COUNTRY REPORT

ESCAP/WMO Typhoon Committee

43nd Session

17 - 22 January 2011

Republic of Korea

JAPAN

CONTENTS

I. Overview of tropical cyclones which have affected/impacted Member's area since the last Typhoon Committee Session

1. Meteorological Assessment (highlighting forecasting issues/impacts)

In 2010, seven tropical cyclones (TCs) of tropical storm (TS) intensity or higher had come within 300 km of the Japanese islands as of the end of November. Five of these affected Japan, with two making landfall. The details of the five TCs that affected the country are outlined below, and their tracks are shown in Figure 1. There were no fatalities in Japan from the approach of these TCs.

(1) STS Dianmu (1004)

Dianmu was upgraded to tropical storm (TS) intensity south of Miyakojima Island at 12 UTC on 8 August. After approaching the island around six hours later, it was upgraded to severe tropical storm (STS), reaching its peak intensity with maximum sustained winds of 50 kt and a central pressure of 985 hPa over the East China Sea at 03 UTC on 9 August. After turning to the east-northeast, it moved along the southern coast of the Korean Peninsula and was downgraded to TS intensity at 21 UTC the next day. Keeping its east-northeastward track, Dianmu made landfall on the northern part of Honshu at around 08 UTC on 12 August with TS intensity. It transformed into an extratropical cyclone south of Hokkaido at 18 UTC that day. Cancellations of flights, ships and trains were reported extensively in Japan.

(2) TY Kompasu (1007)

Kompasu was upgraded to tropical storm (TS) intensity northwest of Okinotorishima Island at 18 UTC on 29 August. Keeping its northwestward track, it was upgraded to typhoon (TY) intensity south of Minamidaitojima Island at 18 UTC on 30 August, reaching its peak intensity with maximum sustained winds of 80 kt and a central pressure of 960 hPa six hours later. Maintaining this level of intensity, it crossed the northern part of Okinawa Island soon after 08 UTC on 31 August and entered the area over the East China Sea. After turning eastward over the Yellow Sea and crossing the Korean Peninsula, Kompasu weakened to tropical depression (TD) intensity over the Sea of Japan at 18 UTC on 2 September.

A peak gust of 49.8 m/s was observed at Nago (47940). Damage to farm products and houses, power outages and cancellations of flights and ships were reported in Okinawa.

(3) STS Malou (1009)

Moving northwestward, Malou was upgraded to tropical storm (TS) intensity south of Okinawa at 00 UTC on 4 September. During its recurvature, it reached its peak intensity with maximum sustained winds of 50 kt and a central pressure of 992 hPa over the East China Sea at 18 UTC on 5 September. Turning to the east, Malou crossed Tsushima Island early on 7 October and then made landfall on Japan before weakening to tropical depression (TD) intensity at 03 UTC the next day.

On 8 August, a 24-hour precipitation amount of 495.5 mm was recorded at an AWS station in the Kanto area, where floods and landslides were reported (Figure 2).

(4) TY Fanapi (1011)

Moving northwestward, Fanapi was upgraded to tropical storm (TS) intensity south of Okinawa

Island at 12 UTC on 15 September. Turning northward, it was upgraded to typhoon (TY) intensity over the same waters at 18 UTC the next day. Turning gradually westward, it reached its peak intensity with maximum sustained winds of 95 kt and a central pressure of 930 hPa south of Iriomotejima Island at 15 UTC on 18 September. Keeping its westward track, Fanapi was downgraded to severe tropical storm (STS) intensity at 12 UTC on 19 September just after crossing Taiwan Island. After crossing the Taiwan Strait and hitting southern China, it weakened to tropical depression (TD) intensity north of Hong Kong at 18 UTC on 20 September and dissipated 24 hours later.

A peak gust of 56.6 m/s was observed at Yonagunijima Island (47912). Damage to farm products, power outages and cancellations of flights and ships were reported in Okinawa.

(5) TY Chaba (1014)

Chaba was upgraded to tropical storm (TS) intensity far east of the Philippines at 12 UTC on 24 October. Moving northwestward, it was upgraded to typhoon (TY) intensity at 00 UTC on 26 October. After recurving the next day, it reached its peak intensity with maximum sustained winds of 90 kt and a central pressure of 935 hPa southeast of Okinawa at 06 UTC on 28 October. Moving northeastward and weakening gradually, Chaba approached the Izu Islands with severe tropical storm (STS) intensity early on 30 October and transformed into an extratropical cyclone east of the Kanto area at 18 UTC that day. A peak gust of 44.6 m/s and 24-hour precipitation of 205.5 mm were observed at Minamidaitojima Island (47945). Seven cases of injury to people were reported in Okinawa. Damage to farm products and cancellations of flights, ships and trains were also reported in Okinawa and the Kanto area.

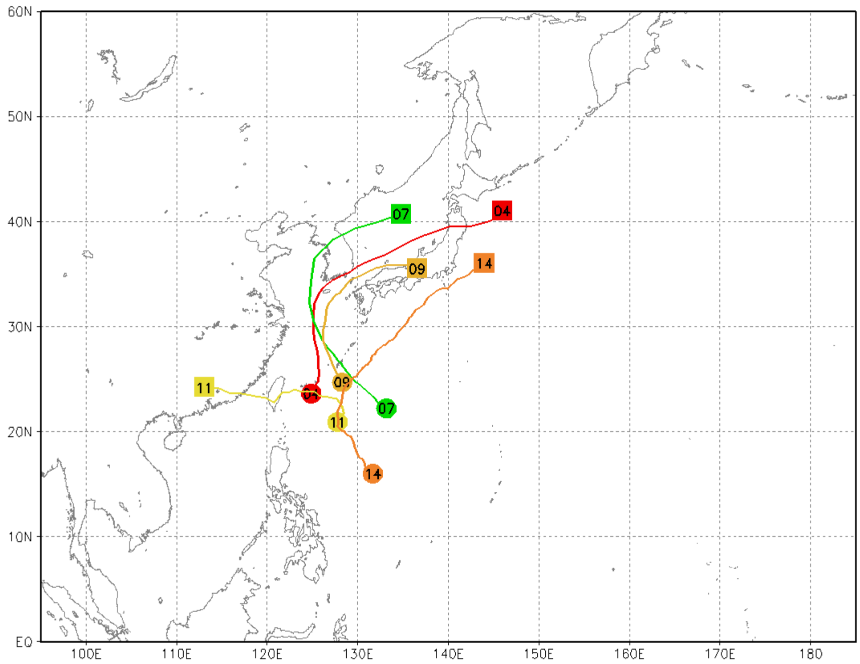


Figure 1. Tracks of the five named TCs that affected Japan in 2010
The numbered circles represent the genesis point of each named TC, while the squares show the dissipation point. The numbers indicate the last two digits of the identification number for each named TC.

Figure 2. Impacts of Malou (1009) Left: landslide in Kanagawa Prefecture (photo: Mainichi Newspapers) Right: flooding in Tokyo Prefecture (photo: Sankei Shimbun) an especially high frequency of deep rapid landslide occurrence, and orange shading indicates areas with a high frequency.)

2. Hydrological Assessment (highlighting water-related issues/impact)

3. Socio-Economic Assessment (highlighting socio-economic and DPP issues/impacts)

4. Regional Cooperation Assessment (highlighting regional cooperation successes and challenges)

II. Summary of progress in Key Result Areas

1. Progress on Key Result Area 1: Reduced Loss of Life from Typhoon-related Disasters.

a. Meteorological Achievements/Results

a-1. Establishment of a regional storm surge watch scheme

RSMC Tokyo is developing a regional storm surge watch scheme to allow forecasting of storm surges in the TYC region. In 2010, the TYC members (Hong Kong, the Philippines, Vietnam, Macao, Malaysia and Singapore) provided tidal and bathymetric data to RSMC Tokyo, which subsequently developed a prototype storm surge model using the bathymetric data. RSMC Tokyo plans to verify the accuracy of the model using the tidal data provided, with a view to supplying distribution maps and time-series charts of storm surges in the future.

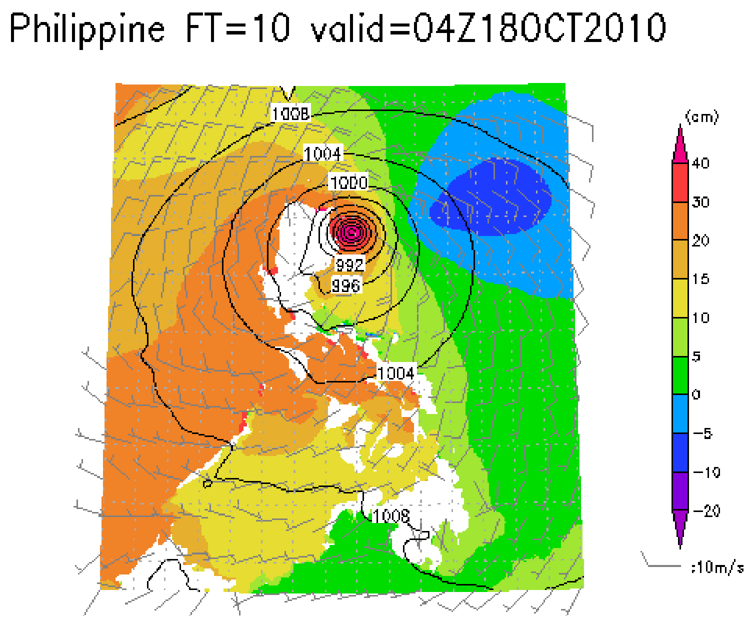


Figure 3. Example of a forecasted storm surge (Typhoon Megi, 2010)
The colors indicate storm surge height (cm), and the contours show surface pressure (hPa). The barbs represent wind strength.

(KRA 7)

b. Hydrological Achievements/Results

b-1. Hazard Mapping for Sediment-related Disasters Project

From 2002 to 2008, the Sediment-related Disaster Forecasting Warning System Project was executed with the aim of sharing the Japanese method of setting the critical rainfall levels that trigger warnings and evacuation in the event of sediment-related disasters from the viewpoint of identifying dangerous situations. The project involved eight TC members (China, Malaysia, Vietnam, the Philippines, Thailand, the United States and Japan), and its final report was published in the form of technical guidelines and case studies for the 42nd TC session in Singapore. (http://www.typhooncommittee.org/docs/publications/book2_SEDIMENT.pdf).

