MEMBER REPORT

ESCAP/WMO Typhoon Committee
12th Integrated Workshop

REPUBLIC OF KOREA

30 October ~ 3 November 2017
Jeju, Republic of Korea

CONTENTS

I. Overview of tropical cyclones which have affected/impacted Member's area in 2017

1. Meteorological Assessment

As of October 2017, there were 22 typhoons in the western North Pacific. The tracks of typhoons are generally divided into two groups: The first group was mostly weakened into tropical depressions after moving on to southern China and Vietnam; and the second group moved to Japan and the east of Japan and then transferred into extratropical cyclones. However, since there were no typhoons in the West Sea and the East Sea that could affect the Korean peninsula, the Korean peninsula suffered little damage from typhoons in 2017. However, the three typhoons shown in the figure below moved from the southern sea of Jeju Island to Japan; there were severe weather warnings on the jurisdiction area; strong winds were recorded in Jeju Island and southern part of the Korean peninsula.

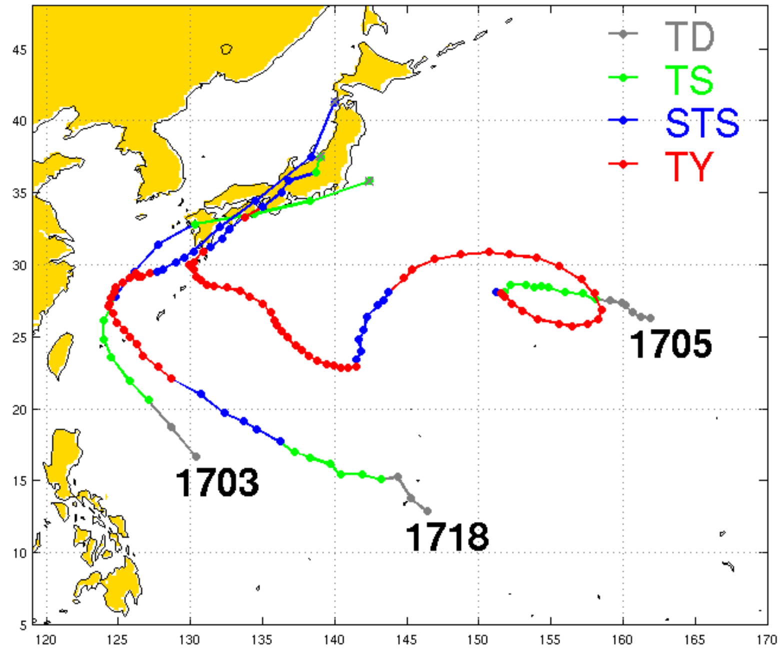


Fig. Ⅰ-1-1. TC tracks that affected the Korean peninsula in 2017.

First of all, the typhoon that affected the Korean peninsula was NANMADOL (1703). NANMADOL was a very small typhoon with strong steering flow formed at the edge of the subtropical ridge. On July 4, it moved very quickly to Kyushu, Japan from the southern sea of Jeju Island. It was a small typhoon and showed fast movement, having little influence on the Korean peninsula. However, since it moved to the Korea Meteorological Administration (KMA) jurisdiction area, a typhoon warning was issued for the southern part of Jeju Island.

The second was NORU (1705). NORU occurred within a wide range of low pressure anomalies and showed a slow moving speed and an abnormal track pattern because of a peripheral anticyclone changing by synoptic pattern. In the afternoon of August 5, NORU which was approaching Korea turned toward near south of Kyushu and headed for the southern part of Japan. Even in the case of NORU, the Korean peninsula was not seriously affected, and a temporary typhoon warning was issued for the southern part of Jeju Island. NORU was formed on July

21 at 00UTC, weakened to tropical depression on August 8 at 06 UTC, and was recorded as a typhoon with the second longest life ever recorded.

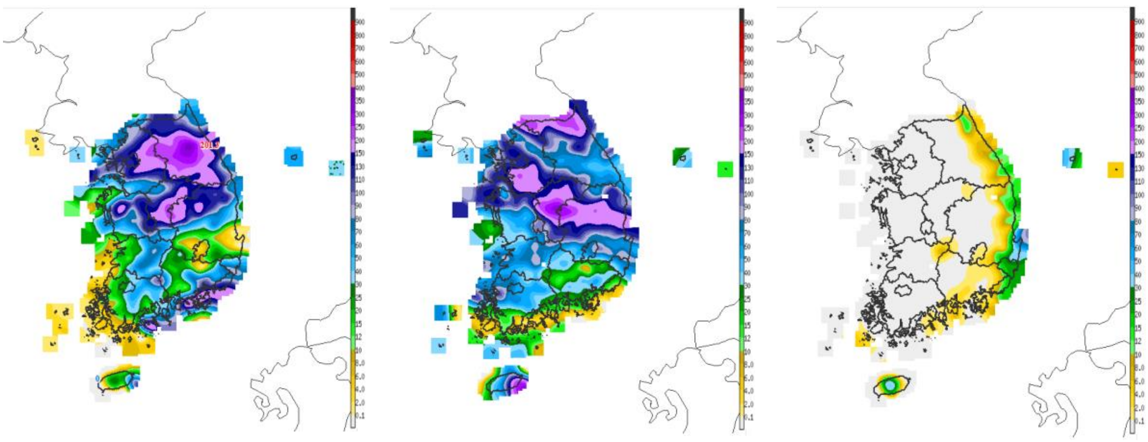
The last affected typhoon was TALIM (1718). The Kuroshio Current existed in the direction of TALIM, and it maintained a very strong intensity even though it moved northward. TALIM was blocked by the cold air form the north, and turned rapidly and moved to Kyushu, Japan along the boundary of the subtropical ridge. When it affected Korea, it did not move north of exceeding 30 degrees north latitude. However, due to the large typhoon size, strong winds were observed in Jeju and the south coasts of Korea. Due to the influence of cold air, heavy rain fell on the southern coast.

Each year, three to four typhoons affect the Korean peninsula, and three typhoons affected this year. However, all of these went to Japan from the southern sea of Jeju Island and there was little damage to Korea.

