifics of this project:
 - Another typical model TC regional cooperation
 - Efficient ways of sharing information and experience in TC region
23. Project on Floods Disaster Risk Management in TC Urban Areas
- WGH agreed in principle with the road map from 2008 to 2010 proposed by China as the leading country. The project will last to the year 2010.
 - Due to comprehensiveness of the Urban flood management issue, WGH proposes to jointly tackle this issue as TC model project for inter-sectoral cooperation.
 - WGH recognized that the past achievement and experiences should built on from various sectors. For this purpose, WGH proposes to hold a inter-sectoral meeting in 2008, mobilizing some amount of TCTF.
24. Socio-Economic Impact Assessment System for Investment in Flood Control Measures – for Infrastructure (to be launched by ROK)
- The objectives to launch this project are: to Develop the evaluation system for various types of flood control measures, which are implemented for basin wide integrated flood control policy such as river levees and storage facilities, etc. and to Assist to determine the priorities of investment for disaster prevention related project and construction of infrastructures
 - Project Period is proposed from 2008 - 2012 (5 years). The main issues related to this project are:
 - Review and analyze structural measures for flood control
 - Analysis of structures of pre-developed evaluation system for flood control measures
 - Design and user requirement analysis for flood control measures evaluation system
 - Analysis stream flow impact due to flood control structures, etc.
 - Economic analysis for structural measures
 - Construct computational evaluation system for flood control measures
 - The expected outcome of this project are as below:
 - Effective policy making by Decision support system for flood control related projects.
 - Standardization of the evaluation system for flood control projects.
 - Active utilization in the field of flood mapping and flood forecasting & warning
 - Support and international cooperation between Asian-Pacific countries' policy making projects in the field of flood control by using developed evaluation system
25. To further develop a Cooperative Project named Climate Change Impact on Water and Hydrology in selected river basins
26. Parallel session of WGH discussed budget request for 2008. WGH proposed the budget request for 2008 from TCTF:

- To allocate US\$ 5,000 from the TC Trust Fund to support international travel for experts from TC Working Groups for a small inter-sectoral meeting on Urban Flood Management project in 2008.
- To allocate US\$ 3,000 from the TC Trust Fund for international travel of two (or three) experts for on-the-job training on flood forecasting in Malaysia.
- To allocate USD 13,000 from the TC Trust Fund to support the international travel for hydrological experts for the Integrated Workshop of TC.

27. Due to movement of Dr. LIU Jinping, one of the competent vice chairs to the TCS as hydrologist, to re-establish the Working Group on Hydrology (WGH) responsible for the planning and promotion of cooperation among the TC Members in the implementation of the Strategic Plan and the Annual Operating Plan and appoint Mr Katsuhito Miyake, Japan, Chair and Dr Hong Ilpyo, Republic of Korea and Mr LIU Zhi-yu, People's Republic of China as Vice Chairs of WGH.

APPENDIX XI

Activities of Members in the DPP Component

CHINA

1. Progress in Member's Regional Cooperation and Selected Strategic Plan Goals and Objectives

c. Interaction with users, other Members, and/or other components

On September 25, 2007, the participants who took part in Administrator Seminar of Emerge Disasters over Developing Countries visited CMA. They listened to the report of CMA's work on meteorological disaster prevention & mitigation system and got an overview of observations, forecasts for preventing meteorological disaster in China.

d. Training Progress

● The international training workshop on tropical cyclone disaster reduction

The international training workshop on tropical cyclone disaster reduction was held in Guangzhou, China in 26-31 March 2007. It was organized by WMO and CMA and hosted by Chinese Academy of Meteorological Science and Guangdong Meteorological Bureau. 60 participants coming from 11 countries attended the workshop, and 45 were operational forecasters from the five tropical cyclone regional bodies while the workshop lecturers were leading experts in the field of tropical cyclone research and forecasting which included Russell Elsberry, Peter Black, Chen Lianshou, and Charles Guard, et al.

This research-oriented international training workshop provided training and experience on new knowledge gained from recent advances on tropical cyclone research and how best to apply these to operational prediction activities in order to enhance the accuracy and usefulness of tropical cyclone forecasts and warnings. It also enabled participants to be aware of the issues associated with disaster mitigation, such as factors contributing to human and economic losses, conveying forecasting and warning information to stakeholders, users and the general public, evaluating the effectiveness of warning systems, mitigation strategies and community capacity-building for disaster reduction. The abstracts of the nine lectures were printed in a booklet and distributed to all the participants before the workshop.

The meeting will provide opportunities for further enhancement of regional cooperation in future.

● The Training Seminar on Meteorological Disasters Forecast, Prevention and Mitigation

From May 21 to June 8, 2007, CMATC held Training Seminar on Meteorological Disasters Forecast, Prevention and Mitigation with 45 foreign participants from 25 counties. Professor Chen Lianshou from the Chinese Academy of Meteorological Sciences, an Academician of the Chinese Academy of Engineering Sciences, was invited to give a lecture to the participants. The main theme of his lecture was the prediction and prevention of typhoon which covered the typhoon types, analysis of typhoon tracks, its moving speed, destructiveness and some effective measures for the prediction and prevention.

● The International Training Course on Coastal Zone Natural Disaster Prevention and Warning

From July 25 to August 8, 2007, CMATC sponsored another International Training Course on Coastal Zone Natural Disaster Prevention and Warning with 10 participants from 8 countries in the class. Professor Chen Lianshou, one Academician of CEA, gave the participants a lecture on the Natural Disaster and Scientific Issues for Landfall Tropical Cyclones, which includes

scientific issues of track turns with the abrupt change of structure and intensity, storm surge, heavy rainfall, dissipating and sustaining as well as the monitoring, forecasting and warning Systems. Professor Jiang Jixi, Senior researcher of National Satellite Meteorological Centre, also was invited to give a lecture on the monitoring, analysis, and techniques for the tropical weather systems based on satellite observation, which included tropical cyclogenesis, locating tropical cyclone centre, tropical cyclone intensity analysis, tropical cyclone thermal structure, tropical cyclone motion forecasting, Intertropical Convergence Zone (ITCZ), upper tropospheric cold vortex, easterly wave, an operational auto-monitoring for the EL Nino episodes and a primary study for summer monsoon index over the South China Sea and East Asia based on satellite observation.

2. Progress in Member's Important, High-Priority Goals and Objectives

(Towards the goals and objectives of the Typhoon Committee)

a. Hardware and/or Software Progress

- **Reference Standard for Severity of Tropical Cyclone**

On June 2007, CMA set the reference standards for severity of tropical cyclones. This standard gives different severities of tropical cyclones, including the potential impacts & damages on vessels and building, etc. The new standard serves as a platform for providing effective meteorological services for prevention of tropical cyclone-induced disasters. It provides for government and relevant agencies to take effective measure.

- **Warning Signal of Meteorological Disasters**

On June 2007, in order to make a unified system for issuing warning signal of the meteorological disasters, CMA amended and published the Methods for Issuing and Broadcasting the Warning Signals of Meteorological Disaster. The warning signals on potential disasters will be broadcasted on a timely basis according to the new methods. By so doing, the warning signals of potential disasters such as typhoon can reach to public more quickly and effectively.

- **Atlas of China Disastrous Weather and Climate**

Atlas of China Disastrous Weather and Climate was published at September 2007. The content includes typhoon and temporal and spatial varieties of its disasters. The book provides an important reference for government decision and academic research, and offers a textbook for occasional people to know the disaster of typhoon and timely prevent the disasters.

b. Implications to Operational Progress

- **Investigations on landing typhoon-induced disasters**

There are several typhoons choose to land on China each year. Investigations on landing typhoon-induced disasters may help to better understand variations of typhoon strength, impact area, associated disasters and losses, etc. The investigations may also give reference information for preventing and mitigating typhoon-induced disasters. This year, before the landing of some strong tropical storms, CMA had sent teams to coastal provinces. They arranged preparatory work in advance and carried out post event investigations.

- **Meteorological Disasters Yearbook of China**

In 2007, CMA also continued to publish Meteorological Disasters Yearbook of China. It compiles the main meteorological disasters took place in China in the year. The Yearbook also includes the information about severe meteorological disastrous events in the world during the previous year.

- **Disseminations of Messages of Typhoon Warning**

Technological methods were used to issue messages of typhoon warnings. The public may get warning messages in time and take relevant prevent measure. The systems to issue message includes mobile phone message, TV, radio, newspaper, websites, electronic display screen, serving station of messages at villages, 96121 phone line. People can get warning messages from different message sending systems. All levels of meteorological bureaus had sent 48,000 pieces of free warning messages from January 2007 to August 2007. There were about 1,200,000,000 times and persons who had got these messages.

During the typhoon season, more than 900 pieces of news on typhoon have been published by new website (<http://www.nmc.gov.cn/typhoon.php?code=722>) for typhoon and service; symbols on the topic of typhoon changed for 17 times, the satellite cloud pictures, the radar echoes composite maps, the latest forecast of typhoon and other relevant information were issued in real time. 7 experts-online and 2 specialized websites on typhoon were created. Some information on typhoon and as how to prevent typhoon was sent out.

c. Interaction with users, other Members, and/or other components

Chinese government attaches great importance to prevention and reduction of typhoon disasters. Governments at all levels request the relevant agencies to take the preventive measures when they received warning message of typhoon. When information is received, the relevant agencies shall monitor typhoon's motions and coordinate their actions in preventing typhoon disasters. These preparations reduce casualties of people as result of typhoon landing. During the invasion of Typhoon SEPAT and VIPA, authorities in the coastal provinces timely organized evacuations of 4.65 million people into some safety area against strong wind. These measures effectively reduced casualties and loss of properties.

In September 2007, the National Meteorological Disaster Prevention and Mitigation Conference was hold at Beijing. Its' main topic is to prevent and mitigate meteorological disasters. At the conference, Vice Premier Hui Liangyu pointed out that it was a top priority to prevent and mitigate meteorological disasters in this new period. The leaders of some relevant provinces and major agencies and meteorologists discussed the topic and exchanged the experiences in meteorological disasters prevention at the conference. The national program for preventing meteorological disasters from 2007 to 2010 was revised at the conference. This event increased governmental and public awareness of meteorological disasters in China.

CMA cooperates with a wide range of agencies in the certification of national comprehensive disaster prevention projects for the 11th 5-year National Development Plan period and revision of the National Emergency Response to Natural Disasters. This work is an important part of the national disaster prevention & mitigation work.

e. Research Progress

The causes of typhoon-induced disasters and their assessment methods were studied in the past year. A set of disaster economic loss indices (DELI), including disaster loss degree (DLD) and environmental instability (EI) was identified to analyze the trend of economic loss as result of typhoon disasters. The result shows that DELI is a reasonable element in making economic loss assessment, which is not limited by temporal and special factors and it is easy for comparisons. Based on disaster system theory, in combination of wind, rain, water and tide conditions, typhoon disaster chain model in Fujian was built up, including 3 continuous and simultaneous disaster chains, i.e. typhoon-winds, typhoon-storm-floods and storm surges. Analysis on typhoon Longwang showed that disaster was mostly due to the heavy precipitation induced by topographic effects and weak cold-air intrusion from the north.

HONG KONG, CHINA

In Hong Kong, China, a website on "Aviation-weather Disaster Risk Reduction" was set up for aviation stakeholders and for Members in RA II and RA V to evaluate the benefits of extended (24-48 hours) aviation weather forecasts and warnings for tropical cyclones. Apart from a collection of cyclone warning tracks and advisories from major meteorological and NWP centres, forecasts of weather conditions, e.g. crosswind and turbulence, that could bring

disruption to airport operation are also provided using the Hong Kong International Airport as an example.

A warning panel on localized gales over Hong Kong for the Home Affairs Department was developed for trial operation to facilitate decision-making on the opening of temporary shelters for people affected by inclement weather during the passage of tropical cyclones. A specialized "Weather Information for Schools" webpage was also introduced to provide the latest weather forecasts and warnings, rainfall distribution, regional wind condition as well as other relevant information to enable school teachers, parents and students to better plan their activities under inclement weather conditions.

In response to the evolving needs of the general public, a comprehensive review of the tropical cyclone warning system was conducted in late 2006. In the process, views of the public and major stakeholders were extensively collected through a series of meetings and surveys. An advisory committee comprising local academics and scholars from different disciplines was established to evaluate the warning system from the social, political and cultural angles. Based on the results of the review and balancing the needs of different user sectors, revised criteria for operating the warning system were implemented in the 2007 tropical cyclone season.

JAPAN

The UN World Conference on Disaster Reduction (UN/WCDR) was held in Kobe, Hyogo Prefecture, Japan in January 2005, with the chair by the Japanese Minister of State for Disaster Management. The Conference adopted the Hyogo Framework for Action (HFA) 2005-2015 as guidance for disaster reduction activities worldwide in the next decade. To realize mitigation of damage caused by disasters worldwide, the HFA must be implemented through actions based on the ownership of each country and the partnership at the international and regional levels.

Looking at the disaster situations worldwide in the last ten years (1996 to 2005), approximately 90% of the number of the people affected by disasters is occupied in Asia. As the regional center for Asia, the Asian Disaster Reduction Center (ADRC) based in Kobe plays a key role in the promotion of the HFA implementation, particularly in the field of information management, capacity building and networking. The ADRC collects and provides information on disaster reduction in Asia through its website (<http://www.adrc.or.jp>), hosts trainees from member countries, and conducts projects including community-level hazard maps creation and town-watching activities. In addition, member countries meet annually for the ADRC to exchange information and views on activities for the promotion of the HFA.

LAO PDR

Natural Disaster prevention and mitigation is one of measures that contribute to the poverty alleviation strategy of the Lao PDR government.

The NDMC consisting of representative from 12 key ministries and Lao Red Cross: The following ministries such as: WREA, LNMRC, Energy and Mine, Planning and Investment, Science and Technology ministries will be come member of NDMC.