Currently, the Hazard Mapping for Sediment-related Disasters Project, led by the Sabo Department of MLIT and NILIM, is being executed by six TC members (China, Hong Kong, the

Philippines, Thailand, the United States and Japan) to share Japanese methods of setting hazardous areas, making hazard maps for warning/evacuation and land use restriction from the viewpoint of identifying dangerous areas.

Before the TC 5th Integrated Workshop in Macao on Sept. 4 and 5, a collaboration meeting between WGDRR and WGH and field training for the Hazard Mapping for Sediment-related Disasters Project was held. On Sept. 4, an indoor lecture was given at the Macao Science Center to explain the Japanese method of setting hazardous areas and how to make and use hazard maps. On Sept. 5, field training was held for TC members and locals (engineers and residents) on setting hazardous areas and improving local awareness of risk for sediment-related disasters at a model site in Zhuhai City, China. The meeting and field training were attended by 20 people from nine TC member countries (Cambodia, China, D.P.R. Korea, Hong Kong China, the Republic of Korea, Macao China, Thailand, the Philippines and Japan) and 15 local staff from Zhuhai City Office and local residents, respectively.

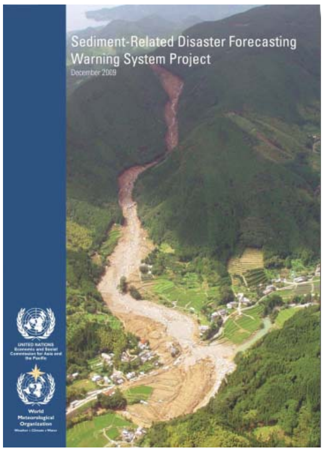


Figure 4. The final report of the Sediment-related Disaster Forecasting Warning System Project

Figure 5. Field training for the Hazard Mapping for Sediment-related Disasters Project in Zhuhai City, China

Example of Hazard Map:

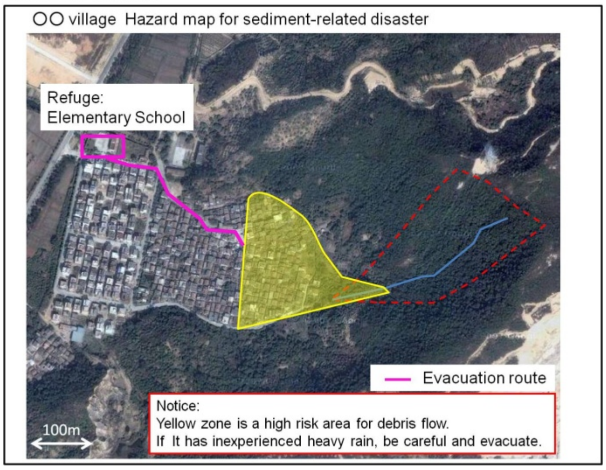


Figure 6. Example of a hazard map for sediment-related disasters

(KRA2, 4, 5, 6, 7)

c. Disaster Prevention and Preparedness Achievements/Results

c-1. Major Disaster and Response Measures since January 2010

In 2010, Japan was affected by a number of bouts of torrential rain. In particular, heavy downpours during the rainy season from mid-June to mid-July resulted in 16 fatalities and caused inundation above floor level in as many as 1,786 houses throughout Japan.

Heavy rains from 18 to 30 September in Amami Oshima, Kagoshima Prefecture, reaching up to 130 millimeters per hour resulted in three fatalities, caused inundation above floor level in 123 houses and damaged about 500 houses. The national government’s response included early warning reports from the Japan Meteorological Agency (JMA) and inter-ministerial meetings for response coordination.

The Prime Minister visited affected sites in Gifu Prefecture in July, and the Minister of State for Disaster Management visited Amami Oshima in October as part of related investigations. .

c-2. Technical Investigation on Large-Scale Flood Countermeasures

There has been a significant reduction in the total area inundated by flood disasters thanks to weather forecasting system improvement and the promotion of land conservation and flood control projects over a period of many years. However, in terms of general assets, the amount of damage in flooded areas has greatly increased in recent years. Additionally, the frequency of downpours depositing more than 100 mm of rain per hour has seen an increasing trend throughout the country over the last 30 years (Figure 7, 8).

This increasing trend necessitates strengthened countermeasures to ensure quick and smooth evacuation and relief activities in the event of large-scale flooding. The Central Disaster Management Council established the Committee for Technical Investigation on Large-Scale Flood Countermeasures to analyze anticipated situations. As an example of related activities, it reviews measures against large-scale flood disasters that are expected to cause immense damage to the capital region.

The Central Disaster Management Council, chaired by the Prime Minister and manned by other Ministers of State, focuses on the promotion of comprehensive disaster countermeasures.

The study was started in 2006, and some interesting cases of analysis have been made. One such example is the simulation of a potential flood area in the Tone River basin (the largest river basin in Tokyo). A map of the flood area was simulated, assuming river dike breach caused by hypothetically fatal rainfall with an occurrence likelihood of once every 200 years. In the worst-case scenario, more than two million people could be affected by such a flood, and nearly a million houses could be damaged. Although this was only a simulation, it is important that the potential magnitude of related damage is properly understood by the government and residents alike (Figure 9).

After 20 rounds of discussions over a period of four years, the committee recommended the following countermeasures March 2010:

1. Damage reduction by ensuring timely and effective evacuation
2. Enhancement of disaster response capabilities and securement of important functions by public institutions
3. Strengthening of disaster response capability among residents and private firms in relation to large-scale flooding and other disaster conditions in March 2010
4. Disaster mitigation through the implementation of flood control measures and land use Control
5. Countermeasures against other damage events associated with large-scale floods

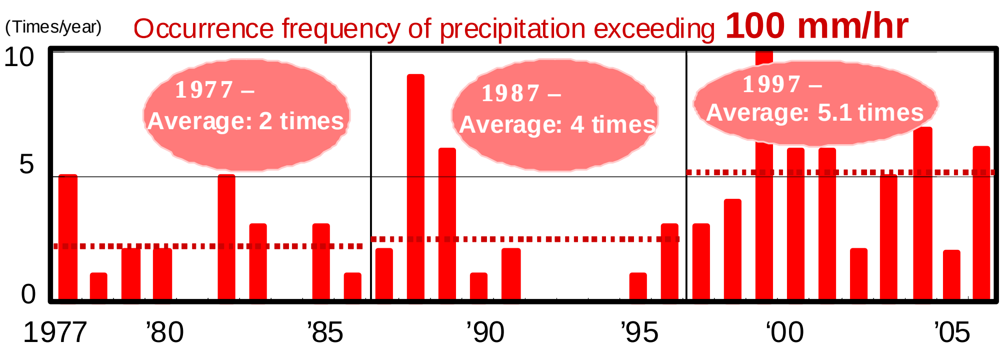


Figure7. Tendency of downpours as of 2006 (over 100 mm/hr)

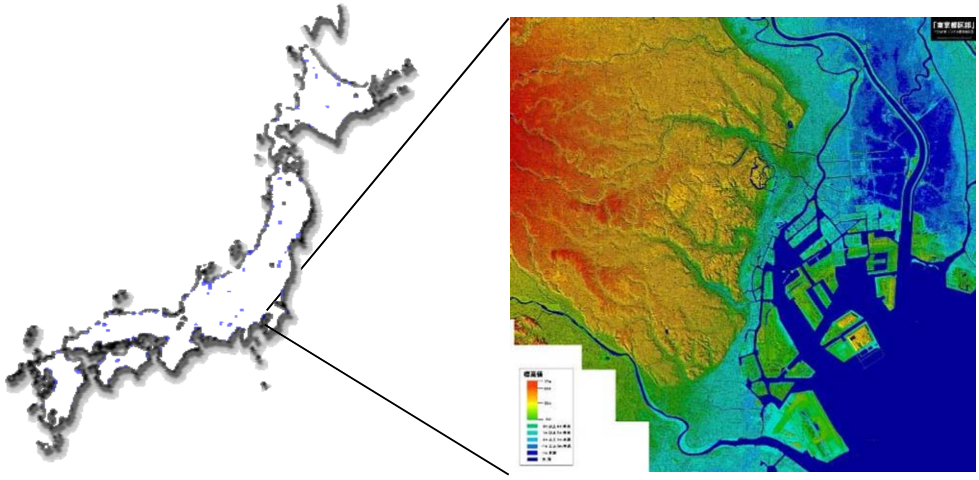
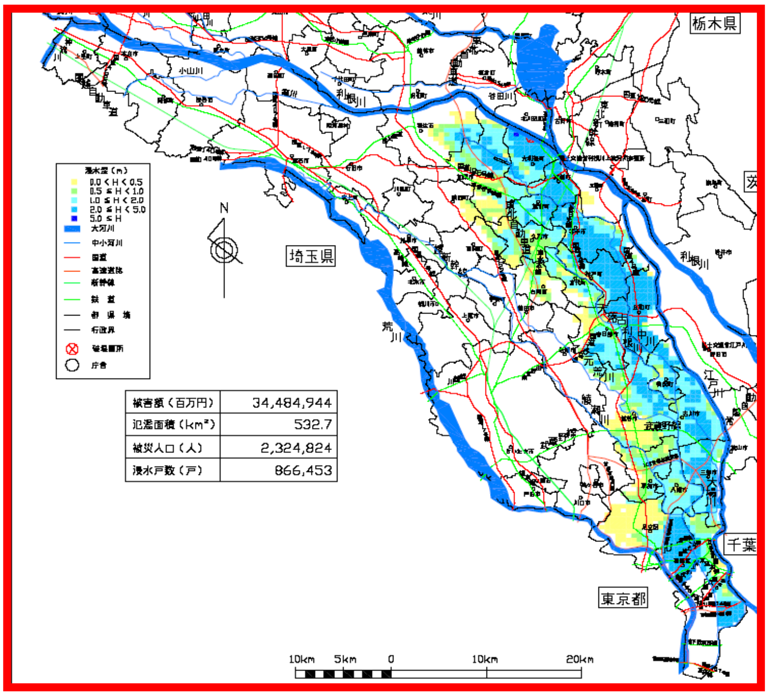


Figure8. Zero-meter altitude area in the metropolitan area



Flood area (hectares)	53,000
Affected population	2,300,000 people
Flooding above floor level	690,000 houses
Flood below floor level	170,000 houses

Figure 9. Flood area simulation for the Tone River basin in Tokyo

c-3 Technical Investigation on Disaster Evacuation

In April 2010, the Central Disaster Management Council established the Committee for Technical Investigation on Disaster Evacuation to investigate various challenges relating to disaster evacuation, such as setting up evacuation centers and preparing for issuance of evacuation information.

d. Research, Training, and Other Achievements/Results

d-1. Technical Emergency Control Force for Disaster Assistance

The Technical Emergency Control Force (TEC-FORCE) was established in 2008. It consists of teams of experts for different purposes formed by different agencies in the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), such as the River Bureau, the National Institute for Land and Infrastructure Management, the Japan Meteorological Agency, the Geographical Survey Institute, and regional branch bureaus. When a large-scale disaster occurs or is likely to occur due to a typhoon or earthquake, TEC-FORCE teams will be dispatched to provide technical assistance by swiftly collecting information on disaster situations and carrying out duties to prevent or contain damage. They will assist municipalities in affected areas in early recovery and smooth, swift implementation of emergency measures.