2. Hydrological Assessment

Of 22 typhoons which occurred until October, 2017, the 3rd NANMADOL, the 5th NORU, and the 18th TALIM were recorded as the typhoons which impacted on Korea.

The NANMADOL was developed into a typhoon in the east-northeast sea of the Philippine Manila on July 1 and disappeared in the east sea of Japan, Tokyo on July 5. And the NORU developed into a typhoon in the east-southeast sea of Tokyo on July 19. That typhoon weakened as a Tropical Depression in the north-northwest land of Tokyo after confusing passage. These two typhoons landed on Japan and caused a lot of damages. In the case of Korea, there were regions with heavy rainfall of nearly 200mm and some damage such as to roads during these typhoons. And a flood watch was issued in Gem River Basin. This, on the other hand, brought benefits to securing the dam water storage, 2.3billion tons of water in the multi-purpose dam in the whole country. The 18th TALIM occurred serious damages in Japan landing on September 17, however it didn't affect Korea peninsula much except a little of rainfall in East Sea and Jeju.



(a) NANMADOL (7.2.-7.5.) *(b) NORU (7.21.-8.8.)* *(b) TALIM (9.12.-9.18.)*

Fig. Ⅰ-2-1. Cumulated Rainfall(mm) of each typhoon.

II. Summary of progress in Key Result Areas

Title of item 1:
The Web-based Portal to Provide the Products of Seasonal Typhoon Activity Outlook for TC Members (POP1)

Main text :

The KMA has issued the seasonal outlook for western North Pacific typhoons on its website (http://gtaps.kma.go.kr/TSP/index.php) since 2014. The information about the number of typhoons and track pattern is provided based on the results of three types of models: Multi-regression model, Global dynamical model, and Hybrid model of statistical and dynamical method. Further information is also available, including climate monitoring, model verification, and model information.

In 2017, the KMA provided TC members with a seasonal outlook for the western North Pacific typhoons for each summer and fall on the website. The summer season outlook was issued in late May and the fall season outlook in late August. According to the fall season (Sep-Nov) outlook, 9-12 typhoons were forecasted to generate. Storm frequency would be above normal in the East China Sea and the North Pacific, and below normal in the South China Sea and the Pacific east of the Philippines.

SUMMER FALL

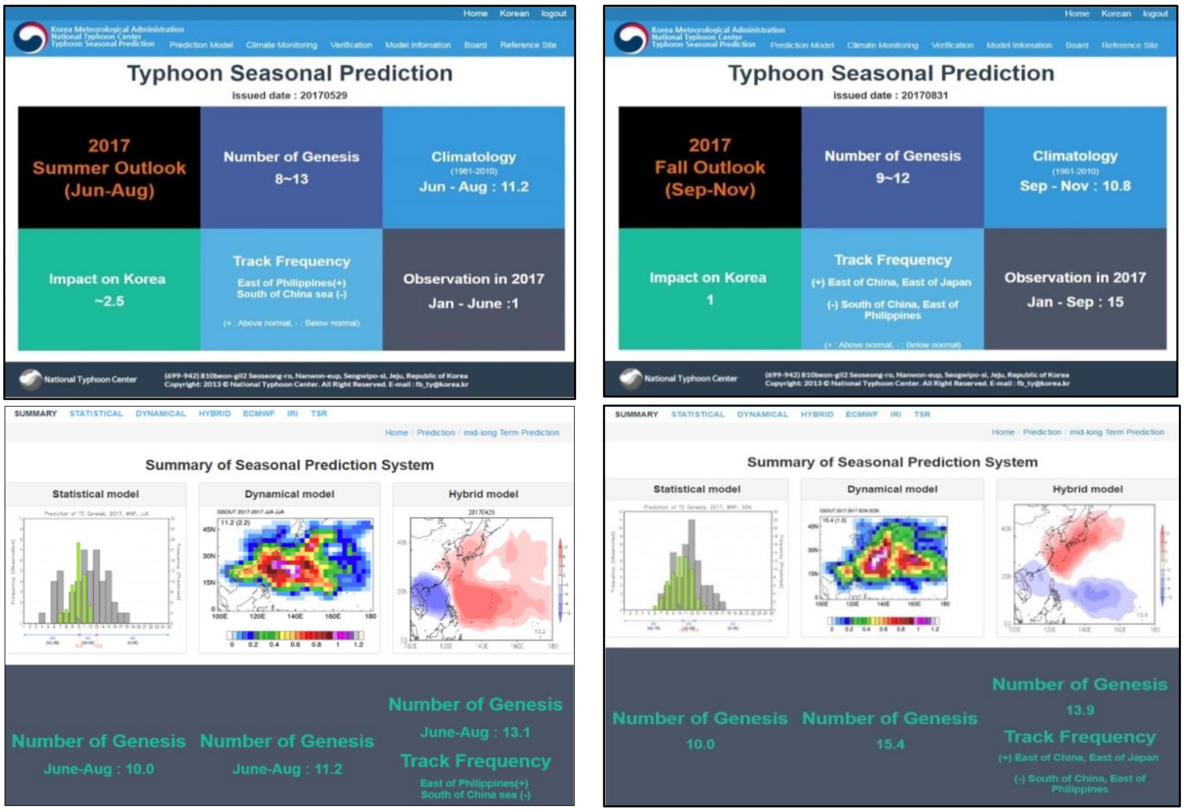


Fig. II-1. Sample pages of the website for the KMA's seasonal typhoon activity outlook: Summer Outlook (Top left), Model prediction results during Jun.-Aug. (Bottom left), Fall Outlook (Top right), Model prediction results during Set.-Nov. (Bottom right).

The KMA plans to keep providing TC members with the seasonal typhoon activity outlook for the summer and fall season on the website. The website will be updated, and typhoon seasonal prediction systems will be improved in order to expand service provision.

Summary Table of relevant KRAs and components

KRA =	1	2	3	4	5
Meteorology		√			
Hydrology					
DRR					
Training and research					
Resource mobilization or regional collaboration					

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Title of item 2:

Implementation of Typhoon Operation System (TOS) in the Thai Meteorological Department (TMD) and the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) (POP4)

Main text :

The NTC/KMA carried out the Typhoon Operation System (TOS) technology transfer to the Thai Meteorological Department (TMD) and the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) from October 11 to 15, 2017. The transfer included lectures and practice sessions for the forecasters from the TMD and PAGASA on typhoon forecast process with TOS and the structure of the system.