Disaster Management Institutional Strengthening during the year

- NDMC has met and discussed twice in annually (Before and after disaster), or call urgent Meeting in case of emergency.
 - NDMC and PDMC development.
 - Up to now, 139 districts had established DM committee, and there are around 100 villages were set the VDPU at disaster prone districts.
 - 3 provinces (Saravan, Khammouane, and Savannakhet) created the Provincial DM Plan.
- Partnership and Cooperation on DRM

Within the Country:

- UNDMT, IASC.
- UNDP, WFP, UNICEF, UN Avian Influenza Coordination, MRC
- Oxfam Aus, WVL, Care International, CWW, SCA,

Outside the Country:

- ACDM (ARPD, AADMER).
- UNOCHA, UNDAC, UNISDR, UNESCAP, ADPC, ADRC, JAXA,

Celebration of AEAN Day on DM and International Day on DR 10 Th October.

- Meeting and Walking for Health
- Advertising through media means: TV, Radio, and Newspaper.
- Pictures exhibition, questionnaires and fire fighting simulation exercise.
- Banner sticking along the main road in Vientiane Capital

At least 4 times a year Disaster Risk Management course had been conducted for local disaster management committees, police, and army and media staffs. CBDM course also conducted for District disaster management committees and communities at the village level under the project cooperated with NGOs.

Flood preparedness planning training guideline had developed and conducted for the provincial disaster management committees at flood prone provinces in central and southern part of the country under MRC project.

Flood preparedness Project NongBok , Khammouane province

- Publish Training Manual on Flood Preparedness in Lao language and distribute
- Conduct one Provincial Training Course on Planning and Implementation of Flood Preparedness Program for Khammouane PDMC
- Preparation of Flood Preparedness
- Program in Khammouane Province and Nong Bok district
- National and Regional Experience Sharing Workshops

Mainstreaming DRM into School Curriculum :

Implementing the project on Mainstreaming Disaster Risk Reduction into Education Sector in Lao PDR, project cooperative with ADPC. The project theme is to:

- Incorporate DRM modules into the school curriculum.
- Construct all new schools located in hazard - prone areas to higher standards of hazard resilience
- Add features in schools in hazard prone areas for use as emergency shelters such as facilities for water, sanitation and cooking.

MACAO, CHINA

Until September 30, 2007, it is fortunate that there has been no direct attack of various strong natural phenomena on Macao for the past 12 months. This is because of the contributions of Macao government's continuous improvement and its optimization in entire infrastructure on civil protection and operation of related organization structure. It is also the integration of past experience in various emergency responses to Macao's current and actual situations, as well as establishment of measures and decision-making timely aimed at multi-situations. Consequently, there was no great impact on Macao's society, neither serious casualties, nor incidents, even though the entire Framework of Civil Protection System and the mechanism of unified coordination and monitor by the Central Command Center for Civil Protection Action, located in Macao's Security Forces Coordination Office, have not been activated. Moreover, there also has been no large impact on Macao's economic damage, nor attack on Macao's entire social order.

Besides the Civil Protection Plan for Typhoon, there is still another Emergency Response Plan for Rainstorm, which is mainly composed of the public sectors such as the Macao Meteorological and Geophysical Bureau, the Education and Youth Affairs Bureau, the Fire Brigade, the Public Security Police and so on, and is in coordination with the Security Forces Coordination Office. In the last 12 months, there have only been 2 rainstorm signals issued in Macao as shown in table below.

Date	Time	Signal
2007-05-20	10:10 ~ 12:45	Rainstorm
2007-06-10	02:55 ~ 04:00	Rainstorm

According to the regulations of the plan mentioned above, the relevant government departments are requested to submit a report on the casualties, incidents and damages by a specified period.

MALAYSIA

Every year, just before the onset of the northeast or winter monsoon, the National Security Council (NSC) would convene the flood disaster preparation and mitigation meeting. All disaster management agencies involved would assess and report on their preparedness on emergency response, recovery and rehabilitation for the flood disaster victims. Similar preparation and mitigation meetings are also held at the state and district levels.

In order to facilitate the management of disaster, the NSC is tasked to coordinate efforts among the various agencies involved in disaster management. Under the Directive, when a severe disaster occurs meeting will be immediately convened by the Disaster Management and Relief Committee. A Disaster Control and Operation Centre will also be operationalised. The operation of the Disaster Control and Operation Centre will be established based on the disasters which could either be at the District, State or National level. Today, the NSC is taking steps by having meetings at regular intervals with the various agencies to further strengthen cooperation in disaster prevention and preparedness.

The national disaster management strategy is to advance effective coordination and integrated approach in developing the culture of prevention and mitigation as well as providing safety for the community. The main components of the strategy are development, partnership, education and training, community awareness, total Defence / Public Participation and international cooperation

Training activities are organized at national and states level to cater for Social Welfare Officers and volunteers to work in disaster management. Other training modules include working at multi disciplines level, disaster technical management, rehabilitation and other issues related to disaster management. The objectives of these trainings are to provide knowledge and skills for officers and volunteers to work professionally in helping the disaster victims.

NSC also conducted exercises to ensure high level of responsiveness among the relevant agencies involved in disaster management in areas such as decision-making and implementation of procedures and guidelines.

PHILIPPINES

Due to the series of natural disaster events in the country, the government has drafted a four (4) – point action plan for disaster mitigation which include upgrading of the forecasting and warning system, enhancement of public education and information campaign on disaster preparedness, capacity building for local government units in identified vulnerable areas, and establishment of a mechanism of the government and private sector partnership in relief and rehabilitation.

In line with this plan of action, a multi-agency initiatives on hazards mapping and assessment for effective on Community-based Disaster Risk Management which is also known as “READY” project, was conceived and has been implemented. The project covers 27 highly risk provinces. The project has three main components, namely:

- a. multi-hazards mapping focused on the provincial on local levels - production of high resolution hazard maps for floods and rain-induced landslides, storm surge, and earthquake-volcanic related hazards
- b. community – based flood forecasting and warning system – installation of rain and water levels gauges, training the people in the community in data gathering, and facilitate involvement of local government agencies/organizations in disaster preparedness.
- c. Enhanced education and information campaign

The National Disaster Coordinating Council (NDCC) chaired by the Department of National Defense, continue to take a lead and active role in disaster preparedness and prevention. Aside from implementing the action plan for disaster management, the NDCC regularly conducts meetings with various departments and national government agencies to address issues and concerns related to the disaster management.

REPUBLIC OF KOREA

Reckless development with urbanization and, in consequence, increase of impermeable areas worsened the flood disaster causing function failure in infrastructures such as underground facilities, road, electric, gas, and water facilities. Also, community-based disaster management is not practiced due to the recovery-oriented management and less participation of local people. To solve these obstacles and improve current management system, several policies are proposed formulating a new paradigm.

SINGAPORE

1. Progress in Member's Regional Cooperation and Selected Strategic Plan Goals and Objectives

Disaster, Preparedness and Prevention Component:

A 2-day Intensive Level Media Management Training Seminar was organised to equip staff with media handling skills. The training was attended by senior staff members where specific skills and difficulties related to the recent Severe Monsoon Season were discussed.

2. Progress in Member's Important, High-Priority Goals and Objectives (towards the goals and objectives of the Typhoon Committee):

Singapore is normally not affected by tropical cyclones. However, historical records have shown that tropical cyclone "Vamei" came as close as 50 km from Singapore on 27 Dec 2001. There was no significant damage to Singapore as "Vamei" weakened rapidly on approaching land.

Under the backdrop of climate change, a multi-agency task force, the Extreme Weather Group (EWG) was formed to study how the impact of extreme events could be mitigated. In addition, a Climate Change Vulnerability Study has also been initiated to look into impacts of possible sea-level rise and extreme weather conditions.

THAILAND

a. Interaction with users, other Members, and or other components

The 2007 key projects of disaster management are as follows:

+ The continual CBDRM Approach:

Thailand by Department of Disaster Prevention and Mitigation--DDPM has continually implemented project of Community-Based Disaster Risk Management--CBDRM from 2004. Up to date, there are 1,676 at risk communities passing the CBDRM training courses. Furthermore, DDPM has collaborated with the international organizations and related governmental bodies such as German, ADRC, Japan to enhance the disaster management capacities in the communities as well as government officials.

+ OTOS Project:

DDPM, in cooperation with various government agencies and NGO's, has launched the "One tambon One Search and Rescue Team--OTOS Programme" which will result in the establishment, training and long-term maintenance of specially trained search and rescue team in every tambon (sub-district).

The main objective is to establish efficient search and rescue team in emergency during disaster occurrence.

OTOS programme has been expected to complete in 2008. Upon the completion, there will be a SAR team (10 members) based in each tambon (7,255 tambons) throughout the country.

+ The Flashflood and Mudslide Warning Programme:

The continuation of the disaster warning network in flashflood and mudslide prone village called "Mr. Disaster Warning" project to function as a vigilant, a forewarner and a coordinator. Since the inception of the programme, approximately 6,455 villagers were trained and assigned to be "Mr. Disaster Warning". Presently, DDPM initiated "Mr. Disaster Warning Database" to record the information of Mr. Warning.

+ Civil Defense Volunteers (CDVs):

CDVs play an important role in disaster management in disaster response, relief, recovery, prevention, mitigation and preparedness.. CDVs have been also engaged in general activities organized by government agencies at national, provincial and local level. At present, there are

around 835,000 CDVs in the country (about 1.3% of the total population). But due to the increase in number, scale and complexity of disaster, MOI has planed to increase the number of CDV to 2 millions (2% of the population) within the year 2007.

b. Training Progress

+ DDPM's Disaster Prevention and Mitigation Academy (DPMA) has conducted a number of disaster management training courses for DDPM officials, local government staffs and volunteers.

USA

In the Federated States of Micronesia, transportation between islands is almost always by boat. Unfortunately, this type of travel has its risks and too often lives are lost at sea. In order to provide an inexpensive way of bringing weather information and warnings to the citizens of Chuuk lagoon located in the Federated States of Micronesia, an FM radio station was installed at the Weather Service Office in Chuuk. This method would allow the WSO to broadcast 24 hours daily information that would reach about 75% of the population. Plans are in the works to install a repeater site elsewhere in the lagoon so as to expand the reach of this broadcast. This is the first step toward an early warning system in Chuuk. Additionally, this similar set up is also being planned for the Republic of the Marshall Islands.

Both WFO Honolulu and WFO Guam were involved with numerous outreach events during this period. They include the annual Tropical Cyclone and Disaster Preparedness Workshops in Micronesia (10 locations) and the Hurricane Preparedness Workshops in Hawaii.

"StormReady" and "TsunamiReady" are NOAA programs that help communities develop plans to handle all types of severe weather..from tornadoes to tsunamis and provides emergency managers with guidelines on how to improve their hazardous weather operations. These guidelines include: 1) communications, 2) NWS information reception, 3) hydrometeorological monitoring, 4) local warning dissemination, 5) community preparedness, and 6) administrative. The island of Saipan in the Marianas (Guam became StormReady/TsunamiReady in 2006) received this recognition this past August and the counties of Maui and Kauai in the Hawaiian Islands renewed their StormReady/TsunamiReady status for another 3 years.

VIET NAM

Implication to Operational Progress

- Regular maintaining and upgrading the dikes systems and hydraulic structures for dyke system in Bac Bo area and northern part of Central Viet Nam.
- Implement the emergency relief and recovery program for overcome disaster consequences.
- Implement the bamboo's planting to protect dykes from water's waves.
- Implement a program to relocate residents living in disaster prone areas
- Implement a program to improve the safety for fisherman.
- Relocated people & social-economic development Program in disaster prone areas, extremely difficult areas, border areas, island areas, unplanned migration, critical areas of protective forest from 2006-2010. A project for transferring and resettling people from low areas and prone - landslide areas has been carried out in almost provinces.
- Strengthening and improve sea dike in the Northern part of Vietnam from Quang Ninh province to Quang Nam province.

Interaction with users, other Members

A special program has been settled up at National Viet Nam Television (Channel 2) to propagate knowledge and raise the community awareness on natural disasters.

ISDR

The representative of the UN/ISDR appreciated the Typhoon Committee for its making significant contribution to implement the Hyogo Framework for Actions 2005-2015. He reported the outcomes of the first session of the Global Platform for Disaster Risk Reduction held in Geneva in June 2007. He stressed the importance of the climate change adaptation in the area

of typhoon-related disasters so that countries can be better prepared for intensifying tropical storms to reduce their risk. To cope with the new disasters, he shared an idea to form a thematic platform on tropical cyclones which would provide one policy message reporting to the Global Platform for Disaster Risk Reduction. The mechanism will be based on the existing system of the WMO's Tropical Cyclone Programme, in particular the Typhoon Committee as a good model. China, Hong Kong, China, Korea, and WMO provided positive comments (maybe having more comments from other countries).

ADRC

Mr. Hajime Nakano, senior researcher of ADRC explained about ADRC's activities for the Typhoon Committee in 2007.

ADRC has three pillars of main activities, one of which is information sharing, including GLIDE. GLIDE is an effective tool for information sharing from existing data sources, which has now many users and is supported by UNISDR, UNDP and WMO. Recommendation on GLIDE is accepted by the Typhoon Committee Workshop held at Macao, in March 2007. ADRC attended the 2nd WGDPP meeting at Seoul and the integrated Workshop at Bangkok and decided to support TC member countries to build TCDIS data, based on GLIDE. Also ADRC will support an expert mission program, to be planned early next year by WGDPP. ADRC will launch 4 new projects for ASEAN countries for disaster risk reduction next year, one of which is GLIDE associated national disaster database project.

