TRAINING & RESEARCH COORDINATION GROUP (TRCG)
ANNUAL REPORT 2012

Edwin S.T. Lai (TRCG Chair)
Hong Kong, China

1. Introduction

1.1 According to the 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 The composition and members list of TRCG are:

Chair:	Mr. Edwin S.T. LAI (Hong Kong, China)
Vice Chair:	Mr. Roger EDSON (USA)
Members:	Ms. Peou PHALLA (Cambodia) Mr. QIAN Chuanhai (China) Dr. KANG Bom Jin (DPR Korea) Ms. Naoko KITABATAKE (Japan) Mr. Bounteum SYSOUPHANTHAVONG (Lao PDR) Mr. TAM Chi Man Benedito (Macao, China) Dr. Wan Azli WAN HASSAN (Malaysia) Dr. Carina G. LAO (Philippines) Dr. Ki-Ho CHANG (Republic of Korea) Mr. Chien Wan THAM (Singapore) Ms. Patchara PETVIROJCHAI (Thailand) Mr. NGUYEN Dai Khanh (Viet Nam)

3. Major TRCG Activities in 2012

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 The Typhoon Committee Roving Seminar 2012 was successfully held on 30 October - 1 November in Seoul, Republic of Korea. It was the first time the Roving Seminar was organized in conjunction with the DRR component, hosted by the National Disaster Mitigation Institute (NDMI) as part of the International Seminar for Disaster Prevention Cooperation 2012. Lectures and presentations in the Roving Seminar were given by DRR experts from NDMI, as well as two guest lecturers from China and Hong Kong, China. The theme was "Tropical Cyclone Damage Assessment and Impact Forecast" with the following three sub-topics:

Topic A: Landfall impact and damage assessment
Topic B: High impact weather and natural hazards induced by tropical cyclones
Topic C: Utilization of NWP products for operational forecasting of tropical cyclone high impact weather

3.3 The Roving Seminar was attended by 20 participants from Republic of Korea (8); Cambodia (2); China (2); Hong Kong, China (1); Macao, China (1); Malaysia (1); Philippines (1); Thailand (2); Viet Nam (2). Even though the schedule of the Roving Seminar was slightly adjusted to take advantage of the activities of the International Seminar, all participants considered the keynote lectures of the International Seminar useful, providing them with broader knowledge and deeper understanding on issues relating to disaster management. Most of the participants considered the skills and knowledge learnt during the Roving Seminar would lead to operational benefits in their services within the next five years. A summary report is given in Annex II.

Forecasters' Training Attachment

3.4 Two forecasters, Mr. Ngo Hai Duong (from Viet Nam) and Ms. Connie Rose S. Dadivas (from the Philippines) visited JMA headquarters from 18 to 27 July 2012 to participate in the 12th Typhoon Committee Attachment Training. The contents of the training included:

1. The satellite analysis and viewer program (SATAID)
2. Tropical cyclone analysis (Dvorak technique)
3. Tropical cyclone forecasting
4. Storm surges
5. Quantitative precipitation estimation (QPE) and quantitative precipitation forecasting (QPF)
6. The Severe Weather Forecasting Demonstration Project (SWFDP)

Research Fellowship Scheme

3.5 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 host Members. 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.

3.6 In 2012, fellowships were offered by Hong Kong, China and Republic of Korea. Details of the latest projects under the scheme, as well as a summary of previous fellowships awarded, can be found in Annex III. Reports or papers since published in connection with the scheme are listed in Annex IV.

UFRM

3.7 In the drafting of the UFRM Guidelines, TRCG Chair has provided further input for the chapter on training and research.

3.8 In support of the UFRM initiatives, a training component was included in the research fellowship programme offered by Hong Kong, China in 2012. During the attachment of the two research fellows, representing the UFRM pilot cities of Malaysia and the Philippines, in-depth QPE/QPF training was provided and SWIRLS, the operational nowcasting system of the Hong Kong Observatory, was taught in details with an aim to adapting the system for use in Malaysia and the Philippines.