Two staff members of the NTC and an engineer visited the TMD and PAGASA during October 11-15, installed the TOS system on the Linux server in each country, and checked the system working and training status.

The TOS is a separate TAPS system which enables data collection and display. Forecasters can make typhoon information with multi ensemble function for intensity and track forecast by using NWP data in the TOS DB. Each system displays each country’s responsible areas and stations.

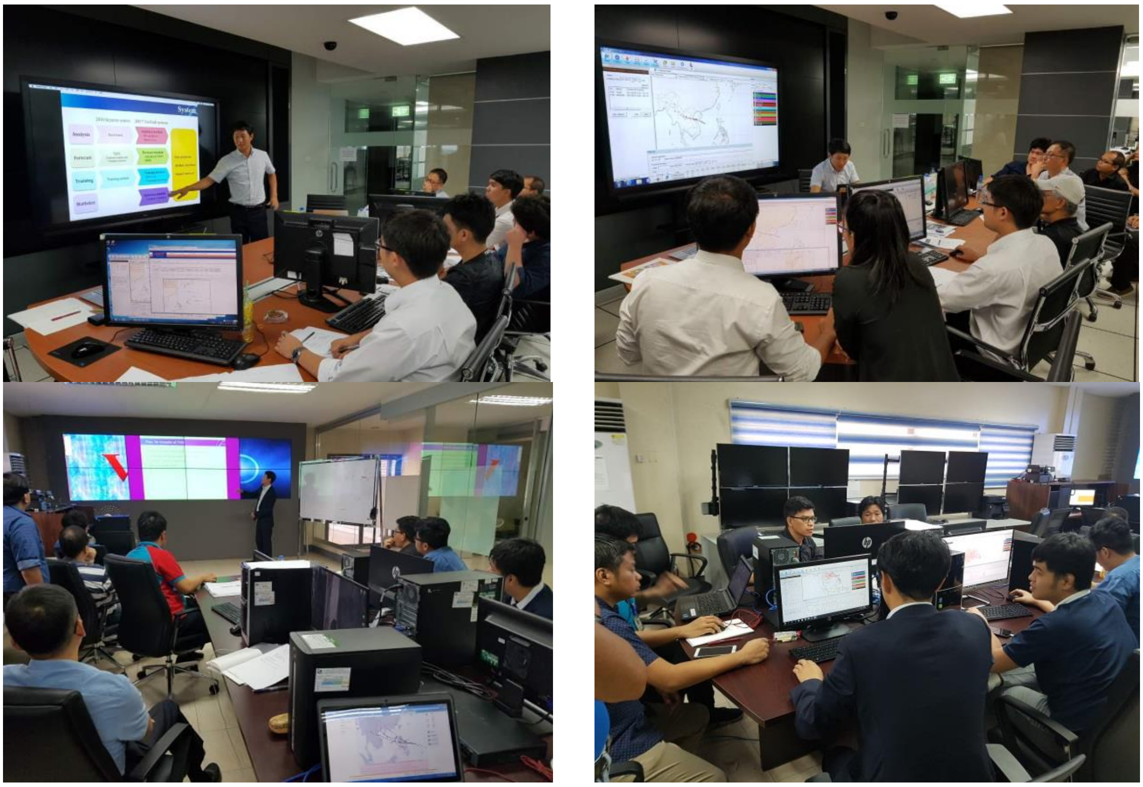

Fig. II-2. TOS introduction and typhoon forecast practice.

Transfer of the Technology of the Typhoon Operation System (TOS) will be continued at Member's request. Interested Members could send the request to the KMA for the transfer of the TOS. The KMA will select one or two members to provide TOS installation and training.

<u>Summary Table</u> of relevant KRAs and components

KRA =	1	2	3	4	5
Meteorology		√			
Hydrology					
DRR					
Training and research					
Resource mobilization or regional collaboration					

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Title of item 3:
2017 TRCG Research Fellowship Scheme by the KMA

Main text :

The NTC/KMA held the 2017 TRCG Research Fellowship Scheme for Members in Jeju for 12 days, from April 17 to 28, 2017. Since 2001 the KMA has offered training and research opportunities to twenty seven participants. This year, the scheme was joined by four participants from the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), the National Hydro-Meteorological Service of Viet Nam (NHMS), and the Thai Meteorological Department (TMD).

Beginning with the opening ceremony and introduction of participants and their organizations, various theoretical lectures on the forecast of typhoon track and intensity, and also typhoon re-analysis methods were provided. In addition, the trainees learned how to use Typhoon Analysis and Prediction System (TAPS) and took a hands-on practice to produce typhoon information.

At the end of the program, they visited the National Meteorological Satellite Center of the KMA to attend lectures on analysis techniques for typhoon position and intensity. They also took a facility tour of the National Meteorological Center in the KMA headquarters and had a training program on typhoon analysis techniques using radar images.

All participants showed great interest in improved technologies and systems of the KMA. The KMA will make continued efforts to provide members with support and cooperation for the collaborative development.

Fig. Ⅱ-3. Photos with the TRCG Fellowships Program participants.

The Research Fellowship Scheme will be continued next year. The travel cost for the participants will be supported by the KMA. Anyone from the members who are interested in operational and research fields of TC forecasts is encouraged to apply for the scheme.

<u>Summary Table</u> of relevant KRAs and components

KRA =	1	2	3	4	5
Meteorology					
Hydrology					

DRR					
Training and research		√			
Resource mobilization or regional collaboration					

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Title of item 4:

Co-Hosting the 10th Korea- China Joint Workshop on Tropical Cyclones

Main text :

The 10th Korea-China Workshop on Tropical Cyclones was held from 15 to 19 May 2017 at the Shanghai Meteorological Service of the China Meteorological Administration (SMS/CMA) in China. This workshop is one of the items agreed at the Joint Working Group (JWG) on Cooperation in the Field of Meteorology between KMA and CMA. The NTC/KMA and the Shanghai Typhoon Institute (STI) of CMA have co-hosted the joint workshop every year since 2008.

