MEMBER REPORT

ESCAP/WMO Typhoon Committee
9th IWS

SOCIALIST REPUBLIC OF VIET NAM

20 - 24 October 2014
ESCAP-UN Conference Center, Bangkok, Thailand

CONTENTS

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

1. Meteorological assessment

Only two tropical cyclones affected Viet nam from 1 January to 30 September in 2014. They were Typhoon Rammasun (1409) and Typhoon Kalmeagi (1415). Their tracks are shown in Fig. 1 and 2.

1.1. Typhoon Rammasun (1409)

Rammasun formed as a tropical depression over the western North Pacific about 400 km southeast of Guam on the morning of 11 July. It intensified gradually and moved westwards steadily in the following days. Rammasun developed into a severe typhoon and turned west-northwestwards on 15 and 16 July, moving across the central part of the Philippines and entering the East Sea. After weakening over terrain, Rammasun re-organized over the South China Sea and intensified into a super typhoon on 18 July just few hours before passed through north-east of Hainan Island. Rammasun made landfall over south of Guangxi, moving along the boundary of Vietnam and China, it then drifted to Caobang province before dissipated over the moutainous area of Vietnam

A peak gust of 27m/s was recorded at Mongcai station (48838). Minimum sea level pressure at Mongcai station (48838) was 978.1mb. Total rainfall amount over the mountainous areas of Vietnam during the time of Rammasun was 100 – 300mm.

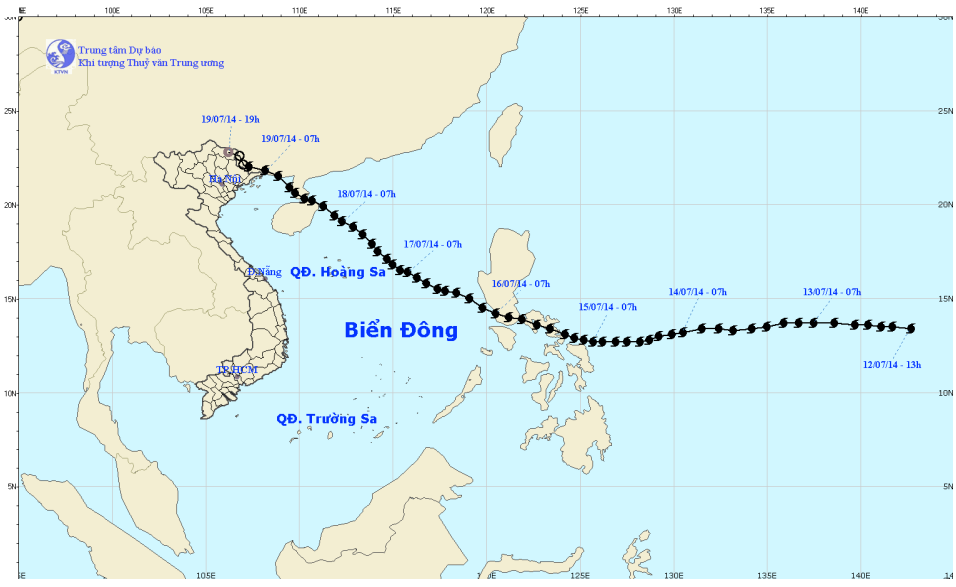

Fig. 1: The best track of Rammasun (NHMS of Viet Nam).

1.2. Typhoon Kalmaegi (1415)

Kalmaegi formed as a tropical depression over the western North Pacific about 1200 km southeast of Luzon (Phillippine) on the noon of 12 September. It intensified gradually and moved westwards steadily in the following days with average speed over 30km/h during its lifetime. Kalmaegi swept across the north part of Luzong Island (Philippines) and entering the East Sea early morning on 15 September. After weakening over terrain, Kalmaegi re-organized over the South China Sea and intensified on 16 September with category of 13 – 14 (Beufort wind scale). Kalmaegi made landfall at Quangninh Province of Vietnam on the evening of 16 September, it then moved westward and dissipated over tho nort-west part of Vietnam on morning 17 September.

A peak gust of 34m/s was recorded at Bachlongvi station (48839). Minimum sea level pressure at Mongcai station (48838) was 972.5mb. Total rainfall amount over the north part of Vietnam during the time of Kalmaegi was 100 – 200mm.