APPENDIX XII

THE REPORT OF WGDPP PARALLEL SESSION

After the 39th Session in Manila, WGDPP had the 2nd Meeting of WGDPP from 22 to 24, August 2007 in Seoul, Republic of Korea and participated in the Integrated Workshop from 10 to 14, September 2007 in Bangkok. Priority activities within the DPP component among the Members during the past year include the followings:

In the 39th Session, WGDPP meeting was held from 11:00 to 12:00 on Dec. 4, 2006 in Manila Hotel, Manila, Philippines. The meeting was attended by 20 participants and convened by Dr. Sam-Kew Roh reviewing the activities of the Members.

Priority activities within the DPP component among the Members include Typhoon Committee database set up, which was agreed to called as TCDIS (Typhoon Committee Disaster Information System) as the first RCPIP of DPP, the 1st Meeting of WGDPP in Seoul 2006 and Joint Workshop in Macao, collaboration for the formulation of the session's Strategic Plans 2007-2011, and annual operation plans in 2007.

On the basis of the information provided by the Members and the Republic of Korea, the WGDPP made plans for TCDIS and agreed to set up TCDIS using database equipment for disaster status analysis and response focusing on the early warning information. The WGDPP agreed to expand TCDIS and to make network with other organizations and related systems in the future.

The Coordination Meeting is agreed to be held to finalize the TCDIS concept, design layout, application method, and enter statistics from 2005 and 2006 in the first and second quarter of 2007 and the Members' experts are to be invited to NIDP, NEMA, Korea to help develop TCDIS in the first or second quarter of 2007.

It was agreed to begin collecting and compiling basic statistics on early warning systems and disaster management information from the Members, then develop and implement pilot web site by the second quarter of 2007. It was also agreed that a pilot web site will be needed to begin collecting and compiling disaster management information from the Members, especially focusing on the early warning systems, then developed and implemented by the second quarter of 2007.

The working group agreed to, if necessary, implement the Expert Mission by dispatching 2-3 experts to help 2-3 Members' actual set up of TCDIS to promote the project and encourage active participation, after the Coordination Meeting and before the 40th Session in 2007.

The 2nd Meeting of WGDPP was held from 22 to 24, August 2007 in Seoul, Republic of Korea. In the 2nd Meeting, the working group agreed on the following points on the TCDIS:

- Completing the TCDIS is a priority of the DPP
- A focal point person and organization in each country is identified or will be identified by the end of August
- NIDP to provide a manual how to fill in the TCDIS
- Members agreed to provide inputs to the TCDIS by early September (before the joint workshop to be held in Bangkok, 10-15 September)

The four major contents, 'About TCDIS', 'Disaster management system', 'Disaster information', 'Warning system' are identified and agreed by members. Members agreed to use GLIDE in the system and ADRC promised to provide supports for members. And collaboration with other working group was explored - joint pilot project with the Hydro WG was proposed.

In the parallel session of the Integrated Workshop in Bangkok, 21 experts from 10 Members and 1 expert from ADRC discussed on TCDIS, Expert Mission, annual operation plan, joint collaboration with WGH, WGM and strategic plan with budget. There were presentations of Member's disaster information. On TCDIS, members agreed to include information on Members' DPP legal frameworks, to clarify the level of disaster information required, and to include metadata in the database, such as relevant topography, geography, population statistics, photographs of damages, satellite pictures etc.

To support TCDIS input, to gather extra information and to see the possibility to expand the use of TCDIS to local level and/or the public, members agreed to have Expert Mission in February or March, 2008. Experts from Republic of Korea, ADRC, etc. (tentative) will be dispatched to Lao PDR, Philippines, Thailand, Vietnam (tentative). Annual operation plan in 2008 was made by members.

APPENDIX XIII

REPORT OF THE TRAINING & RESEARCH COORDINATION GROUP (TRCG) 2007

1. Introduction

1.1 At the 39th Typhoon Committee Session held in Manila, it was decided to change the name of “Typhoon Research Coordination Group” to “Training & Research Coordination Group” (with the same acronym TRCG) to reflect its extended scope of activities towards knowledge transfer and capacity building aspects, and towards a more integrated approach in the incorporation of hydrological and DPP applications.

1.2 According to the updated Terms of Reference, TRCG is to promote research and training activities on various aspects of tropical cyclone analysis and forecasting, including assessment of tropical cyclones’ impacts on Members’ socio-economic development processes, and to encourage cooperation of efforts among Members. Towards this end, TRCG is expected to assist in: (a) identifying scientific and technical problems in the analysis and forecasting of tropical cyclones and their impacts on water resources and measures for disaster prevention and preparedness; (b) facilitating the exchange of experience and knowledge on the latest development and techniques related to the above problems; (c) initiating activities and programmes aimed at improving the technical capacity and capability of Members to better serve the people in the region; and (d) recommending to the Committee priority areas and long-term plans for cooperation in research and training in support of the various KRAs of the Committee’s Strategic Plan.

2. Membership

2.1 As at 30 September 2007, the composition and members list of TRCG are:

Chair: Mr. Edwin S.T. LAI (Hong Kong, China)

Vice Chair: Mr. Mitsuru UENO (Japan)

Members: Ms. Seth VANNARETH (Cambodia)

Mr. XU Yinglong (China)
Mr. KANG Bom Jin (DPR Korea)
Mr. Manoloth SOUKHANOUVONG (Lao PDR)
Mr. LEONG Weng Kun Ivan (Macao, China)
Dr. Wan Azli WAN HASSAN (Malaysia)
Dr. Vicente B. MALANO (Philippines)
Dr. Ki Ryong KANG (Rep. of Korea)
Mr. Chien Wan THAM (Singapore)
Mr. Sampan THAIKRUAWAN (Thailand)
Mr. Roger EDSON (USA)
Ms. Duong Lien CHAU (Viet Nam)

3. Major TRCG Activities in 2007

Roving Seminar / Visiting Lecturers Programme

3.1 Roving seminars have been arranged for capacity building purposes on both research and operational aspects. Knowledgeable experts travel to Members' countries and deliver lectures focused on subjects of current interest to operational centers. A record of all roving seminars previously organized can be found in Annex I.

3.2 Owing to resource constraints, the Roving Seminar in 2007, as in recent years, could only be staged at one single venue and the idea of holding a Tropical Cyclone EPS Workshop in conjunction with the Roving Seminar was not pursued further. Without additional funding sources, such constraints are unlikely to be relaxed in the foreseeable future and the original concept of "Roving" Seminar may need to be re-visited at an opportune time.

3.3 Nevertheless, the eventual seminar that was organized in Manila with the generous support of PAGASA had reported much success and fruitful outcome. Altogether, 43 participants from eight Members attended the 4-day seminar on 5 – 8 September, with three invited lecturers from the US and Japan providing expert training on topics such as microwave satellite images analysis, Doppler radar analysis and tropical cyclones' interaction with monsoon systems. For the first time, evaluation forms were distributed to both trainers and trainees to collect their feedback on the design, contents and organization of the seminar. For potential applications of the training material, nearly all trainees considered the knowledge and techniques acquired would be operationally useful. Even more encouragingly, over 90% of the respondents indicated that they would be able to apply such knowledge and techniques operationally within five years, and nearly 60% of respondents in a matter of two years. Detailed results of the evaluation are incorporated into the seminar report in Annex II.

Review of Web-based Training Material

3.4 Following the discussion at the 39th Session in Manila, TRCG Chair took up an assignment to explore the options of web-based training material on tropical cyclone forecasting. A review of existing websites has been conducted and links to some useful reference material are listed in Annex III for Members' general information. However, as these material are mostly US-based, the emphasis and focus will inevitably be skewed towards knowledge and skills applicable to forecasting techniques in the Atlantic/Caribbean or eastern North Pacific basins.

3.5 To develop similar web-based training material specifically geared towards the Typhoon Committee region, there are inherent obstacles and resource challenges to be faced. One option is to simply link up Members' existing web-based training material, though probably not much readily available at present, through a portal for mutual cross-reference; the obstacle here is the variety of languages used in the region. A more elaborate option is to launch a purposely designed training website for the Typhoon Committee, either through the award of a contract to an IT specialist or through the contribution of one (or more) voluntary Member(s). The primary site is likely to be in English, with Members investing their own resources or acquiring additional support to translate it into their own language. Apart from the resource implications, the website developer also faces the challenges of harnessing a whole spectrum of expertise to cater for the wide-ranging needs and demands within the region: from storm surge to mudflow; from tropical monsoon rain to extratropical transition, from river flooding to urban flash flood, etc.

3.6 In consideration of the needs and difficulties involved, one feasible development option that can be pursued slowly but surely in the long run is to gather on an incremental basis material presented in the course of training activities in the region, either organized directly under TRCG (e.g. Roving Seminar) or through other related training initiatives, and post them onto a centralized location, mostly likely to be hosted by the planned TCS website. Members can then select and extract what they need and translate or develop such material further in their own good time.

Women Forecasters' Attachment to RSMC Tokyo

3.7 With training officially coming under the care of TRCG, the progress of this activity is also included for the first time in the TRCG annual report. Two women forecasters from Cambodia and Philippines successfully completed a training attachment at RSMC Tokyo on 18 – 27 July, details of which can also be found in the RSMC Tokyo annual report.

3.8 While the nomination process and logistic arrangement were mostly handled among WMO, TCS and RSMC Tokyo, an issue did arise this year in relation to whether the original objective of female gender preference should be strictly adhered to when certain Members experienced unexpected but genuine difficulties in sending a woman forecaster to attend. If the requirement is to be relaxed to cater for such circumstances, some guidelines may be necessary to ensure that the spirit of the activity is not compromised and that priority is appropriately assigned to women forecasters for attendance wherever possible. Discussion at the Bangkok Integrated Workshop also touched on the possibility of expanding the programme to all forecasters, male or female, and extending the visits to other major operational centres in the region other than RSMC Tokyo. Further consultation among Members is required to explore such ideas in depth.

Research Fellowship Scheme

3.9 The Research Fellowships have been awarded to Members to promote joint research through the exchange of visiting scientists on a short-term basis with voluntary funding and logistic support by donor countries. One of the merits of the scheme is that the visiting fellow has a chance to work closely with experienced scientists at the host centre, providing an opportunity to transfer knowledge and latest research findings to operational applications. The scheme has worked well on the basis of bilateral cooperation mutually agreed between the host and the applicant. A record of fellowships awarded can be found in Annex IV; reports or papers since published in connection with the scheme are listed in Annex V.

3.10 While requests of fellowships were received from three Members (Malaysia, Thailand and Viet Nam) in 2007, only one hosting offer from Hong Kong, China was made available. The fellowship was eventually taken up by Mr. NGUYEN Dang Quang (Viet Nam) who spent two months (15 Sep – 14 Nov) at the Hong Kong Observatory to study the use of EPS information for tropical cyclone forecasting.

Support of WGM Studies

3.11 In response to a research initiative under WGM, TRCG with the assistance of Macao, China reviewed a paper drafted by WGM Chair on the assessment of trends in tropical cyclone frequency and intensity over the western North Pacific and South China Sea basins, results of which would be collated for submission by WGM at the 40th Session. TRCG Chair also extracted some key cyclogenesis information and research findings from IWTC-6 for consideration and reference by WGM.

4. Recent Research Activities of Members

4.1 A wide range of research activities was undertaken by Members. Details are included in Members' respective country reports. Highlights of some major projects and achievement as provided by individual Members can be found in Annex VI – VIII.

4.2 Resource persons or contact points on specialized research subjects provided by some Members are tabulated for reference in Annex IX.

5. Prioritization of Research Studies

5.1 Following the discussion at the Integrated Workshop held in Bangkok in September 2007 and incorporating recommendations received from the visiting lecturers at the Roving Seminar in Manila, the priority areas for research studies are adjusted and updated as follows:

(a) Meteorology

- (1) improvement of precipitation forecasting related to interaction between tropical cyclones and monsoon, including development and implementation of

- an intensive observation experiment;
- (2) application of Dvorak and microwave satellite image analysis techniques;
- (3) application of radar-based analysis/products for landfalling tropical cyclones;
- (4) application of ensembles of guidance from dynamical models, conceptual models, statistical models and systematic knowledge-based approach;
- (5) use of high resolution numerical models with advanced data assimilation techniques;
- (6) better understanding of TC-related issues across different spatial and time scales, including climatological aspects such as El Nino/La Nina and global warming/climate change;
- (b) Meteorology and Hydrology**
- (7) application of meteorological information for forecasting of river flooding and urban flash flood;
- (8) better understanding of wave, storm surge and marine forecasting;
- (c) Meteorology and DPP**
- (9) development of technical procedures to quantify forecast uncertainties and to convert probabilistic information into effective warnings; and
- (10) development of decision-making tools for DPP purpose including the integration of forecast information with GIS and the use of automated information processing systems.

6. Proposed Plans and Activities in 2008

6.1 “Routine” activities on a yearly basis have since evolved under TRCG, namely Roving Seminars and Research Fellowship Scheme. With the re-naming of TRCG, training activities are now also included in the yearly plans. Instead of having individual activities moving along under their own momentum, and sometimes on an *ad hoc* basis, it seems there are definite advantages in linking activities together under a more strategic approach and to plan their implementation in a more purposeful manner. This also ties in with the Typhoon Committee’s recent effort to establish a Strategic Plan for achieving specific targets in different Key Result Areas (KRAs).

6.2 Under the over-arching objectives of TRCG, the proposal therefore is to create such strategic linkages among the activities through a re-alignment of programme objectives or sharpening of focus as outlined below:

(a) TRCG Training Workshop (new activity, every four years and with a theme of general interest, e.g. “EPS and Information Processing System” proposed for the first workshop in 2008)

To collate research findings in recent years (for example, from the 4-yearly IWTC), identify appropriate research and training needs for the Typhoon Committee region, and to draw up implementation programmes to meet such research and training needs on the basis of a 4-year planning cycle. This also provides an opportunity and forum for the current loosely organized TRCG members to meet and exchange views.