The workshop program consisted of eighteen presentations, five invited talks, and four sessions of Observation Research, Typhoon Forecast Technique, Wind and Precipitation, and Air-sea Interaction.

Six participants from the NTC and the National Meteorological Satellite Center (NMSC) of KMA presented the recent advances in TC center position estimation using MW satellite data, the improvement result of intensity prediction using STIPS; the identification of global warming influence on the intensity in WNP; analysis of vertical wind profile observed data at the NTC; and historical records of typhoon in Korea.

At the following cooperative conference, the delegates from the NTC/KMA and the STI/CMA had a discussion about future collaboration activities and mutually agreed agendas including exchanging observation data and experts.

Fig. Ⅱ-4. Photos of the 10th Korea-China Joint Workshop on Tropical cyclones.

Delegates from the NTC/KMA and the STI/CMA agreed to exchange observation data and TC seasonal forecasts and had a discussion on future collaboration activities. The 11th workshop would be held in Korea in upcoming year.

<u>Summary Table</u> of relevant KRAs and components

KRA =	1	2	3	4	5
Meteorology		√			√
Hydrology					
DRR					
Training and research					
Resource mobilization or regional collaboration					

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Title of item 5:
Improvement of TC Center analysis using COMS and Microwave satellite data

Main text :

Images of COMS/MI IR, VIS and SWIR are used basically to estimate Tropical cyclone (TC) position in operation. While these are easy to use in real time analysis of TC, these are hard to accurately decide TC center position by only using cloud images of infrared and visible channels in generating and developing time with cb cluster cloud, and decaying time with shear type cloud. To overcome this limit, Microwave (MW) satellite data that can penetrate the cloud layer to figure out the lower stream is used to analyze the position and intensity of TC with COMS data operationally in the NMSC/KMA.

We are receiving the sea surface wind data of METOP/ASCAT via EUMETCAST. Especially, METOP/ASCAT of active scatterometer observes 10m wind direction and speed above the surface of the ocean. We can estimate more accurate TC center position by using these satellites' wind vector.

[Fig. Ⅱ-5] shows an example of the analysis of TC center position. This case considered CHABA (1618). From the ASCAT data, the central position on September 28 2016 at 00 UTC was estimated as 14.49°N and 147.91°E when using METOP/ASCAT-A wind vector in re-analysis time. The re-analysis position changed to the westward about 0.7° from the real time position (14.41°N, 148.65°E) when using wind vector of ASCAT.

Therefore, the microwave wind is very useful to estimate the central position as well as strong wind area of TCs from an operational viewpoint.

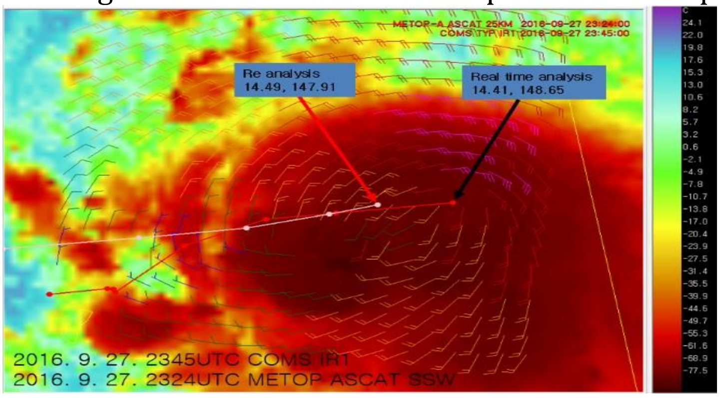
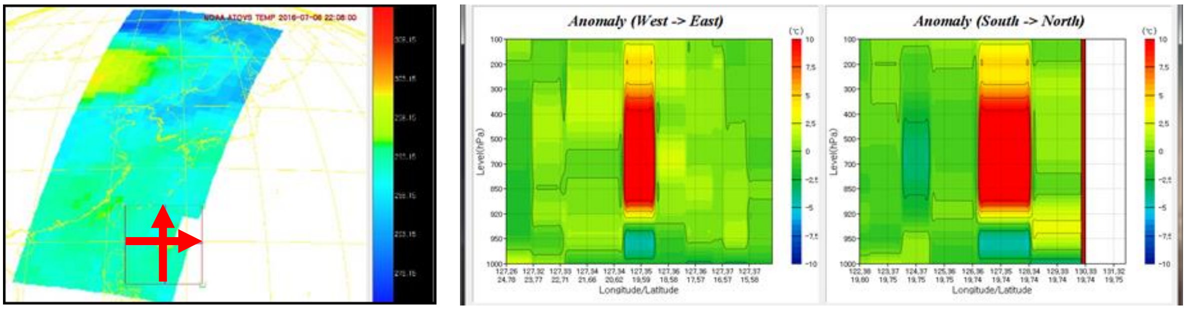


Fig. Ⅱ-5. Reanalysis and real time TC center position of CHABA (1618) using superimposed image of surface wind vector from METOP-A/ASCAT at 23:24UTC and COMS/MI IR at 23:45UTC on 27 September 2016.

We try to analyze the TC central position from the estimated warm core by using NOAA/ATOVS sounding temperature. Tb anomalies are derived from the temperature of NOAA/ATOVS on the selected area around TC. [Fig.Ⅱ-6] shows the vertical cross section of Tb anomalies in the case of NEPARTAK (1601).



(a) NOAA ATOVS temperature image of 1000hPa on 6 July 2016 at 22:08UTC

(b) Vertical cross section of Tb anomalies from west to east of square of (a)

(c) Vertical cross section of Tb anomalies from south to north of square of (a)

Fig. Ⅱ-6. Tb anomaly of NEPARTAK (1601) to detect TC warm core using MW sounder.