Immediately after the occurrence of a large-scale disaster, damage to elements of infrastructure supporting local livelihoods such as roads will often interrupt life-saving work and the stable daily activities of residents. However, municipalities originally responsible for such infrastructure are very likely to be overwhelmed in responding to residents' emergency needs, making them unable to fully perform the tasks needed to assess infrastructure damage and start recovery efforts. Composed of national government employees with expertise in infrastructure management and experience in disaster response, TEC-FORCE aims to provide professional support in order to assist municipalities across Japan in the event of such circumstances.

In 2010, TEC-FORCE teams were dispatched to different areas on three occasions: to Hiroshima Prefecture on 16 July during a Baiu-front heavy rainfall event, to affected areas on 8 September in relation to Typhoon No. 9, and to the Amami area on 20 October during a heavy rainfall event. Over 400 TEC-FORCE members were sent to these affected areas for investigations from the air by helicopter as well as on the ground. They also provided guidance to local task forces on restoration work to assist early recovery.

Figure 10. Damage assessment on the ground

Figure 11. Damage assessment by helicopter

Figure 12. Technical assistance team (advising on recovery works)

(KRA2, 4)

e. Regional Cooperation Achievements/Results

e-1. Publication of a Deep Rapid Landslide Frequency Map of Japan

The Sabo Department of Japan’s Ministry of Land, Infrastructure, Transport and Tourism (MLIT) and Public Works Research Institute (PWRI) have implemented studies on deep rapid landslides in response to several instances of the phenomenon in recent years that have caused fatalities among residents. In such landslides, both the soil layer and the underlying deep weathered/fractured bedrock collapse simultaneously. Although they occur less frequently than shallow landslides, they are capable of causing large-scale disasters.

According to recent findings by PWRI, deep rapid landslides occurring since the Meiji era (i.e., since 1868) in Japan have been seen in areas with a high rock uplift rate and specific types of geology. Accordingly, based on spatial patterns of rock uplift rates and on a geological map of Japan, the Deep Rapid Landslide Frequency Map – a resource showing estimated occurrence frequencies of the phenomenon all over Japan – has been created. The Sabo Department of MLIT and PWRI have officially announced the publication of this map, and will execute the measures outlined below.

(a) For a period of around three years, focused investigation of areas deemed to have especially high frequencies of deep rapid landslide occurrence will be carried out, and susceptibility to occurrence in individual small mountain catchment areas will be evaluated. The results of this investigation will be sequentially published once the related work is complete. Research is also under way to develop a simplified investigation method that can be applied to other large areas where deep rapid landslide occurrence is relatively frequent.

(b) For small mountain catchment areas deemed as a result of evaluation to be highly susceptible, the risk of landslide dam occurrence will be investigated, and warning/evacuation systems will be established in cooperation with the local governments responsible for neighborhood and downstream areas.

The Sabo Department of MLIT and PWRI will collaborate with the Japan Society of Erosion Control Engineering to clarify the processes and mechanisms behind deep rapid landslides in further detail and to develop effective countermeasures for the phenomenon.

Figure 13. Example of a natural dam – a sediment-related disaster caused by a deep rapid landslide (Mimikawa River, Miyazaki Pref.)

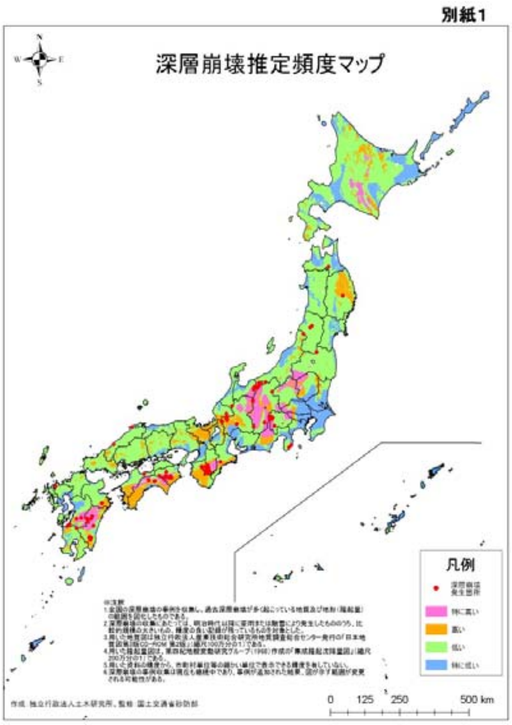


Figure 14. Deep Rapid Landslide Frequency Map of Japan (Red dots indicate locations where deep rapid landslides have occurred. Purple shading indicates areas with an especially high frequency of deep rapid landslide occurrence, and orange shading indicates areas with a high frequency.)

（KRA2, 5, 6, 7）

f. Identified Opportunities/Challenges for Future Achievements/Results

2. Progress on Key Result Area 2: Minimized Typhoon-related Social and Economic Impacts.

a. Meteorological Achievements/Results

b. Hydrological Achievements/Results

c. Disaster Prevention and Preparedness Achievements/Results

d. Research, Training, and Other Achievements/Results

e. Regional Cooperation Achievements/Results

f. Identified Opportunities/Challenges for Future Achievements/Results

3. Progress on Key Result Area 3: Enhanced Beneficial Typhoon-related Effects for the Betterment of Quality of life.

a. Meteorological Achievements/Results

b. Hydrological Achievements/Results

c. Disaster Prevention and Preparedness Achievements/Results

d. Research, Training, and Other Achievements/Results

e. Regional Cooperation Achievements/Results

f. Identified Opportunities/Challenges for Future Achievements/Results

4. Progress on Key Result Area 4: Improved Typhoon-related Disaster Risk Management in Various Sectors.

a. Meteorological Achievements/Results

a-1. JMA's Climate Change Monitoring Report

JMA describes inter-annual variability and long-term trends regarding typhoon activity in its Climate Change Monitoring Report every year. This is distributed to the Japanese public as well as to NHMSs via the Tokyo Climate Center's website (http://ds.data.jma.go.jp/gmd/tcc/tcc/products/gwp/gwp.html).

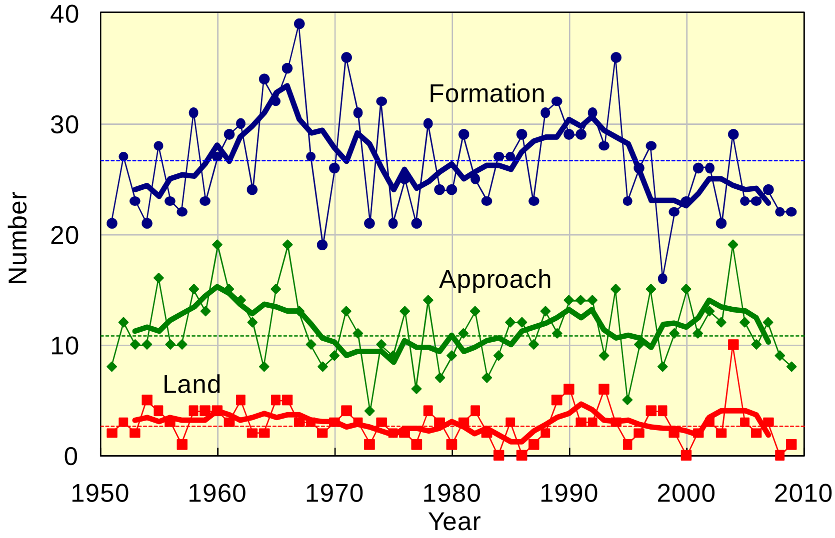


Figure 15. The number of tropical cyclones (TS intensity or higher) forming in the western North Pacific (top), those that approached Japan (middle) and those that hit Japan (bottom). The thin, solid and dashed lines represent annual/five-year running means and normal values (1971 – 2000 averages), respectively.

(KRA1, 2, 5, 6)

b. Hydrological Achievements/Results

c. Disaster Prevention and Preparedness Achievements/Results

c-1. Visiting Researchers from ADRC Member Countries

The ADRC receives visiting researchers from member countries, and 50 have taken part in this program to date. Below is a list of the visiting researchers in the network.