(b) Research Fellowship (similar to current arrangement but with more TRCG guidance)

To create research opportunities for the introduction of new technology/knowledge or for the exchange of technology/knowledge among Members.

(c) Training Attachment to Major Operational Centres (including attachment of women forecasters to RSMC Tokyo) or Attendance of Other Relevant Workshops/Seminars

To enable forecasters from Members to gain experience and exposure at advanced operational centres and to acquire latest knowledge/skills in training workshops/seminars.

(d) Roving Seminar (every year on a roving basis similar to current arrangement, but taking a sabbatical in the year when the TRCG Training Workshop is held)

To provide training opportunities to Members through a series of lectures and practical sessions delivered by visiting experts. Members' needs can also be identified through such roving visits and reported in the TRCG Training Workshop for planning the next cycle of activities.

6.3 On the assumption that the above proposal is endorsed at the 40th Session, TRCG activities in 2008 will include: (i) a Roving Seminar with the inclusion of a media training theme; (ii) attachment of women forecasters to RSMC Tokyo; and (iii) research fellowships as offered by Members on a voluntary basis. Details of proposed activities and their resource implications are included in the overall AOP 2008 compiled and submitted by AWG.

6.4 The first TRCG Training Workshop is tentatively scheduled for early 2009. Subject to endorsement at the 40th Session, planning and preparation work will begin in 2008.

Summary of Roving Seminars

Year	Dates	Venue	Topic	Lecturers
2003	20 – 21 Oct	Seoul	Interpretation of Typhoon Forecasts and Analyses	Dr. H-J Kwon Mr. Nobutaka Mannoji
	22 – 24 Oct	Hong Kong	Interpretation of Satellite Data and Use of Radar Data in Operational Tropical Cyclone Forecasting	Dr. Mark Lander Dr. P.W. Li Dr. B.-J. Sohn
	27 – 29 Oct	Shanghai	Interpretation of Satellite Data and Use of Radar Data in Operational Tropical Cyclone Forecasting	Dr. Mark Lander Dr. P.W. Li
2004	22 – 24 Nov	Beijing	Operational Application of Multi-model Ensemble Typhoon Forecasts	Prof. Johnny C.L. Chan Mr. Nobutaka Mannoji
	25 – 27 Nov	Kuala Lumpur	Operational Application of Multi-Model Ensemble Typhoon Forecasts	Prof. Johnny C.L. Chan Mr. Nobutaka Mannoji
2006	4 – 7 Sep	Ha Noi	Tropical Cyclone Motion and Intensity, and Principles of Dvorak Method	Prof. Johnny C.L. Chan Mr. Joe Courtney Dr. B.-J. Kim
2007	5 – 8 Sep	Manila	Satellite and Radar Analysis Techniques, and Tropical Cyclone Interaction with Monsoon Systems	Mr. Roger Edson Mr. Bart Hagemeyer Dr. Tetsuo Nakazawa

**SUMMARY OF TYPHOON COMMITTEE ROVING SEMINAR 2007
(Manila, Philippines, 5 - 8 September 2007)**

(A) EVENT SUMMARY

I. Organization

1. The Seventh Roving Seminar of the Typhoon Committee was held at the Diamond Room of the Tiara Oriental Hotel, in Makati City, Philippines, from 5 to 8 September 2007.
2. The TC Roving Seminar 2007 was attended by a total of 43 participants, which included 2 from China; 2 from Hong Kong, China; 2 from Malaysia; 3 from Viet Nam; 1 each from Singapore, Republic of Korea and Thailand; 27 from the Philippines; as well as 3 lecturers from the USA and Japan.

II. Opening

The TC Roving Seminar was declared open by Acting Director Martin F. Rellin, Jr. of the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) at the Tiara Hotel on 5 September 2007.

Dr. Olavo Rasquinho, Secretary of the Typhoon Committee delivered his opening message and also read the message of Mr. Edwin S.T. Lai, Chairman of the Training and Research Coordination Group (TRCG).

The Keynote Address of the Secretary of the Department of Science and Technology (DOST), Hon. Estrella F. Alabastro, was delivered by Asec. Carol M. Yorobe of DOST.

III. Adoption of the Program

The Roving Seminar adopted the program (not shown here).

IV. Working Seminar

1. The Roving Seminar officially started with Mr. Bart Hagemeyer of National Oceanic and Atmospheric Administration (NOAA) giving his lecture on Doppler Radar Analysis (Rain and Wind) after which a question-and-answer discussion followed.

Annex II(2)

2. Mr. Roger Edson of NOAA was the second lecturer with a topic on Satellite Analysis (QuikScat and Microwave Imageries) followed by a question-and-answer forum.
3. Dr. Tetsuo Nakazawa of MRI/Japan Meteorological Agency (JMA) gave his lecture on Interaction of Tropical Cyclones with Monsoon Systems and was followed by a question-and-answer discussion.
4. The Roving Seminar also included a visit at the facilities of the Weather and Flood Forecasting Center of PAGASA from after which a lecture was given to the participants by Messrs. Robert Sawi and Robert Rivera, who are both PAGASA forecasters.
5. The three lecturers gave the second parts of their respective lectures on the next succeeding days of the seminar.

The participants gave a warm appreciation to the three lecturers for their outstanding presentations, which provided the participants new insights on the topics discussed.

V. Proposals/Recommendations

Round-up discussions among the participants and lecturers resulted in a number of proposals and recommendations as shown in Section (B).

VI. Closure of the Roving Seminar

The participants from the member-countries of the Typhoon Committee expressed their gratitude and appreciation to the Government of the Philippines and the PAGASA for the successful hosting of the Roving Seminar, for their excellent arrangements and warm hospitality.

The Closing Remarks was given by Dr. Prisco D. Nilo, Chairman of the Typhoon Committee, after a brief remark by Dr. Olavo Rasquinho and the presentation of certificates of completion to the participants. Gifts or tokens were also distributed to the foreign participants and lecturers. The Roving Seminar was closed on 8 September 2007.

(B) SEMINAR RECOMMENDATIONS

- 1) Radar module: (a) more technical training in different uses of the Doppler radar; (b) separate training for radar operators to coincide with the Roving Seminar; (c) training for a smaller group of participants to give more focus and more days in a real workshop.

Annex II(3)

- 2) Satellite module: (a) more practical training on Dvorak analysis; (b) general satellite interpretation and tropical cyclone analysis.
- 3) Monsoon module: (a) research study on systems that develop to the west of the Philippines; (b) quantitative rainfall forecast through the use of models, nowcasting techniques, satellites and radars; (c) mesoscale systems outside the tropics, or rainfall events not related to the tropics.
- 4) Others: (a) possibility to include some knowledge on current status of probabilistic forecast; (b) topics on proper utilization of numerical models for NMHSs in future roving seminars; (c) use of ensemble forecasts to understand variations of different models; (d) accommodating more participants and afterwards they can share the knowledge to others; (e) subjects related to aeronautical meteorology; (f) effects on tropical cyclones due to global warming; (g) separate training for research and operational groups; (h) wave, storm surge and marine forecasting; (i) intensity and intensification of tropical cyclones; (j) tropical cyclones landfall impact and forecasting aspects for disaster preparedness; (k) modelling and statistical methods for track and intensity forecasts; (l) NWP forecasts augmented by systematic or knowledge-based approach and highly experienced chart analysis.

Prioritization as suggested by lecturers:

Mr. Edson: 1) combination of ensemble and numerical forecasting, understanding the behaviour of TCs; 2) understanding of waves, storm surge and marine forecasting; 3) rainfall forecasting; 4) knowledge-based systematic approach to tropical cyclone forecasting.

Mr. Hagemeyer: 1) focus on applications and better use of radars for landfalling tropical cyclones; 2) quantitative rainfall forecasts several days in advance; 3) storm surge and marine forecasting.

Dr. Nakazawa: 1) a balanced understanding of events across different spatial and time scales; 2) wider coverage for El Nino and La Nina.

Other feedback received from lecturers: 1) capacity building for running non-hydrostatic models for tropical cyclone forecasting; 2) use of ensemble techniques to ascertain forecast uncertainties; 3) development of radar-based products and applications for forecasts and warnings of tropical cyclones.

(C) SEMINAR EVALUATION

All three lecturers and 38 participants (though not all gave answers to all questions) returned their evaluation forms.

Annex II(4)

On seminar arrangement and logistics, trainers and trainees were asked to rate 10 various aspects as “below”, “met” or “exceeded” expectation. The top two aspects were “refreshments” and “helpfulness and friendliness of organizers”; the relatively low scores, just meeting expectation, were “accommodation” and “funding arrangements”.

On the contents and delivery of the three training modules, and on a scale of 1 to 5, the following average scores were obtained from the trainees:

Level of interest:		4.7	
Contents:			4.5
Organization:		4.4	
Presentation:		4.6	
Training and practical material:	4.4		
Language and understanding:		4.6	
Overall effectiveness:	4.3		

For a simplistic interpretation of the scores, both the level of interest and achieved effectiveness were high. In search of room for improvement, such as for effectiveness to match the level of interest, may be more attention should be given to the organization and preparation of training material. The view was also shared by one of the lecturers during the discussion sessions, who suggested that training notes (3-4 pages) be distributed describing the overview of presented material to give participants a better idea of what topics were to be discussed.

On the designs and structures of the three modules, trainees were asked to make some qualitative assessment. In summary, the radar and satellite modules were both just about right in terms of objectives, scope of coverage, technical level, and theoretical vs. practical emphasis; but both were considered to be too short in duration, reflecting a popular demand for more discussion, interaction with trainers, and hands-on practical sessions. The monsoon module was found to be too wide in coverage and slightly too theoretical; probably the result of mixing a topic with slightly more research flavour for a group of predominantly operational trainees.

For potential applications of the training material, nearly all trainees considered the knowledge and techniques acquired would be operationally useful. Even more encouragingly, over 90% of the respondents indicated that they would be able to apply such knowledge and techniques operationally within five years, and nearly 60% of respondents in a matter of two years.

Links pointing to some web-based training and reference materials on TC forecasting:

http://www.meted.ucar.edu/topics_hurricane.php

http://www.bom.gov.au/bmrc/pubs/tcguide/global_guide_intro.htm

<http://www.nrlmry.navy.mil/training-bin/training.cgi>

<http://rammb.cira.colostate.edu/wmovl/VRL/PPTLectures/TROPICAL/>

or

<http://rammb.cira.colostate.edu/wmovl/VRL/PPTLectures/Lectures.htm>

<http://www.isse.ucar.edu/trmm/presentations.html>

https://metocph.nmci.navy.mil/jtwc/jtwc_fcst_env_files/frame.htm

Summary of Awarded Research Fellowships

Subject	Fellow	Host	Period
Analysis of evolution of landfalling tropical cyclones with a view to developing forecast guidance for wind and rain	Mr. XUE, Jianjun (China)	Hong Kong Observatory	1 Feb – 31 Mar. 2001
TC track forecasting with use of super-ensemble	Dr. PENG, Taoyong (China)	Korea Meteorological Administration	15 Jun – 15 Nov 2001
Near real-time analysis of the wind structure of tropical cyclones	Dr. Nathaniel T. SERVANDO (Philippines)	Hong Kong Observatory	5 May – 4 Jul 2002
Numerical modelling on typhoon intensity change	Miss YU, Hui (China)	Kongju National University and Korea Meteorological Administration	15 Jul – 15 Sep 2002
Tropical cyclone track forecasting method	Dr. KANG, Bom Jin Dr. KIM, Tae Jin (DPR Korea)	Shanghai Typhoon Institute	Feb – Mar 2001 Oct – Nov 2002
Analyses on the responses of extratropical transition of tropical cyclone to its environment	Dr. Vicente B. MALANO (Philippines)	Korea Meteorological Administration	Jun – Aug 2004
Effect of tropical cyclone bogussing on model analysis and forecasts	Ms. WANG, Dongliang (China)	Hong Kong Observatory	11 Oct – 10 Dec 2004
Evaluation of the model performance in typhoon prediction in the high-resolution global model (T426L40)	Ms. Sugunyanee YAVINCHAN (Thailand)	Kongju National University and Korea Meteorological Administration	1 Aug – 30 Oct 2005

Summary of Awarded Research Fellowships (cont'd)

Subject	Fellow	Host	Period
Impact study of Moisture Data on TC forecasting in South China Sea and Western North Pacific	Dr. Vicente B. MALANO (Philippines)	Hong Kong Observatory	20 Sep – 19 Nov 2005
Using ensemble prediction system (EPS) information in tropical cyclone forecasting	Ms. CHEN, Peiyan (China)	Hong Kong Observatory	13 Oct – 12 Dec 2006
Numerical simulation of Typhoon RUSA with a very high resolution mesoscale model, and calibration of intensity of typhoon with Kalman filtering	Mr. HOA, Vo Van (Viet Nam)	Korea Meteorological Administration	Jun – Aug 2006
Use of EPS information in TC forecasting	Mr. NGUYEN, Dang Quang (Viet Nam)	Hong Kong Observatory	15 Sep – 14 Nov 2007

TRCG Publications / Papers

Malano, V.B., W.K. Wong and E.S.T. Lai 2006: Effect of Moisture Data to the Numerical Simulation of Tropical Cyclone in the Western North Pacific. Submitted to Typhoon Committee Annual Review 2005.

Peng, T.-Y., H.-J. Kwon, W.-J. Lee, and J.-H. Lim, 2005: A systematic approach to tropical cyclone track. *The International Journal of Systems & Cybernetics*. **34**, 681-693.

Servando, N.T., P.W. Li and E.S.T. Lai, 2003: Near Real-time Analysis of the Wind Structure of Tropical Cyclones. Typhoon Committee Annual Review 2002 (in CD form)

Wang, D.L., W.K. Wong and E.S.T. Lai, 2005: A Study on Tropical Cyclone Bogussing Strategies in NWP Model Analysis and Forecast. Typhoon Committee Annual Review 2004.