4. Resource Support for Research and Training

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

4.2 The Pacific Desk programme operated by the USA National Weather Service with training in Honolulu, Hawaii is currently under evaluation while seeking a new instructor. In previous years, six times a year, two interns from the same country or neighbouring ones spend six weeks in Honolulu for basic forecaster training involving satellite interpretation, numerical model analysis, use of observations, general climatology of the interns' area, and other practical aspects of operational forecasting. Each intern is given a PC for use during the training, and then the PC is shipped to his or her affiliated meteorological service back home for further use in a sustained effort of capacity building. Future funding for this popular programme is available, but the details of a new start date and syllabus have yet to be worked out. WMO Region V and the Typhoon Committee Secretariat will be kept informed regarding any changes in status.

5. Prioritization of Training and Research Areas

5.1 Taking into consideration comments made by the resource persons in the Roving Seminar 2012, the list of priority research topics is re-established as follows:

(A) Meteorology

(a) rainfall forecasting: development of nowcasting and very short range forecasting techniques, and understanding of interaction between tropical cyclones and monsoon;
(b) application of Dvorak and microwave satellite image analysis techniques;

(c) application of radar-based analysis/products for landfalling tropical cyclones;
(d) application of ensembles of guidance from dynamical models, conceptual models, statistical models and systematic knowledge-based approach;
(e) use of high resolution numerical models with advanced data assimilation techniques;
(f) better understanding of TC-related issues across different spatial and time scales, from mesoscale and synoptic analysis for track prediction, to climatological impact arising from El Nino/La Nina and global warming/climate change;

(B) Meteorology and Hydrology

(g) application of meteorological information for forecasting of river flooding and urban flash flood;
(h) better understanding of wave, storm surge and marine forecasting;

(C) Meteorology and DRR

(i) development of technical procedures to quantify forecast uncertainties and to convert probabilistic information into effective warnings; and
(j) development of decision-making tools for DRR purpose, including the integration of forecast information with GIS and the use of automated information processing systems.

5.2 In view of the devastating impact of tropical cyclones that affected Members in recent years, attention should also be given to capacity-building in the following aspects:

(1) understanding and assessment of rain-induced geological hazards such as landslides and mudflow;
(2) forecasting and warning systems for better coastal protection from hazards such as storm surge, river delta inundation and urban flooding; and
(3) effective communication of warning messages to stakeholders, DRR users and communities at risk.

6. Future Directions and Strategies

6.1 The first 4-year cycle of TRCG work plan is entering its final stages (Annex VI), and plans for the new cycle will be formulated in the next TRCG Forum, which will be held in conjunction with the 8th Integrated Workshop (IWS) in 2013. It is also proposed that the 4-yearly TRCG Forum, to become part of the IWS series of seminars, should be organized as a major regional event highlighting Typhoon Committee's works across the three components in meteorology, hydrology and DRR. Themes and contents for the 2nd TRCG Forum in 2013 will be further discussed in the 7th IWS at Nanjing in late November 2012.

6.2 Summary and review of TRCG AOP 2012 can be found in Annex VII. TRCG will continue to support plans to have more cross-cutting training and research initiatives with the hydrological and DRR components, including the organization of joint meetings/activities such as UFRM. Members are also encouraged to promote such initiatives through proactive involvement of respective hydrological and DRR counterparts in their countries.

6.3 In connection with the AWG discussion in Seoul, Republic of Korea in late May on matters relating to enhancing efficiency and governance of the Typhoon Committee, TRCG will review its terms of reference and provide survey materials as reference for other working groups to assess the outcome of their respective activities.

Annex I

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
2009	16 – 19 Nov	Nanjing	Forecasting of High-impact Weather associated with Tropical Cyclones, and Formulation and Communication of Warning Messages	Mr. S.T. Chan Mr. Chip Guard Mr. Sam Muchemi
2010	30 Nov – 3 Dec	Ubon Ratchathani	Tropical Cyclone Genesis and Large Scale Interaction	Mr. S.M. Lee Prof. Zhang Qinghong Dr. Mark Lander
2011	20 – 23 Sep	Petaling Jaya	Heavy Rain and Flood Hazards associated with Landfalling Tropical Cyclones	Dr. Siriluk Chumchean Mr. H.Y. Yeung Prof. Chen Charng-Ning
2012	30 Oct – 1 Nov	Seoul	Tropical Cyclone Damage Assessment and Impact Forecast	DRR experts from NDMI Ms. Xu Jing Mr. W.K. Wong

Annex II

SUMMARY OF TYPHOON COMMITTEE ROVING SEMINAR 2012
(Seoul, Republic of Korea, 30 Oct – 1 Nov 2012)

I. Organization

1. The Typhoon Committee Roving Seminar (TCRS) 2012 with the main theme on Tropical Cyclone Damage Assessment and Impact Forecast was successfully held on 30 October - 1 November 2012 in Seoul, Republic of Korea. It was organized by the ESCAP/WMO Typhoon Committee (TC) and hosted by National Disaster Management Institute (NDMI) of Republic of Korea, as part of the International Seminar for Disaster Prevention Cooperation 2012.