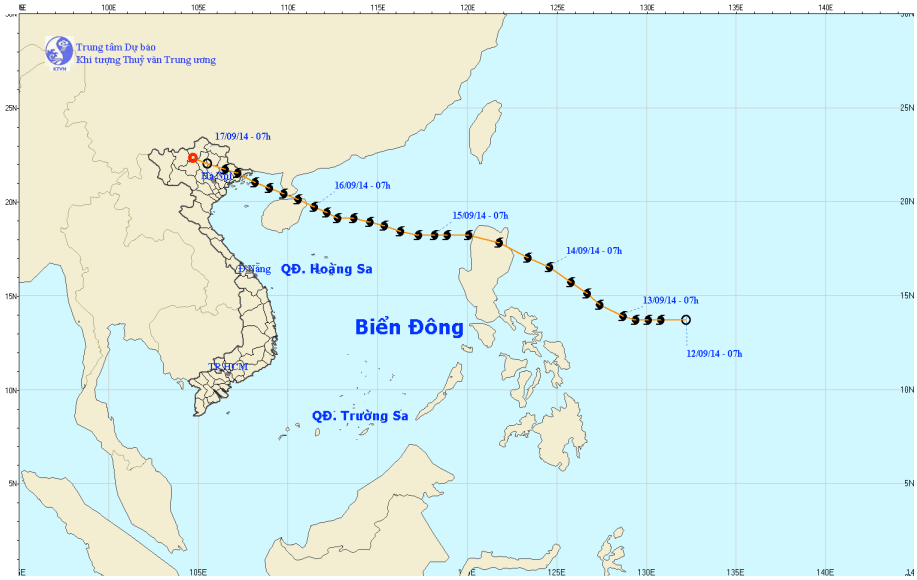

Fig. 2: The best track of Kalmaegi (NHMS of Viet Nam).

2. Hydrological Assessment

The report present flood situation during the period of the beginning of January and the end of September with the different flood situations along Viet Nam from the North to the South. Until the report making time, flood season in the North is finishing on October 15th and has been switching to dry season, while flood situations have been starting in the Central , Central Highland area and the South of Viet Nam. Following statistics counted until 30 September 2014, the number of Typhoon (TY) and Tropical Storm (TS) appearances in the South China Sea were 15 in which 2 of them directly made landfall in Viet Nam and mostly affected to the Northern part only.

2.1. Flood situations by Tropical cyclone in the North

The 2014 flood season in Northern part started in May as usually. The first flood event (early flood) in the Red-Thai Binh river system occurred in the end of May, from 28 to 30 (6-8 days later than the long-term average) with the small amplitudes of 1-1,5m and on Da, Lo, Cau rivers only. Figure 2 illustrate 2 main river sytems in the North detailed as below:

- The Red river including Da, Thao, Lo rivers and the downstream of the Red river;
- The Thai Binh in cluding Cau, Thuong, Luc Nam and the downstream of Thai Binh river.