Xue, J.J., 2002: Structural and Diagnostic Analyses of Landfalling Tropical Cyclones near Hong Kong in 1999 and 2000. Typhoon Committee Annual Review 2001, pp. 153-161

Yu, Hui and H. Joe Kwon, 2005: Effect of TC–Trough Interaction on the Intensity Change of Two Typhoons. *Weather and Forecasting*. **20**, 199–211.

**Hong Kong Observatory (HKO)
Research Activities in 2007**

The following tropical cyclone related research projects were undertaken at HKO in 2007:

- (a) A study on the recent decline of typhoon activities in the South China Sea was carried out and the main results were presented in the International Conference on Climate Change held in Hong Kong in May 2007.
- (b) An automatic windshear alerting algorithm in HKO's Windshear and Turbulence Warning System, based on data from the infrared Doppler Light Detection And Ranging (LIDAR), was developed to provide windshear alerts at the Hong Kong International Airport (HKIA) under conditions of rain-free areas between rainbands of tropical cyclones.
- (c) Computation of turbulence intensity profiles in the vicinity of the Hong Kong International Airport using LIDAR and mini-SODAR data with applications to tropical cyclone cases.
- (d) A joint research project between HKO and the Physics Department of the Chinese University of Hong Kong was conducted to develop a statistical scheme for tropical cyclone intensity prediction using NWP model products.

**Japan Meteorological Agency (JMA)
Research Activities in 2007**

1. Development of a Typhoon Ensemble Prediction System

Japan Meteorological Agency (JMA) has developed a new ensemble prediction system (EPS), Typhoon EPS, aimed to further improve both deterministic and probabilistic forecasts on tropical cyclone (TC) movements. Its full operation will start no later than the beginning of the typhoon season in 2008, following the preliminary operation which has been conducted since May 2007.

In the Typhoon EPS, 11 initial fields are prepared for integration by the JMA global spectral model (GSM) with horizontal spectral truncation TL319 (L representing the linear grid) and 60 vertical layers. The EPS focus on TCs in the western North Pacific Ocean and the South China Sea (0-60N, 100E-180E), and runs four times a day (not fixed) at 0000, 0600, 1200, 1800UTC with the forecast range of 132 hours (not fixed), which covers 5-day forecasts. A singular vector method is employed to make initial perturbations.

In numerical experiments prior to the preliminary operation, statistical verifications on TC track forecasts have shown that deterministic forecasts by the ensemble mean of Typhoon EPS, have smaller errors than those by deterministic GSM or Typhoon model beyond the first 3 days. More importantly, verifications have shown that the Typhoon EPS provides accurate TC strike probability and informative spread-skill relationship.

Future issues are 1) the introduction of a stochastic physics method, which addresses the forecast uncertainties due to the imperfection of a NWP model itself, and 2) the improvement of applications, which leads to more beneficial use of the EPS in both deterministic and probabilistic ways.

2. An Improvement of the Initialization Scheme for Tropical Cyclones

JMA has confirmed an improvement of the numerical tropical cyclone (TC) track prediction by a modification to the operational initialization scheme for TCs (Typhoon-Bogus scheme) in the global spectral model (GSM-TL959L60). In the Typhoon-Bogus scheme, several "pseudo" observational data are deployed inside a circle centered at the observed center position of the TC. These data are assimilated in the 4D-VAR global data assimilation process. The radius of the circle is called "Bogus-Radius". While the Bogus-Radius for each TC with Tropical Storm (TS) intensity or higher is specified with a function of the radius of 30kt winds and the Coriolis parameter at the center of the TC, a fixed radius (360km) has been used for the Bogus-Radius for tropical depressions (TDs), since TDs have no analysis of the radius of 30kt winds.

However, the fixed Bogus-Radius for TDs occasionally has worked insufficiently and failed in correcting erroneous positions of TDs in the first guess field appropriately. To alleviate the problem, a function has been introduced for TDs so that their Bogus-Radius varies depending on their strength and latitudinal location. The Bogus-Radius for TDs is now defined as a function of their central pressure and the latitude of their center position, with a lower limit at 360km. The function has been determined based on a regression analysis of parameters for TCs which have just developed to the TS intensity. With this modification, TC track predictions by GSM- TL959L60 show significant improvement in the case of Typhoon RANANIM in 2004.

The new function for Bogus-Radius in case of TDs will be adopted in GSM-TL959L60 at the beginning of its operation in November 2007.

3. Numerical study on the heavy rainfall associated with Typhoon Meari (2004)

A heavy rainfall event occurred in the mountainous Kii Peninsula Japan, associated with Typhoon Meari in 2004, has been investigated using the JMA nonhydrostatic model (JMA-NHM) with a horizontal resolution of 1 km. Precipitation efficiency is calculated for elucidating the mechanisms of the heavy rains. The efficiency, defined as the amount of rainfall reaching the ground divided by the sum of vertically accumulated condensation and deposition, is higher in the period of heavy precipitation. The larger rainfall efficiency is attributed to the greater rate of conversion of cloud water to rainwater via accretion of cloud water by rain. Higher clouds in moving precipitation systems provide raindrops for the accretion of cloud droplets in lower clouds in the stationary precipitation system.

4. Numerical simulations of tornado-producing supercell storm and tornado associated with Typhoon Shanshan (2006)

On 17 September 2006, three tornadoes hit Kyusyu Island, western Japan, during the passage of the outer rainband that accompanied Typhoon Shanshan (2006). In order to reveal the environmental field, tornado-producing storm and the generation processes of tornadoes, the numerical simulations were conducted. The simulated rainband on the right-front quadrant of the typhoon consists of a number of isolated active convective cells as Radar observed. Some convective cells have the hook pattern and bounded weak region of hydrometeors, which are identical to the mini-supercell as showed in many previous studies. The simulation with a horizontal grid spacing of 50 m successfully reproduced tornado spawned by the mini-supercell. The diameter of the vortex near the surface is about 500 m. The vertical vorticity reached 0.7 s⁻¹ and surface pressure drop was about 12 hPa. The model results indicate that the enhancement of low-level vertical vorticity is essential to the genesis of the tornado.

5. Numerical study on the vertical tilt of typhoon vortex

The relationship between the vertical tilt of typhoon vortex and asymmetric components of its thermodynamic fields is investigated in a quantitative manner based on the numerical simulation data obtained for Typhoon Chaba in 2004. In order to understand the mechanism by which the tilt occurs, a Lagrangian trajectory analysis as well as a two-dimensional theoretical formulation are developed and applied to the numerical model data. The results suggest that the robust features of vortex tilt observed in the simulated data are strongly linked to the asymmetries of the thermodynamic fields caused by the environmental vertical wind shear.

6. Investigation of sea state dependency of momentum flux in high wind conditions by an atmosphere-wave coupled model

The effect of the sea state (ocean wave) on typhoon intensity is investigated, by numerical experiments with an atmosphere-wave coupled model. For the study the JMA-NHM is coupled with the third generation wave model MRI-III. Since there are many formulae of sea state dependency of momentum flux, three typical formulations for drag coefficient were tested and compared each other. While the results showed different evolutions of momentum flux among the three coupled simulations, the following two features were commonly observed in the coupled simulations: (a) weakening of surface wind by increased drag coefficients, (b) enhancement of frictional convergence and shrinking of eyewall rainbands, which lead to stronger storm intensities at later times than the uncoupled case. Further investigation is undergoing to understand the mechanisms responsible for these features.

**Korea Meteorological Administration (KMA)
Research Activities in 2007**

1. Predicting the extratropical transition of typhoon

A number of tropical cyclones have a trend to move into the mid-latitudes and some of them (about 27%) transform into extratropical cyclones. This process is referred to as extratropical transition (ET). As a result of this ET, the cyclones produce intense rainfall and strong winds. KMA is developing an objective method to determine the extratropical transition of tropical cyclones over the North western Pacific following Evans and Hart's scheme which is based upon the cyclone phase space (CPS) using the three parameters: the motion relative thickness asymmetry of the storm, 600-900hPa thermal wind and 300-600hPa thermal wind. This ET prediction system is under verification to make sure of its performance and will be put into operation for the typhoon forecasters.

2. Typhoon-Ocean Interaction: Ocean heat content and typhoon intensity

The upper oceanic thermal structure has been suggested as an indicator of the typhoon intensity change. KMA has been carrying out a study of relationship between the typhoon intensity change and ocean heat. A typhoon-related Oceanic Heat Content Index (TOHCI) was defined to represent the ocean thermal heat energy. The TOHCI was calculated by integrating the vertical temperature of the layer whose value is over 26°C, which is considered as a potential energy source for the typhoon to be intensified over the ocean. The water temperature data from the International ARGO (Array for Real-time Geostrophic Oceanography) Project were used in this study and the analysis of central pressure. TOHCI showed that the higher thermal energy of ocean could more decrease the central pressure of typhoon, indicating that TOHCI could be an excellent potential indicator to predict the typhoon intensity change.

3. Typhoon model development using the WRF

KMA's global and regional models as well as one barotropic model have been used for typhoon forecast. However, the performance of these models in typhoon prediction has not been fully satisfied with increasing the necessity of new dynamic model which is solely devoted to typhoon prediction. The National Institute of Meteorological Research (new name of the Meteorological Research Institute, METRI) of KMA set the goal to develop new typhoon model called TWRF (Typhoon-WRF) based on the WRF model of NCAR, NOAA, USA. The KMA-WRF (KWRF) began to run as the KMA's new regional operational model on May 2007, and TWRF is based on KWRF. TWRF will use the optimized grid and physics scheme to get the best performance in typhoon prediction, and the GFDL-type typhoon bogus scheme will be implemented to improve the initial field within and around the Typhoon.

List of Resource Persons (as at 30 September 2007)

Member	Specialties	Name	E-mail	Affiliation
(A) Data Assimilation				
China	TC vortex initialization	LIANG, Xudong	Liangxd@mail.typhoon.gov.cn	Shanghai Typhoon Institute
	TC intensity estimation by radar, satellite, SSMI and QuikScat	GAO, Shuanzhu ZHOU, Bing	gaosz1129@sina.com bingz@cma.gov.cn	National Meteorological Center
	Radar data quality control and assimilation scheme	GONG, Jiandong	gongjd@cma.gov.cn	National Meteorological Center
Hong Kong, China	TC data assimilation	W.K. WONG	wkwong@hko.gov.hk	Hong Kong Observatory
Japan	TC vortex initialization	Mitsuru UENO Masaru KUNII	mueno@mri-jma.go.jp mkunii@mri-jma.go.jp	Meteorological Research Institute
	Satellite data analysis	Tetsuo NAKAZAWA	nakazawa@mri-jma.go.jp	Meteorological Research Institute
	TC intensity estimation	Tetsuo NAKAZAWA	nakazawa@mri-jma.go.jp	Meteorological Research Institute
	Data analysis related to extratropical transition	Naoko KITABATAKE	nkitabata@mri-jma.go.jp	Meteorological Research Institute
(A) Data Assimilation (cont'd)				

Member	Specialties	Name	E-mail	Affiliation
Republic of Korea	Typhoon bogussing	YOO, Hee Dong	hyoo@kma.go.kr	Korea Meteorological Administration
		KWON, H. Joe	hjkwon@kongju.ac.kr	Kongju National University
	Satellite data analysis	PARK, Jong Seo	jspark@kma.go.kr	Korea Meteorological Administration
	Radar data analysis	LEE, Jong Ho	jhlee@kma.go.kr	Korea Meteorological Administration
USA (western North Pacific)	TC analysis, satellite interpretation, use of microwave imagery and scatterometer data	Roger EDSON	roger.edson@noaa.gov	NOAA National Weather Service Guam
(B) Modelling				
China	Numerical schemes of TC model	DUAN, Yihong	duanyh@mail.typhoon.gov.cn	Shanghai Typhoon Institute
	TC model physics and bogussing schemes	MA, Suhong	mash@cma.gov.cn	National Meteorological Center
	Ensemble track forecasting	ZHOU, Xiaqiong	zhouxq@mail.typhoon.gov.cn	Shanghai Typhoon Institute
	Typhoon modelling	LIANG, Xudong	Liangxd@mail.typhoon.gov.cn	Shanghai Typhoon Institute
(B) Modelling (cont'd)				

Member	Specialties	Name	E-mail	Affiliation
Hong Kong, China	TC modelling and bogussing schemes	W.K. WONG	wkwong@hko.gov.hk	Hong Kong Observatory
Japan	Numerical schemes of TC model	Wataru MASHIKO	wmashiko@mri-jma.go.jp	Meteorological Research Institute
	Physical processes of TC model	Mitsuru UENO Akihiko MURATA	mueno@mri-jma.go.jp amurata@mri-jma.go.jp	Meteorological Research Institute
	TC-ocean interaction (incl. mixed-layer ocean and ocean surface wave modelling)	Nadao KOHNO Akiyoshi WADA	nkohno@mri-jma.go.jp awada@mri-jma.go.jp	Meteorological Research Institute
	Storm surge modelling	Nadao KOHNO	nkohno@mri-jma.go.jp	Meteorological Research Institute
Republic of Korea	Global NWP model tracks	YOO, Hee Dong	hyoo@kma.go.kr	Korea Meteorological Administration
	Ensemble track forecasting	YOO, Hee Dong	hyoo@kma.go.kr	Korea Meteorological Administration
	Typhoon modelling	YOO, Hee Dong	hyoo@kma.go.kr	Korea Meteorological Administration
		KWON, H. Joe	hjkwon@kongju.ac.kr	Kongju National University
		BAIK, Jong Jin	jjbaik@snu.ac.kr	Seoul National University
(C) Forecasting				