2. The TCRS was attended by 20 participants from Republic of Korea (8); Cambodia (2); China (2); Hong Kong, China (1); Macao, China (1); Malaysia (1); Philippines (1); Thailand (2); Viet Nam (2). Apart from three resource persons provided by NDMI, there were two guest lecturers from China and Hong Kong, China, along with the representative from the TC Secretariat. The TC Secretary also attended the TCRS as an invited speaker for the International Seminar.

II. Opening

1. The official opening of the International Seminar was held in the International Conference Room of the Central Government Complex at 10:30 on 30 Oct. Soon after the opening, the TCRS participants had the opportunity to attend the keynote lectures presented by the invited speakers on various topics related to disaster management.

2. The official opening of TCRS was held separately at 16:40 on 30 Oct and was officiated by the President of NDMI, Mr. Woon-kwang Yeo, and the TC Secretary, Mr. Olavo Rasquinho. Mr. Yeo delivered the opening speech stressing the importance of international cooperation and expressed that NDMI would be willing to provide continuous support to TC. Mr. Rasquinho in his opening message stressed the importance of TCRS and expressed his sincere appreciation to NDMI for the support to host the TCRS and for the resource persons provided by China Meteorological Administration (CMA), Hong Kong Observatory (HKO) and NDMI.

III. Seminar Programme

1. On the first day of the International Seminar, the TCRS participants had the opportunity to attend the following keynote lectures:

- Post-2015 International Cooperation for Disaster Reduction Strategy by Mr. Glenn Dolcemascolo (USA);
- Strategies for International Cooperation Research for DRR and the Role of UNESCAP/WMO Typhoon Committee by Mr. Olavo Rasquinho (TCS);
- Integrated Volcanic Risk Management and International Approach with the MIAVITA Project by Dr. Pierre Thierry (France);
- 2011 East Japan Earthquake and Lessons Learnt by Dr. Yoshimitsu Okada, NIED (Japan);
- Disaster Mitigation and Emergency Operation – The Technology Improvement after Typhoon Morakot by Dr. Hongey Chen, NCDR (Taiwan);
- Recent Volcanic Crises in the USA and Europe: Some Cases Studies by Dr. Bruce Houghton, NDPTC (USA);
- CBDRM for Community Preparedness Strengthening Community Preparedness Around Disaster-Prone Areas of Merapi Volcano, Central Java - Case Study by Dr. Eko Teguh Paripurno (Indonesia).

2. In the TCRS, three resource persons from NDMI presented Topic A on " Landfall impact and damage assessment". Ms. Xu Jing of CMA presented Topic B on "High impact weather and natural hazards induced by tropical cyclones". Mr. W.K. Wong of HKO presented Topic C on "Utilization of NWP products for operational forecasting of tropical cyclone high impact weather".

3. During the wrap-up discussion the lecturers and participants reviewed and commented on the arrangement of TCRS as well as the materials presented in the lectures.

IV. Proposals and Recommendations

1. Even though the schedule of the Roving Seminar was slightly adjusted to take advantage of the activities of the International Seminar, all participants commented that the keynote lectures of the International Seminar were useful, providing them with broader knowledge and deeper understanding on issues relating to disaster management.

2. The participants warmly appreciated the effort made by the resource persons to provide new ideas and insight on the topics discussed.

3. Most of the participants considered the skills and knowledge learnt would lead to operational benefits in their services, and the majority thought such benefits could be felt within the next five years.

4. Suggestions from the resource persons for future reference: (a) similar academic background or experience among the participants so as to make the lectures more effective; (b) lecturers with operational background in public weather services

and tropical cyclone forecasting; (c) more practical and interactive sessions; and (d) satellite techniques in tropical cyclone analyses and forecasts.