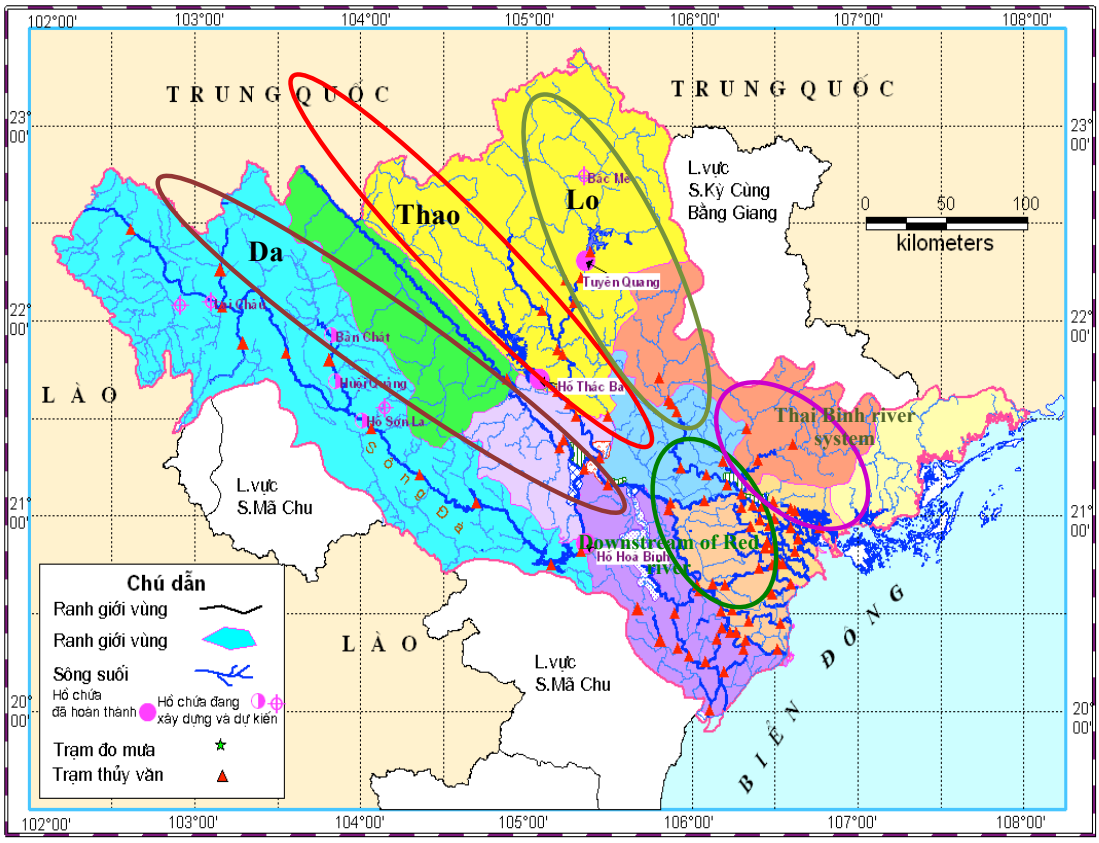

Fig. 2: River system in the North of Viet Nam

Two TS directly landed over the Northern part are TS No.2 (Rammasun), TS No.3 (Kalmaegi), in which flood peak of the year was observed in the end of July and in the first half of August at almost main stations of the Thai Binh river system during the appearance of TS No. 2 and No. 3.