	Name	Country	ADRC attendance in VR role		
1	Shim Kee-Oh	Republic of Korea	1999/07/23	-	1999/10/11
2	Ngo Van Sinh	Vietnam	1999/12/10	-	2000/03/17
3	Lek Nath Pokharel	Nepal	2000/01/12	-	2000/05/07
4	Nimal D. Hettiarachchi	Sri Lanka	2000/04/13	-	2000/10/12
5	M. Babul Akhter	Bangladesh	2000/05/12	-	2000/11/16
6	W. A. Chulananda Perera	Sri Lanka	2000/11/13	-	2001/04/05
7	Hiripsime Vardanyan	Armenia	2001/03/09	-	2001/06/04
8	Philomena Miria	Papua New Guinea	2001/06/04	-	2001/12/03
9	So Ban Heang	Cambodia	2001/06/04	-	2001/12/04
10	Md. Atikuzzaman	Bangladesh	2002/01/09	-	2002/06/30
11	Tigran Sayiyan	Armenia	2002/02/23	-	2002/08/22
12	Khun Sokha	Cambodia	2002/07/29	-	2002/12/25
13	V. P. Pasrija	India	2002/10/05	-	2002/12/25
14	Dilli Pd. Shiwakoti	Nepal	2003/01/08	-	2003/07/02

15	Bolormaa Borkhuu	Mongolia	2003/01/08	-	2003/07/05
16	Vilayphong Sisomvang	Lao PDR	2003/07/08	-	2003/12/25
17	Rachman Sobarna	Indonesia	2003/07/09	-	2003/09/30
18	Om Prakash	India	2003/10/08	-	2003/12/24
19	Rahmonov Suhrobsho	Tajikistan	2004/01/14	-	2004/06/10
20	Nguyen Thanh Phuong	Vietnam	2004/01/27	-	2004/06/29
21	Yuan Yi	China	2004/07/19	-	2004/10/15
22	Bouasy Thammasack	Lao PDR	2004/07/21	-	2004/12/24
23	Shyam Sunder	India	2005/10/02	-	2005/12/25
24	Ross Sovann	Cambodia	2005/01/23	-	2006/06/30
25	Bal Bahadur Malla	Nepal	2005/01/30	-	2006/06/29
26	Maria Matilde Limpahan Go	Philippines	2005/07/13	-	2005/12/27
27	Diloro Mirzovatanovna Mirova	Tajikistan	2005/07/15	-	2005/12/21
28	Lyudmila Harutyunyan	Armenia	2006/01/11	-	2006/04/10
29	G. M. J. K. Gunawardana	Sri Lanka	2006/03/01	-	2006/06/30
30	San-Hyeok Kang	Republic of Korea	2006/07/01	-	2006/12/15
31	Altanchimeg Shaazan	Mongolia	2007/01/09	-	2007/06/30
32	Arun Pinta	Thailand	2007/01/14	-	2007/06/30
33	Nwet Yin Aye	Myanmar	2007/07/06	-	2007/12/31
34	Karybai Uulu Kanat	Kyrgyz Republic	2007/07/04	-	2007/12/31
35	Zhang Yunxia	China	2008/01/01	-	2008/05/28
36	Zafar Waqar Taj	Pakistan	2008/02/23	-	2008/06/24
37	Vu Thanh Liem	Vietnam	2008/07/11	-	2008/12/17
38	Shambhu Prasad Marasini	Nepal	2008/07/11	-	2008/12/19
39	Muhammad Khalil Bin Aziz	Malaysia	2009/1/15	-	2009/06/24
40	Areerat Wijitpatchraphon	Thailand	2009/1/15	-	2009/06/24
41	Predeep Kodippili	Sri Lanka	2009/8/6	-	2009/10/17
42	Porcil Josefina Tan	Philippines	2009/8/5	-	2010/12/10
43	Mishra Sagar	Nepal	2009/8/6	-	2010/12/10
44	Shahid Hussain Malik	Pakistan	2009/8/7	-	2010/12/10
45	Phurimon Puneam	Thailand	2010/1/6	-	2010/4/30
46	Amirzudi bin Hashim	Malaysia	2010/1/15	-	2010/4/30
47	Aziz Ali Nasser	Yemen	2010/1/1	-	2010/6/13
48	Nguyen Ngoc Huy	Vietnam	2010/6/1	-	2010/6/30
49	Carmelita A. Laverinto	Philippines	2010/7/21	-	2010/11/20
50	Chinthaka Dinesh Hemachandra	Sri Lanka	2010/7/21	-	2010/11/20

Figure 16. Visiting Researchers

d. Research, Training, and Other Achievements/Results

d-1. Disaster Management Policy Program: Water-related Risk Management Course

In response to the growing threat of water-related disasters around the world, there is an urgent need to build a community of experts and professionals to deal with them, particularly in developing countries. To meet this need, ICHARM offers a master's degree program called the Water-related Disaster Management Course of Disaster Management Policy Program, which started in October 2007. This 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).

As of the beginning of 2011, 12 masters students are enrolled on the course. Two of these were selected from a TC member region (China).

Figure 17. Management course students for the year 2009-2010

(KRA1, 2, 5, 7)

d-2. Implementation of JICA's Comprehensive Management of Rivers and Dams group training program

The River Bureau of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), the

National Institute for Land and Infrastructure Management, PWRI and JICA serve as implementing agencies for JICA's Comprehensive Management of Rivers and Dams group training program, which began in 1973.

Engineering officers working on flood control and water resource management from Asia and elsewhere are invited to attend the program. Lectures are given on water management measures taken by the Japanese Government, presentations/exercises are organized in relation to aspects of engineering technology (such as river management systems, riparian structures, hydrological analysis and dam design/operation), and field visits to relevant facilities are arranged. In 2010, officers from Indonesia, Iraq, the Philippines, Myanmar, Syria and Vietnam participated in the training from September to December.

The program is coordinated by Infrastructure Development Institute-Japan.

Figure 18. Trainees of the program

(KRA1, 2, 5, 7)

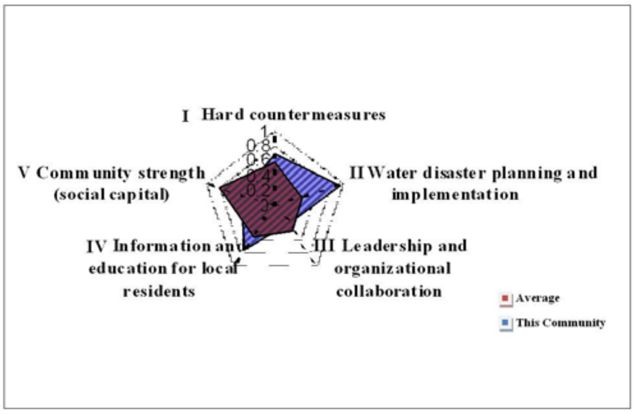
e. Regional Cooperation Achievements/Results

e-1. Project for the Development of Flood Disaster Preparedness Indices

Strengthening disaster preparedness for effective response at all levels and identifying, assessing and monitoring disaster risks are issues stressed in the Priorities for Action section of the Hyogo Framework for Action adopted in January 2005. However, despite these recognized priorities, central governments in many countries often provide inadequate assistance or fail to implement it in a timely manner when disasters happen. It is also well understood that when a disaster occurs, the most effective actors are local residents themselves. Accordingly, raising disaster preparedness levels to ensure effective response by local communities/governments is a critical factor in disaster management. As a further consideration, there is no widely recognized indicator that can be utilized for periodical self-assessment in localities. In this regard, a common operational overview is needed by which communities can be encouraged, directed and allowed to learn from each other to take rational procedures toward ensuring an adequate state of preparation.

Against such a background, the current project was proposed to fill these gaps and adopted for implementation. Its objective is to establish indices to improve flood disaster preparedness levels of local governments and communities.

Establishing FDPI



In order to develop a well-organized set of indicators, it was agreed that they should be based on the disaster management cycle. However, they should also be localized and enriched by feedback from TC members. To this end, ICHARM developed a rudimentary set of indicators for model trial/evaluation and launched a website exclusively for the task at hand (www.fdpi.jp/fdpi) in September 2010. Currently, TC members are being encouraged to provide this information to their communities and local municipalities so that they can model-test the proposed set of indicators in a questionnaire style. The list of questions is also expected to serve as a resource providing instruction on how to develop local disaster response capacity.

(KRA1, 2, 5, 6, 7)

f. Identified Opportunities/Challenges for Future Achievements/Results

5. Progress on Key Result Area 5: Strengthened Resilience of Communities to Typhoon-related Disasters.

a. Meteorological Achievements/Results

a-1. JMA Mobile Observation Team

In October 2008, JMA named its disaster survey team the Mobile Observation Team (JMA-MOT). Survey teams from JMA carry out field surveys to ascertain actual conditions and provide scientific explanations of events after natural disasters such as severe storms, earthquakes, tsunamis, volcanic eruptions and storm surges. JMA gave a unified name to the survey team to familiarize the public with its activities and contribute to the reinforcement of community resilience and risk management authorities after disasters. Once a disaster occurs, the relevant local meteorological observatory organizes and dispatches the Mobile Observation Team based on agreement with the local government. Another mission of this Team involves public relations; the local meteorological observatory issues an official announcement on the dispatch of JMA-MOT just after the decision to send them out, and releases the field survey report as soon as possible, which is expected to reduce anxiety among the public.

(KRA4, 6)

b. Hydrological Achievements/Results

c. Disaster Prevention and Preparedness Achievements/Results

d. Research, Training, and Other Achievements/Results

d-1. Training Course on Local Disaster Management Planning with Flood Hazard Maps

ICHARM conducted the Flood Hazard Map (FHM) training course from 2004 to 2008, thereby significantly contributing to the promotion of the TC project of the same title. To build on past achievements and further promote the establishment of solid local disaster management plans in developing countries, this new training course was launched and run over a period of three weeks in November 2009 in collaboration with JICA. The overall goal is to reduce flood damage in the target countries by formulating local disaster management plans combined with FHMs and flood forecasting/warning systems and by strengthening local resilience against floods. The program aims to give trainees the skills required to develop direction and schedules for the creation of local disaster management plans combined with flood hazard maps and flood forecasting/warning systems. The second-year (Jan. 2011) part of this three-year systematic training course is currently under implementation, and is attended by nine trainees, two of whom are from TC member regions (Lao PDR and Thailand).

Figure 19. Opening ceremony of the training course

(KRA1, 2, 6, 7)

e. Regional Cooperation Achievements/Results

f. Identified Opportunities/Challenges for Future Achievements/Results

6. Progress on Key Result Area 6: Improved Capacity to Generate and Provide Accurate, Timely, and understandable Information on Typhoon-related Threats.

a. Meteorological Achievements/Results

a-1. Improvement of Observation Systems

Satellite observation

Switchover of Meteorological Mission from MTSAT-1R to MTSAT-2

As detailed in the previous country report for Japan, on 1 July, 2010, JMA switched over imaging satellite operations to the Multi-functional Transport Satellite-2 (MTSAT-2, also known as Himawari-7), which is located at 145 degrees east, from MTSAT-1R (Himawari-6), which is located at 140 degrees east and now operates as an in-orbit stand-by for MTSAT-2.

MTSAT-2 captures cloud imagery, observing with one visible and four infrared channels in the same way as MTSAT-1R. The spatial and quantization resolutions of the images are also identical. The observation timetable of MTSAT-2 has no changes from that of MTSAT-1R; it observes the Northern Hemisphere every 30 minutes and the Southern Hemisphere hourly. Overall, MTSAT-2 continuously provides the same information on typhoon observation.

Regarding the satellite's HRIT/LRIT (High/Low Rate Information Transmission) image dissemination service for MDUS/SDUS (Medium/Small scale Data Utilization Station) users, MTSAT-1R continuously provides MTSAT-2's images even at the post-switchover stage, meaning that MDUS and SDUS users do not need to reconfigure the orientation of their receiving antennas. Since the switchover, full-disk visible images have been additionally disseminated by LRIT.