Member	Specialties	Name	E-mail	Affiliation
China	Track and intensity forecasting	LEI, Xiaotu	Leixt@mail.typhoon.gov.cn	Shanghai Typhoon Institute
	Long-range prediction of typhoon	XU, Ming	Xum@mail.typhoon.gov.cn	Shanghai Typhoon Institute
Hong Kong, China	TC climatology and best track analysis	W.H. LUI	whlui@hko.gov.hk	Hong Kong Observatory
	TC intensity, structure and landfall impact	Edwin S.T. LAI	stlai@hko.gov.hk	Hong Kong Observatory
	Long-range forecasting of TCs	S.M. LEE	smlee@hko.gov.hk	Hong Kong Observatory
	TC motion, intensity, size, modelling and seasonal prediction	Johnny C.L. CHAN	Johnny.Chan@cityu.edu.hk	City University of Hong Kong.
Republic of Korea	Track and intensity forecasting	YOO, Hee Dong	hyoo@kma.go.kr	Korea Meteorological Administration
		KWON, H. Joe	hjkwon@kongju.ac.kr	Kongju National University
		BAIK, Jong Jin	jjbaik@snu.ac.kr	Seoul National University
		SOHN, Keon Tae	ktsohn@pusan.ac.kr	Pusan National University
(C) Forecasting (cont'd)				
Republic of Korea	Long-range prediction of typhoon	KWON, H. Joe	hjkwon@kongju.ac.kr	Kongju National University

Member	Specialties	Name	E-mail	Affiliation
		SOHN, Keon Tae	ktsohn@pusan.ac.kr	Pusan National University
Singapore	Seasonal prediction of typhoon	LIM, Tian Kuay	LIM_Tian_Kuay@nea.gov.sg	Meteorological Services Division, National Environment Agency
USA (western North Pacific)	TC analysis and forecasting, seasonal prediction, use of microwave imagery and scatterometer data, Dvorak technique	Mark LANDER	mlander@uog9.uog.edu	University of Guam (WERI)
(D) Application				
Hong Kong, China	TC warning system	Hilda LAM (Mrs)	hildalam@hko.gov.hk	Hong Kong Observatory
	TC warning operations	M.C. WONG	mcwong@hko.gov.hk	Hong Kong Observatory
	TC information visualization and display systems	C.M. TAM	cmtam@hko.gov.hk	Hong Kong Observatory
USA (western North Pacific)	TC warning and disaster preparedness, seasonal prediction, Dvorak technique	Chip GUARD	chip.guard@noaa.gov	NOAA National Weather Service Guam

APPENDIX XIV

Review of the 2007 Typhoon Season

Provided by RSMC-Tokyo

As of the end of October, twenty tropical cyclones (TCs) of tropical storm (TS) intensity or higher had formed in the western North Pacific and the South China Sea in 2007. This total is lower than the 30-year average* (23.0 by the end of October 2007). Of these twenty, eleven TCs reached typhoon (TY) intensity, three grew to severe tropical storm (STS) intensity, and six attained TS intensity (see Table 1).

Table 1 List of tropical cyclones reaching TS intensity or higher in 2007

Tropical Cyclone			Duration		Minimum Central Pressure				Max Wind
			(UTC)	(UTC)	(UTC)	(N)	(E)	(hPa)	(kt)
TY	KONG-REY	(0701)	010000 Apr	- 060000 Apr	031200	17.7	144.3	960	80
TY	YUTU	(0702)	171800 May	- 230000 May	201200	19.8	135.3	935	95
TS	TORAJI	(0703)	040600 Jul	- 051800 Jul	041800	19.6	109.2	994	35
TY	MAN-YI	(0704)	090000 Jul	- 160000 Jul	120000	21.0	129.2	930	95
TY	USAGI	(0705)	290600 Jul	- 040600 Aug	010000	25.1	137.1	945	90
TY	PABUK	(0706)	050600 Aug	- 090600 Aug	070900	22.1	122.7	975	65
TS	WUTIP	(0707)	080000 Aug	- 082100 Aug	080600	21.1	124.1	990	35
TY	SEPAT	(0708)	121800 Aug	- 191200 Aug	160000	17.3	126.5	910	110
TY	FITOW	(0709)	290000 Aug	- 080000 Sep	310000	26.5	155.2	965	70
STS	DANAS	(0710)	070600 Sep	- 111800 Sep	101800	40.4	154.7	990	55
TY	NARI	(0711)	130000 Sep	- 170000 Sep	141200	25.7	127.2	935	100
TY	WIPHA	(0712)	160000 Sep	- 191200 Sep	171800	23.9	124.6	925	100
TS	FRANCISCO	(0713)	231200 Sep	- 250600 Sep	231200	19.3	114.0	990	40
STS	LEKIMA*	(0714)	300000 Sep	- 040600 Oct	020000	17.0	111.6	975	60
TY	KROSA*	(0715)	020000 Oct	- 081200 Oct	060000	23.7	123.5	920	105
TS	HAIYAN*	(0716)	060000 Oct	- 061800 Oct	060000	28.5	170.8	998	35
TS	PODUL*	(0717)	060600 Oct	- 070000 Oct	060600	32.4	155.5	990	35
TS	LINGLING*	(0718)	120600 Oct	- 150600 Oct	121200	25.7	172.4	994	45
TY	KAJIKI*	(0719)	190600 Oct	- 220600 Oct	201800	26.0	142.1	945	90
STS	FAXAI*	(0720)	260000 Oct	- 271800 Oct	270500	32.8	138.8	980	55

*Results based on operational analysis data (rather than post-analysis data).

The TC season this year began in April with the formation of KONG-REY (0701). From April to May, two TCs formed in the western North Pacific in response to enhanced convective activity there.

From June to July, convective activity turned inactive over the sea around the Philippines and in the South China Sea, and the subtropical high was weak over the south of Japan. Of the three TCs that formed in this period (the 30-year average* is 5.8), two formed over the sea east of 140°E and one in the South China Sea. MAN-YI (0704) and USAGI (0705) moved northwestward and hit Japan, bringing serious damage to the country.

After August, convective activity became enhanced over the sea east of the Philippines, and the subtropical high turned strong over the sea south of Japan. Many TCs, which formed over the sea east of the Philippines and in the South China Sea, moved westward and hit China and Vietnam. PABUK (0706), WUTIP (0707), SEPAT (0708), WIPHA (0712), LEKIMA (0714) and KROSA (0715) brought serious damage to some countries including China, the Philippines and Vietnam. On the other hand, FITOW (0709) and NARI (0711) moved northward, bringing serious damage to Japan and Korea. After HAIYAN (0716), all four TCs except FAXAI (0720) formed over the sea east of 140°E.

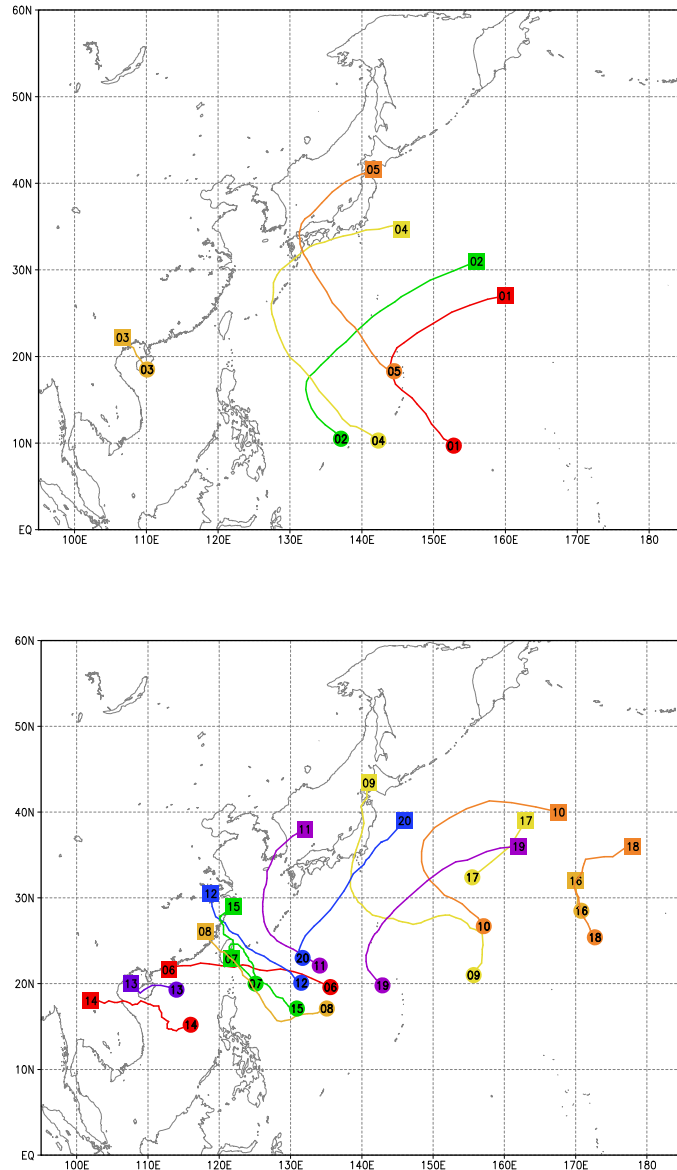


Figure 1 Tracks of the 20 named TCs in 2007
The upper figure shows the five TCs that formed from April to July, and the lower one shows the fifteen that formed after August. The numbered circles represent the genesis point of each named TC, while the squares show the dissipation point. The numbers indicate the last two digits of the identification number for each named TC.

In 2007 (as of the end of October), the mean formation latitude and longitude* were 19.7°N and 139.8°E, which is north and east of the 30-year average** of 16.2°N and 136.9°E. The mean duration*** for TCs of TS intensity or higher was 4.0 days, which is shorter than the 30-year average* of 5.2 days.

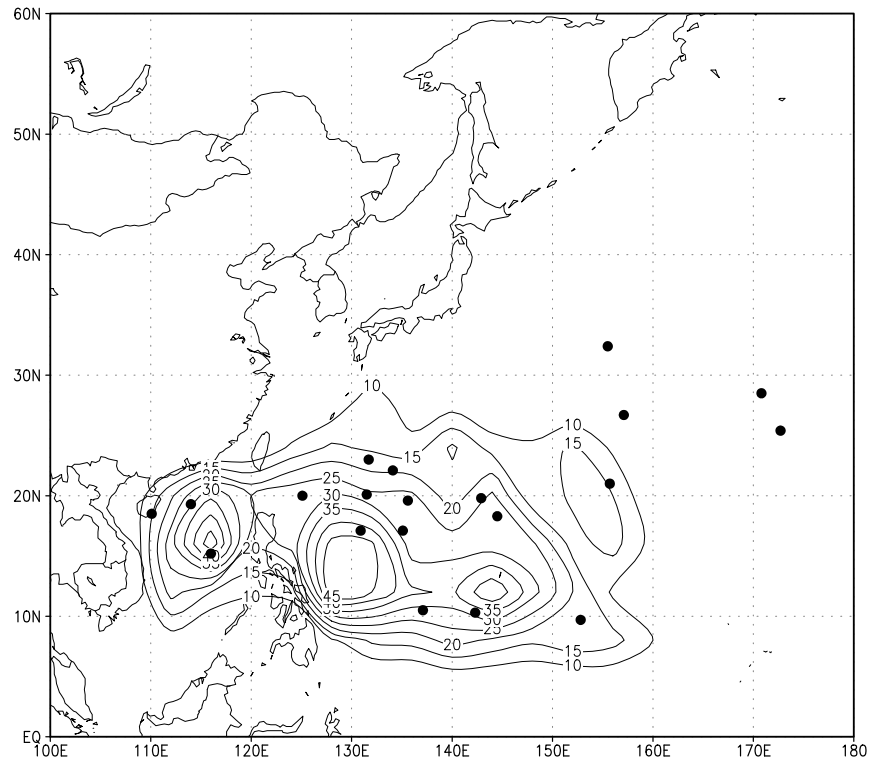


Figure 2 Genesis points of the 20 TCs that formed in 2007 (dots) and frequency distribution of genesis points for 1951-2006 (lines)

*Mean formation latitude (longitude) here is defined as the arithmetic average of formation-point latitudes (longitudes) for all tropical cyclones that reached TS intensity or higher.

**30-year average from 1971 to 2000.

***Mean duration here is defined as the arithmetic average of the durations of all of tropical cyclones that reached TS intensity or higher.

Narrative Accounts of Tropical Cyclones in 2007

Accounts of the thirteen named tropical cyclones from KONG-REY (0701) to FARNCISCO (0713) were prepared using post-analysis data, while those for the seven cyclones from LEKIMA (0714) to FAXAI (0720) were compiled using operational analysis data. Accounts for LEKIMA (0714) and FAXAI (0720) are limited to the tropical cyclone period of TS intensity or higher.

KONG-REY (0701)

KONG-REY formed as a tropical depression (TD) over the sea around the Marshall Islands at 12 UTC on 30 March 2007. Moving northwestward, it developed into a tropical storm (TS) over the sea around the Caroline Islands at 00 UTC on 1 April. Keeping its northwest track, it was upgraded to typhoon (TY) intensity over the sea north of Saipan Island at 00 UTC on 3 April. During the recurvature, KONG-REY reached peak strength with maximum sustained winds of 80 kt and a central pressure of 960 hPa over the sea northwest of Saipan Island at 12 UTC on 3 April. After turning to the east-northeast, it was downgraded to TS intensity west of Minamitorishima Island at 06 UTC on 5 April, and then transformed into an extratropical cyclone east of Minamitorishima Island at 00 UTC the next day. Moving to the east, it dissipated at 00 UTC on 7 April.