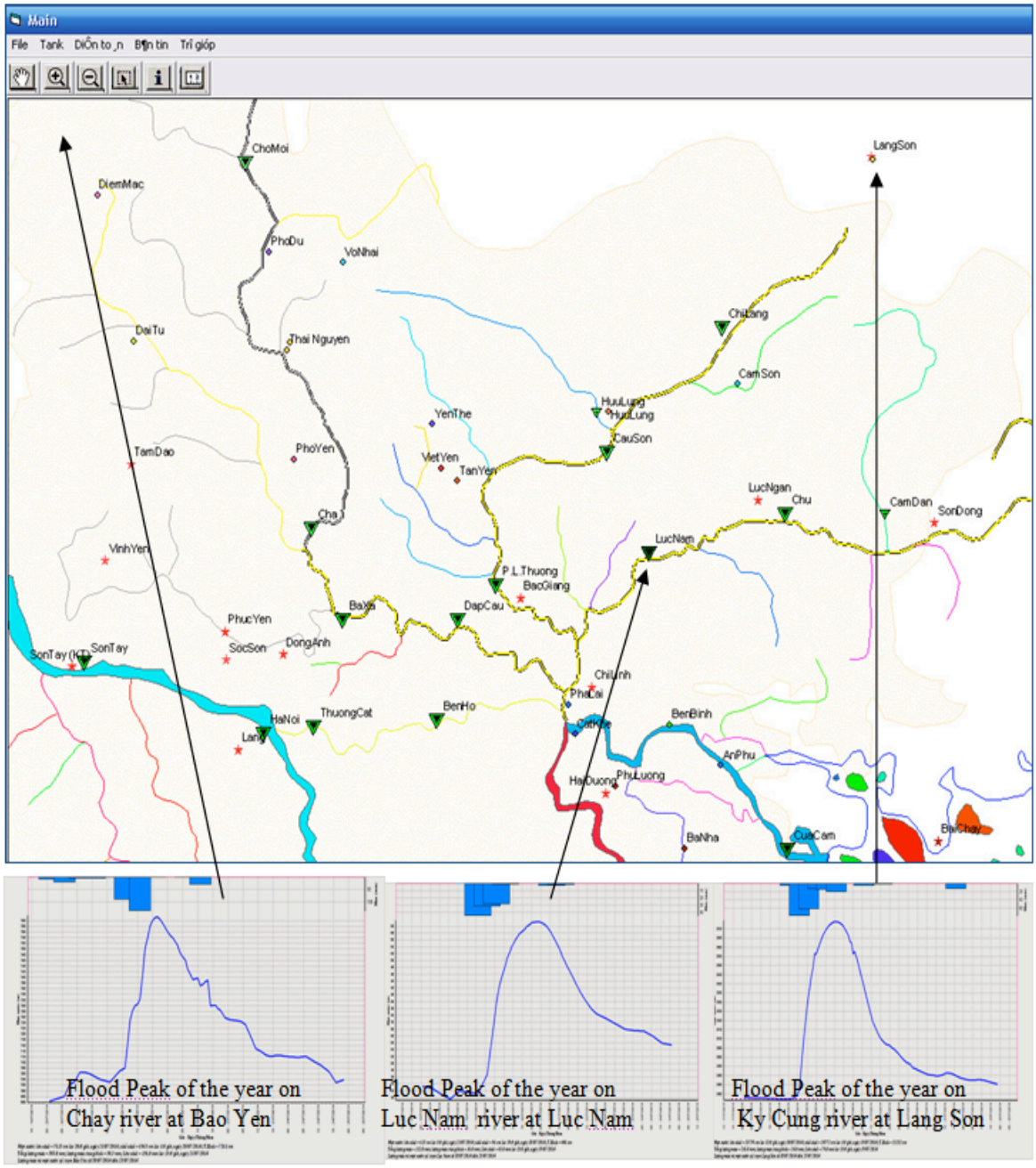

Figure 3: Flood peaks of the year on rivers: Chay at Bao Yen, Ky Cung river at Lang Son and Luc Nam river at Luc Nam

Table 1 and 2 summerized information of flood characteristics in the Red and Thai Binh river system during the end of July and the first half of August when the appearance time of 2 those TSs. Figure 3 shows the flood peaks of the year on the main rivers Cau, Thuong and Luc Nam belong Thai Binh river system as a result of TS No.3 affect.

Table 1. The charateristics of flood events for main stations in the Red-Thai Binh rivers system when TS No.2 landfall.

No	Station	River	Peak of flood event(m)	Appearance time of flood peak	Flood Amplitude (m)	Alarm Level (m)
1	Lang Son	Ky Cung	257.39	12a.m. 20 Jul 2014	9.67	> AL3: 0.89m
2	Bao Yen	Chay	76.13	20p.m. 21 Jul 2014	5.80	> AL3: 1.13m
3	Luc Nam	Luc Nam	6.13	3a.m. 21 Jul 2014	5.013	< AL.3: 0.17m
4	Tuyen Quang	Lo	23.36	7a.m. 22 Jul 2014	5.49	< AL.2: 0.64m
5	Yen Bai	Thao	31.80	21 p.m. 22 Jul 2014	3.81	>AL.2: 0.80m

Table 2. The charateristics of flood events for main stations in the Red-Thai Binh rivers system when TS No.3 landfall.

No	Station	River	Peak of flood event(m)	Appearance time of flood peak	Flood Amplitude (m)	Alarm Level (m)
1	Lang Son	Ky Cung	256.33	1a.m. 18 Sep 2014	8.62	<AL.3 0.67m
2	Bao Yen	Chay	75.52	17 p.m. 18 Sep 2014	7.62	> AL3: 0.52m
3	Luc Nam	Luc Nam	5.64	4 a.m. 18 Sep 2014	4.46	> AL.2: 0.34m
4	Ha Giang	Lo	103.46	16 p.m. 18 Sep 2014	8.73	> AL3: 0.46m
5	Thai Nguyen	Cau	26.40	16 p.m. 18 Sep 2014	5.07	< AL.3: 0.60m

The inflows to big reservoirs in Da, Gam rivers sharply increased at the end of July, table 3 presents rapidly rising of inflows to Son La and Tuyen Quang reservoirs in the Da and Gam rivers.