<u>Summary Table</u> of relevant KRAs and components

KRA =	1	2	3	4	5
Meteorology		√			
Hydrology					
DRR					
Training and research					
Resource mobilization or regional collaboration					

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Title of item 6:
Developing typhoon analysis skills for Geo-KOMPSAT-2A satellite application

Main text:

The KMA is planning to launch the next generation geostationary satellite, Geo-KOMPSAT-2A (GK-2A) in November next year. To maximize the benefits of the GK-2A, the NMSC/KMA is developing the retrieval algorithms for 52 baseline products and the application techniques on various areas, including nowcasting, typhoon analysis, oceanic and hydrological applications.

The KMA is trying to improve Advanced Dvorak Technique (ADT) for Korean weather forecasters. To this end, it is researching to introduce an ensemble method to determine the accurate typhoon center position. Updating the conversion relationship from CI index to mean surface level pressure or maximum wind speed is being considered too.

For the typhoon intensity prediction guidance, the NMSC/KMA is developing new GK2A-based thermodynamical and dynamical products, such as maximum potential intensity (MPI), depth-averaged upper-ocean temperature (T80), ocean heat content (OHC), intensification potential (POT), vertical wind shear (VWS), divergence (DIV), convergence (CONV), and vorticity (VOR). The thermodynamical products (MPI, OHC, T80, POT, see [Fig. Ⅱ-7]) are produced by using oceanic temperature profiles calculated from the relationship between variation in sea surface height anomaly (SSHA) and subsurface temperature, in which positive SSHAs generally reflect subsurface temperatures that are warmer than the climatology (isotherm deepening below the mean level), while negative SSHAs represent cooler temperatures. The empirical relation is obtained by using satellite-driven altimetry and sea surface temperature data, ARGO observations, and climatological ocean data. The dynamical products (VWS, DIV, CONV, VOR) are calculated by using a multilayer marine wind product, which is also a new GK2A-based product.

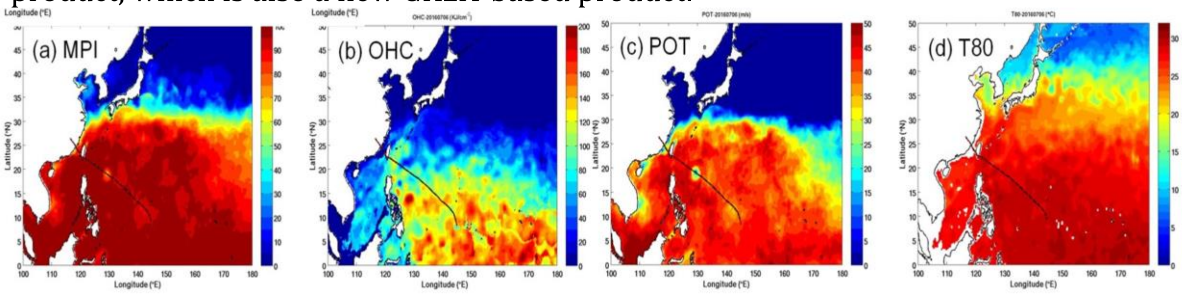

Fig. Ⅱ-7. Spatial distributions along the track of typhoon NEPARTAK (1601), which are new GK2A-based products for typhoon intensity prediction guidance.

The NMSC/KMA is also developing a GK2A-based application product that provides information on the relative intensity for rain and wind of an approaching typhoon compared to historical typhoons, *i.e.*, the percentile of precipitation and wind speed accompanied by typhoon [Fig. Ⅱ-8]. The information, which is usually not provided in operational predictions, will be the basic data necessary to establish a disaster prevention plan for typhoons according to wind-dominant or rain-dominant. This product is calculated by using GK2A-estimated rainfall intensity and marine wind fields as well as atmospheric reanalysis and best track data for historical typhoons.

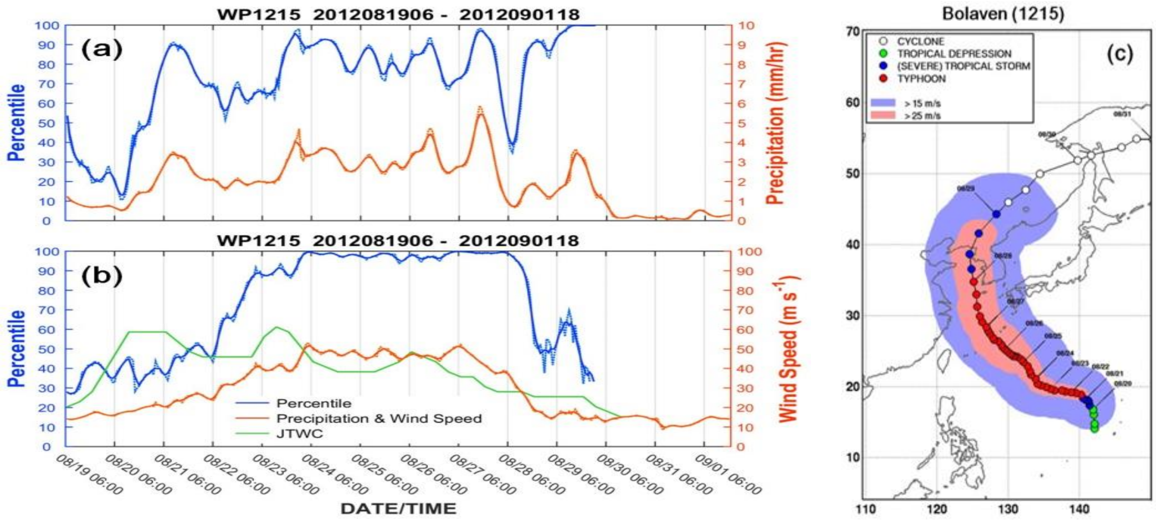

Fig. Ⅱ-8. An example of percentile (blue) analysis of rainfall (a) and wind speed (b) for Typhoon BOLAVEN (c) along with averaged rainfall intensity and maximum wind speed (dark yellow). The results reveal that BOLAVEN contained upper 99% percentile of wind speed near the Korean peninsula, implying that BOLAVEN was likely to be a wind-dominant type (At that time actual wind-induced damage was very serious).