YUTU (0702)

YUTU formed as a tropical depression (TD) over the sea around the Caroline Islands at 06 UTC on 15 May 2007. After moving west-northwestward over the sea near Yap Island early on 17 May, it developed into a tropical storm (TS) over the sea northwest of Yap Island at 18 UTC the same day. Moving northwestward, it was upgraded to typhoon (TY) intensity over the sea east of the Philippines at 18 UTC on 18 May. After recurvature over the same sea on 19 May, YUTU reached peak strength with maximum sustained winds of 95 kt and a central pressure of 935 hPa southwest of Okinotorishima Island at 12 UTC the next day. Moving to the east-northeast, it approached Iwojima Island with TY intensity after 12 UTC on 21 May. Weakening in intensity, YUTU was downgraded to TS intensity at 18 UTC on 22 May, and transformed into an extratropical cyclone over the sea east of Japan six hours later. Keeping its east-northeast track, it crossed longitude 180 degrees east over the sea south of the Aleutian Islands before 00 UTC on 25 May.

TORAJI (0703)

TORAJI formed as a tropical depression (TD) in the South China Sea at 00 UTC on 3 July 2007, and moved to the north-northwest. Moving northwestward, it developed into a tropical storm (TS) around the southern coast of Hainan Island at 06 UTC the next day. It crossed the Island northwestward and then reached peak intensity with maximum sustained winds of 35 kt and a central pressure of 994 hPa around the northwestern coast of the Island at 18 UTC the same day. Keeping its northwest track in the Gulf of Tongking, it hit around the border between China and Vietnam on 5 July. Moving northwestward along the border, TRAJI weakened to TD intensity at 18 UTC on 5 July and dissipated at 06 UTC on 6 July.

MAN-YI (0704)

MAN-YI formed as a tropical depression (TD) over the sea around the Caroline Islands at 06 UTC on 7 July 2007. Moving west-northwestward, it developed into a tropical storm (TS) over the sea southwest of Guam Island at 00 UTC on 9 July. Keeping its west-northwestward track, it was upgraded to typhoon (TY) intensity over the sea far east of the Philippines at 18 UTC on 10 July. Turning to the north, it reached peak intensity with maximum sustained winds of 95 kt and a central pressure of 930 hPa over the sea south of Okinawa Island at 00 UTC on 12 July. MAN-YI recurved off the west coast of Okinawa Island around 00 UTC the next day. It turned to the northeast weakening in intensity, and hit Kyusyu with TY intensity after 05 UTC on 14 July. After moving east-northeastward along the coast of the Japanese islands, it was downgraded to TS intensity at 12 UTC on 15 July, and transformed into an extratropical cyclone over the sea east of Japan at 00 UTC on 16 July. It turned to the northeast over the sea far east of Japan and then crossed longitude 180 degrees east over the sea south of the Aleutian Islands at 06 UTC on 23 July.

USAGI (0705)

USAGI formed as a tropical depression (TD) over the sea south of Minamitorishima Island at 12 UTC on 27 July 2007. Moving westward, it developed into a tropical storm (TS) over the sea around the Mariana Islands at 06 UTC on 29 July. Turning to the northwest, it was upgraded to typhoon (TY) intensity over the sea south of Iwojima Island at 12 UTC the next day. Keeping its northwest track, USAGI reached peak strength with maximum sustained winds of 90 kt and a central pressure of 945 hPa over the sea south of Japan at 00 UTC on 1 August. Turning to the north, it made landfall on Kyushu with TY intensity before 09 UTC the next day. After recurvature, it was downgraded to TS intensity at 21 UTC the same day and moved northeastward in the Sea of Japan. Soon after USAGI made landfall on the northern part of Honshu after 03 UTC on 4 August, it weakened into a TD at 06 UTC the same day and then transformed into an extratropical cyclone over the sea south of Hokkaido six hours later. Moving eastward, it dissipated over the sea southeast of Hokkaido at 00 UTC on 5 August.

PABUK (0706)

PABUK formed as a tropical depression (TD) over the sea far east of the Philippines at 18 UTC on 4 August 2007. Moving west-northwestward, it developed into a tropical storm (TS) over the sea south of Okinotorishima Island at 06 UTC on 5 August. After turning to the west, it reached peak intensity with maximum sustained winds of 65 kt and a central pressure of 975 hPa, and was upgraded to typhoon (TY) intensity over the sea southeast of Taiwan at 09 UTC on 7 August. After passing around the southern tip of Taiwan with TY intensity after 15 UTC on 7 August, PABUK was downgraded to TS intensity over the sea east of Hong Kong at 12 UTC on 8 August and then weakened to TD intensity off the south coast of Hong Kong at 06 UTC on 9 August. After staying over the same sea on 10 August, it hit around Hong Kong the next day. Moving to the northeast, it entered the East China Sea late on 12 August. PABUK turned to the north in the same sea and transformed into an extratropical cyclone in the northern part of the Korean Peninsula at 12

UTC on 14 August. After turning quickly to the northeast, it dissipated northeast of Vladivostok at 12 UTC on 15 August.

WUTIP (0707)

WUTIP formed as a tropical depression (TD) over the sea east of the Philippines at 12 UTC on 6 August 2007, and then moved to the west. After turning to the northwest, it developed into a tropical storm (TS) at 00 UTC on 8 August and reached peak intensity with maximum sustained winds of 35 kt and a central pressure of 990 hPa over the sea east of the Luzon Straits at 03 UTC on 8 August. Moving to the northwest, WUTIP rapidly dissipated off the east coast of Taiwan at 21 UTC on 8 August.

SEPAT (0708)

SEPAT formed as a tropical depression (TD) over the sea far east of the Philippines at 00 UTC on 12 August 2007. It moved to the west and developed into a tropical storm (TS) over the same sea 18 hours later. Keeping its westward track, it was upgraded to typhoon (TY) intensity over the sea east of the Philippines at 00 UTC on 14 August. After turning to the northwest, it reached peak intensity with maximum sustained winds of 110 kt and a central pressure of 910 hPa over the same sea at 00 UTC on 16 August 2007. After moving over the sea south of the Nansei Islands, it hit Taiwan late on 17 August. After hitting South China, SEPAT was downgraded to TS intensity at 00 UTC on 19 August and then TD intensity at 12 UTC on 19 August. It moved to the west and dissipated in the same area at 12 UTC on 24 August.

FITOW (0709)

FITOW formed as a tropical depression (TD) over the sea south of Minamitorishima Island at 18 UTC on 27 August 2007. Moving to the northeast, it developed to tropical storm (TS) intensity over the sea southeast of Minamitorishima Island at 00 UTC on 29 August. Turning to the west in a counterclockwise direction, it was upgraded to typhoon (TY) intensity at 12 UTC on 31 August and then reached peak intensity with maximum sustained winds of 70 kt and a central pressure of 965 hPa over the sea north of Minamitorishima Island at 00 UTC on 1 September. Moving to the west, FITOW was downgraded to severe tropical storm (STS) intensity over the sea east of Chichijima Island at 12 UTC on 3 September. Then turning to the north, it developed again to TY intensity and reached peak intensity with maximum sustained wind of 70 kt and a central pressure of 965 hPa over the sea northwest of Chichijima Island at 00 UTC on 5 September. Almost keeping its peak intensity and northward track, it hit Honshu late the next day. Weakening in intensity, it moved northward over the Japanese islands. It was downgraded to TS intensity in the Tsugaru Straits at 15 UTC on 7 September and then transformed into an extratropical cyclone off the east of Hokkaido at 00 UTC on 8 September. It dissipated around the same area six hours later.

DANAS (0710)

DANAS formed as a tropical depression (TD) over the sea east of Minamitorishima Island at 00 UTC on 6 September 2007. Moving northwestward, it developed into a tropical storm (TS) over the sea northeast of Minamitorishima Island at 06 UTC on 7 September. During the recurvature, it was upgraded to severe tropical storm (STS) intensity over the sea east of

Japan at 12 UTC on 9 September. After turning to the northeast, it reached peak intensity with maximum sustained winds of 55 kt and a central pressure of 990 hPa over the same sea at 18 UTC on 10 September. Moving eastward, it was downgraded to TS intensity at 12 UTC on 11 September and transformed into an extratropical cyclone over the sea far east of Japan six hours later. Keeping its eastward track, it crossed longitude 180 degrees east over the sea south of the Aleutian Islands before 00 UTC on 13 September.

NARI (0711)

NARI formed as a tropical depression (TD) over the sea far east of the Philippines at 12 UTC on 11 September 2007. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity southeast of Minamidaitojima Island at 00 UTC on 13 September 2007. Keeping its west-northwestward track, it developed rapidly to typhoon (TY) intensity at 18 UTC on 13 September. Turning to the north, it reached peak intensity with maximum sustained winds of 100 kt and a central pressure of 935 hPa southwest of Okinawa Island at 12 UTC on 14 September. After passing around Kumejima Island with peak intensity the same day, it moved northward with gradual weakening in the East China Sea. It approached Cheju Island with TY intensity early on 16 September. Turning to the northeast, NARI hit the Korean Peninsula the same day and then transformed into an extratropical cyclone in the Sea of Japan at 00 UTC on 17 September. It dissipated over the same sea at 06 UTC the next day.

WIPHA (0712)

WIPHA formed as a tropical depression (TD) over the sea far east of the Philippines at 00 UTC on 15 September 2007. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity over the same sea at 00 UTC the next day. Moving to the northwest, it was upgraded to typhoon (TY) intensity at 00 UTC on 17 September and reached peak intensity with maximum sustained winds of 100 kt and a central pressure of 925 hPa over the sea south of the Nansei Islands at 18 UTC on 17 September. After passing Iriomotejima Island before 00 UTC on 18 September, it hit the central part of China, keeping its intensity and northwestward track late the same day. Turning to the north, it rapidly weakened to TS and TD intensity in the central part of China at 06 and 12 UTC respectively on 19 September. Turning to the northeast, it transformed into an extratropical cyclone at 00 UTC on 20 September and dissipated over the Yellow Sea at 18 UTC on 20 September.

FRANCISCO (0713)

FRANCISCO formed as a tropical depression (TD) over the sea around the Babuyan Islands at 12 UTC on 21 September 2007. Moving to the west, it was upgraded to tropical storm (TS) intensity at 12 UTC on 23 September and reached peak intensity with maximum sustained winds of 40 kt and a central pressure of 990 hPa over the sea south of Hong Kong at 18 UTC on 23 September. Turning to the southwest, it hit Hainan Island the next day. Soon after passing Hainan Island, it abruptly turned to the northwest and was downgraded to tropical depression (TD) intensity in the Gulf of Tonkin at 06 UTC on 25 September. After hitting Vietnam late the same day, it dissipated there at 06 UTC on 26 September.

LEKIMA (0714)

LEKIMA was upgraded to tropical storm (TS) intensity in the South China Sea at 00 UTC on 30 September 2007. It moved westward and was upgraded to severe tropical storm (STS) intensity 21 hours later. After turning to the northwest, it reached peak intensity with maximum sustained winds of 60 kt and a central pressure of 975 hPa over the sea southeast of Hainan Island at 00 UTC on 2 October. It turned to the west again and then hit Vietnam with STS intensity the next day. Keeping its west track, it weakened to tropical depression (TD) intensity around the border between Laos and Thailand at 06 UTC on 4 October.

KROSA (0715)

KROSA was upgraded to tropical storm (TS) intensity over the sea far east of the Philippines at 00 UTC on 2 October 2007. After staying there the same day, it moved to the northwest from the next day and was upgraded to typhoon (TY) intensity over the same sea at 06 UTC on 3 October. Keeping its northwest track, it reached peak intensity with maximum sustained winds of 105 kt and a central pressure of 920 hPa over the sea southeast of Yonagunijima Island at 00 UTC on 6 October. After passing around Yonagunijima Island, KROSA moved in a counterclockwise direction to circle the northern part of Taiwan with TY intensity the same day. Moving northwestward, it was downgraded to severe tropical storm (STS) intensity at 00 UTC on 7 October and then hit the central part of China late the same day. After being downgraded to tropical storm (TS) intensity at 21 UTC the same day, it recurved and then transformed into an extratropical cyclone around the coast of the central part of China at 12 UTC on 8 October.

HAIYAN (0716)

HAIYAN was upgraded to tropical storm (TS) intensity over the sea west of the Midway Islands at 00 UTC on 6 October 2007, when it reached peak intensity with maximum sustained winds of 35 kt and a central pressure of 998 hPa. Moving northward, it weakened to tropical depression (TD) intensity over the same sea at 18 UTC the same day.

PODUL (0717)

PODUL was upgraded to tropical storm (TS) intensity over the sea far east of Japan at 06 UTC on 6 October 2007 when it reached peak intensity with maximum sustained winds of 35 kt and a central pressure of 990 hPa. Moving northeastward, it transformed into an extratropical cyclone over the same sea at 00 UTC the next day.

LINGLING (0718)

LINGLING was upgraded to tropical storm (TS) intensity over the sea west of the Midway Islands at 06 UTC on 12 October 2007. Moving to the north-northwest, it reached peak intensity with maximum sustained winds of 45 kt and a central pressure of 994 hPa six hours later. After recurving around 00 UTC on 14 October, it transformed into an extratropical cyclone over the sea north of the Midway Islands at 06 UTC the next day.

KAJIKI (0719)

KAJIKI was upgraded to tropical storm (TS) intensity over the sea south of Chichijima Island at 06 UTC on 19 October 2007. During the recurvature, it developed rapidly to typhoon (TY) intensity over the sea southwest of Chichijima Island at 00 UTC the next day. It passed northeastward around Iwojima Island after 12 UTC on 20 October, and then reached peak intensity with maximum sustained winds of 90 kt and a central pressure of 945 hPa over the sea southeast of Chichijima six hours later. Turning to the east, it transformed into an extratropical cyclone over the sea far east of Japan at 06 UTC on 22 October.

FAXAI (0720)

FAXAI was upgraded to tropical storm (TS) intensity over the sea south of Minamidaitojima Island at 00 UTC on 26 October 2007. After recurving late the same day, it moved northeastward over the sea south of Japan. It was upgraded to severe tropical storm (STS) intensity at 00 UTC on 27 October and reached peak intensity with maximum sustained winds of 55 kt and a central pressure of 980 hPa over the same sea six hours later. Keeping its northeastward track, it passed around the Izu Islands and then transformed into an extratropical cyclone over the sea east of Japan at 18 UTC the same day.