V. Closing

1. The participants expressed their gratitude and appreciation to NDMI for the warm hospitality and successful hosting of TCRS, and appreciated very much the opportunity of a field trip to the De-militarized Zone. They also expressed their thanks to the TC Secretariat and the local staff from NDMI for the excellent arrangement of the Seminar.

2. Dr. Jae-Hyun Shim, Director of Disaster Research Division of NDMI, and Mr. Olavo Rasquinho, TC Secretary, presented the certificates of attendances to all the participants and delivered the closing remarks.

3. The seminar was officially closed at 16:40 on 1 Nov.

(Full report of TCRS 2012 can be found on the Typhoon Committee website.)

Annex III

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
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
Seasonality of Tropical Cyclone Activities over the Western North Pacific	Ms. YING, Ming	Korea Meteorological Administration	22 Sep – 20 Dec 2008
Study of high resolution non-hydrostatic model in prediction of landfalling tropical cyclones	Mr. Santi SUMDIN (Thailand)	Hong Kong Observatory	20 Oct – 19 Dec 2008
Tropical cyclone bogus in NHM and its impact on forecast track and intensity	Mr. QU, Anxiang (China)	Hong Kong Observatory	29 Oct – 28 Dec 2009
Typhoon Vortex Initialization Scheme and typhoon Ensemble Forecast Techniques	Ms. NGUYEN Thi Minh Phuong (Viet Nam) and Mr. Chatchai CHAIYASAEN (Thailand)	National Meteorological Center, China Meteorological Administration	Early Dec 2009 – Early Feb 2010
Improvement of typhoon analysis and forecast with KMA's TAPS	Mr. TRAN Quang Nang (Viet Nam)	Korea Meteorological Administration	1 Sep – 27 Nov 2010
Study on the tropical cyclone genesis in the northwestern Pacific	Mr. Kamol Promasakha Na SAKOLNAKHON (Thailand)	Korea Meteorological Administration	1 Sep – 27 Nov 2010
Typhoon Information Processing System	Mr. NGUYEN Manh Linh (Viet Nam) and Ms. Kamolrat SARINGKARNPHASIT (Thailand)	National Meteorological Center, China Meteorological Administration	8 Oct – 8 Dec 2010

Can the extreme rainfall associated with Typhoon Morakot (0908) happen in Hong Kong?	Mr. HUANG, Yiwu (China)	Hong Kong Observatory	29 Oct – 28 Dec 2010
Improvement of typhoon analysis and forecast with KMA's TAPS	Mr. Jori J. LOIZ (Philippines)	Korea Meteorological Administration	Sep – Nov 2011
Improvement of typhoon analysis and forecast with KMA's TAPS	Mr. Chukiat THAIJARATSATIAN (Thailand)	Korea Meteorological Administration	Sep 2011
Implementation of Tropical Cyclone Intensity Forecast in the Tropical Cyclone Information Processing System (TIPS) of the Hong Kong Observatory	Mr. Nursalleh K. CHANG (Malaysia)	Hong Kong Observatory	24 Oct – 23 Dec 2011
Improvement of Prediction Method for the Rapid Intensification of Tropical Cyclones in the South China Sea	Dr. Sukrit KIRTSAENG (Thailand)	National Meteorological Center, China Meteorological Administration	2 Nov – 29 Dec 2011
Application of Numerical Ensemble Prediction in the Forecasting of Typhoon Sharp Turning Tracks	Mr. Raymond C. ORDINARIO (Philippines)	National Meteorological Center, China Meteorological Administration	14Nov 2011 – 13 Jan 2012
Typhoon Analysis and Prediction System (TAPS), genesis and dissipation of tropical cyclones, and change of typhoon characteristics due to climate change	Mr. Renito B. PACIENTE (Philippines), Ms. Plaidao KHUMCHAIYAPHUM (Thailand) and Mr. Bounteum SYSOUPHANTHAVONG (Lao PDR)	Korea Meteorological Administration	May – June 2012
Enhancement of rainfall nowcast in tropical cyclone situation	Mr. Maqrun Fadzli Mohd Fahmi (Malaysia) and Mr. Michael S. Bala (Philippines)	Hong Kong Observatory	22 Oct – 21 Dec 2012

Annex IV

TRCG Publications / Papers

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

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)

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.

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.

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.