(KRA1, 2, 4, 5)

a-2. Improvement of the Initialization Scheme for Tropical Cyclones in JMA's NWP

In JMA's global and meso-scale NWP systems, a typhoon-bogus scheme is applied to initialization for tropical cyclones (TCs) over the western North Pacific. In this scheme, a typical TC structure is generated based on real-time TC analysis at RSMC Tokyo, and pseudo-observation data (i.e., bogus data) extracted from this structure are deployed around the TC. The bogus data are assimilated in each NWP system.

In recent years, the accuracy of the first-guess fields in operational analysis has been improved by the introduction of new satellite data and a sophisticated data assimilation system. This has reduced the relative accuracy of the bogus data, and the assimilation of too many bogus data could impair the accuracy of analysis. To deal with this issue, a bogus data adjustment function has been introduced. With this function, the number of bogus data can be adjusted according to the distance from the TC's central position in the TC analysis to the one in the first guess. In many cases, the number of bogus data is greatly reduced as a result, and these data are deployed only in the vicinity of the TC center.

For the global NWP system, data assimilation and forecast experiments were conducted prior to actual operation. The level of TC track prediction error was clearly reduced as a result of using the improved typhoon-bogus scheme (Figure 20). The new scheme was incorporated into the operational global NWP system in April 2010.

An almost-identical scheme was incorporated into the operational meso-scale NWP system in September 2010. One additional change for the meso-scale system is the timing of bogus data generation. Previously, these data were prepared for the start of the assimilation window (at a point three hours before the analysis time). In the new scheme, the data are prepared for the end of the assimilation window (at the analysis time). This allows the system to use the latest TC analysis data. However, since the meso-scale data assimilation process is started only 50 minutes after the analysis time, the bogus data generation schedule is very tight and the process sometimes cannot be completed in time. Any data delivered late will be used in the next data assimilation process three hours later.

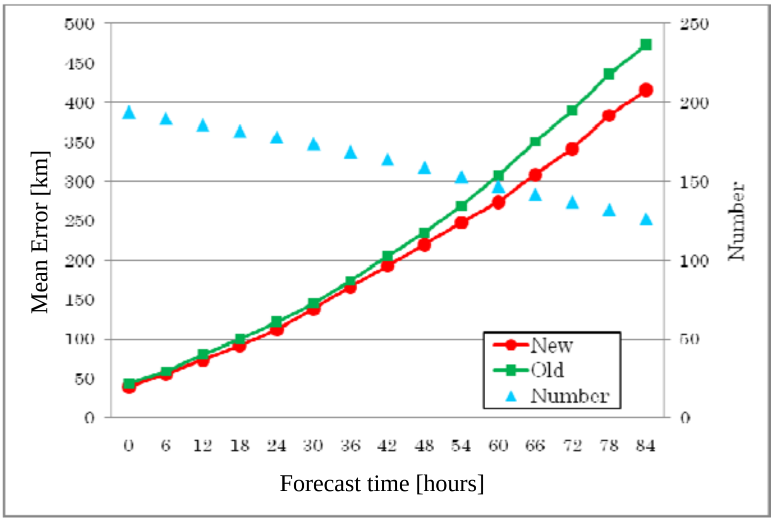


Figure 20. Mean track forecast errors (km) for TCs in RSMC Tokyo's area of responsibility from 25 September to 25 October, 2009, according to the global NWP system. The red line shows errors of TC track prediction with the improved typhoon-bogus scheme, and the green line shows those with the old one. The level of error is clearly lower with the improved scheme. The blue triangles denote the number of verification samples.

(KRA1, 2, 4, 5, 7)

a-3. Improvement of the RSMC Data Serving System

JMA's RSMC Data Serving System (DSS) has provided TDCF (Table-driven Code Form) observational data types such as SYNOP BUFR since July 2010, also has provided TAC (Traditional Alphanumeric Code) observational data including SYNOP, SHIP, BUOY, TEMP and PILOT since 1995. In recent years, the number of WMO members providing TDCF observational data through the Global Telecommunication System (GTS) has increased in line with national migration plans. In this regard, JMA has expanded the content of the RSMC DSS to include TDCF surface and upper observational data. It will continue to provide TAC and TDCF observational data in parallel until further notice.

(KRA1, 2, 4, 5, 7)

a-4. Improvements to the initial perturbation of JMA's Typhoon Ensemble Prediction System

Since February 2008, JMA has operated the Typhoon Ensemble Prediction System (TEPS) with the aim of contributing to operational five-day TC forecasts at the RSMC Tokyo-Typhoon Center.

The forecast model of TEPS is a low-resolution version (TL319L60) of JMA's Global Spectral Model (GSM). It runs four times a day when TCs of TS/STS/TY intensity are present or expected to appear in the Typhoon Center's area of responsibility (0˚N – 60˚N, 100˚E – 180˚E) with 11 members (1 control member + 10 perturbed members) and a forecast time of up to 132 hours.

The initial perturbations of TEPS are created using the singular vector (SV) method. Two types of SV spatial target area are defined to capture the uncertainty of TC track forecasts. One is the Northwestern Pacific (20°N – 60°N, 100˚E – 180˚E), and the other is a group of areas around the central positions of TC forecasts (three at maximum: TC target area). To further improve the performance of TEPS, JMA revised the method used to make initial perturbations. First, TC target areas are set as circular regions with a 750-km radius from the TC's central position, in contrast to the previous rectangular-area settings (10 degrees in the meridional direction and 20 degrees in the zonal direction). Second, the amplitude of the initial perturbation is normalized using the moist total energy value, in contrast to the previous normalization using the maximum meridional or zonal wind speed.

Figure 21 shows ensemble mean track forecast errors classified according to the reliability index. A, B and C represent the highest, mid-level and lowest levels of forecast reliability. The index is determined by the six-hourly accumulated ensemble spread at each forecast time. In the new system, the mean track forecast errors of A, B and C remain in the same order as the reliability indices throughout the forecast time, which was not the case with the previous system. This result indicates that the revisions contribute to appropriate distribution of initial perturbations and improve the spread-skill relationship of TC track forecasts, thereby ensuring that TEPS products can provide information on operational TC forecasts with a higher level of confidence.

The revisions were incorporated into TEPS in May 2010.

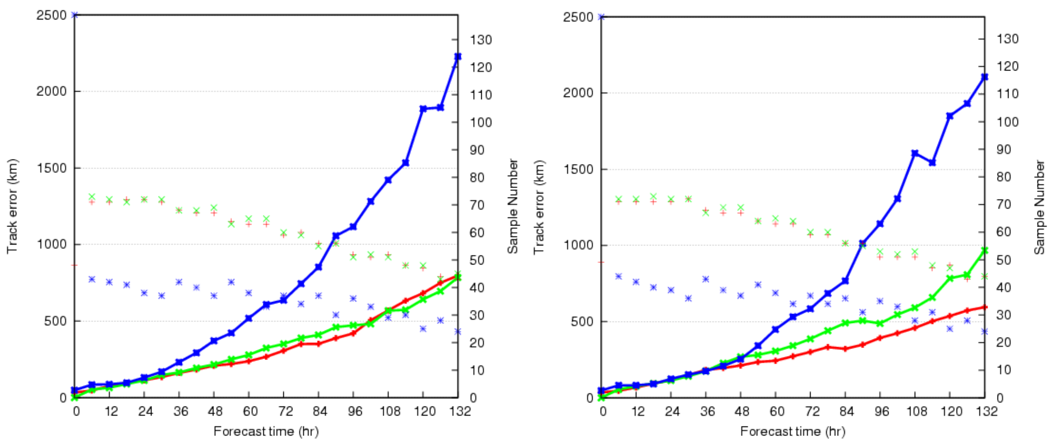


Figure 21. Ensemble mean track forecast errors for TCs in the Typhoon Center's area of responsibility from 25 September to 25 October, 2009. The figure on the left is for the old system, and that on the right is for the new system. The red, green and blue lines show the mean track errors with reliability index A, B and C, respectively. The colored marks indicate the number of samples for each class.

(KRA1, 2, 4, 5, 7)

a-5. Weekly report on extreme climate events

JMA issues weekly reports on extreme climate events around the world, including extremely heavy precipitation and/or weather-related disasters caused by tropical cyclones. These reports are distributed to NMHSs via the TCC website in near-real time (http://ds.data.jma.go.jp/gmd/tcc/tcc/products/climate/).

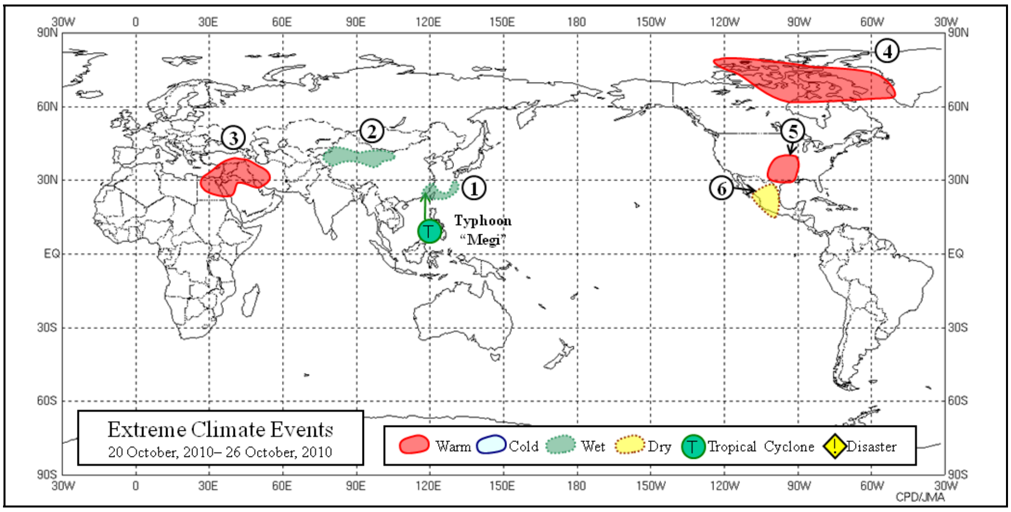


Figure 22 Distribution of global extreme climate events (7 Oct 2009 - 13 Oct 2009); The figure indicates areas where extreme climate events were identified from SYNOP messages, and also shows the tracks of tropical cyclones based on preliminary data from Tropical Cyclone Centers worldwide.