Summary Table of relevant KRAs and components

KRA =	1	2	3	4	5
Meteorology		√			
Hydrology					
DRR					
Training and research					
Resource mobilization or regional collaboration					

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Title of item 7:
Extreme Flood Forecast System development (AOP2)

Main text :

Han River Flood Control Office (HRFCO) of MOLIT, Republic of Korea has developed an extreme flood forecasting system which presents step-by-step models for flood forecasting to strengthen the response capacity of member countries against flood. This year, the system comes to the final stage to development and program CD and technical report (including manual) will be distributed to member countries on coming 12th IWS. The system is stand-alone PC-version program. The LEVEL1-module is using regression analysis method using relationship of stage-stage, stage-rainfall, and discharge-rainfall. At the same time, the LEVEL2-module using a rainfall-runoff model (storage function model) and the LEVEL3-module using radar precipitation linked with LEVEL2-module have been developed. The members from Thailand, Philippines and Laos have cooperated for the system developing as pilot countries. For the continuous application, members are asked for continuous application. HRFCO plan to improve the system as the backbone of flood forecast system of member countries applied rain radar data and stochastic method linked with next AOPs.

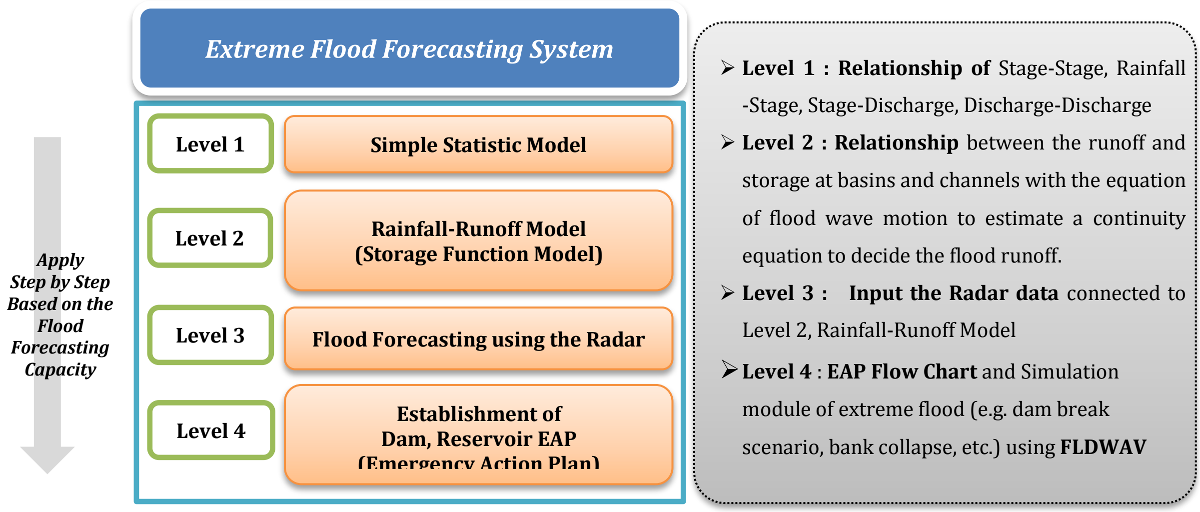

Fig. Ⅱ-9. EFFS explanation according to its Levels.

Member countries will be encouraged to apply the system on their cases after distribution and to give the opinions until next year and HRFCO is planning to complement the system and to provide the technical support.

Summary Table of relevant KRAs and components

KRA =	1	2	3	4	5
Meteorology					
Hydrology		√	√	√	
DRR					

Training and research					
Resource mobilization or regional collaboration					

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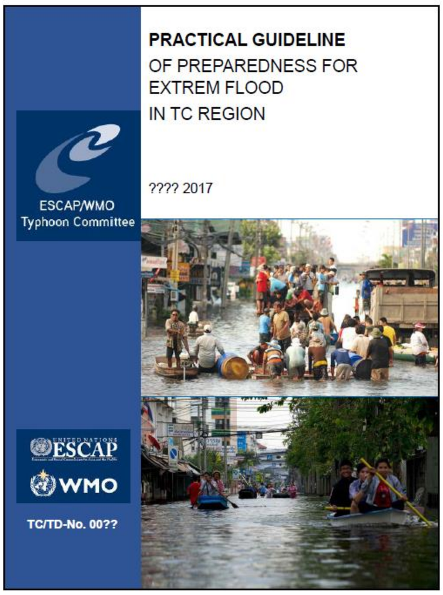
Title of item 8:
Establishment of Guidelines of Extreme Flood Risk Management(AOP6)

Main text :

A guideline for responding to extreme flood is being established to help the member countries strengthen their own capabilities of flood response in practical working field thorough understanding the current status of flood management and flood vulnerability. The guideline consists of the definition of extreme flood, hydrological data quality control, flood forecasting & warning, structural/non-structural flood control measurements, dam operation and extreme flood adaptation. Also, it presents actual cases in the member countries according to each section. WGH members, especially pilot countries, Philippines, Thailand, and Lao PDR, cooperated to review and field surveys. Guideline is close to release to the members and it will be on the 12th IWS. For ensuring higher usability of the guideline, it was reviewed by WGH members and revised reflecting members' opinions and situation.

The proposed guideline will be meaningful in aspects that it includes extreme flood non-structural countermeasures and the determined status of the members of the Typhoon Committee with the standard status for each sector. In the future it is able to be modified through the application of TC WGH members as practical and realistic measures against these issues.



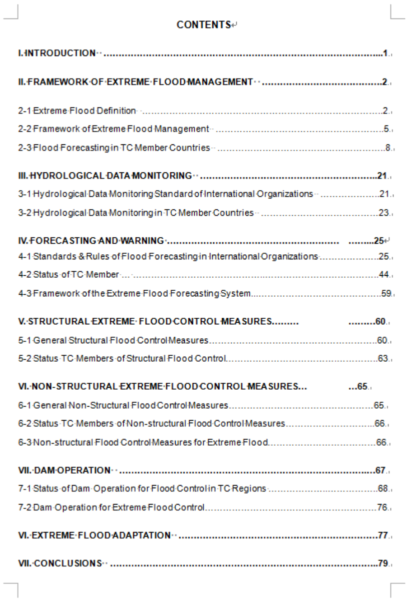

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Fig. Ⅱ-10. Cover of Guideline and its contents.