Table 3. The quick increasing of reservoir inflow in the Da and Lo river

No	Reservoir	River	Beginning of flood event		Peak of flood event		Flood Amplitude
			Time	Q (m^3/s)	Time	Q (m^3/s)	(m^3/s)
1	Son La	Da	7a.m., 20 Jul 2014	2450	2 a.m, 21 Jul 2014	13400	**10950**
2	Tuyen Quang	Gam	22 p.m., 19 Jul 2014	500	9a.m., 20 Jul 2014	3100	**2600**

2.2. Flood situations by Tropical cyclone in the Central and Highland area

From the beginning of the year to the mid of October, there is no severe floods on rivers along of those areas is observed.

3. Socio-Economic Assessment

3.1. Damage Situation in 2013

From the begining of this year until now, there had been 264 dead and missing people; 800 injured ones; 11,851 collapesed and drifted houses, 706,786 houses were flooded, damaged and unroofed, 122,449 hectares of rice were damaged; 206,172 ha of crops were damaged; 86,491 ha of industrial crops and fruit fields were damaged; 105,058 ha of aquatic products lost; 17,379 million m3 of soil, stone and roads tumbled down. Estimated total value of material damage was about 25,021 billion (in the storm number 15, the damage statistic only synthesized dead or missing people, the other types of damages are being intergrated by other localities and will be reported later) (detailed appendices are attached).

3.2. Damage Situation in 2012

In year 2012, there were 10 hurricanes and 02 tropical depression operating in the South China Sea; there were 11 earthquakes of magnitude 3.3 to 4.7 degrees and there were several thunderstorms and tornadoes with hails. These natural calamities have created 258 dead and missing people, 408 injured ones, 6,292 collapesed and drifted houses; 101,756 houses were flooded, damaged and unroofed, 408 383 hectares of rice crops were damaged; 3240,069 m3 of of soil, stone and roads tumbled down Estimated total value of material damage was about

16,000 billion (Prime Minister had decided to support the local areas, departments and ministries affected by natural calamities to hunger relief and overcome consequences with a total amount of: 1445.8 billion VND and 6,500 tons of rice).

3.3. Damage Situation in 2011

In year 2011, there were 7 hurricanes and 07 tropical depression operating in the South China Sea, more rains, floods in the central region , the Central Highlands and the Mekong Delta, there are over 70 thunderstorms, tornadoes associated with hail in many provinces in the country. Also there were some earthquakes in Cao Bang province, Son La province.... but with lower intensity, they did not create much damage. These natural calamities have created 295 dead and missing people, 274 injured ones, 2170 collapesed and drifted houses; 447,694 houses were flooded, damaged and unroofed, 350,367 hectares of rice crops were damaged; 9689.559 m3 of of soil, stone and roads tumbled down Estimated total value of material damage was about 12703 billion (Prime Minister had decided to support the local areas, departments and ministries affected by natural calamities to hunger relief and overcome consequences with a total amount of: 1922 billion VND and 11600 tons of rice).

II. Summary of progress in Key Result Areas

Title of item: Progress in interpreting Regional Forecasting Support Center - Ha Noi in SWFDP of WMO at South-East Asia

Main text:

The SWFDP-SeA webpage is developed and taken into operationally since June 2012 under the link of http://www.swfdp-sea.com.vn (username: swfdp-sea and password: RA2 - in case sensitive) for NHMSs of Lao PDR, Combodia, Thailand to access and use available products (see Fig. 1 and 2). At present, the following products are operationally provided through the SWFDP-SeA portal:

- Short range (1-2 days) and Medium range (3-5 days) Guidance products: the guidance is made by forecasters of NHMS of Vietnam and operationally issued at 00UTC. The guidance includes warning maps related to severe weather such as heavy rainfall, strong wind for responsible areas and categorical warning table for all given locations of relevant countries.

- MTSAT-2's IR1 and VIS products: horizontal resolution of 5km x 5km, 48 pictures per day, update every 30 minutes

- Global Satellite Mapping of Precipitation (GSMAP) is global rainfall estimates by the retrieval algorithm for brightness temperatures from satellite-born microwave radiometers.

The horizontal resolution is 0.25 x 0.25 deg, 24 pictures per day, update every 1 hour. The delayed time is about 4 hours

- Storm tracks: this product is developed by NHMS of Vietnam in order to issue warning the direction and speed of the movements of deep convective systems of up to 3 hours. The algorithms are based on 3 steps: motion vector fields are derived two successive images using multi-scale variational method; deep convective clouds are simply recognized by multi-threshold method from MTSAT-2 data (infrared channels); and convective systems are separated by deep first searching (DFS) algorithm

- ASCAT: this product provides a measure of wind speed and direction near the sea surface. The measurements are obtained through the processing of scatterometer data originating from the ASCAT instrument on EUMETSAT's Metop-A satellite.