(KRA 1, 2, 4, 5, 7)

a-6. Tropical Cyclone Ensemble Forecast Information Website

1. Introduction

As a five-year initiative starting from 2009, the World Weather Research Program (WWRP) RDP project entitled North Western Pacific Tropical Cyclone (TC) Ensemble Forecast (NWP-TCEF) aims to build on the THORPEX Interactive Grand Global Ensemble (TIGGE) concept and take advantage of the TIGGE Cyclone XML (CXML) data provided by multiple organizations to improve TC track forecast skill over the Northwestern Pacific. Since May 2010, the Meteorological Research Institute has operated a website for ESCAP/WMO Typhoon Committee members and interested researchers around the world to allow visualization, comparison and verification of ensemble forecasts provided by the multiple organizations using CXML data. The site’s URL is http://tparc.mri-jma.go.jp/cyclone, but password protection is used to ensure exclusive access to operational forecasters and researchers.

2. CXML data

CXML data consist of XML formatted text files containing information including the TC center location, maximum wind speed and sea level pressure in real-time analysis and deterministic/ensemble forecasts. A detailed description of the CXML format is provided on the CXML website at http://www.bom.gov.au/cyclone/cxmlinfo/index.shtml.

Such files are provided by JMA, ECMWF, NCEP, UKMO, MSC (Canada), KMA, CMA and STI (China). JMA provides two different forecasts: the weekly ensemble forecast (WEPS) and the typhoon ensemble forecast (TEPS).

3. Website overview

The site provides TC forecast tracks and information on strike probabilities, i.e., the chances of a TC coming within 120 km of certain points. These probabilities are plotted on a map for each forecast time and for a period of four days. Time series representations of distances to the TC center and strike probabilities are also shown for major or coastal cities and islands.

Figure 23 shows the main view of the site. Users can choose a TC from the menu on the left, the initial time of the forecast from the menu to the top right, and the image type (tracks or strike probabilities) from the menu in the top center. Forecasts provided by individual centers can be viewed and compared at a glance, and large images can also be seen (see Figure 24). For verification purposes, the TC track analyzed in real time by JMA is also shown with a black line.

Figure 25 shows a screenshot of a time series view (accessible via the Strike Prob. menu option). Blue circles on the map indicate the cities from which the time series of distances to the TC center and strike probabilities are calculated. The city names are also listed below the map to enable selection using either method. The selected city is highlighted with a red circle on the map, and its name and location are indicated in the time series image. Figure 26 shows a sample time series plot for an individual center. The bars represent strike probabilities, and the red box plots represent distances to the TC center based on all ensemble forecasts. The blue line is the distance based on deterministic forecasting (if available), and the black line represents the distance based on the TC track analyzed in real time by JMA for verification purposes.

4. Further use

To access the site and the CXML data for further research purposes, email a request including your name, country, and affiliation to thorpex@mri-jma.go.jp to receive a user ID and password.

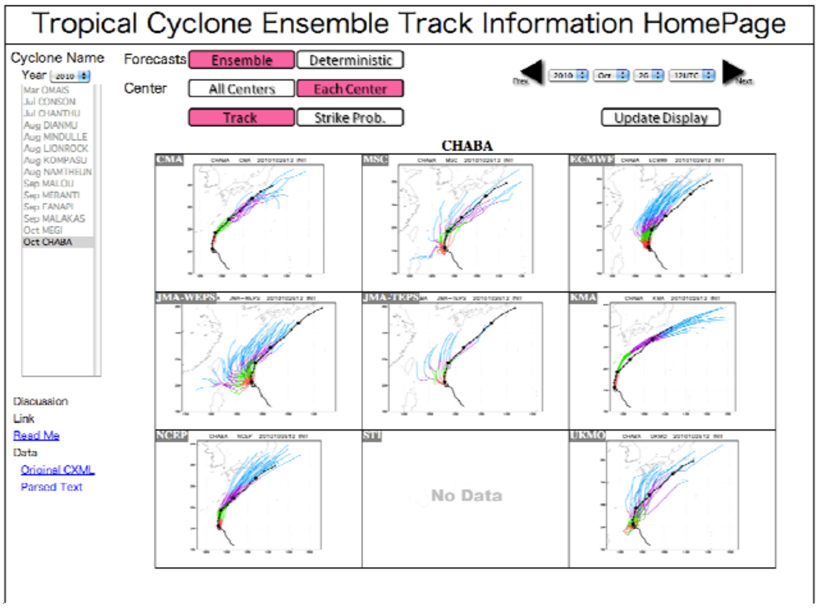


Figure 23. A screenshot showing the main view of the website (displaying data from 12 UTC on 26th October, 2010, for Typhoon Chaba). The user can choose the TC from the menu on the left, the initial time from the menu to the top right, and the image type from the menu in the top center.

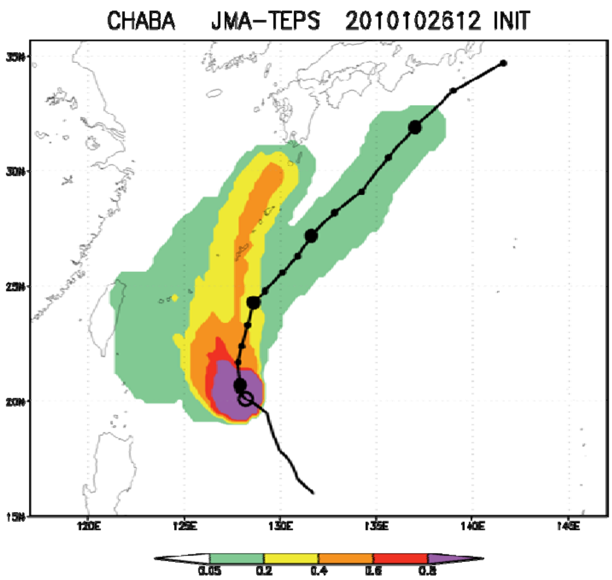


Figure 24. A sample strike probability map (created using JMA typhoon ensemble forecasts from the case shown in Fig. 1). Colored shading indicates the probability that the TC center will come within 120 km of certain points within four days based on ensemble TC track forecasts. The black line with dots represents the TC track analyzed in real time by JMA.

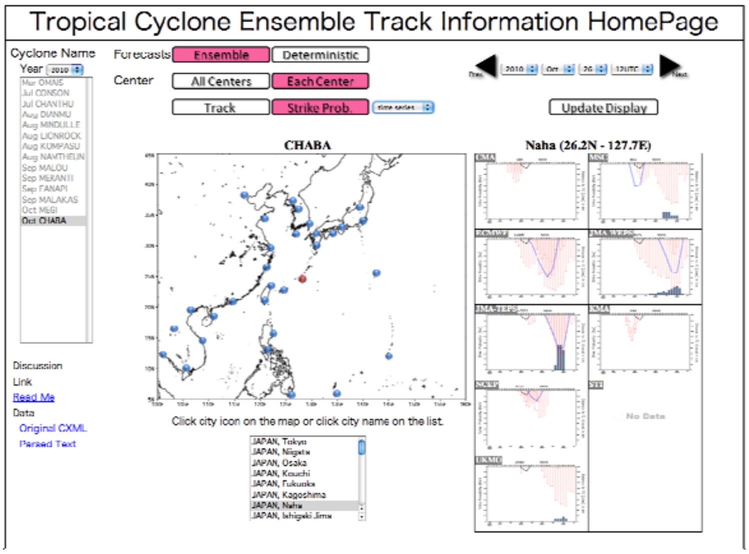


Figure 25. A screen shot of the time series view (the same case as that shown in Fig. 23). When the user selects a city by clicking on the map (available cities are marked with blue circles, and the selected city is marked with a red circle) or the list, the time series of the distance to the TC center and the strike

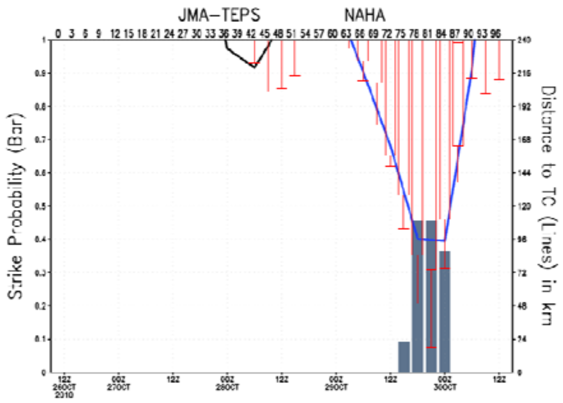


Figure 26. A sample time series display (the same case as that shown in Fig. 23 for Naha, Japan). The bars represent strike probabilities, and the red box plots represent the distances between the city and the TC center based on ensemble forecasting. The blue line is the distance based on deterministic forecasting, and

b. Hydrological Achievements/Results

b-1. Approaches of the International Flood Network (IFNet) and the Global Flood Alert System (GFAS)

(1) IFNet

IFNet was established to promote international sharing of knowledge, technology and information related to flood countermeasures and international cooperation in flood management.

The first statement was expressed at the 3rd World Water Forum in Kyoto in March 2003. IFNet is an open network for parties in charge of flood risk reduction, including government/nongovernment organizations, international bodies, public corporations, private companies and educational institutions. It had 617 registered participants from 81 countries as of 31 March, 2010. In its role as the network's secretariat, Infrastructure Development Institute-Japan manages the IFNet website at http://www.internationalfloodnetwork.org/.

(2) GFAS

GFAS is a project offering the information needed to rank the risk of flood occurrence utilizing satellite observation of rainfall amounts, and related information has been provided through the IFNet website since 2006. Automatic distribution of information on the project was introduced in June 2006. GFAS supplies rainfall data and flood occurrence probability (flood possibility) information based on global rainfall measured every three hours by multiple earth observation satellites. This is intended to act as a valuable resource for flood forecasting and the issuance of warnings in areas along large rivers where it takes several days for data on rainfall in upstream areas to reach downstream areas, in regions where telemeter systems have not been developed, or in international river zones where it is difficult to transmit information on upstream areas to downstream areas. GFAS offers two types of services – one providing basic information and the other providing customized information.

GFAS is currently implementing upgrades to add GSMaP data for analysis of hourly rainfall and to serve as a more usable interface for residents living in areas at risk of flooding.