We intend to provide a applicable guideline working in actual flood situation. It will help for members to respond and to prepare the flood cases which they haven't ever met.

Summary Table of relevant KRAs and components

KRA =	1	2	3	4	5
Meteorology					
Hydrology			√	√	
DRR					
Training and research					
Resource mobilization or regional collaboration					

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Title of item 9:
The 6th Meeting and Workshop of TC WGH and WGH Homepage

Main text :

Since the 1st WGH Meeting in 2012, the 6th UNESCAP/WMO Typhoon Committee WGH meeting and workshop hosted by Han River Flood Control Office was held on 25-28 September in Seoul, the Republic of Korea. A total of 20 delegations and participants from China, Japan, Laos, Philippines, the Republic of Korea, Thailand, USA, Vietnam and TC secretariat participated in the event. Especially, the Workshop was preceded under a theme "Adaptive Capacity Building for Extreme Flood Preparedness" and the final draft version of the extreme flood forecast system and guidelines of Extreme flood risk management were open to the participants. In this year meeting, the training course was prepared to simulate the extreme flood forecast system directly. The participants had active discussion about the usability of extreme flood forecasting system and practical guideline. Additionally, in the 6th meeting of TC WGH, the progress on AOP projects, future plan and proposed AOP were shared. WGH members shared opinion about making election rule of chairperson for operating WGH activities effectively.

Regarding TC WGH webpage, HRFCO took some action for enhancing security such as updating security patches.

Fig. Ⅱ-11. The 6th TC WGH Meeting Group Photo.

WGH meeting is very important event for WGH members because it provides opportunities to discuss about WGH activities including AOPs. It makes members to prepare next meetings, IWS and TC session.

Summary Table of relevant KRAs and components

KRA =	1	2	3	4	5
Meteorology					
Hydrology					√
DRR					
Training and research					
Resource mobilization or regional collaboration					

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Title of item 10:
Improvement of Flood Information Service System

Main text :

Flood forecast includes not only to analyze and predict flood events but also to measure and collect hydrological data, and to disseminate information to related organization and to the public. This year, Flood Control Offices decided to provide the flood forecast issue by Cell Broadcasting System (CBS) directly. Another improvement has been done that information can be spread by email and official document as well as text message automatically if the staff inputs once. It will be helpful to reduce the spending time to dissemination and to prevent information leakage. Additionally, HRFCO plans to integrate the flood information systems of 4 FCOs for the prompt information delivery and to develop the understandable contents.

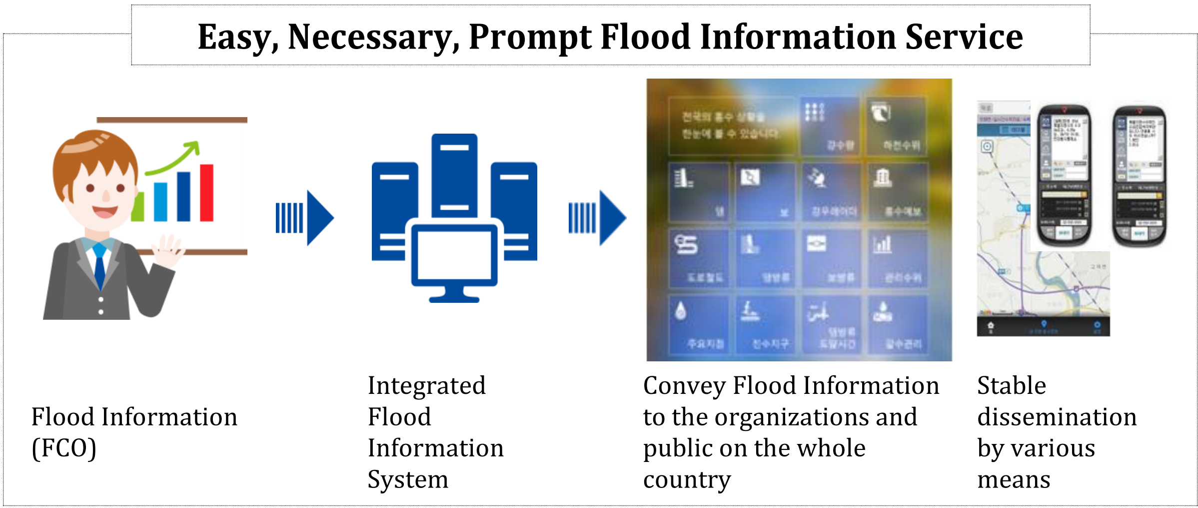

Fig. Ⅱ-12. Integrated Flood Information Service System Plan in Korea.

HRFCO can share the know-how to deliver the flood information for prompt action to prevent the flood damage and to produce the flood information contents with member countries.

<u>Summary Table</u> of relevant KRAs and components

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Hydrology		√		√	
DRR					
Training and research					
Resource mobilization or regional collaboration					

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Title of item 11:
2017 Vietnam and LAO PDR Project by NDMI

Main text :

At the 9th Annual Workshop of WGDRR in 2014, Lao PDR and Vietnam requested NDMI to implement ODA project in their countries. After dispatching experts to investigate feasibility study to Lao PDR and Vietnam, NDMI implemented a new project to build up capabilities of flash flood in 2016.

For Vietnam, Lao Cai located 280 km away from north-west of Hanoi, Vietnam where lack of early warning system caused flood damage was selected for installing ARWS(Automatic Rainfall Warning System) and FFAS(Flash Flood Alert System). For Lao PDR, Vang Vieng was selected as the pilot area for the first year since the number of tourists in Vang Vieng has been increasing, there are growing needs for early warning system in order to save more lives. Therefore, NDMI implemented and completed the first year's work of installation of ARWS and FFAS.

(a) Discussion between MARD and NDMI in Vietnam

(b) Investigating to install water level gauges in Vietnam

(c) Field research in Muang Beng in Lao PDR

(d) System check in Department of Meteorology and Hydrology in Lao PDR

Fig. Ⅱ-13. Photos of ODA projects by NDMI.