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. Typhoon Committee Annual Review 2005, pp. 242 – 251.

Chen, P.Y. and S.T. Chan, 2009: Use of the JMA Ensemble Prediction System for Tropical Cyclone Intensity Forecasting. Typhoon Committee Annual Review 2008, pp. 276-285.

Nguyen, D.Q. and S.T. Chan, 2009: Study on Application of Ensemble Prediction System Information in Tropical Cyclone Track Forecasting. Typhoon Committee Annual Review 2008, pp. 286-291.

Chan, S.T. and Y. Huang, 2012: Can the Extreme Rainfall Associated with Typhoon Morakot (2009) Happen in Hong Kong? Tropical Cyclone Research and Review, **1**, 1-15.

Chang, N.K., L.S. Lee and Y.S. Li, 2012: Comparison of Performance of Various Multiple-Model Ensemble Techniques in Forecasting Intensity of Tropical Cyclone. Tropical Cyclone Research and Review, **1**, 353-360.

Annex V

List of Resource Persons

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	Satellite data assimilation	Kazumasa AONASHI	aonashi@mri-jma.go.jp	Meteorological Research Institute
	Satellite data assimilation	Naotaka UEKIYO	n-uekiyo@mri-jma.go.jp	Meteorological Research Institute
	Data analysis related to extratropical transition	Naoko KITABATAKE	nkitabat@mri-jma.go.jp	Meteorological Research Institute

Member	Specialties	Name	E-mail	Affiliation
(A) Data Assimilation (cont'd)				
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	CHOI, Byoung-Choel	cbc123@korea.kr	Korea Meteorological Administration
	Radar data analysis	PARK, Jong Seo	jspark@kma.go.kr	Korea Meteorological Administration
USA (western North Pacific)	TC analysis, satellite interpretation, use of microwave imagery and scatterometer data	Tom LEE Peter BLACK Paul CHANG	Lee@nrlmry.navy.mil Peter.Black.ctr@nrlmry.navy.mil Paul.S.Chang@noaa.gov	NRL, Monterey, CA NRL, Monterey CA NOAA/NESDIS, Suitland MD
(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

Member	Specialties	Name	E-mail	Affiliation
(B) Modelling (cont'd)				
Hong Kong, China	TC modelling and bogussing schemes	W.K. WONG	wkwong@hko.gov.hk	Hong Kong Observatory
Japan	Ensemble track forecasting	Munehiko YAMAGUCHI	myamagu@mri-jma.go.jp	Meteorological Research Institute
	TC-ocean interaction (incl. mixed-layer ocean and ocean surface wave modelling)	Akiyoshi WADA	awada@mri-jma.go.jp	Meteorological Research Institute
	Storm surge modelling	Nadao KOHNO	nkono@met.kishou.go.jp	Japan Meteorological Agency
Republic of Korea	Global NWP model tracks	PARK, Hoon	hoon@kma.go.kr	Korea Meteorological Administration
	Ensemble track forecasting	PARK, Hoon	hoon@kma.go.kr	Korea Meteorological Administration
	Typhoon modelling	PARK, Hoon	hoon@kma.go.kr	Korea Meteorological Administration
		KWON, H. Joe	hjkwon@kongju.ac.kr	Kongju National University
		HO, Chang Hoi	hoch@cpl.snu.ac.kr	Seoul National University

Member	Specialties	Name	E-mail	Affiliation
(B) Modelling (cont'd)				
USA (western North Pacific)	TC Modeling Extratropical Transition TC Genesis Sub-Tropical Systems Structure	Jim DOYLE Pat HARR Jenni EVANS	James.Doyle@nrlmry.navy.mil paharr@nps.edu evans@meteo.psu.edu	NRL, Monterey CA Naval Postgraduate School, Monterey CA Pennsylvania State Univ
Viet Nam	Computational fluid dynamics and modelling	LE, Duc	leducvn@yahoo.com	National Hydro-Meteorological Service of Viet Nam
(C) Forecasting				
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	S.T. Chan	stchan@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.