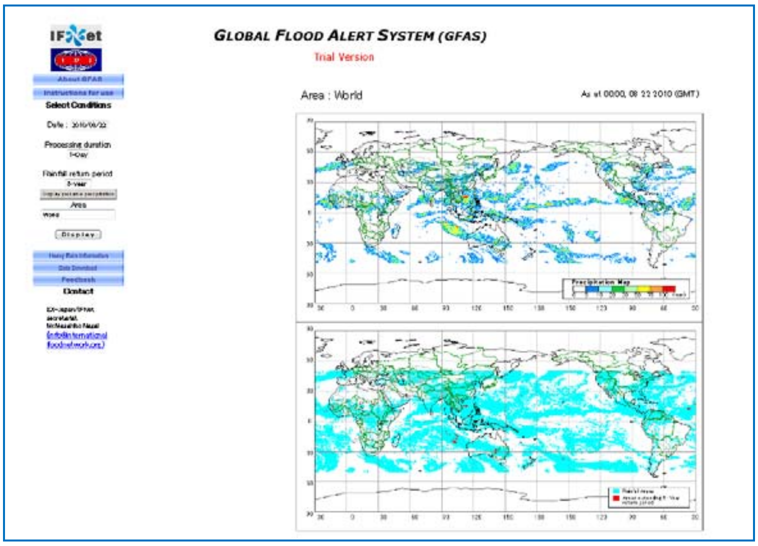


Figure 27. Global Flood Alert System (GFAS)

(KRA1, 2, 4, 5)

<u>b-2. Enhancement of Countermeasures for Localized Heavy Rainfall and Extremely Intensified Rainfall – Test operation of X-band MP radars –</u>

In recent years, localized heavy rainfall and extremely intensified rainfall have become more frequent throughout Japan. To implement adequate countermeasures for such high-risk water hazards in flood fighting and river management, MLIT had installed 11 X-band MP (multi-parameter) radars in three metropolitan areas and other regions (Kanto, Hokuriku, Chubu and Kinki) by the end of March 2010, and began distributing rainfall information via web images for public use in July 2010.

1) Observation with X-band MP radars

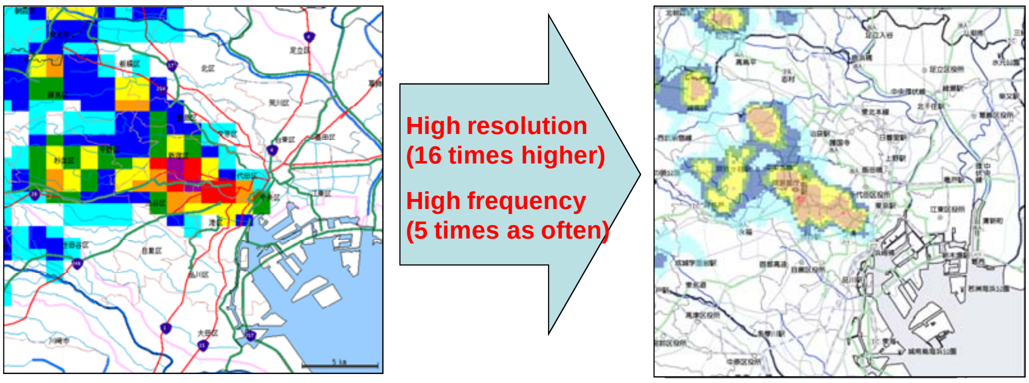
X-band MP radars now enable rainfall observation with a level of detail that was previously difficult to capture with conventional C-band radars. The new radar system allows real-time observation of rainfall events on a much finer scale than before.

X-band MP radars and C-band radars

	X-band MP radars	C-band radars
Observation interval	1 minute	5 minutes
Minimum observation area	250-m mesh	1-km mesh

【C-band radars】
- Minimum observation area: 1-km mesh
- observation interval: 5 minutes
- observation to data delivery: 5 – 10 minutes

【X-band MP radars】
- Minimum observation area : 250-m mesh
- observation interval : 1 minute
- observation to data delivery : 1 – 2 minutes



C-band radars (quantitative observation coverage: 120-km radius) are better suited for wide-area rainfall observation. On the other hand, X-band MP radars (quantitative observation coverage: 60-km radius) enable real-time, detailed observation even for localized heavy rainfall, although they are capable of covering only smaller areas.

Figure. 28

2) Use of observation information in river management

Detailed information including rainfall data from X-band MP radars can be put to a wide variety of uses toward adequate efforts in flood fighting and river management to cope with localized heavy rainfall and extremely intensified rainfall – phenomena that have become more frequent in recent years. Detailed information from this advanced system is expected to improve the accuracy of risk assessment for rising river water levels and subsequent flooding caused by extreme rainfall events.

In addition to providing real-time images, the new radar system is also designed to output images observed during the previous 30-minute period so that users can check rainfall area movement. This is expected to facilitate appropriate evacuation during heavy rainfall events as well as to support the preparation and implementation of better countermeasures for possible disasters in flood-prone structures and areas such as underground shopping malls.

(KRA1, 2, 4)

c. Disaster Prevention and Preparedness Achievements/Results

d. Research, Training, and Other Achievements/Results

e. Regional Cooperation Achievements/Results

f. Identified Opportunities/Challenges for Future Achievements/Results

7. Progress on Key Result Area 7: Enhanced Typhoon Committee's Effectiveness and International Collaboration.

a. Meteorological Achievements/Results

a-1. TCC News

TCC issues a quarterly newsletter called TCC News, which is available on the TCC website. It covers various climate-related topics including the El Niño outlook, JMA's seasonal numerical prediction for the coming summer/winter, summaries of Asian summer/winter monsoons, reports on extreme climate events around the world, and introductions to new TCC services. The latest issue, TCC News No. 22, covers the reduced frequency seen in the formation of tropical cyclones of tropical storm (TS) intensity or higher over the western North Pacific and discusses two tropical cyclones that caused fatalities in the Philippines, the Republic of Korea and the Democratic People's Republic of Korea. (http://ds.data.jma.go.jp/tcc/tcc/news/tccnews22.pdf).

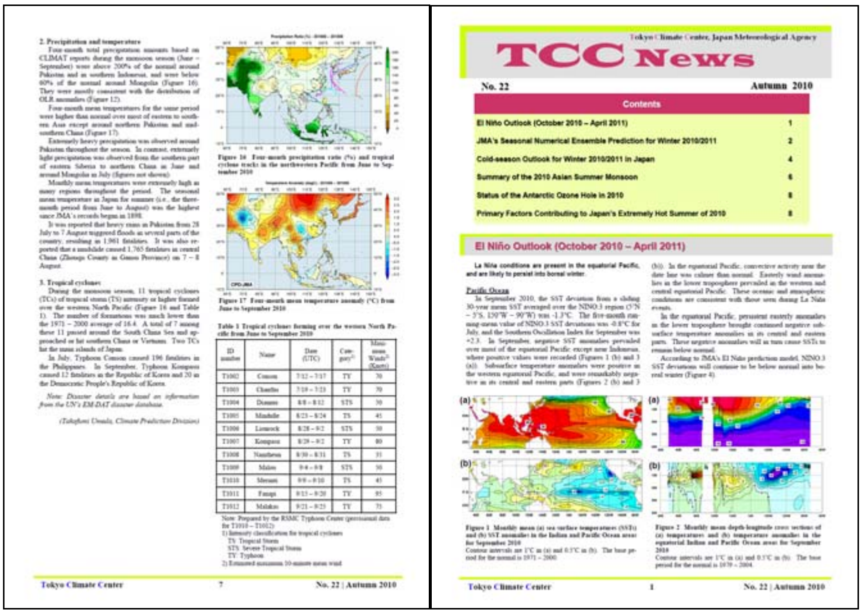


Figure 29. TCC News

(KRA1, 2, 4, 5)

b. Hydrological Achievements/Results

b-1. 5th International Conference on Flood Management (ICFM5)

The International Conference on Flood Management (ICFM) is the only recurring international conference wholly focused on flood-related issues. It is designed to bring together practitioners and researchers alike, including engineers, planners, social specialists, disaster managers, decision makers and policy makers engaged in various aspects of floodplain management. It provides a unique opportunity for these various specialists to come together to exchange ideas and experiences.

ICFM5 will be held in Tsukuba, Japan, from 27 to 29 September, 2011. It will consist of 5 plenary sessions and more than 20 parallel sessions for oral presentations, as well as poster sessions, special events and technical and cultural tours. Attendees will have the opportunity to participate in various sessions, including the following:

- Flood Risk Management (Prevention, Mitigation and Adaptation)
- Flood Disaster Management (Preparedness, Emergency Response and Recovery)
- Flood Forecasting and Early Warning Systems
- Flood Management in Different Climate Conditions and Geographic Zones
- Cross-cutting and other topics

http://www.ifi-home.info/icfm-icharm/icfm5.html

ICFM5: Important Dates

Abstracts Submission Deadline: 1st April, 2011

Acceptance notification due: 30 April, 2011

Online registration: March to June, 2011

Your proactive participation is very much appreciated.

We look forward to seeing you in September 2011 in Tsukuba, Japan.

(KRA1, 2, 4, 5,6）

b-2. The 8th Ministers' Forum on Infrastructure Development in the Asia-Pacific Region

The 8th Ministers' Forum on Infrastructure Development in the Asia-Pacific Region was held in Tokyo, Japan, on Saturday 9 October, 2010. Ministers in charge of infrastructure development from 15 member states and territories attended the forum for a high-level meeting on social infrastructure in the region. This year, the forum was hosted by Japan and chaired by H.E. Mr. Sumio Mabuchi, the Minister of Land Infrastructure, Transport and Tourism (MLIT).

The general meeting of the forum started with a keynote address entitled An End-to-End Approach for Climate Change by Dr. Toshio Koike, who is a professor at Tokyo University's Civil Engineering Department and chair of the Steering Group on Water and Climate Change of the Asia-Pacific Water Forum. The speech was followed by a series of presentations by the heads of the participating delegations reporting on issues they currently face and efforts to solve them along the line of the forum's theme – the adaptation of infrastructure to increasing water-related risks under the influence of climate change. The presentations provided a great opportunity for the ministers and other participants to share local knowledge and experience. MLIT Vice-Minister Mr. Wakio Mitsui spoke on behalf of the Japanese delegation and introduced water-related efforts made in Japan, such as flood control, water resource development, adaptation to climate change and other international contributions.