In 2017, the second phase of the ODA project to expand target areas and build up capacities against flash flood was implemented in Oudomxay province in Lao PDR. The project in 2017 aims to select an appropriate pilot area and install the ARWS including rainfall gauges, water level gauges, and warning posts and FFAS in the expanded target area. NDMI and officials from the Department of Natural Resources and Environment in Oudomxay Province and Department of Meteorology and Hydrology, Lao PDR discussed the appropriate place to install ARWS and selected two locations, Muang Houn and Muang Beng for rainfall gauges and water level gauges also Vang Va and Nam Oun were considered as warning posts. NDMI slected Hydromet office in Dunrey to install FFAS to manage and monitor ARWS. The second phase work will be executed in the end of this year.

The second year of the ODA project in Vietnam, NDMI will install ARWS and FFAS in another target area. NDMI, MARD(Ninistry of Agriculture and Rural Development), and VAWR(Vietnam Academy for Water Resources) discussed where the extended pilot area would be in 2017. Lao Cai where is the same place for the last year of the ODA project was selected again as ARWS including 2 rainfall gauges, 2 water level gauges, and 2 warning posts for the second project year. Implementation for the Vietnam will be performed in the end of this year. The project of the installation of ARWS and FFAS for Lao PDR and Vietnam will be expanded to 2018.

Through field studies for the second year in Vietnam and Lao PDR, NDMI should install ARWS and FFAS in the appropriate place for flash floods. Therefore, NDMI will send rainfall gauges, water level gauges, and warning posts to the places and be prepared to install them in 2017.

Summary Table of relevant KRAs and components

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Meteorology					
Hydrology					
DRR					√
Training and research					√
Resource mobilization or regional collaboration					√

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Title of item 12:
The 12th Annual Workshop of TC WGDRR

Main text :

The 12th International Annual Workshop of Typhoon Committee Working Group on Disaster Risk Reduction was held in Ulsan, Republic of Korea from 30th May to 2nd June 2017. Around 40 participants from international organization including UNESCAP, WMO, and 7 of all TC 14 members attended the 12th annual meeting.

The main agenda of the 12th WGDRR workshop was 'Future Strategic Plan of WGDRR after Sendai Framework' and issues involved, including disaster risk reduction and lessons learned from the past disasters, were discussed at the meeting. Moreover, the AWG members discussed the main theme and programmes of the 12th Integrated Workshop which will be held in Jeju Island, Republic of Korea.

At the meeting, AOPs of WGDRR also were discussed to intensify implementation of Sendai Framework. Compared to last year's AOPs, there are two new goals, which one of them is 'Sharing Information related to Disaster Risk Reduction Management', and another one is 'Making the Education Videos related to Disaster Risk Reduction'.

Fig. Ⅱ-14. Photos of The 12th Annual Workshop of TC WGDRR.

After NDMI moved to Ulsan last year, it was the first time that NDMI held the WGDRR Annual Workshop jointly with Ulsan Metropolitan City where is the developed city for the automobile and chemical industries in the Republic of Korea. The WGDRR annual meeting co-hosted by NDMI and Ulsan city means that disaster risk management has been becoming increasingly important field in the world. Through annual meeting of WGDRR, member countries of TC could share not only information about DRR but also strengthen capabilities for disaster management.

Summary Table of relevant KRAs and components

KRA =	1	2	3	4	5
Meteorology					
Hydrology					
DRR					√
Training and research					
Resource mobilization or regional collaboration					√

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Title of item 13:
Education Videos related to DRR

Main text :

The 12th International Workshop of TC WGDRR was held in Ulsan, Republic of Korea in 2017 and strategies for DRR after Sendai Framework was discussed at the annual meeting. Moreover, participants such as UNESCAP, WMO, and experts in disaster management field discussed AOPs to enhance international cooperation for implementation of the framework. Among all 6AOPs of 2017 WGDRR, there is new goal to share information of disaster management. The goal is the number 6 AOP "Making the Education Videos related to DRR".

The video explains how people could response accidents due to flood damages that cause the loss of human lives every summer season. In the promotion video, NDMI researchers and Mr. Jaehyun Shim who is the director-general of NDMI interviews on disaster safety measures for rain fall and flow velocity.

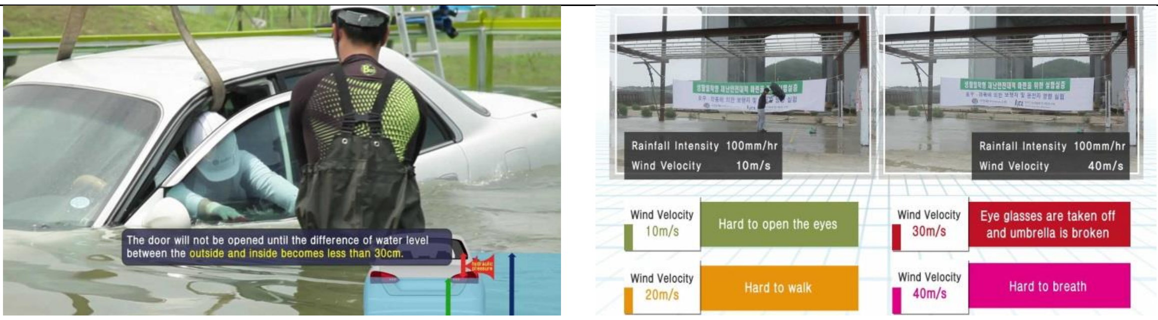

Fig. Ⅱ-15. Video shots of Promotion Video and NDMI Experiments.

The promotion video will be released to all TC members to share information and give access to education video on disaster risk reduction in their countries. Moreover, TC will discuss how to use the videos for improving international cooperation in the near future.

Through sharing the promotion video among TC members, NDMI could implement the Sendai Framework Goal no. 7 which is substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030. Implementing the framework could build capabilities that will get people out of disasters. Also the project will intensify SDGs implementation by improving partnership and sharing information.

Summary Table of relevant KRAs and components

KRA =	1	2	3	4	5
Meteorology					
Hydrology					
DRR					√
Training and research					
Resource mobilization or regional collaboration					√

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