APPENDIX XV

Report of the Advisory Working Group Activities During 2007

(Submitted by AWG Vice Chairperson)

ACTION REQUIRED:

The Committee is invited to:

Review the progress and accomplishments regarding the activities of the Advisory Working Group during 2007

APPENDIX:

Report of the Advisory Working Group Activities During 2007

Report of the Advisory Working Group Activities During 2007

1. Introduction.

At the 39th Session of the Typhoon Committee, the Committee requested the AWG to undertake the Terms of Reference given in Appendix XX of the final Report of the Typhoon Committee On Its Thirty-Ninth Session, 4-9 December 2006, in Manila, Philippines.

2. AWG Meeting 10-14 September 2007

- a. The AWG members met 10-14 September 2007 in conjunction with the Integrated Workshop on Social-economic Impacts of Extreme Typhoon-related Events in Bangkok, Thailand to consider and act upon the tasks assigned by the Committee.
- b. The Chairpersons of the three working groups, TRCG, and RMG delivered their reports concerning their activities in support of the Committee's Strategic Plan and 2007 Annual Operating Plan.
- c. The AWG thoroughly reviewed the Typhoon Committee's Annual Operating Plan for 2007 and documented the actions which were completed and those which were not completed (see Appendix II). The group was very pleased with the progress made on the Annual Operating Plan and encouraged everyone to continue the hard work necessary to complete the remaining uncompleted actions.
- d. As requested by the 39th Session and because of the success of the 2007 Annual Operating Plan, the AWG developed a proposed draft, result-oriented 2008 Integrated Annual Operating Plan for 2008 (see Appendix III). Again the AOP has specific objectives, actions, and success indicators which support the Key Results Areas and Strategic Goals of the Typhoon Committee's Strategic Plan.
- e. The AWG members then developed a proposed budget for 2008 to be funded through the use of the Typhoon Committee Trust Fund (TCTF) for the Committee to consider for the period from 1 January to 31 December 2008 (see Appendix IV). The proposed budget is based upon the recommended priority items contained in the AOP. In addition to the proposed budget, there are **three budget related proposals for the Committee's consideration:**
 - 1) Request approval of the proposed budget format which includes columns for the previous year's allotments, the amount spent thus far in these allotment categories, and then the proposed allotments for the next fiscal year.
 - 2) The Typhoon Committee is becoming a very active, well-known, important member of the region and in other locations. Because of this, some great opportunities (events, travel, projects, etc.) arise during the year which had not previously been planned for or funded. Therefore request approval of \$10,000 (above the budgeted \$100,000) be allotted to the AWG to take advantage of some of these opportunities as they arise and also to create some flexibility for WGs, TCS, TRCG, and others to request additional funds for non-budgeted, high priority items to accomplish the strategic goals of the Typhoon Committee.
 - 3) As stated at previous Sessions and in line with the Strategic Plan, request approval to adjust future proposed draft budgets submitted to the Committee for their approval to focus on high priority items identified in the Strategic Plan and tied to results oriented actions and accomplishments of the WGs, TRCG, and RMG.

3. AWG Strategic Planning Mission to Thailand

- a. On 17-18 September 2007, the Vice Chair of the AWG conducted a strategic planning mission to Thailand in conjunction with his attendance at the Integrated Workshop on Social-economic Impacts of Extreme Typhoon-related Events in Bangkok, Thailand 10-14 September 2007.
- b. Mr. Suparerk Tansiratanawong, Director-General, Thai Meteorological Department, opened the Workshop on Formulating a Strategic Plan on the morning of 17 September 2007 and then closed it during the late afternoon of 18 September 2007.
- c. The workshop was very successful because the Thai Meteorological Department

was well prepared and had gone through an internal strategic planning session for their Government approximately 2 months before the workshop. So much of the workshop was focused on modifying and improving the format and content on the previously prepared document with special emphasis on defining specific actions and specific performance indicators. During the last part of the workshop after completing the outline of the strategic plan changes, the group started preparing an annual operating plan for the coming year to support the strategic issues and goals identified in the strategic plan. Much progress was made on the annual operating plan, and the group committed to completing it following the end of the workshop.

- d. The AWG is planning future strategic planning missions to Viet Nam, Lao PDR, and Cambodia. Based upon the lessons learned during the Thailand strategic planning workshop, future missions should consider the following: 1) using an interpreter to ensure all attendees can participate to their fullest degree, 2) obtaining copies of any current strategic plans, 3) start with a briefing by the meteorological service on their mission and responsibilities, and 4) obtain a list of the Member's approximately 6 highest priority goals before the beginning of the mission.

4. Proposals for Consideration

- a. Propose the creation of a glossy 1 to 2 page brochure outlining the Typhoon Committee's Vision, Mission, KRAs, and SGs. This could be used for publicity and to pass out at appropriate meetings and resource mobilization activities.
- b. Proposed the creation of a emblem/symbol and song for the Typhoon Committee in celebration of 40th Anniversary. This would consist of a Member-wide contest; similar to Hong Kong's typhoon name contest, but all 14 Members could participate. This would increase publicity and recognition for the Typhoon Committee.
- c. Propose a new "Country Report" format based on the TC Strategic Plan.

APPENDIX XIX



World Meteorological Organization
Organisation météorologique mondiale

Temps • Climat • Eau
Weather • Climate • Water

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ESCAP/WMO TYPHOON COMMITTEE TRUST FUND

Statement of income and expenditure
For the period 1 January to 31 December 2006
Amounts in US dollars

1. Balance of fund at 1 January 2006		671,015
2. Income:		
2.1 Contributions received:		
2.1.1 28 Mar 06 (China)	12,000	
2.1.2 18 Apr 06 (Korea)	12,000	
2.1.3 20 Apr 06 (Hongkong, China)	12,000	
2.1.4 10 May 06 (Malaysia)	12,000	
2.1.5 10 May 06 (Thailand)	12,000	
2.1.6 11 May 06 (Vietnam)	12,000	
2.1.7 12 May 06 (Macao)	12,000	
2.1.8 21 Aug (Japan)	6,000	
2.1.9 1 Dec (Singapore)	12,000	
2.1.10 Total contributions received	102,000	
2.2 Interest credited	11,567	
2.3 Total income		113,567
3. Total available funds during reporting period		784,582
4. Expenditure:		
4.1 Direct project costs:		
4.1.1 Lump sum to TCS, Transfer to Macao, 21-24 Feb 2006	4,576	
4.1.2 Travel - Roving Seminar, Hanoi, 4-7 Sept 2006	8,077	
4.1.3 CD-ROM Typhoon Ctte Newsletter and Review	1,009	
4.1.4 Miscellaneous services	263	
4.1.5 Operating Costs of TCS	25,634	
4.1.6 Financial support to IWTC-VI (Costa Rica, 21-30 Nov 2006)	15,000	
4.1.7 Financial support to Reg. Workshop (Manila, 11-15 Sep 2006)	4,098	
4.1.8 Total direct project costs		58,657
4.2 Indirect project costs		
4.2.1 Support costs at 13%	7,625	
4.2.2 Bank charges	129	
4.2.3 Differences in exchange	(45,382)	
4.2.4 Adjustments	92	
4.2.5 Total indirect project costs		(37,536)
4.3 Total project expenditure		21,121
5. Balance of fund at 31 December 2006		763,461

Certified correct:

Luckson Ngwira
Chief, Finance Division

15 October 2007

WMO
OMM



World Meteorological Organization
Organisation météorologique mondiale

Temps • Climat • Eau
Weather • Climate • Water

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ESCAP/WMO TYPHOON COMMITTEE TRUST FUND

Interim Statement of income and expenditure
For the period 1 January to 30 September 2007

Amounts in US dollars

1. Balance of fund at 1 January 2007				763,461
2. Income:				
2.1 Contributions received:				
2.1.1 Japan (24 Jan)			12,000	
2.1.2 Japan (26 Mar)			6,000	
2.1.3 Hongkong, China (15 Aug)			12,000	
2.1.4 Macau, China (16 Aug)			12,000	
2.1.5 Japan (28 Aug)			6,000	
2.1.6 Thailand (28 Aug)			12,000	
2.1.7 USA (5 Sept)			24,000	
2.1.8 Total contributions received			84,000	
2.2 Interest credited			11,378	
2.3 Total income				95,378
3. Total available funds during reporting period				858,839
4. Expenditure:				
4.1 Direct project costs:				
4.1.1 Participants in non-WMO training seminars, Tokyo 18-27 Jul 07	4,422	-	4,422	
4.1.2 "TC Integrated Workshop on Social Economic Impacts of Extreme Typhoon Related Events", Bangkok, 10-14 Sep 07	4,542	49,200	53,742	
4.1.3 "Roving Seminar" Manila, 5-8 Sep 07	-	14,000	14,000	
4.1.4 Total direct project costs	8,964	63,200	72,164	
4.2 Indirect project costs				
4.2.1 Support costs at 13%	1,165	8,216	9,381	
4.2.2 Differences in exchange	(13,204)	-	(13,204)	
4.2.3 Total indirect project costs	(12,039)	8,216	(3,823)	
4.3 Total project expenditure				68,341
5. Balance of fund at 30 September 2007				790,498

Certified correct:

Luckson Ngwira
Chief, Finance Division

15 October 2007

WMO
OMM

APPENDIX XX

List Scientific Lecturers to the 40th TC Session

Name of Lecturer	Title of the Lecture
Zhiyu Liu, Bureau of Hydrology, Ministry of Water Resources of China	"Mountainous Torrent Disasters and Approaches to Flash Flood Early Warning in China"
Mr. S. W. Li Hong Kong, China	"Tropical Cyclone Information Processing Systems".
Ms. Sandy M.K. Song Hong Kong, China	"CAeM pilot project - Aviation-Weather Disaster Risk Reduction (ADRR) Website".
Mr. Kunio SAKURAI Japan Meteorological Agency	"Typhoon Ensemble Prediction System developed at the Japan Meteorological Agency."
Mr. QIAN Chuanhai CMA, China	"Social Economic Benefits Evaluation of Typhoon Disaster Mitigation in China"
Dr. Eun Mi Chang KSIC, Rep. of Korea	"TCDIS - Typhoon Committee Disaster Information System"
Dr. Le-Huu Ti ESCAP	"Monitoring of Investment and Results in Water Resources"
Dr. Le-Huu Ti ESCAP	"Tool and Practices in Adaptation Planning"

APPENDIX XXI

Acronyms and Abbreviations

ADPC	Asian Disaster Preparedness Center
ADRC	Asian Disaster Reduction Center
AOP	Annual Operating Plan
APWF	Asia-Pacific Water Forum
ARC	Asian THORPEX Regional Committee
ATOVs	Advanced TIROS Operational Vertical Sounder
AWG	Advisory Working Group
BOH	Bureau of Hydrology
CIR	Committed Information Rate
CBS	Commission for Basic Systems
CMA	China Meteorological Administration
COMS	Communication, Ocean, Meteorological Satellite
DPP	Disaster Prevention and Preparedness
DVBS	Digital Video Broadcasting System
ESCAP	Economic and Social Commission for Asia and the Pacific
EBT	Expanded Best Track Data
EPS	Ensemble Prediction System
GTS	Global Telecommunication System
HFA	Hyogo Framework for Action
HiRID	High Resolution Image Data
HRIT	High Rate Information Transmission
HYCOS	Hydrological Cycle Observing System
IDI	Infrastructure Development Institute
IWS	Integrated Workshop
JMA	Japan Meteorological Agency
JPEG	Joint Photographic Experts Group
JTWC	Joint Typhoon Warning Center
KRAs	Key Result Areas
KICT	Korea Institute of Construction Technology
KMA	Korea Meteorological Administration
KOICA	Korea International Cooperation Agency
K-Water	Korea Water Resources Corporation
LRIT	Low Rate Information Transmission
MLIT	Ministry of Land, Infrastructure and Transport
MOCT	Ministry of Construction and Transportation
MRC	Mekong River Commission

MTSAT	Multi-functional Transport Satellite
MWR	Ministry of Water Resources
NIDP	National Institute for Disaster Prevention
NILIM	National Institute of Land and Infrastructure Management
NEMA	National Emergency Management Agency
NMHSs	National Meteorological and Hydrological Services
NWP	Numerical Weather Prediction
OJT	On-the-Job Training
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PVC	Permanent Virtual Circuit
RCPIP	Regional Cooperation Programme Implementation Plan
RMG	Resource Mobilization Group
RSMC	Regional Specialized Meteorological Center
RTH	Regional Telecommunication Hub
SATADI	Satellite Animation and Interactive Diagnosis
SGs	Strategic Goals
SIDS	Small Island Developing States
SMG	Serviços Meteorológicos e Geofísicos de Macau
TAC	Traditional Alphanumeric Codes
TCP	Tropical Cyclone Programme
TCP/IP	Transmission Control Protocol/Internet Protocol
TCDC	Technical Cooperation among Developing countries
TCDIS	Typhoon Committee Disaster Information System
TDCF	Table Driven Code Forms
THORPEX	The Observing System Research and Predictability Experiment
TCS	Typhoon Committee Secretariat
TIPS	Typhoon Information Processing System
TOM	Typhoon Committee Operational Manual
T-PARC	THORPEX Pacific Asian Regional Campaign
TRCG	Training and Research Coordination Group
UN/ISDR	United Nations International Strategy for Disaster Reduction
VCP	Voluntary Cooperation Programme
WEFAX	Weather Facsimile
WGDPP	Working Group on Disaster Prevention and Preparedness
WGM	Working Group on Meteorology
WGH	Working Group on Hydrology
WHYCOS	World Hydrological Cycle Observing System
WMO	World Meteorological Organization