The forum finally adopted a Ministers' Declaration stating a common understanding of the current situations and outlining future efforts to be made by the member states and territories regarding the forum's theme. Some of the understandings shared were as follows:

- Resolving water-related issues, such as floods, droughts and water quality deterioration, is essential for sustainable development and preservation of the environment and the ecosystem.

- It is important that the governments of the member states and territories acknowledge and promote the implementation of appropriate measures for water-related risks as a political priority issue through cooperation at all levels.

Based on these and other common understandings, the forum issued a joint statement on future efforts, including the following:

- The member states and territories will strongly promote mitigation and adaptation measures for water-related risks, which are expected to increase due to the effects of climate change.

- The member states and territories will promote integrated adaptation measures combining physical and non-physical action.

- The member states and territories will strengthen their network and promote international cooperation toward the resolution of water issues around the world.

Figure 30. The ministers pose for photos at the 8th Ministers' Forum on Infrastructure Development in the Asia-Pacific Region

(KRA1, 2, 4, 5, 6)

c. Disaster Prevention and Preparedness Achievements/Results

c-1. Asian Conference on Disaster Reduction 2010

The Asian Conference on Disaster Reduction (ACDR) 2010 was held in Kobe, Hyogo Prefecture, Japan from 17 to 19 January, 2010. The event was organized jointly by the government of Japan, the Secretariat of the United Nations International Strategy for Disaster Reduction (UNISDR) and the Asian Disaster Reduction Center (ADRC). It was attended by as many as 238 participants, including high-level government officials from 28 countries and representatives of 53 international and regional organizations, the academic community, the private sector and civil society organizations.

The conference facilitated the sharing of experiences and lessons learned during the process of implementing the Hyogo Framework for Action 2005 – 2015 (HFA), thereby providing important insights for the Mid-Term Review of the HFA as well as for ongoing preparations toward the 4th Asian Ministerial Conference on Disaster Risk Reduction held in October 2010 in Incheon, Republic of Korea.

The key topics addressed at ACDR 2010 were as follows:

1. Lessons to be learned from recent disasters in Asia
2. Progress and shortcomings in implementing the Hyogo Framework for Action 2005 – 2015
3. Expansion of applications for space technologies and other technological innovations in disaster risk reduction
4. Strengthening of sub-regional cooperation for disaster risk reduction

Among those delivering initial remarks at the opening ceremony on the first day of the conference were H.E. Mr. Hiroshi Nakai (Minister of State for Disaster Management of the government of Japan and Conference Chair), Mr. Kenzo Oshima (Senior Vice-President of the Japan International Cooperation Agency (JICA)), who emphasized the necessity of further promoting international cooperation on disaster risk reduction for the potential impacts of global climate change, and ADRC Chairman Prof. Shigeru Ito, who expressed high expectations for ACDR 2010.

The keynote speech was given by Ms. Margareta Wahlstrom, Assistant Secretary-General for Disaster Reduction and Special Representative of the Secretary-General for the Hyogo Framework for Action in the Secretariat for the International Strategy for Disaster Reduction. In her presentation, entitled "Five Years of Implementation of the Hyogo Framework for Action: Mid-Term Review," Ms. Wahlstrom invited all attendees to make further commitments toward achieving the goals of the HFA. She also stressed the importance of integrating disaster risk reduction considerations into economic and territorial development efforts.

During active discussions in the public forum and during breakout sessions, participants concluded that the following points should be further explored in a consistent manner in individual countries and organizations:

- Action to address climate-related natural disaster risks
- Action to address disaster risks in cities
- Transfer of experiences and lessons to the next generation in order to preserve such knowledge
- Enhancement of efforts to strengthen the capacity to respond to and deal with natural disasters not only at national level, but more importantly at local and community levels
- Facilitation of better use for space technologies in achieving disaster risk reduction objectives by raising awareness of their effectiveness among related institutions, and enhancement of capacity building and human resource development in the field
- Further promotion of institutionalization for disaster risk reduction activities by enabling cooperation at regional or sub-regional levels.

Figure 31. Group photo of participants

c-2. Urban Search-and-Rescue Training in Singapore as an ADRC activity for disaster reduction

The Singaporean Government holds a training course every year for search and rescue officers. The course has been receiving trainees from outside Singapore for the past nine years and providing training on the search-and-rescue expertise required in urban disaster situations. The training facility complex of the Civil Defence Academy (CDA) run by the Singapore Civil Defence Force (SCDF) is one of the highest-level facilities of its kind in Asia. In an effort to utilize their expertise and facilities, ADRC has been inviting relevant officers from member countries to the training course since 2001. Officers from Armenia and Sri Lanka attended the course from 11 to 22 January, and officers from Mongolia, Bhutan and the Maldives participated from 18 to 29 October, 2010 (two weeks).

Figure 32. Urban search-and-rescue training in Singapore

d. Research, Training, and Other Achievements/Results

d-1. Tenth Typhoon Committee Training Seminar at the RSMC Tokyo - Typhoon Center

One responsibility of the RSMC Tokyo - Typhoon Center is to assist members of the ESCAP/WMO Typhoon Committee in tropical cyclone forecasting services. A related activity of the Center is to hold on-the-job training in tropical cyclone operations for forecasters in the region with the aim of improving analysis and forecast skills by exchanging views and sharing experiences in the field.

Two forecasters – Ms. Wong Sau Ha (Hong Kong Observatory) and Ms. Hu Yihong (National Environment Agency of Singapore) – visited the Japan Meteorological Agency (JMA) from 21 to 30 July, 2010, to participate in the tenth Typhoon Committee Training Seminar. On the course, the two forecasters learned about tropical cyclone analysis and forecasting, and in particular analysis using SATAID software (a satellite viewer program). The sessions provided were intended to give detailed information on RSMC products, including JMA's operational tropical cyclone forecast. The course also featured practical training to estimate tropical cyclone center position and intensity using the Dvorak and the early-stage Dvorak techniques.

Figure 33. Ms. Hu Yihong (left), Mr. Kunio Sakurai (middle), Director-General of JMA, and Ms. Wong Sau Ha (right), with staff members from the National Typhoon Center (JMA’s Director-General's Office)

Figure 34. Discussion in the operation room (JMA’s Forecast Division)

(KRA1, 2, 4, 5, 6)

d-2. *The Reinforcement of Meteorological Services* group training course

JMA conducted the Reinforcement of Meteorological Services group training course as one of the Training and Dialogue Programmes of the Japan International Cooperation Agency (JICA) from 14 September to 18 December 2010. The session was one of a series of JICA group training courses in meteorology that have been provided since 1973 to support capacity building among National Meteorological Services. On the course, eight participants from eight countries (including Cambodia, Lao PDR, and Myanmar from among the TC members) acquired skills in the utilization of satellite data including nephanalysis and tropical-cyclone analysis, and learned about the application of numerical weather prediction products and radar data. The course also included technical tours to research institutes, private weather companies, airlines, meteorological instrument manufacturers, and mass media in charge of disaster prevention/mitigation and risk management to highlight state-of-the-art application and communication of meteorological information.

(KRA1, 2, 4, 5, 6)

d-3. International Centre for Water Hazard and Risk Management (ICHARM) – an organization operated under the auspices of UNESCO

ICHARM, established on 3 March, 2006, under an agreement involving the Japanese Government, UNESCO and the Public Works Research Institute, actively promotes various activities for better water-related disaster management. Although ICHARM's scope is global, many of its activities target the Asia-Pacific region, including TC members' areas of responsibility.

Training, research and information networking are the three pillars of ICHARM's activities to produce the best practicable strategies for a range of localities worldwide and to assist in their implementation. ICHARM primarily places priority on risk management in relation to flood-related disasters, including those induced by typhoons.

Some of ICHARM's notable activities over the past year are outlined below.

Update on ICHARM's progress

1) Training

i) Water-related Disaster Management Course of Disaster Management Policy Program (a one-year master's degree program offered since October 2007 in collaboration with GRIPS and JICA)

ii) Local Emergency Operation Plans with Flood Hazard Maps training course (launched in 2009 as successor to the flood hazard mapping training course in collaboration with JICA)

2) Research

i) Development of IFAS (the Integrated Flood Analysis System)

ii) Research on water-related risk assessment and other issues

3) Information Networking

i) Service as secretariat of the International Flood Initiative (IFI) − a joint project of UNESCO, WMO, UN/ISDR and UNU

ii) Service as topic coordinator on water-related disaster issues at the Asia-Pacific Water Summit and the World Water Forum

iii) Extension of technical assistance to selected Asian countries in collaboration with ADB (launched in November 2009) and other activities

Many of these activities are expected to be beneficial in enhancing social, economic, environmental and institutional aspects of disaster risk reduction in TC member regions. ICHARM also makes related information available on its website at http://www.icharm.pwri.go.jp/.

(KRA1, 2, 3, 4, 5, 6)

e. Regional Cooperation Achievements/Results

e-1. Expert services of the Japan Meteorological Agency (JMA)

- Two experts from JMA and MRI visited the Malaysian Meteorological Department in September 2010 to provide training at a workshop on marine forecasting models for waves and oil spills and on an ocean data assimilation model.
- A JMA expert visited the Korea Meteorological Administration in December 2010 for sharing experience on radar operation systems to help improve the systems in the Republic of Korea.
- A JMA expert visited Thailand in December 2010, to give a lecture on QPE/QPF technique at a workshop on “Space Application to Reduce Water-related Disaster Risk in Asia”. The workshop was attended by participants from China, Viet Nam and Macau.

e-2. Technical visits to JMA

- A numerical weather prediction expert from the Hong Kong Observatory visited JMA for technical exchange on JMA’s non-hydrostatic model and its 3D variational data assimilation system in January 2010.

f. Identified Opportunities/Challenges for Future Achievements/Results

III. Resource Mobilization Activities

1. A basic design study for the project to upgrade the radar system in the Philippines

The government of Japan has exchanged a letter with the government of Philippines about an agreement on the project named Improvement of the Meteorological Radar System in the Philippines. This is a project for sponsorship by Japan’s Grant Aid program, and is implemented by The Japan International Cooperation Agency (JICA) to support the upgrading of the radar observation system run by the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA). In this project, three Doppler radars and VSAT system will be installed.

IV. Update of Member’s Working Groups Representatives

1. Working Group on Meteorology

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2. Working Group on Hydrology

3. Working Group on Disaster Prevention and Preparedness

4. Training and Research Coordinating Group

5. Resource Mobilization Group