Member	Specialties	Name	E-mail	Affiliation
(C) Forecasting (cont'd)				
Republic of Korea	Track and intensity forecasting	PARK, Hoon	hoon@kma.go.kr	Korea Meteorological Administration
		KWON, H. Joe	hjkwon@kongju.ac.kr	Kongju National University
		HO, Chang Hoi	hoch@cpl.snu.ac.kr	Seoul National University
		SOHN, Byung-Ju	sohn@snu.ac.kr	Seoul National University
	Long-range prediction of typhoon	KWON, H. Joe	hjkwon@kongju.ac.kr	Kongju National University
		HO, Chang Hoi	hoch@cpl.snu.ac.kr	Seoul 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 Roger EDSON	mlander@uguam.uog.edu Roger.Edson@noaa.gov	University of Guam (WERI) National Weather Service, Forecast Office Guam
	Satellite data analysis, use of microwave imagery	Jeff HAWKINS	Jeff.Hawkins@nrlmry.navy.mil	Navy Research Laboratory, Monterey

Member	Specialties	Name	E-mail	Affiliation
(C) Forecasting (cont'd)				
USA (western North Pacific)	Satellite data analysis, use of microwave imagery, automated Dvorak Technique, AMSU	Chris VELDEN Derrick HERNDON	chris.velden@ssec.wisc.edu dherndon@ssec.wisc.edu	CIMSS, University of Wisconsin-Madison
	Satellite data analysis, use of microwave imagery, AMSU	John KNAFF	john.knaff@noaa.gov	NOAA/NESDIS at CIRA, Colorado State University
(D) Application				
Hong Kong, China	TC warning systems and operations	Edwin S.T. LAI	stlai@hko.gov.hk	Hong Kong Observatory
	TC information visualization and display systems	L.S. LEE	lslee@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

Annex VI

TRCG Work Plans (2012 – 2013) – updated as at end of Sep 2012

Year	Quarter	Typhoon Committee Activity	Training and Research Activities (*activities organized by parties other than TRCG)	Themes (if any) / Remarks
2012	Q1	TC-44 (Hangzhou)	UFRM Training Workshop (Macao)*	
	Q2		Research Fellowship	Urban/coastal flooding; TC QPF; TIPS
	Q3		RSMC Tokyo attachment*	To be attended by Viet Nam and Philippines
			Research Fellowship	Urban/coastal flooding; TC QPF; TIPS
	Q4	7th Integrated Workshop (Nanjing)	Roving Seminar	Damage assessment methodology
			Research Fellowship	Urban/coastal flooding; TC QPF; TIPS
2013	Q1	TC-45 (Hong Kong)		
	Q2			
	Q3		RSMC Tokyo attachment*	To be attended by Cambodia and Thailand
			Research Fellowship	TC damage assessment methodology
	Q4		Research Fellowship	TC damage assessment methodology
		8th Integrated Workshop and 2nd TRCG Forum / Meeting		(theme to be confirmed)

Annex VII

Summary and Review of TRCG AOP 2012

KRA / SG	*Objective*	*Action*	*Other WGs Involved*	*TCS Responsibility*	*Expected Quarter Completed*	*Other Organizations Involved*	*Success Indicators*	*Funding Required*	*Funding Sources*	*Review and Target Met? (Yes / No)*
KRA 6 / SG 6b and 6c	To: (a) implement training initiatives in the priority operational and research areas as identified in the TRCG annual report; and (b) enhance Members' capability and capacity in the assessment of damage and pre-assessment of potential impact caused by landfalling TCs	Roving Seminar [with themes on damage assessment and pre-assessment methodology]	WGDRR	Provision of administrative and logistic support.	3rd or 4th	-	Feedback from evaluation forms to be completed by a target audience of about 30 people.	USD 14,000	TCTF	Completed. Yes.
KRA 6 / SG 6b and 6c	To facilitate technology transfer (emphasis on QPF/QPE) among TC Members through research and development initiatives.	Research Fellowship	WGM	Provision of administrative and logistic support.	2nd - 4th	TC Members	Publication of research findings and development output in TCRR or other journals.	Fellowship offered by voluntary hosts.	TC Members	Completed. Yes.
KRA 6 / SG 6b and 6c	To enhance TC Members' capacity and knowledge in operational tropical cyclone forecasting.	Attachment of two forecasters (Philippines and Viet Nam) to RSMC Tokyo	nil	Provision of administrative and logistic support.	3rd	RSMC Tokyo, WMO	Assessment as given in RSMC Tokyo report.	USD 4,000	TCTF	Completed. Yes.