- Global deterministic NWP products from GSM model of JMA, GFS of NCEP and NOGAPS of US Navy, GEM of CMC and GME of DWD. The products of GSM, GFS and NOGAPS has resolution of 0.5 x 0.5 deg. Meanwhile, GEM and GME products have respectively resolution of 0.6 x 0.6 deg and 0.3 x 0.3 deg. All of global model products is updated every 6 hours at 00UTC, 06UTC, 12UTC and 18UTC. The available surface forecasting products include charts for precipitation, pressure of mean sea level, temperature at 2 meters, wind at 10 meters, 1000-500mb thickness. For upper levels (850, 700, 500 and 300mb), the forecasting charts of wind and geo-potential height, relative humidity, relative vorticity and vertical velocity is also provided.

- Global Ensemble Prediction Products based on 21 ensemble members of GFS ensemble system (NAEPS) for forecasting 5-10 day ahead: these products have resolution of 1.0 x 1.0 deg and are updated every 12 hours at 00UTC and 12UTC. The available EPS products include charts for ensemble mean (i.e. pressure of mean sea level, wind and geo-potential height at 850mb and temperature at 850mb), stamp map of 24-hours accumulated precipitation, and probabilistic maps (i.e. 24-hours precipitation quartile, 24-hours precipitation probability, 24-hours maximum wind-gust probability, 24-hours maximum CAPE probability, etc). In addition, the EPS-diagram for the 22 locations of Cambodia, 17 locations of Lao PDR and 16 locations of Thailand are also provided.

- Regional Ensemble Prediction Products based on two operational EPS of NHMS of Vietnam, namely is SREPS and LEPS. The SREPS (Short Range Ensemble Prediction System) is multi-model multi analysis EPS in which running HRM (High resolution Regional Model of DWD) and WRF (with two dynamic cores ARW and NMM) with initial and boundary conditions separately from 5 global models including GSM, GEM, GFS, GEM and NOGAPS. The SREPS has 15 members with resolution of 0.15 x 0.15 deg and is updated every 6 hours at 00UTC, 06UTC, 12UTC and 18UTC. The main aim of SREPS is in order to provide ensemble products for forecasting 1-3 days ahead. The LEPS is developed to provide ensemble products from 3 to 5 days ahead by running HRM model with initial and boundary conditions separately from 21 members of global EPS of GFS

model. The LEPS has 15 members with resolution of 0.2 x 0.2 deg and is updated every 12 hours at 00UTC, and 12UTC. All available ensemble mean and probabilistic products of SREPS and LEPS is the same as with NAEFS.

Identified opportunities/challenges, if any, for further development or collaboration:

The SWFDP-SeA webpage is taken into operationally since June 2012 and the forecasters of NHMS's Lao PDR, Combodia, Thailand, Philippines can access and use available products as above mentioned. Recently, NHMS's of Philippines and Myanmar are interested in the SWFDP-SeA webpage and asked NHMS's Vietnam to expand responsible areas of specific products to cover these countries. In order to ensure all functions of WMO's RFSC and improve predictability of severe weather phenomena for South-East Asia in SWFDP project, the key task in 2014 will be more paid attention to:

- Provide forecast product of the motion of observed precipitation areas up to 3 hours ahead (1 hour cycle) using Semi-Lagrangian advection scheme in combination with satellite data

- Provide tropical cyclone track and intensity forecasting products based on RSMCs and NWP models

- Provide verification products for guidance and near real-time NWP verification products

- Provide weather forecasting charts from regional non-hydrostatic model with 2-5km resolution to increase predictability of severe weather phenomena

- Add "Forecast Forum" tool in SWFDP-SeA website in order to NHMS's forecaster can discuss and share information

Summary Table of relevant KRAs and components:

KRA =	1	2	3	4	5	6	7
Meteorology	☒	☒	☐	☒	☒	☒	☒
Hydrology	☒	☒	☐	☒	☒	☒	☒
DRR	☒	☒	☐	☒	☒	☒	☒
Training and research	☒	☒	☐	☒	☐	☐	☐
Resource mobilization or regional collaboration	☐	☐	☐	☐	☐	☐	☐

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